Temporal Acuity's Music Printer Plus, Steinberg/Jones' Cubase and Five More Reviews

Electronic Musician

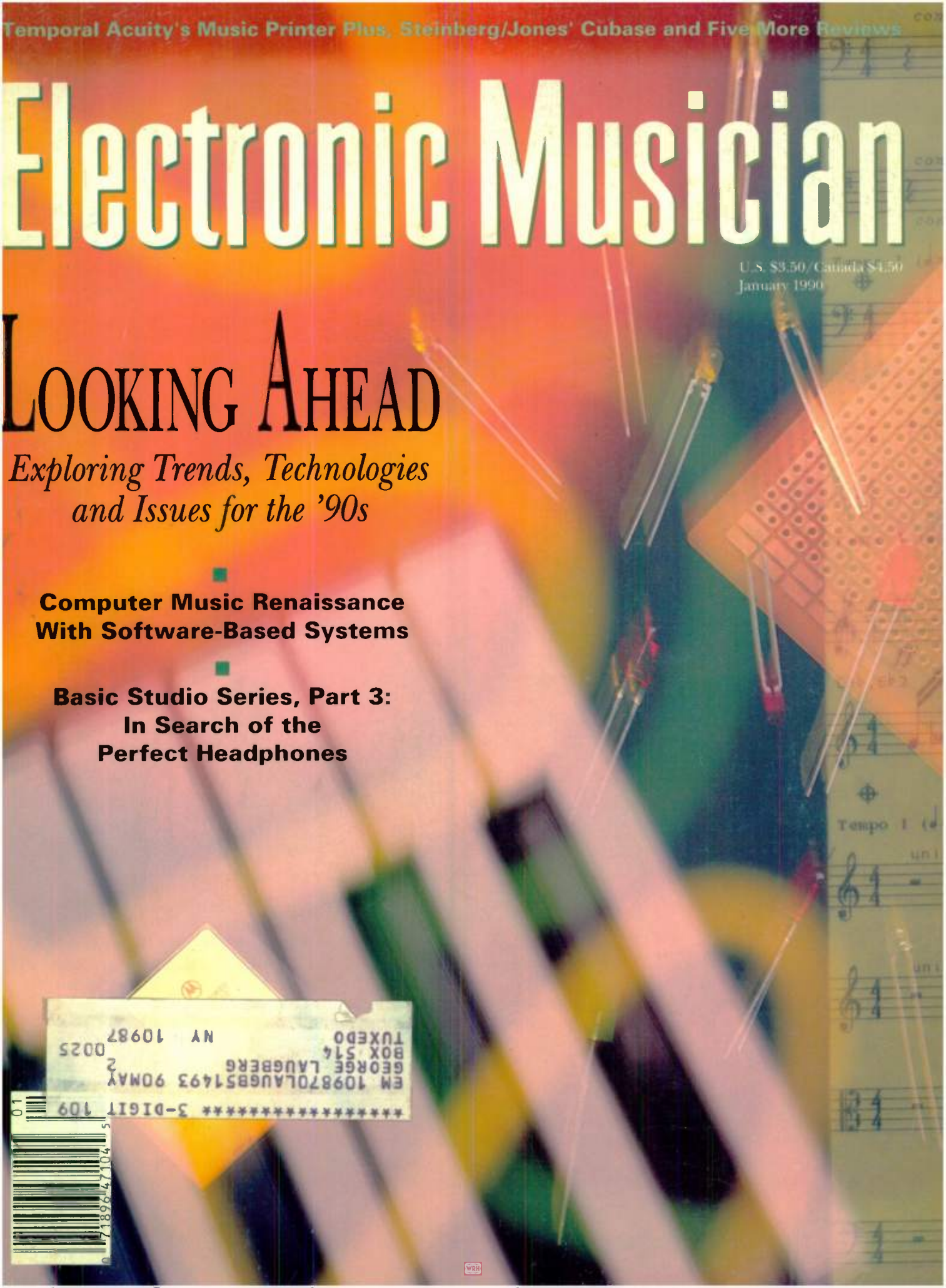
U.S. $3.50/Canada $4.50
January 1990

Looking Ahead

Exploring Trends, Technologies and Issues for the '90s

Computer Music Renaissance With Software-Based Systems

Basic Studio Series, Part 3: In Search of the Perfect Headphones



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Introducing the music production studio without walls.

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Electronic Musician

AN ACT III PUBLICATION
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Cover: Photograph by Elizabet Zeilon. Motorola 56000 IC courtesy of Digidesign.

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Personal Vision

Ideas, by their very nature, are forward-looking concepts. To dream up an idea is to create a goal you wish to achieve or make concrete, be it a musical, work-related, philosophical, practical, or general artistic one. Ideas point us toward the actions and thoughts that will occupy our minds and bodies for the future.

In **EM**'s forward-looking first issue of a new decade and in this, my first column, it seems particularly appropriate to focus on ideas and how they relate to our personal futures. I'm specifically interested in those that make us individuals, that define us, and about which we feel passionate.

For lack of a better phrase, I'm calling the combination of these ideas a personal vision: vision, because they represent our outlook and our plans for the future, and personal, because they are distinctly our own. Certainly, you can (and probably do) "borrow" ideas from a variety of sources, but ultimately, the ideas that shape who you are and what you do can only be self-generated.

As easy as it is for me to write about it, however, actually fulfilling a personal vision is not a simple task, particularly when it comes to an original artistic vision. Strong economic, societal, and other forces often require that you write music or create art for the marketplace, a marketplace that may not initially understand or care for the type of ideas you have brought to life. I don't profess to have any unique insights into this dilemma, but I do have a few simple words of encouragement.

If you have a strong inclination or idea, trust your gut, follow it, and develop it. I mean it. And don't stop part way; have confidence in your ideas and take them to the logical conclusions to which you feel they need to be brought. The only way you're ever going to achieve any kind of artistic fulfillment is by reaching into yourself, discovering (or at least trying to figure out) what it is you want to express, and determining how you can best express those ideas. This doesn't mean you have to write weird, avant-garde music; you just need to be honest with yourself. If you really feel the desire to write and/or play pop, do it; but make it your own. On the other hand, if you do occasionally think about taking musical chances, then by all means take them. Explore the opportunities all your gear presents you with.

Applying these thoughts to my life, one of my most passionate visions has to do with the direction of this magazine. **EM** has come a long way in its short existence, but Craig and I believe much more can be achieved, shared, and explored. In a similar way, as the types of tasks performed by electronic musicians continue to expand, so we need to expand our coverage into new territories, take on more of a leadership role, and chart a path into the future. This doesn't mean the magazine's focus will be changing, but it does mean we may be taking a few more chances and trying out some new ideas. Sure, we'll trip and fall a few times (and let us know if we do, by the way, in case we don't notice ourselves), but we need to grow as your informational needs grow.

With this issue, we're moving in that direction. We're offering a look at how electronic music industry visionaries see the future they are in the midst of formulating, discussions with musicians who are following their artistic visions and using non-traditional methods to create music, and a brief look at another non-traditional but familiar type of composition, computer music. These are logical extensions of the **EM** tradition, and we think you'll find these articles interesting and enjoyable.

The ultimate goal in all our efforts is, of course, to achieve some sort of personal satisfaction or pride, knowing that we have been true to our personal vision. At this point, the rewards have been outlined, but the challenge remains.

Welcome to the new decade.

Bob O'Donnell

Electronic Musician

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BPA

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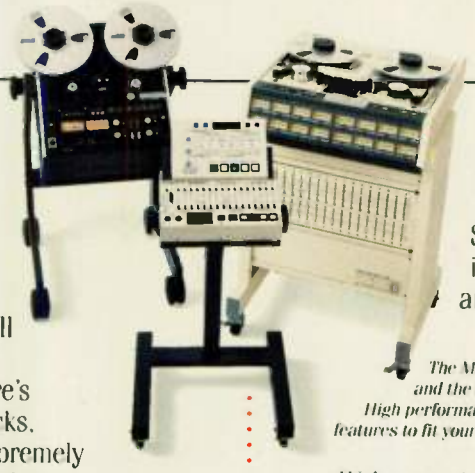
The MX-80, (and its little brother, the one-inch, 16-track MX-70) share a constant-tension, servo-controlled transport, plus the Otari 37-pin standard parallel interface for SMPTE synchronizers, editors, and controllers.



The MX-70 multitrack and the MX-55N 2-track. High performance and enhanced features to fit your creative energies.

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Call us at (415) 341-5900 for complete information on any one, or all. Better yet, call your nearest Otari dealer for a demo!

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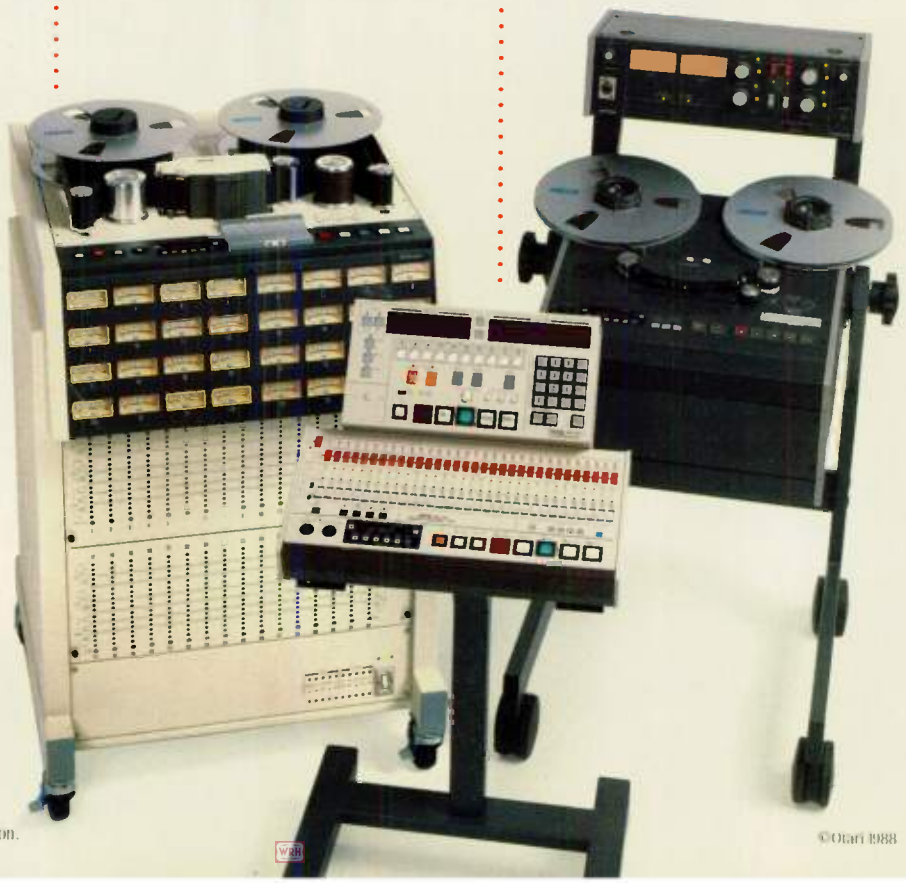

Otari's MX-80 multitrack and the new MX-55NM 2-track. Alone or together, the ultimate choice for your personal studio.

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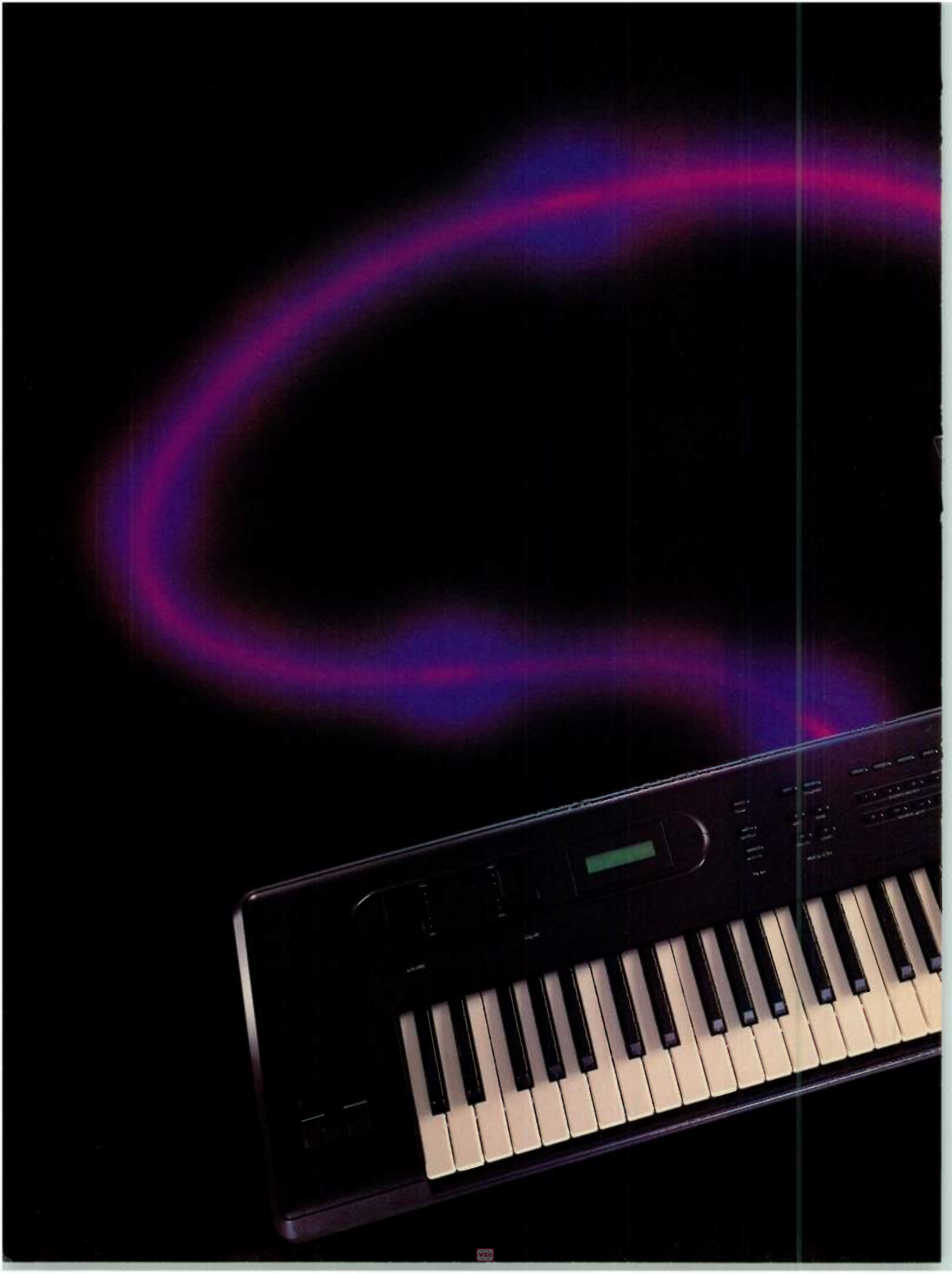

POWER STATION

Sometimes, the whole is greater than the sum of the parts. Consider the K4 and Q80. When combined, they offer not only more power and performance than any stand-alone workstation, but at a price substantially less than most.

We call it a Power Station – two products uniquely designed to work together as a complete production system. This combination offers today's hottest synthesizer sounds – Acoustic Sampled, Digital and Analog – under the control of an incredibly sophisticated sequencer. Just compare the specs below to any workstation.

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Imagine all this power for a total price of only $2240.00 Or, you can build a system your own way at $795.00 for the Q80, and $1445.00 for the K4.

Now that you know the facts, we're sure you'll agree that knowledge is power.

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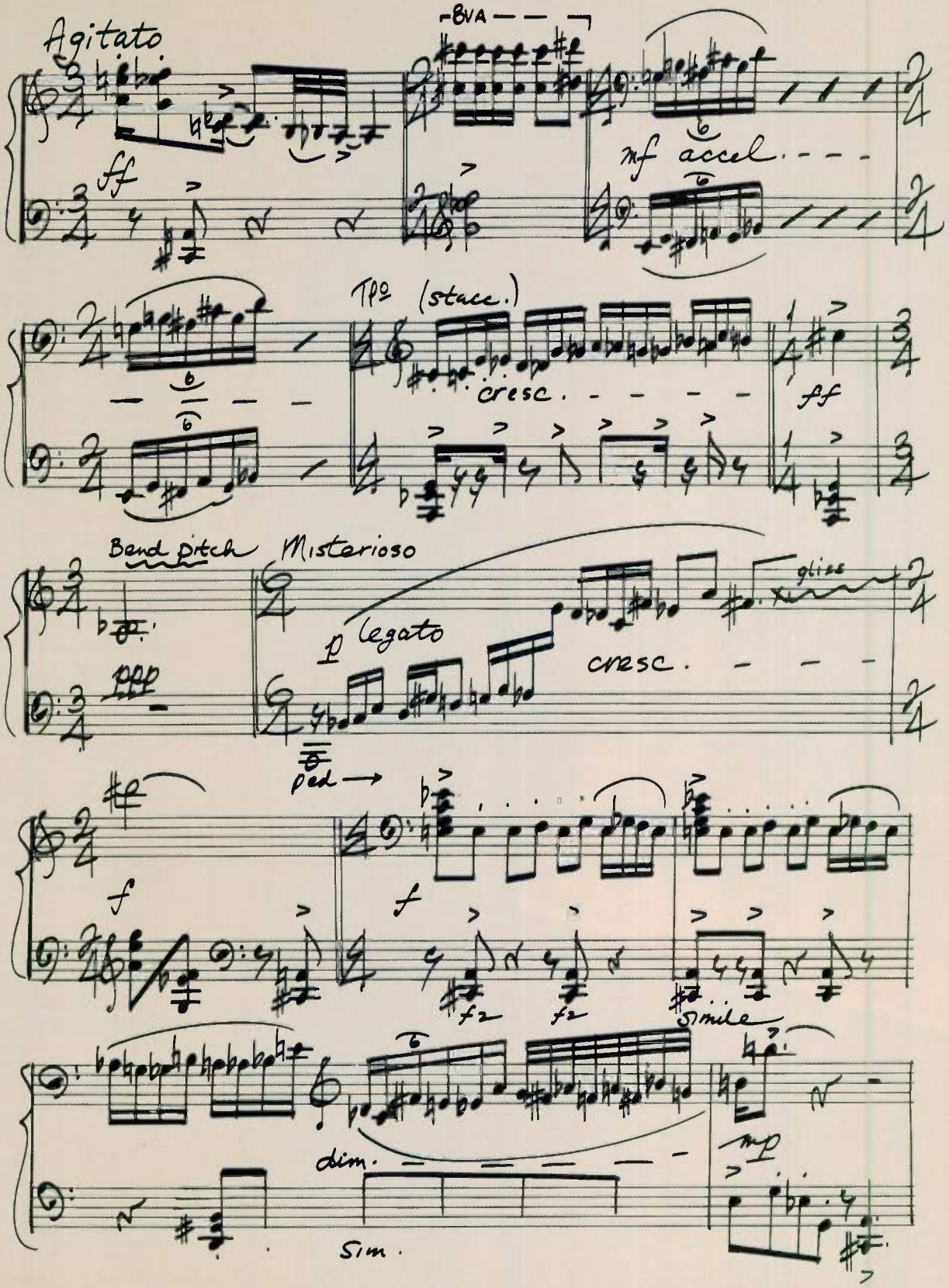
Ingenious!

See the K4/Q80 Power Station at a dealer near you. For more information write or call: Kawai Digital Products Group, 2055 E. University Drive, Compton, CA 90224 (213) 631-1771. Kawai Canada Music Ltd. 6400 Shawson Dr., Unit #1, Mississauga, Ontario, Canada L5T1L8. Prices shown are US suggested retail.

The better you read this page, the more you'll appreciate our new keyboard.

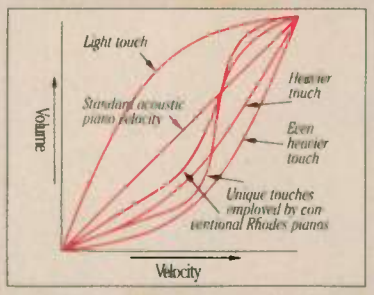


Ditto.

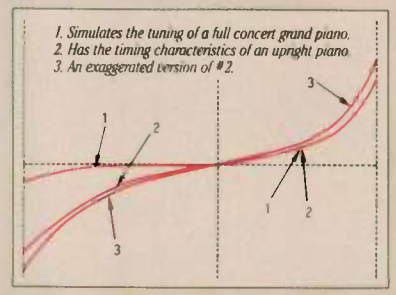
If you want to read the other side first, go right ahead. You're exactly the kind of person we're looking for, so we're more than happy to wait for you.

Now that you're back, get ready to find out all about the new Rhodes MK-80. Or as we like to think of it, your next keyboard.

What makes us so confident that you're going to want this keyboard? Two things, really. The fact that our ingenious stretch tuning method accurately duplicates the inharmonicity of an acoustical piano. And the equally remarkable fact that our Advanced Structured Adaptive synthesis actually allows you to modify the harmonic content of your sounds.



It's one thing for a keyboard to have a nice feel. It's quite another for a keyboard to have six, all of which can be stored as parameters in the user memory.



These are the stretched tuning curves that give the new Rhodes its unique sound. If you want to find out how they work, read the ad.

Either one of those is quite a technological breakthrough. Together, they're only slightly less impressive than cold-fusion.

The MK-80 comes standard with perfected digital versions of the sounds Harold Rhodes himself pursued as "ideal": The classic tone, with its thick sustain and sharp attack; a modified sound with a higher harmonic content; a blended sound that's a combination of the first two; and a contemporary sound with bell-like qualities of synthesizer-based Rhodes sounds. Add to those four other extraordinary sounds — concert grand piano, electric grand piano, clavi, and vibraphone — and you've got an instrument that's ideal for performing.

As extraordinary as these sounds are, however, you may only want to use them as starting points. Which is fine. The MK-80 is equipped with chorus, phaser, and tremolo, as well as a three-band equalizer with parametric mid-range for advanced tonal adjustments. You can even edit the harmonics of the tones using a Macro Edit function on the ASA Operator level. And an Auto-Bend parameter allows you to apply a velocity-sensitive pitch envelope to your sounds.

What this means is that you can create all the legendary Rhodes sounds of the past 20 years, as well as new sounds you never imagined possible.

Then, once you've sculpted the sound you want, you can save it, along with 55 of its comrades, in the user memory. With variations on everything from Macro Edit, parameter settings and effects on/off switching to MIDI messages.

As if that weren't enough, the MK-80 is also a formidable MIDI controller.

There's plenty more. For example, we didn't even begin to tell you about the smaller, yet equally impressive, MK-60. (Just to whet your appetite: We packed many of the same features into a 64-note keyboard that uses an octave shift to play the complete 88-note range.)

But since you've read this far, it's fair to assume that you're interested in seeing the new Rhodes firsthand. In fact, you're no doubt already wondering who in their right mind is going to take your old keyboard off your hands.

Probably someone who wasn't lucky enough to read this ad.

Or good enough.

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As promised in last month's "Letters" column, the entire staff now lends their expertise in answering your questions.

DINOSAURS REVISITED

In your articles, "New Life for Old Gear: the MIDI Retrofit Story" and "Resurrecting the Dinosaur" (September 1989 issue), you neglected to mention the Clarity XLV in your discussion of MIDI-to-control voltage converters. The XLV is the only MIDI-to-CV converter oriented toward control data. It allows you to route any MIDI controller number to any of eight CV outputs and scale the control data to ±100% to give it log and antilog curves, turn control or switch information into triggers, and derive a full 0-127 control output from a 5-octave keyboard. The XLV, which also is used to automate the Lexicon 224XL, 480L, and AMS RMX 16, is not oriented toward notes and has no polyphony algorithms. Perhaps the author only thinks of MIDI as key numbers, a limited concept.

Also, to omit the Buchla 100, 200, and 400 series synthesizers, which were creative, ground-breaking musical instruments, was an unfortunate oversight. Synthesizers of the same age were prominently mentioned. Interesting control concepts and signal processing were the Buchla hallmarks. These are the elements we now need most, as the newer instruments have pitch accuracy covered but have sorely neglected other areas of musical control.

Gregory Kramer
Clarity
New York

SOFTWARE RIGHTS

I have a question regarding the software published in **EM**. Do you allow programs to be copied and circulated in the public domain or do you restrict the use of the software to purchasers of your magazine?

Garry Jones
California

Garry—Programs published in **EM** *are copyrighted and are the property of the authors. We have permission to publish them, and their use is restricted to our readers. Anyone interested in using the programs can purchase back issues of* **EM** *from the Mix Bookshelf or our circulation department; see the FYI page for details. Some authors sell copies of their programs to our readers; this is generally noted in the article.—Steve O.*

BEGINNERS BLUES

Help! Would someone please come up with an explanation of the terms used in your magazine. Toward the end of 1988, I subscribed to **EM** because I am an engineer, mathematician, metaphysician, and amateur musician and wanted to get into computer-generated music. Can you recommend articles that explain MIDI and the **EM** lingo? Also, when you refer to a piece of equipment, you might, for my sake, mention what it does. Why not produce a dictionary or thesaurus?

J. Packard Laird
Delaware

Packard—The first places you can go are the "For The Beginner" sidebars that accompany many articles in your **EM** *collection. These mini-articles both define terms and discuss the basic concepts you seek. Next, in our April '89 issue, David Doty looked at four electronic music and audio dictionaries that give the types of definitions you want.—Steve O.*

CIVIC RESPONSIBILITIES

Craig, thanks for saying something about the environmental consequences of the "sea of packaging." Perhaps thinking about the dependency of our music "biz" on timber and petroleum products in large quantities is something most of us would rather avoid. But we can't, any more than other citizens can, and we *shouldn't*. Your October "Back Page" is a memorial to Mandrake *(Craig's activist band in the 1960's—SO)*; let's hope it's not one for our planet.

Hal L. Dean
Pennsylvania

DX 900 MODIFICATION

Based on the articles I have seen in **EM** about the Toshiba DX 900, I know there are owners that share my joys and frustration with this unit, the most frustrating being the inability to access all five audio tracks at once (i.e., the PCM, Hi-fi, and linear tracks). Necessity became the mother of modification; with help from my engineer friend Mark, we modified a DX 900 [to solve the problem]. The output of the linear track need not be mixed with the Hi-fi output unless you choose it to be that way with the Audio Select button. The mod provides separate audio out and in, not affected by the Audio Select button.

continued on page 115

DAVID POVILAITIS

What's New from the 87th AES Convention

The mood was good, the gear plentiful, as members of the Audio Engineering Society rolled out the carpets for their biannual convention.

By Bob O'Donnell and Steve Oppenheimer

Yamaha SY77 Digital Synthesizer

Amid the cold and rain of an East Coast fall, the Audio Engineering Society Convention was held from October 18 to 21 in New York City. Other than distressing reports of numerous manufacturers having significant amounts of equipment stolen from exhibits, and news about the San Francisco Bay Area earthquake, this year's convention seemed quite successful, with good attendance and several interesting new products. As expected, there were more hard disk recorders, expensive mixing consoles, automation systems, and other recording-related developments, but more importantly, there were things of interest to those with moderate incomes. What follows won't be a complete list of what we saw, but a quick peek at some of the most exciting developments. Be aware that the prices, features, availability, and existence of these products are subject to change.

Probably the most exciting development in synthesizers was the introduction of Yamaha's new **SY77** synth ($2,995; tel. [714] 522-9011). After a false start with the ill-fated V80FD, the SY77 digital synthesizer may bring Yamaha back into the running. The instrument combines an advanced form of 6-operator FM synthesis (AFM) with an enhanced 16-bit PCM sample technology (Advanced Wave Memory, or AWM 2) in a new form of synthesis, Realtime Convolution & Modulation, or RCM (for those who love abbreviations). Rather than simply combine preset samples with FM, RCM allows the use of samples as FM operators. Additional sampled waveforms may be added via ROM card, but there is no provision for user sampling. The SY77 features 32 dynamically allocated voices, sixteen for the AFM section and sixteen for the AWM 2 section. The AFM section offers 45 6-operator algorithms, with each operator capable of producing one of sixteen different waveforms. The SY77 also includes a 16-track sequencer, a built-in disk drive, four effects processors, and four individual outputs.

The most interesting synthesizer development was the first full demo of the long-awaited Technos **Acxel Resynthesizer** ($9,995 for a basic system; tel. [418] 835-1416). The instrument consists of the Solitary, a stand-alone black cube that houses a disk drive and the voice cards, and the innovative Grapher, the brilliantly conceived interface for the unit. Basically, a resynthesizer samples a sound and converts it into a series of sine wave oscillators in additive synthesis format, which involves an enormous amount of data. Rather than overwhelm you with numbers, however, the Grapher presents this information in a series of graphic displays of harmonic spectra, amplitude spectra, and pitch and amplitude envelopes. To make adjustments, you simply move your fingers over the touch-sensitive surface, and instantly the shapes are redrawn and the sound adjusted. It's tremendously intuitive, tremendously fast, and at this moment, tremendously expensive. Nevertheless, the instrument sounds quite good and, even more importantly, unique, so look for more about it in upcoming issues.

At one-tenth the Acxel's price, Roland unveiled the very clean-sounding **U-220** ($995; tel. [213] 685-5141), a nicely souped-up version of the U-110 32-voice sample player, at a price that competes directly with E-mu's Proteus. In a somewhat similar price range is Akai's new **XR10** 16-bit drum machine ($699; tel. [817] 336-5114). It features 65 ROM-based, PCM-sampled drum and percussion sounds; two outputs and one effects send; 50 basic ROM-based patterns with variations; and 99 user patterns. Sounds

Akai XR10 Drum Machine

Now hear this.

Digidesign's Sound Tools™ is the most widely installed Digital Recording and Editing System in use today. Here are a few reasons why.

Sound Tools is certainly representative of the breakthroughs in power, user-friendliness, and price that will hopefully become the accepted standards for the electronic musical instruments of the future. The real-time DSP capabilities provided by the Sound Accelerator card are – in a word – astounding, the sonic clarity of the system is as good as 16-bit linear gets, the waveform editing utilities are as sophisticated as they are functional, and we have yet to see a user interface that is more logical, more clear, or easier to understand and use than the one found in Sound Tools.

Michael Marans, *Keyboard Magazine*

Without a doubt, Sound Tools is brilliant. It makes great use of the Macintosh, both its interface and its computing power, to provide a system that is easy to use, eminently practical in a wide variety of situations, and sounds terrific.

Paul Lehrman, *Electronic Musician*

From pre-production to final CD mastering, Digidesign has created the most powerful production tool I've used. Sound Tools has altered my whole approach to digital recording.

James Guthrie, Film Composer and Producer

When we put together the *Solo Piano* (CBS) project, Sound Tools really expanded our options. We were able to assemble the best selections from each performance seamlessly. Acoustic piano is a real challenge for *any* digital recording system – Sound Tools performed faultlessly.

Phillip Glass, Composer

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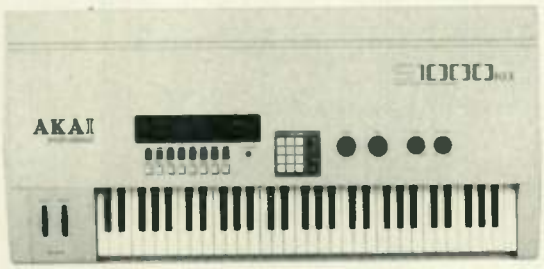
are played via fifteen pads, with two accent levels per pad. User-programmable parameters include pan, send level, sweep (depth, decay, and polarity), tuning (coarse and fine), decay, hold, and reverse. Akai also introduced the **S1000KB** ($6,699), a keyboard version of its S1000 16-bit, stereo sampler.

In the area of hard disk recording, the most popular new development at the show was the introduction of the Symetrix **DPR-100** (price to be announced; tel. [206] 282-2555). The system is a Mac II-controlled digital processor/recorder that offers 40 channels of 16-bit, hard disk recording at 32, 44.1/44.056, or 48 kHz; real-time level control; EQ; compression; limiting; gating; complete automation; and dynamic recall of all system parameters. All record and edit events are locked to SMPTE/EBU time code, VITC, house sync, and/or external word clock. Nondestructive, random-access editing is accurate to a digital sample, with user-selectable crossfade and ramp-in/out profiles. It will be expensive, but very nice.

Another intriguing recording product is Akai's **DD1000** ($13,000), a stereo digital recorder that utilizes a Sony rewritable 650 MB optical disk. Features include 44.1 and 48 kHz sampling rates; dual, stereo, simultaneous playback (which is not possible with R-DAT); a SCSI connector that allows the exchange of data between up to four DD1000s; random-access replay of samples, referenced to a SMPTE cue list constructed in the DD1000; and *lots* of I/O connections, including MIDI, SMPTE, digital, analog, fiber optic, ans RS422. A DL1000 remote control unit includes SMPTE time code generation and SCSI.



Akai S1000KB Sampling Keyboard

Yamaha also upped the ante in the area of digital multitrack tape recorders, with the introduction of the very cool **DMR8X** (under $40,000, including eight mic preamps and eight outboard, 19-bit, A/D and D/A converters). The small unit (some people humorously referred to it as the ultimate portable studio) combines an 8-track digital recorder (using stationary-head, thin-film technology) with a completely automated 24-input, digital mixer that includes programmable EQ and up to seven built-in effects per channel (not unlike three DMP7Ds—on steroids—in a box). The automation computer storage is onboard, and the mix data is stored at the head of your tape. The unit chase-locks to another DMR or DRU8X, accurate to the sample, without an outside synchronizer, or chase-locks to time code with an outside synchronizer. Unfortunately, the tape format is a proprietary one that's based on 8mm videotapes, but Yamaha vowed that the tapes, which record up to twenty minutes of 20-bit, 8-track digital audio, will be readily available. The **DRU8X**, a rack-mount version of the recorder alone, has an estimated price of $18,000.

In the arena of signal processing, a new company called Zoom (tel. [415] 593-1664)—started by former Korg engineers—drew a great deal of attention, even though their products didn't make any noise at the time of the show. The **Zoom 9010** ($1,495) is a 16-bit multi-effects unit with four discrete inputs, allowing you to process up to four different instruments or tape tracks simultaneously, each with its own set of multi-effects. Though they're not the first company to offer such a product (Peavey had the Multifex), it's an encouraging sign of a new trend. The company also showed a prototype of the **9002** ($395), a handheld or belt-worn 16-bit guitar multi-effects processor with compression, EQ, digital chorus, reverb, analog distortion, and a built-in tuner and metronome. If it sounds as good as it looks, this could be really great.

Finally, for those of you looking for lots of inputs, Tascam showed the **M3500** ($8,499; tel. [213] 726-0303), a 32-input board with a slew of cool features, including separate faders for tape monitoring or 32 extra inputs at mixdown, and six auxiliary sends. (The 24-input version lists for $7,499.) The company designed it for use with its TSR-24 1-inch, 24-track recorder, but any studio looking for a relatively inexpensive board with lots of inputs should take notice.


Yamaha's **DMR8X Digital Mixing Recorder**

Of course, there was lots more at AES. Euphonix is now shipping the **Crescendo** ($68,500; tel. [415] 325-5003), a compact, digitally controlled system consisting of a console-like controller that remotely operates a rack of analog electronics, and Beyer Dynamic showed four **TG-X** series high-performance, high-fidelity, handheld microphones that use enhanced field magnets for high output ($159-$349; tel. [516] 935-8000).

REV UP

Repertoire (tel. [408] 476-1753) announced *Music Publisher Version 2.5* ($495; upgrades $15). New features include real-time entry, MIDI time dilation (reading of tempo markings), and enhanced speed and ImageWriter output...Coda (tel. [612] 854-1288) released *Finale V. 2.0* for the Macintosh ($749; upgrades $75 for registered users). Enhancements include the replacement of many dialog boxes with menu-driven options and commands; four new volumes of documentation; and two disks containing libraries, tutorial examples, templates, and a revised Petrucci font that supports high-resolution ImageWriter output...Syntaur Productions (tel. [818] 769-4395) now offers its *Soundset 1 and 2* patch collections for the Ensoniq ESQ-1 and SQ-80 on SQ-80 disks and EEPROM cartridges, in addition to the previously available data cassettes and Mirage disks. ■

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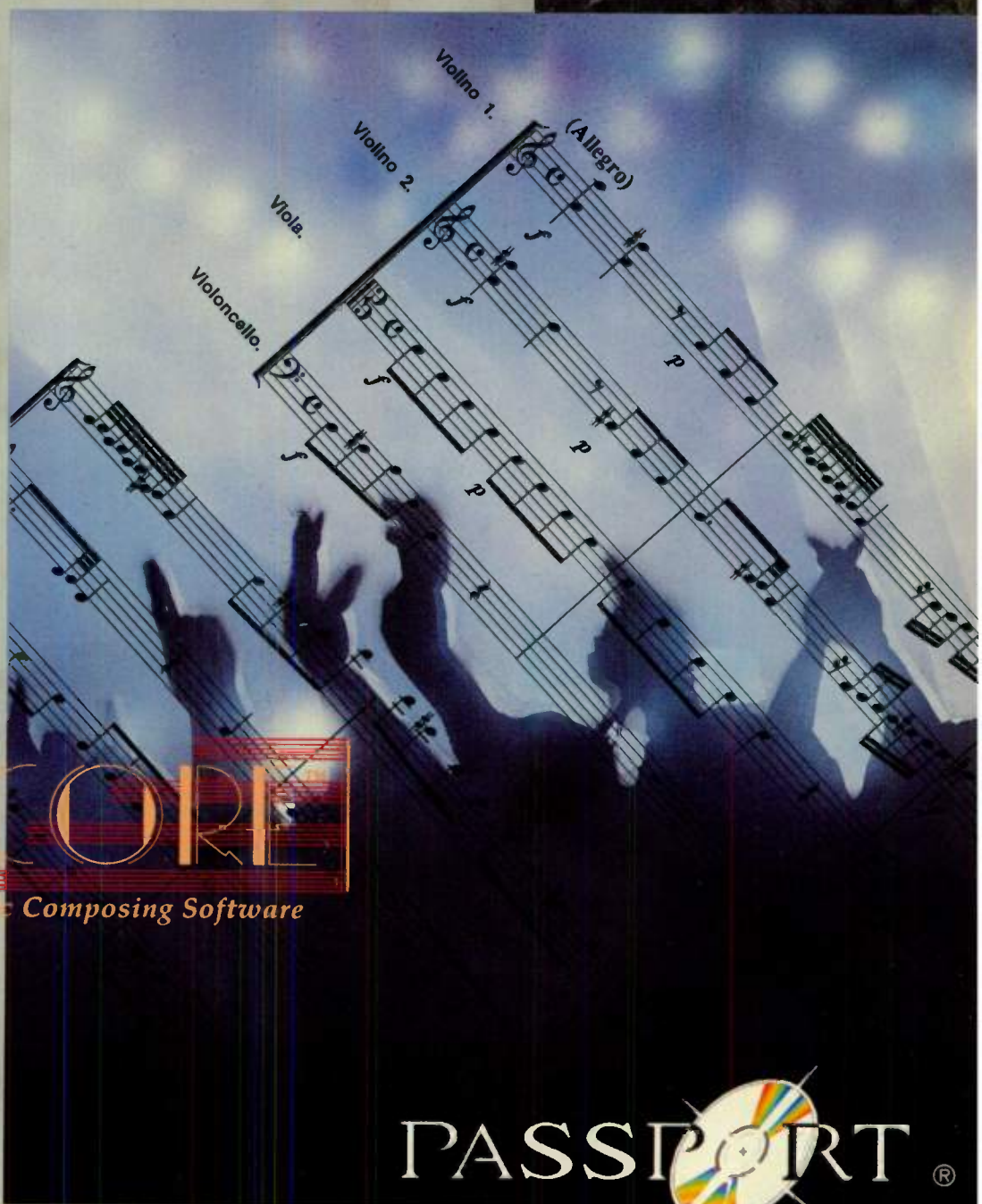

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SPUDS: Simple Projects/Useful Devices

Electronics doesn't always have to be complicated. For a few bucks and few hours, these wizardly widgets will make life a lot easier.

By James Chandler, Jr.

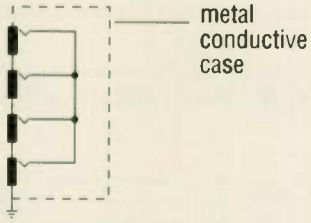

FIG. 1: Junction box.

Most tools of the musician's trade are available ready-made for less than the cost of do-it-yourself kits, so building electronic music equipment may seem pointless—after all, no one's going to build a DX7. However, keep your soldering iron heated up, because there are still gadgets that are cheaper to build than buy. Some are even unavailable commercially, but when you need 'em, they're worth their weight in gold-plated patch cords. Here are a few of my favorites.

FUNCTIONAL JUNCTION BOX

It is remarkably difficult to build an audio Y cord that can withstand the strain of heavy use, so I keep a stock of junction boxes around for Y-cord functions. These are aluminum miniboxes with four to six paralleled, ¼-inch jacks (**Fig. 1** shows four jacks). They are practically indestructible, well shielded (use 16-gauge wire for best results with power applications), and handle 100 watts as easily as 100 millivolts. I use them to feed mixer outputs to multiple power amps, record mono on a stereo tape recorder, or send the keyboard mix to both the keyboard amp and the main P.A. board. Junction boxes make patching speaker arrays a breeze. One size fits all.

Though the junction box is good for 1-to-X splits, it is not sufficient for X-to-1 mixing (such as summing left and right outputs of a tape recorder to a single P.A. channel, or both outputs of a CD player to a mono sampler). Wiring multiple line-level outputs together can cause signal level loss, distortion, and possible damage to older equipment.

For passive mixing, use resistive, ¼-inch patch cords; make these by soldering a 4.7k resistor in series with the tip connection and label them so you do not inadvertently use them for other applications. Resistive cords usually do not cause much signal loss, and they allow flexible summing arrangements when used with junction boxes. Radio Shack (RS) sells a ready-made, 2-in/1-out adapter (part #274-309) that I use with resistive cords to do passive summing on patch bays; however, it is too fragile for general P.A. work.

AMP SWITCHER

An amp switcher (**Fig. 2a**) routes an instrument signal to amplifier A or amplifier B. Guitarists use such devices to select between clean and distorted amps, or to select EQ (equalization) channels on the same amp. The principle is just as useful to a keyboardist.

The 180k resistors bleed DC from input/output capacitors in the amps and synthesizer so that DC won't cause popping noises in amps during switching. For the switch, use a DPDT (double-pole, double-throw) or push-push type (example: RS #275-614).

The guitarist in my band occasionally plays string bass, but I play synth bass when he's playing guitar. The change between synth bass and string bass is less obvious to the audience if the bass amp always carries the bass signal. So I switch the output to go to either the bass amp, or to the keyboard mixer when I'm not playing bass. The bass amp's gain is much higher than my keyboard mixer's gain, yet tweaking synth bass patches for low volume wrecks the signal-to-noise ratio. Therefore, a switcher with volume balancing on one output (**Fig. 2b**) matches the high synth bass level to the low electric bass level so the bass amp receives a comparable level no matter which instrument generates it.

EFFECTS SWITCHER

Any reasonable stage setup should include at least two keyboards (three if the performer is three-handed). If you cannot afford a multi-effects processor for each synthesizer, or do not have a keyboard mixer with multiple effects busses, the logical thing to do is switch effects between synths.

The switcher in **Fig. 3a** switches one effect between two keyboards, while keeping both keyboards assigned to their proper mixer channels. Use a 4PDT switch (four-pole, double-throw; GC #35-038 or equivalent). The double switcher in **Fig. 3b** swaps two effects be-

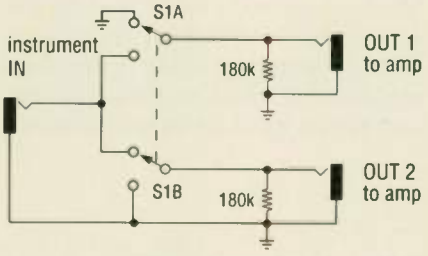

FIG. 2a: Two-amp switcher.

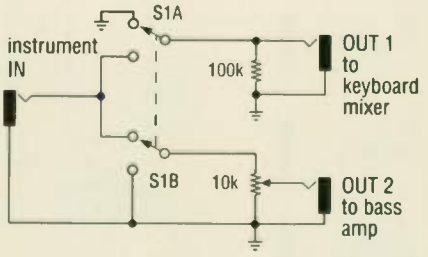

FIG. 2b: Two-amp switcher with volume balancing on one leg.

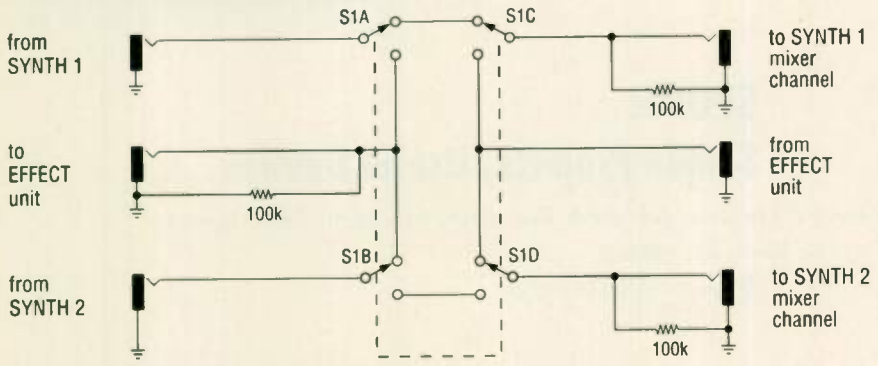

FIG. 3a: Two-input, one-effect switcher.

tween two keyboards. On the drawing, if all of S1's switches point down, synth 1 connects to effect 1 and synth 2 connects to effect 2. With S1's switches pointing up, synth 1 connects to effect 2 and synth 2 connects to effect 1. S2 puts the two effects in series on a selected keyboard. If S2's switches point up, operation is normal. With the switches pointing down, effect 2 follows effect 1. Both S1 and S2 are 4PDT switches.

MIDI SOURCE SELECTOR

Suppose you have a MIDI sound module that you want to control sometimes from a computer, sometimes from remote keyboard A, sometimes from remote keyboard B, and sometimes from a MIDI guitar controller. At the turn of a knob, this selector (**Fig. 4**) routes any of the MIDI sources to the sound module. You can also go the other way around and have one controller switch between several different sound modules. This unit can handle up to six inputs. Although this design sacrifices a continuous shield connection, in practice this is rarely a problem. Note that to avoid stuck notes, make sure no notes are being transmitted when switching. Use a rotary DP6T switch (double-pole, six-throw; RS #275-1386 or equivalent).

RHODES BASS MOD

If you play a Fender Rhodes and provide the band's bass lines, you may want to EQ the bass sound differently from the rest of the keyboard. To do this, install a 4PDT switch and extra output jack in your Rhodes (**Fig. 5**). In one switch position you have full-range Rhodes. In the other position the lowest two octaves are split off to a bass amp or specially adjusted mixer channel. The bass sound is passable with channel EQ, and can be excellent with graphic EQ.

CHEAP BI-AMP CROSSOVER

Technical considerations demand bi- or tri-amping large sound systems, but bi-amping a midsize P.A., which entails adjusting a crossover and running multiple speaker wires, is a big hassle just to do a spot job for an audience of a hundred or so. For midsize venues, bands can use a couple of small, 100-watt P.A. speakers (they are easy to move and don't frighten the club manager during setup). On larger gigs, a band can truck in another power amp and a couple of sugar scoop subwoofers to help out the bass. For these occasional applications, though, you may not want to put big bucks into an adjustable active crossover.

Don't laugh, but many times a passive, 6 dB/octave, 200 Hz crossover is adequate for this job (**Fig. 6**). Inserted between mixer and power amps, it keeps the highs out of the sub-woofers and keeps the lows out of the small full-range speakers. This enables the woofers in the full-range speakers to carry more low-mids without overload. They can do this because the horns in most midsize P.A. speakers are over-spec'ed, frequently using the same driver as in the manufacturer's larger arrays. Such horns can easily keep up with increased levels of low midrange frequencies and bass, especially since the horn crossovers handle less low bass energy.

Don Lancaster, in his *Active Filter Cookbook*, states that a passive network should be driven from a source impedance one tenth the network impedance and loaded by an impedance at least ten

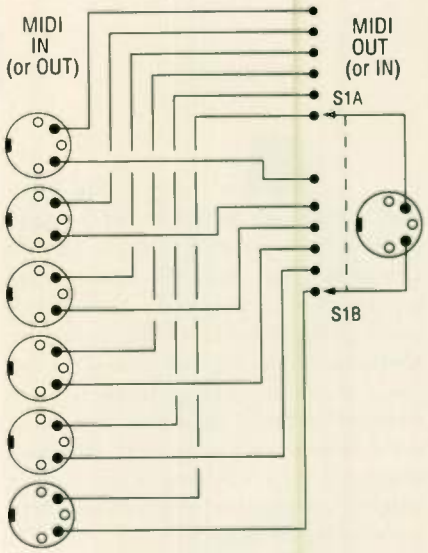

FIG. 4: MIDI selector switch.

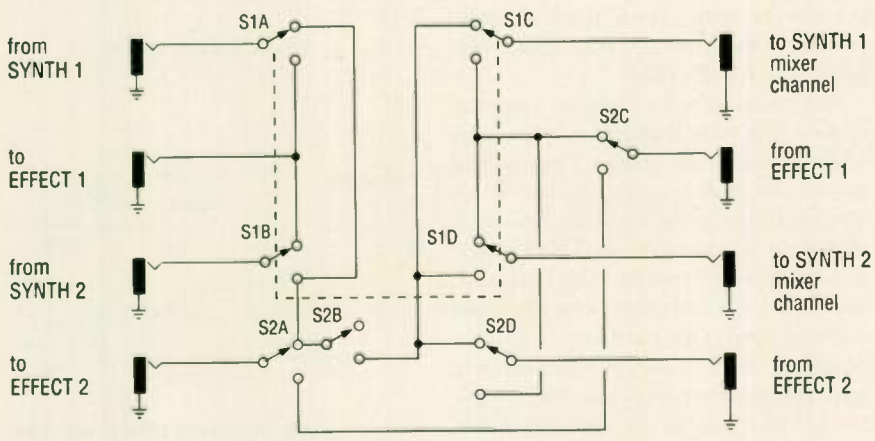

FIG. 3b: Two-input, two-effect switcher.

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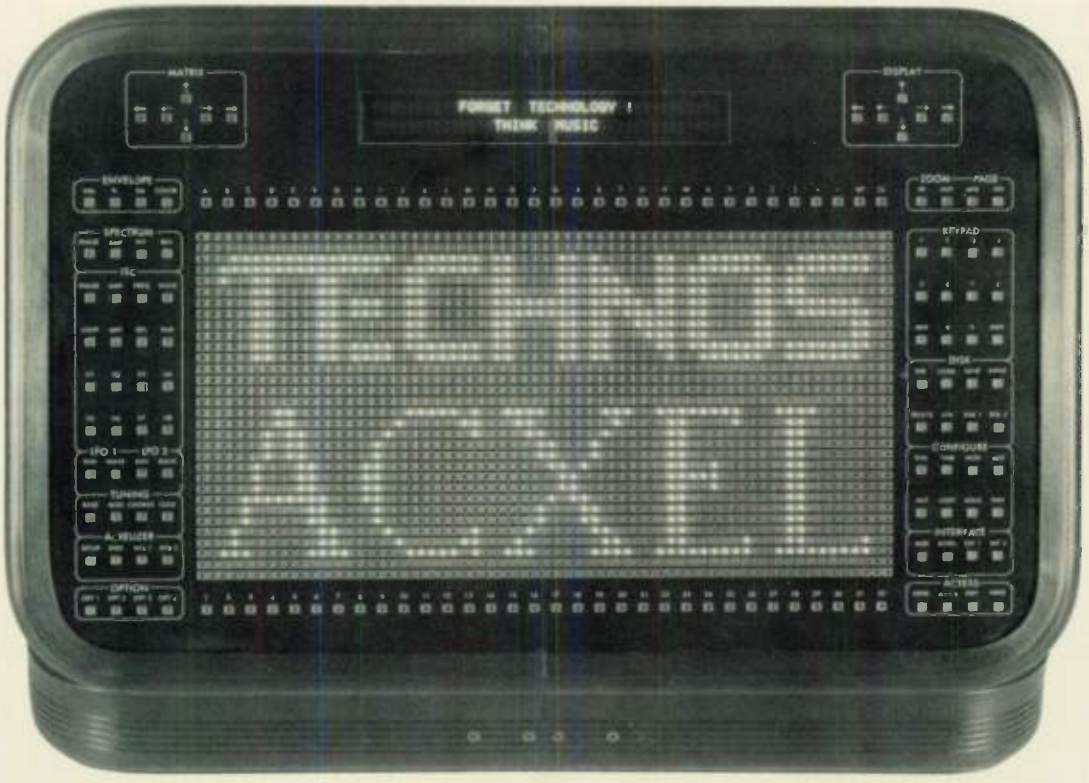

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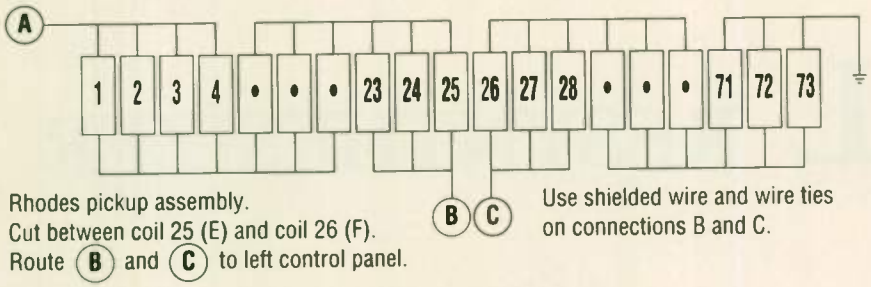


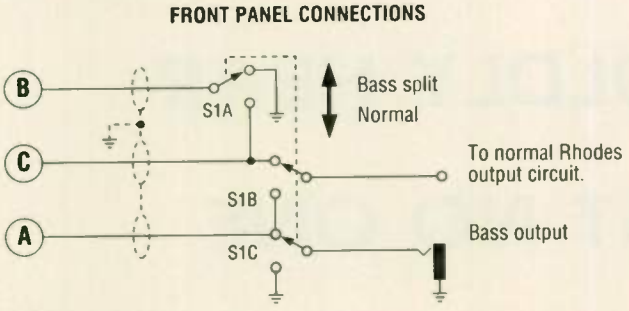


FIG. 5: Rhodes bass mod.

times the network impedance. Mixer output impedances typically range from 100 to 1,000 ohms, and power amp input impedances are usually somewhere between 10k and 50k ohms. Using this passive crossover with a high-impedance mixer output or a low-impedance power amp input could result in inaccurate frequency response or excessive signal loss. The values shown in **Fig. 7** are compromise values that should work in many applications, especially since minor frequency anomalies can be fixed with graphic EQ and power amp gain adjustments.

INSERT CLIPPER

Controlled clipping is easy to create on mixers equipped with channel inserts. My Peavey MD-16 mixer has an in/out jack normaled between each channel's preamp and EQ section. I plug in one of these clippers and adjust clipping level with the channel pre-gain control. Use **Fig. 7a** for hard clipping; **Fig. 7b** gives softer clipping. Construct the insert clipper by wiring the diodes and resistors inside the shell of a stereo, ¼-inch plug.

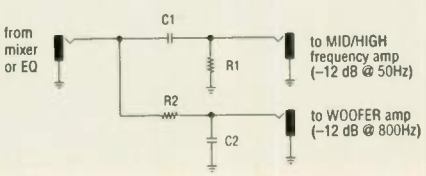
A hard clipper is good for heavy metal effects without a fuzzbox. Use the soft clipper to calm angry transients. Subtle clipping can add punch to bass drum, snare, or electric bass, and is certainly cheaper than compression. When recording direct to digital, soft clipping can emulate the coloration that analog tape adds to percussion tracks.

PARTS AND CONSTRUCTION

DPDT toggle switches and DP6T rotary switches are available from Radio Shack. 4PDT toggle switches are available in the GC product line, which is carried by many TV repair parts distributors. My favorite project box is the RS #270-286, though the RS #250-235 aluminum minibox is more suitable for a junction box because it is stronger and eliminates having to solder jack grounds together (connection through the aluminum provides adequate grounding).

None of the listed projects requires a circuit board. Components can be mounted between terminals on jacks or switches. Sometimes components should be tacked down with a glob of silicone rubber to make them more resistant to vibration. Velcro self-adhesive strips, such as RS #64-2345, allow you to mount boxes conveniently to keyboards, mixers, or rack cabinets.

Beware of ground loops on projects that connect several units together via patch cords. Power all units from the same AC circuit, then lift the ground (using two-wire to three-wire AC adapters) on any device that causes ground-loop hum. Be careful, though; lifting the ground could cause a hazardous condition if any patch cord ground should become open. Powering an audio system from more than one AC breaker can also cause severe equipment and/or personnel damage. When in doubt, measure for any voltage between different, unconnected grounds before making connections. If there is any leakage voltage, find the reason for this and fix it before proceeding.



MIXER OUTPUT Z	C1, C2	R1, R2	MIN. POWER AMP Z
500–1,000 Ω	.14µ	5.6 kΩ	20 kΩ
100–500 Ω	.29µ	2.7 kΩ	10 kΩ

Use parallel capacitors to approximate C1 and C2 values. For example: 0.22µ +0.06µ = 0.28µ.

FIG. 6: Cheap bi-amp crossover (200 Hz, 6 dB/octave).

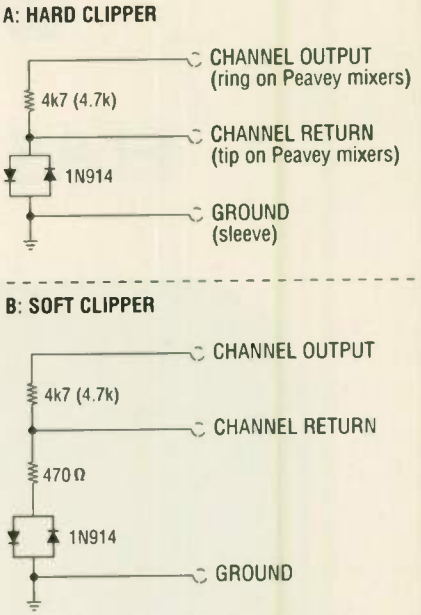


FIG. 7: Insert clipper.

YOUR OWN SPUDS

All you have to do to design your own SPUDs is to think simply. Sometimes the easiest solution is the best for high-tech problems, and often, you won't need more than a couple of switches, some wire, and the tools necessary to do a little electronic construction.

James Chandler Jr. *plays a six-night-a-week bar gig so he can afford to hack music hardware and software the rest of the time. He recently has been working with Altech Systems programming* Macintosh MIDIBasic *and* MIDIPascal *upgrades.*

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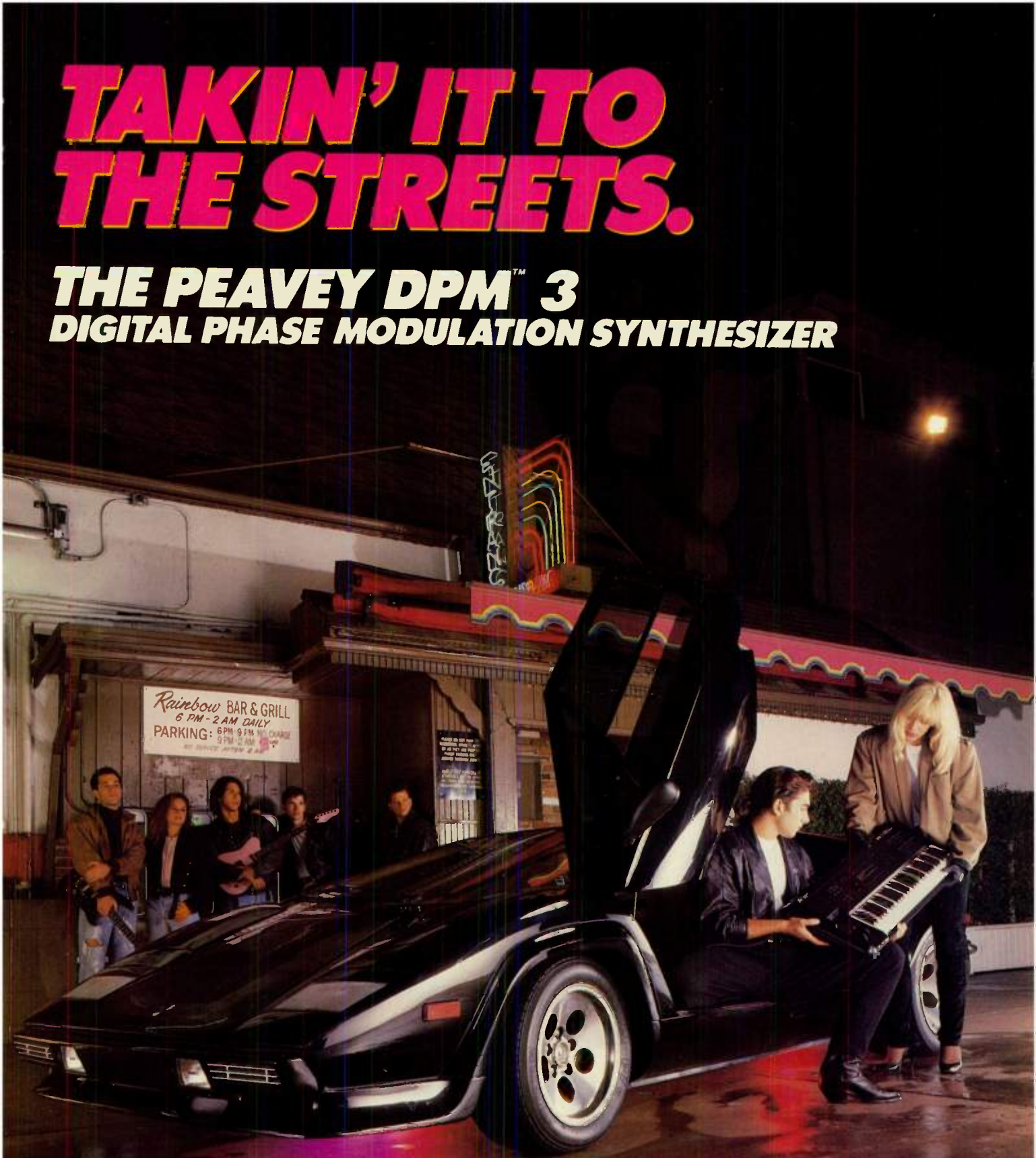

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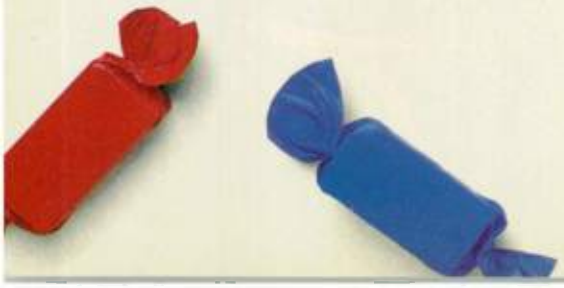

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Looking Ahead:

Visions for the 1990s

No doubt about it, there's something in the air. The primary developments of the 1980s—mass market samplers, digital synthesizers, digital recorders, and personal computers—have matured into usable, if still somewhat flawed, tools. Yet much remains to be discovered, and there's a growing feeling that integrating what we already know with coming developments will produce a sum far greater than any of the individual parts.

The questions now deal not so much with innovation as with application. How are we going to combine our new tools into meaningful, ergonomic systems? What forms of music will result as yesterday's avant-garde becomes tomorrow's mainstream? Will new types of controllers facilitate the creation of new kinds of music? The answers to these questions are starting, however tentatively, to come into a somewhat clearer focus.

Definitive answers aren't possible, but well-informed opinions are. To give a preview of the issues we'll be confronting as electronic musicians in the 1990s, we've gathered together the thoughts of some of the key people in our industry. Interestingly, none of the contributors saw any of the other's writings prior to publication, yet there are striking similarities between some of the predictions (as well as some profound differences). In any event, these visionaries provide a fascinating joyride into the future. Come with us and see what tomorrow brings. —*EM Staff*

We know where we've been...but where are we going? Fifteen electronic music industry visionaries present their ideas on high-tech musical life in the 1990s.

PHOTOGRAPH BY ELIZABET ZEILON

Raymond Kurzweil

Among the most exciting developments in the technology-driven music culture of the future will be changes in the way composers, musicians, and audiences communicate with each other.

Live music performance will continue to have the same emotional and intellectual appeal that it does today. While much of what is heard may be previously programmed, the interaction between musicians and their audience will continue to be a special form of human communication. In addition, "cybernetic" musicians will be commonplace, automatically and "creatively" generating lines of accompaniment and counterpoint. The intelligence of these software-based musical accompanists will be partially built into the instrument and partially programmed by the musicians as they prepare a performance.

Intelligent software that incorporates knowledge of musical theory and styles will be extensively used by professional musicians in "writing" musical compositions and preparing performances, as well as by amateur musicians and students who can "jam" with their computer-based instruments.

The music of the future will not necessarily take the form of fixed works heard from beginning to end. One new form of musical composition will consist of a set of rules—or modification of a set of rules—as well as "expression structures" that can generate an essentially unlimited number of pieces. This "work" would sound different every time, although each such listening would share certain features, so it could be considered a single work. A 21st-century composition may also allow the listener to control the entry and exit of various instruments and lines of music, and, if desired, modify the evolution and emotional content of a piece.

This new, participatory listening mode will not require traditional musical knowledge. Instead, the composition will respond—thanks to advanced computer technology—to both voluntary and involuntary cues from the listeners (subtle facial expressions, muscular tension, perhaps even brainwaves). Such compositions will transform "listening to a composition" into "exploring a composition."

In these ways, music will move bit by bit away from passive entertainment toward an active, learning experience. The listener's active posture and the composition's ability to respond to feedback from the listener will blur the distinction between listener and composer. Increasingly, regardless of musical talent and training, everyone will be able to express feelings directly through music and participate in the musical experience.

The music of the future will not necessarily take the form of fixed works.

In spite of all these changes, the goal of music in the next century must remain the same: the communication of emotions and ideas between composer, performer, and listener through sound, using the elements of melody, rhythm, harmony, form, timbre, and expression. The challenge for the musical artist is the same as for all artists: to make choices and to select from a certain palette the precise elements that can best express the creator's ideas and feeling. Thanks to the microchip, the musical palette will know few bounds.

Raymond Kurzweil's *three companies develop artificial-intelligence products: Kurzweil Music Systems (digital synthesizers); Kurzweil Computer Products, a Xerox company (reading machines); and Kurzweil AI (speech-controlled reporting systems for doctors).*

KEIKO KASAI

Raymond Kurzweil — Mr. Bonzai

Mr. Bonzai

What is this big hooplah over electronic music anyway? When Mr. Sax invented the instrument that would someday yakkity-yak around the world, I doubt that the clarinets were worried. Electronic instruments are simply new tools that will be used poorly by some and with unheard-of beauty by others. The field is still fresh and ready for spring planting.

Fifteen years ago, working in a small 8-track studio, I realized the economic sense of giving the artist a little electronic whizbang and avoiding the need to call in a roomful of expensive sidemen. We worked speedy wonders with a Minimoog and an ARP String Ensemble. The production times, they were a changin'.

Now the technology is available to millions, and what have we done with it? The early experiments were intriguing because we had never heard such cool and unusual sounds before. As the tools became more sophisticated, so did the programmed emulation of traditional instruments. Unfortunately, this has led to mass quantities of inhuman, robotic music. Electronic musicians should stretch and expand the boundaries of music, and the traditionalists should continue doing what they do best—playing with the physicality of bows and guts, bamboo pipes, skins, and mallets. Artists such as Peter Gabriel have demonstrated that these two worlds can mix well.

Maurice Jarre *(a prominent film scorer—CA)* once told me, "When you deal with electronic instruments, there are dangers. A sequencer creates a perfect pattern that repeats over and over again. When you ask an orchestra to do this, the pattern will never be exactly perfect, because it is human...

"I don't think one guy making overdubs can get the same feeling as six

ILLUSTRATIONS BY LINDA BLECK

LIONEL HAMPTON ON VIBES.

Lionel Hampton is legendary for playing an instrument no one in jazz had played before. The vibes. So, naturally after performing for over fifty years he thought he'd found every way possible to play them. That is, until he discovered the new Technics SX-KN800 Keyboard.

A keyboard so advanced it creates vibes sounds impressive enough to get even Lionel Hampton to put down his instrument and pick up ours. Which isn't surprising considering the KN800's digitally-stored computer chips create sounds so lifelike you'd probably think you had the actual instrument right in front of you.

What's more, the SX-KN800 features over 32 other true to life instrumental sounds, an 8-track sequencer with flexible edit functions, and a 16-bit computer memory with optional disk storage. Which allows an accomplished musician to accomplish even more.

But the true genius behind the KN800 is the fact you don't have to be a genius to play it. Because at the touch of a button you'll not only have a world of instruments at your fingertips, you'll also have a wide variety of rhythm accompaniments to choose from as well. Many of which have been recorded by respected musical artists. So, you can play with the best even if you're just a beginner.

Now, if all this sounds too good to be true, we suggest you hear it for yourself.

Just call 1-800-447-9384 ext. 888 for the participating Technics dealer nearest you. And you'll see why one of the world's great vibes players is now backing us up.

Technics
The science of sound

people, or ten people, playing together. Also, I use an electronic woodwind instrument, the [Akai] EWI, for the human touch. They have to blow and they have to breathe."

George Martin, who has been responsible for landmark breakthroughs in the use of electronic magic, says, "I think (software-driven music) is making music boring. You hear the same sounds over and over again. Maybe I'm old-fashioned, but I think the sound of a natural instrument is the best. One of the dangers of this technology and this eternal synthesized sound and programming and mechanics is that it is making music a bit sterile. These are wonderful tools if you use them properly, but if you use them to the detriment of real sounds, you go down a cul-de-sac of boring repetitions...

"The kids are growing up with this facility at their fingertips. They're getting brainwashed to a certain extent. They might like to have some real sounds and get an orchestra and not quite know how to use it. They'd end up making the orchestra sound like a synth. If you're scoring for an orchestra, it's not just translating what you do on a keyboard and putting it into an orchestra. There's something more to it than that."

When I asked Weird Al Yankovic if he had any favorite new recording gadgets, he replied, "Microphones are kinda cool."

Mr. Bonzai, *editor-at-large for* Mix *magazine, has worked in the music industry for 20 years as a disc jockey, engineer, producer, recording studio manager, and journalist.*

DONNA ABBOTT

Joel Chadabe

Joel Chadabe

The decade of the 1980s has been part of a transitional period that started with the analog synthesizers of the late 1960s and will culminate in the design of reliable and expressive electronic musical instruments. This transitional period will probably extend well into the 1990s (or beyond).

In our progress toward the design of an electronic instrument, we are roughly at a time equivalent to, say, 1800 in the design of the piano, when there was little standardization in the size of the keyboard, the physical framework of the instrument, even the mechanics of the piano action and its pedal operation. Eventually, though, the various approaches of so many manufacturers will settle into one standard, or perhaps two standards will evolve, one for the amateur and one for the professional. For the amateur, ease of playing will be a major goal, meaning that a greater number of people will be able to enjoy music as an expressive outlet. For the professional, new instruments will be more "powerful" than traditional instruments, which means musicians will be able to extend their capabilities to performing many different sounds simultaneously.

The trends I see occurring in instrument design are toward interactivity and expressivity. Electronic instruments will become more integrated with computers, making the former more interactive. Currently, computers serve primarily as "tools," so you get out only what you put in (garbage in, garbage out). But the potential benefit in using a computer is clearly to extend one's creativity, so that you get out *more* than you put in. This means incorporating the computer in the creative process, so that the computer adds to what you do and presents you with material that you might not have considered.

Expressiveness is partly a function of the way a sound is made and partly how an instrument is performed. Sound generators in the future will probably be more based on the physical modeling of musical instruments than on the modeling of the physical properties of sound, so that a musician won't have to think in technical terms when making a sound, and yet will have greater control over changing a sound during a performance. The way an instrument is performed is mostly a question of the controller used, but we've been far too conservative in thinking of controllers based on traditional models such as keyboards. In the near future, we'll probably think of the gesture first. Do we want to touch something, rub something, move our hands in the air? Then we'll find a way to translate that gesture into control information for a sound generator.

Joel Chadabe *is a composer and president of Intelligent Music. He performs concerts throughout the world, and his articles on aspects of electronic and computer music have appeared in many magazines and journals.*

Dave Rossum

Being an engineer and technologist, I view the future of electronic music, which is definitely here to stay, primarily from the advances I foresee in technology. Sound generation will become digital, diverse, and expressive; different algorithms will abound. Analog sound generation will never reappear in force, but the qualities of analog synths will be digitally simulated to good effect.

Some visionaries will predict far more sweeping changes than I, but looking to the past verifies that change is slow. The '60s brought the advent of the synthesizer; it took a decade to move from "voltage-controlled thermometers" to usable musical instruments. In the mid-'70s, we designers saw the future of digital signal processing, but it has taken until the end of the '80s for that promise to be realized. What we see as the clear future now will take another decade to become commonplace.

The digital electronics technology explosion will continue full steam through the '90s, so digital hardware will continue to increase in capability by leaps and bounds. This will have two major impacts on musicians. First, the generation of complex, usable, quality sounds will become more possible. One of the musician's dreams—having new machines that really sound like (and are) interesting musical instruments, yet sound totally new—will become reality in the next decade. The new science of dynamic systems ("chaos theory") will contribute here as well.

The other impact will be combined with the software revolution. True artificial intelligence (as compared to today's

CHUCK MANGIONE ON HORN.

Chuck Mangione, one of the world's most popular horn players, is always looking for innovative ways to create his music. And thanks to Technics he's found one. The new Technics SX-KN800 Keyboard.

A keyboard that creates instrumental sounds so realistic that even a professional like Chuck Mangione is impressed with its playing. Which isn't surprising considering the KN800's digitally-stored computer chips create sounds so lifelike you'd probably think you had the actual instrument right in front of you. What's more, the SX-KN800 features over 32 other true to life instrumental sounds, an 8-track sequencer with flexible edit functions, and a 16-bit computer memory with optional disk storage. So even the most accomplished musician can accomplish even more.

Equally impressive is that while the KN800 lives up to professional standards, you don't have to be a professional to play it. Because at the touch of a button you'll not only have a world of instruments at your fingertips, you'll also have a wide variety of rhythm accompaniments to choose from as well. Many of which have been recorded by respected musical artists. Which means you can play with the best even if you're just a beginner.

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So, whether you've been playing the same instrument for years or just getting started, it's never too late to pick up a new instrument.

After all, Chuck Mangione did.

Technics
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Dave Kusek

"artificial stupidity") will be available to the product designer. I predict that visionary professional musicians will begin to use this capability as a performance tool, to literally "jam" with a talented instrument. In some ways these capabilities will be resisted, as in their early stages they will be reminiscent of the familiar "auto-accompaniment" features found in many home organs, but the musicians who accept the concept and strive to help in its perfection will reap great rewards. As an offshoot, instruments will, in general, become easier to use.

With the advent of smarter instruments, the professional musician will require more sophisticated intermodule communication than is possible with current MIDI; hopefully, the "network revolution" in the computer industry will spill over into the music industry to supplant MIDI 1.0 with a true local area network. Ultimately, the consequences will be that the entire electronic music studio will be just one instrument, one orchestra. There will be great struggle and confusion in this change, as the current standard falls away and the war for a new standard is fought.

Controllers will probably not experience revolutionary development. The cost of raw material, plastics and metal, will increase and while there will be advances in materials science, they will not be revolutionary in nature, and the propagation into musical instrument controllers will be slow. One exception may be the "guitar controller"; here the signal processing electronics, not the hardware, is the limiting factor, so affordable, dramatic improvement may be made.

Dave Rossum *is co-founder and chief wizard of E-mu Systems, the world's oldest electronic music company.*

Dave Kusek

Music making is far less of a social activity than it was years ago, especially in our area of electronic music. As you all know, we can do some really incredible things in our home studios that were unheard of just a few years ago. Alone with all this power, electronic musicians have essentially become an entirely new genre of musicians. And there's no doubt that the "first call" synthesists have taken over the studios and forced many fine acoustic musicians to find another gig.

But if people in large numbers begin to produce music all alone or use the technology to replace the stimulating environment of a group of musicians, I think that will be a sad day. Despite the unlimited potential offered by these instruments, I hope manufacturers can develop products that help avoid electronic musicians' propensity to play alone.

For the next decade or so, an even bigger issue may be "Where do I plug in?" Power in the future will be a big deal. If electronic musicians don't learn to properly play a musical instrument, they will be in big trouble when the lights go out. You can't rely on the chips if you ain't got no chops.

Regarding future trends, I think the war on drugs will eventually reach the music industry, which should positively impact the quality of the music. I also see a resurgence of the really artful players who carefully craft their music, blending in technology without being governed by it.

Synthesizers got their start commercially as a featured solo instrument with Keith Emerson. Then Wendy Carlos got the solo band rolling. Today there are many all-synthesizer bands, and a lot of TV and film work is almost entirely synthesized. I hope to see it come full circle again, with electronics taking an appropriate role in the whole scheme of things along with acoustic instruments and the environment.

As to whether musical electronics has passed its peak or is just getting started, the whole field has been described by a friend of mine as a "baby market." It should grow and develop in the coming years (at least as long as the power holds out). What is most certainly before us is the age of information, in which music will play a major role. Just as it has dominated the airwaves and retail records and tapes, music will creep into the information age.

ALBERT'S PHOTO STUDIO

Bob Moog

Already, you can buy sequenced songs containing MIDI information and play them back on your home system. These songs can be transposed, rearranged, and completely dissected using a MIDI sequencer. You can even print the song out in standard music notation using the right software. The next big step for presequenced music will be MIDI-equipped CDs that will play connected MIDI instruments in sync with the recorded material.

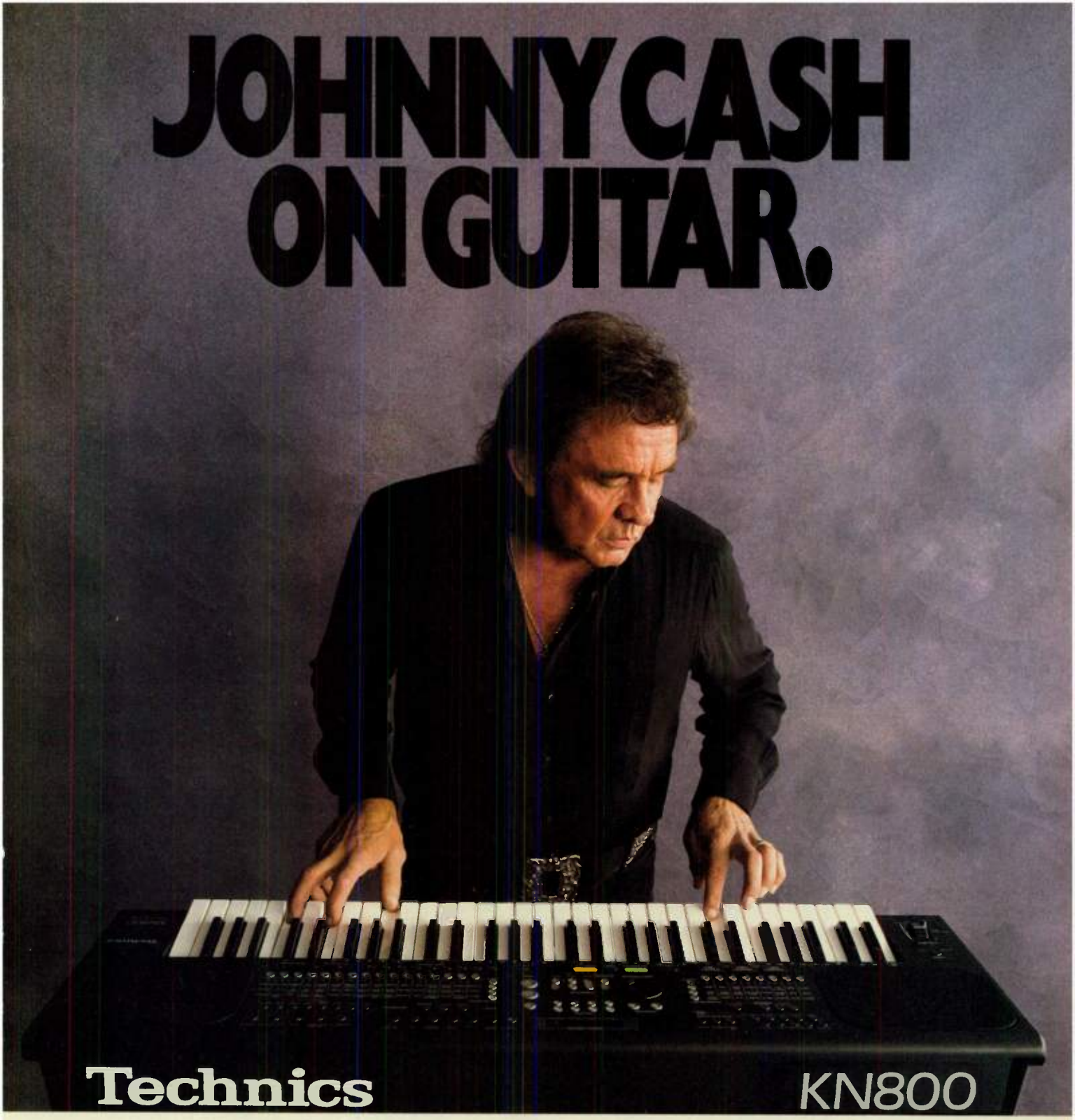
David Kusek *is a musician, engineer, and businessman whose career has helped shape many aspects of the music industry. After working for EMI, Kusek co-founded Star Instruments, and then in 1980 he co-founded and became president of Passport Designs (a position he still holds), the first music software company.*

Bob Moog

Fueled by the proliferation of powerful personal computers, experimentation with new musical resources now occurs at a blazing pace. But experimentation is one thing, and productive music-making is another. As I see it, music-making has always been an input-intensive activity. The actual rate of information flow from a traditional performer, through the instrument and then to the listeners, is the highest of any human activity.

An example is a virtuoso pianist, who routinely plays one or two dozen notes per second, all with a timing resolution of a few milliseconds and a loudness resolution of at least one part in ten. If you work through the numbers, you'll see that it comes out to be an information flow rate of several hundred bits per second, in the parlance of the computers we all know and love. (In contrast,

JOHNNY CASH ON GUITAR.



Perhaps no other guitar player has accomplished more than Johnny Cash. Not only is he one of the most successful artists in country music, he's one of the most successful songwriters in the history of music. So, it's not surprising he's always on the lookout for a great sounding guitar. What is surprising is he's found it in a keyboard. The new Technics SX-KN800 Keyboard.

A keyboard so advanced it creates guitar sounds impressive enough to get even Johnny Cash to put down his instrument, and pick up ours. That's because the KN800's digitally-stored computer chips create sounds so lifelike you'd probably think you had the actual instrument right in front of you.

What's more, the SX-KN800 features over 32 other true to life instrumental sounds, an 8-track sequencer with flexible edit functions, and a 16-bit computer memory with optional disk storage. But what's equally ingenious about the KN800 is the fact you don't have to be a genius to play it. Because at the touch of a button you'll not only have a world of instruments at your fingertips, you'll also have a wide variety of rhythm accompaniments to choose from as well.

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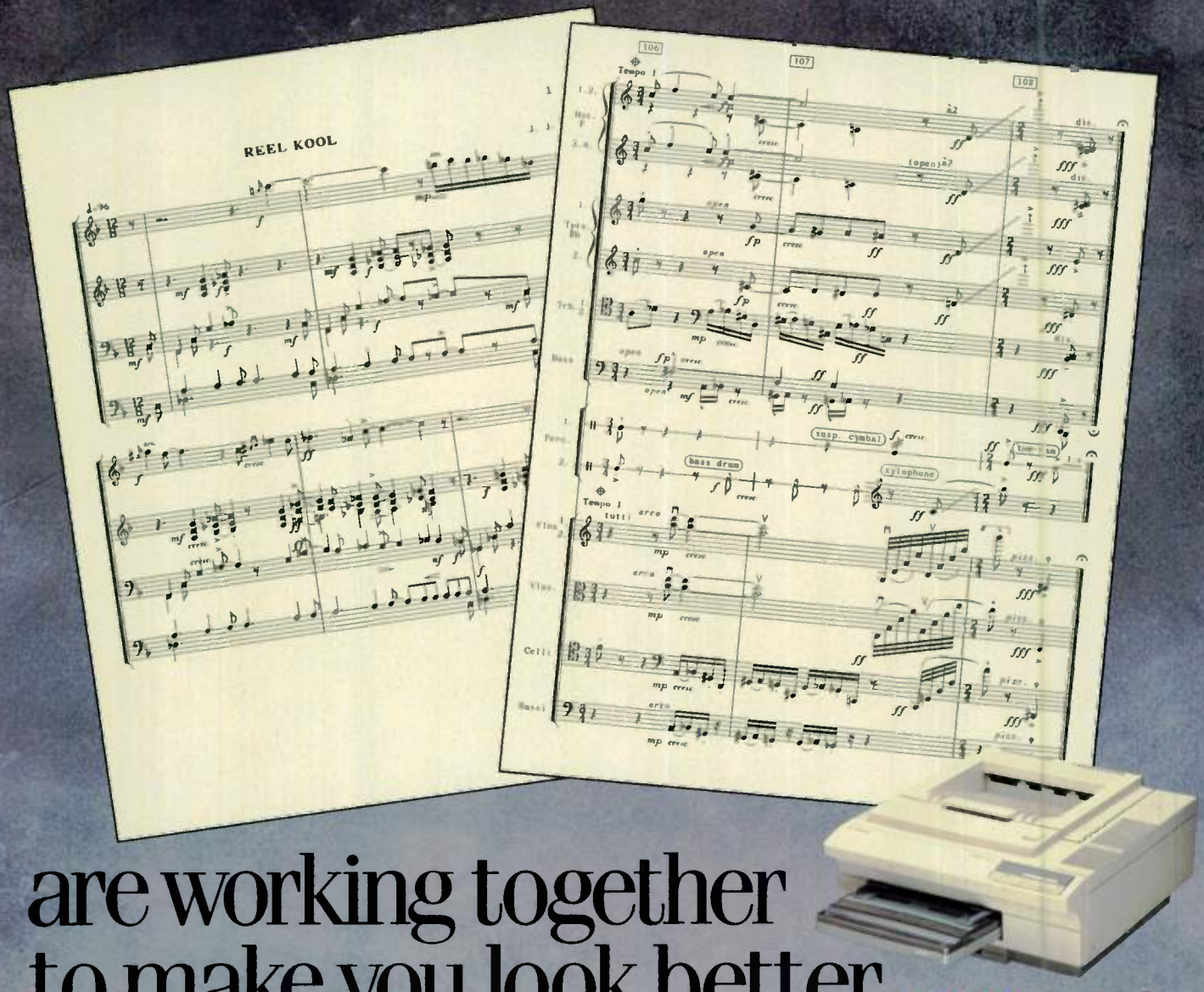

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WRH

MONICA DEE

Larry Fast

I'm generating an information flow rate of perhaps 20 or 30 bits per second as I sit at my word processor writing these words, and I think that I'm going fast!) Therefore, the quality of someone's playing depends heavily on just how intensively information can be conveyed to their listeners. (If the term "information flow" sounds too cold and technical to you, then try virtuosity, nuance, or expression. They're really all the same.)

How do today's digital instruments measure up when it comes to facilitating rapid information flow? Not too well, I'm afraid. The best synthesizer keyboards are nowhere near as well-matched to the capabilities of the human hand as, say, the piano keyboard. Sure you can play fast on a synth keyboard, and you can play soft and loud notes. But can you play a fast passage with precisely controlled dynamics?

And how about front panels? What is to be said in favor of today's trend toward few buttons, small displays, and only one or two knobs that you can actually turn? How can you compare the "click-click-click" button push sequence that you have to go through to change something on a digital module, with the way a traditional organist can reconfigure an entire instrument with one quick motion of the hand on the stop tabs? Your latest and greatest sound module may have 569 functions tucked away in its operating system, but how fast can you get to them?

Historically speaking, all musical instruments were developed with the highest technology of their time. Today, our highest technology is digital electronics, so musical electronics, even as we know it today, is not about to go off to fad heaven. We've been going through a period of experimentation, and we're learning how to use digital electronics to make music. Now we have to go through a period of matching the capabilities of digital instruments to those of the human musician. We'll have to go back to old-timey mechanical manufacturing technology to come up with finely tuned performance controllers and specialized data entry surfaces that are ergonomically optimized.

Bob Moog *developed some of the first commercially produced analog synthesizers. At present he is research professor with the music department of the University of North Carolina at Asheville. Also, as president of Big Briar, Inc., he designs and builds state-of-the-art musical electronic devices.*

Larry Fast

Though I think it's too hard to predict exactly where musical trends will go in the '90s, it's a little easier to envision how we'll actually make and record that music. The many different ways of making music that we use now (recording, sampling, synthesizing, and so on) are pretty well-established. So are the methods for arranging sequences and editing and shaping sounds, and so are ways of archiving those libraries of sound. What sets all this apart from the world of conventional multitrack recording, whether analog, digital tape, or tapeless digital, is a barrier between the two applied technologies. Recording is still recording; synthesis, sampling, and sequencing are still largely in their own world, notwithstanding a few limited attempts to get it all into one box at the high-priced end of the business.

The capabilities of digital instruments need to match those of the human musician.

But it's beginning to merge. I won't use the "W" word, but what I see coming is a complete creative station where the lines of distinction between recording and sound-creation will all but disappear. Digital recorder and mixing console functions will be available to record

Dave Oppenheim

the basic tracks, even if all-acoustic. That material could be edited, pasted, and then mixed with complete recall of mix events and effects. There would be full control of pitch and timing. DSP (digital signal processing) functions would remove distortion and noise or alter the sound in a variety of other ways: fix an out-of-tune vocal, move an off-time drum hit, and so on.

There will, of course, be a flexible and intelligent sequencer for the sampler/synthesizer module of the system, along with editing and library programs. Such a device will also suit all forms of audio-for-picture work. The key is for one generalized system to serve many different creative users. The synthesis/sampling side will be intelligently locked and melded to the pure recording side so that musical pieces can be edited and sculpted much like today's sequencers, except that the digital audio recorder and sequencer will be completely integrated.

A few quick predictions: MIDI 1.0 will be with us for quite a while, but I expect to see more SCSI or similar-type data interchange among the more powerful instruments. Smaller MIDI nodes will become satellites linked together to create larger, more powerful networks. And we'll all be surprised at how quickly fiber optics invade our everyday connector world, aided by digital outs on even the lowest cost instruments and digital audio devices, as well as low-cost monolithic electrical-to-optical (and vice versa) converter connectors.

Larry Fast *is the creative force behind the Synergy albums released over the last thirteen years. His most recent work has been producing and playing on Annie Haslam's (of Renaissance) solo album just released on Epic Records, and electronic arrangements on Helen Schneider's* A Walk on the Weill Side.

Dave Oppenheim

In the '90s, electronics will occupy about the same role in music that it does now. A lot of music will be produced by synthesizers, modified by electronic effects, and separate boxes will be hooked together by some kind of network like MIDI. However, the continuing rapid integration of ever more massive amounts of electronics onto single VLSI chips will make much more musical power affordable by every electronic musician. The computer's role will continue to grow, MIDI will get much faster, and there will be a completely new MIDI 2.0 that will address the inadequacies of MIDI 1.0.

More dense integration of circuitry has caused a progression from the monophonic analog synthesizer to the programmable polyphonic analog and digital synthesizers to the multitimbral synthesizer. The next logical step is to replace rack-mount synthesizers with boards that go into computers.

The coming decade will see the computer's roles in sequencing and patch management continue to grow as programs become more sophisticated and integrated. Also, the computer will control device interconnection as local area network (LAN) technology is applied to connecting musical instruments.

During the last five years, two major shortcomings of MIDI have become clear. It is too slow to perform several "tracks" simultaneously on one cable, and one is always moving MIDI cables around. To solve these problems, the MIDI Manufacturer's Association agreed two years ago that the next generation of MIDI would most likely use LAN technology common to personal computers. Lone Wolf's MediaLink is one of the first examples of this.

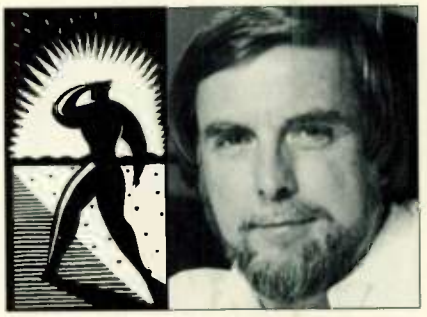
This technology, the decreasing cost of fiber optics, and the availability of inexpensive VLSI LAN-controller chips will make possible a faster MIDI, which will carry hundreds of times more information than MIDI does now. These same cables could carry digital audio as well, so that someday the only cables going to a synthesizer will be power and the "notes-in/sound-out" LAN cable. Once connected, the cables wouldn't have to be moved. The "connections" would be changed in software, probably on the user's computer.

MIDI 1.0 is good, but not great. Consequently, we need a MIDI 2.0, designed without the constraints of MIDI 1.0. It should support thousands of programs, controllers, and channels. Notes should specify an exact pitch, without having to use separate pitch bend messages. Once a note has begun, its pitch and velocity should be updatable. A computer could find out exactly what devices are on a network in a completely standard way, and the synthesizer would supply the computer with a list of its parameters, so that a new patch editor would not be needed for each new synth. These are only a few ideas, but they are representative examples of needed tasks that cannot be done elegantly within the constraints of MIDI 1.0.

MIDI 1.0 need not be obsolete, however; MIDI 1.0 and MIDI 2.0 messages could coexist on the same fast network. You would simply inform your sequencer which devices work with which protocol.

I'm looking forward to the '90s; they're going to be a lot of fun.

Dave Oppenheim, *founder of Opcode Systems, has been playing piano keyboards since age six and computer keyboards since eighth grade.*

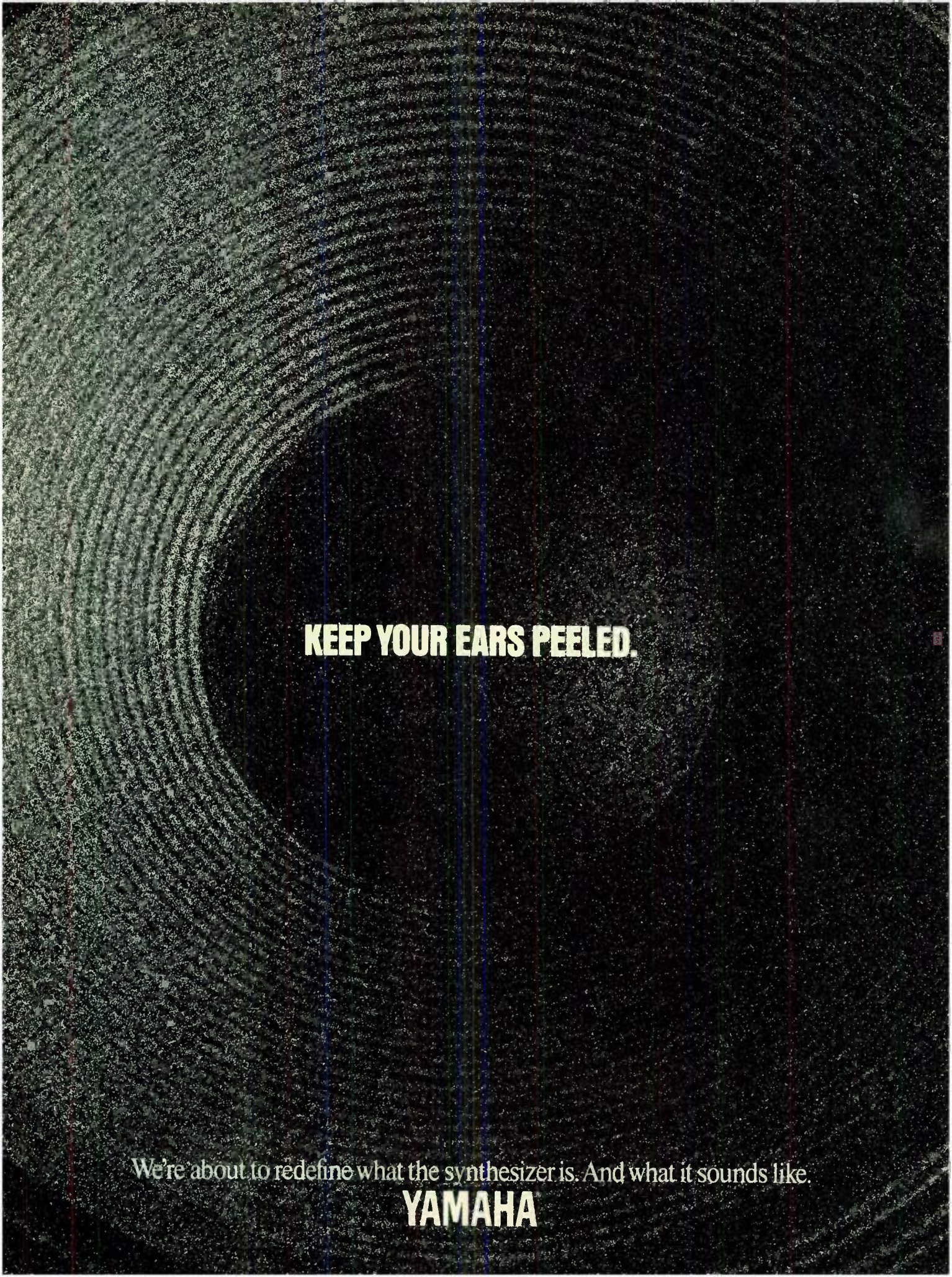


Hartley Peavey

Hartley Peavey

Since the advent of "electronic music," those segments of the field that relate to synthesizers have been in a state of constant turmoil due to rapid technological change. However, we are finally reaching a stage of maturity that will enable electronic musicians to free themselves, at least to a certain extent, from the vicious cycle of obsolescence.

We are approaching the end of the "hardware era" and rapidly approaching the "software era" of electronic music. More and more electronic music equipment is becoming software-driven to al-


KEEP YOUR EARS PEELED.
We're about to redefine what the synthesizer is. And what it sounds like.
YAMAHA

low for sounds, features, and functions not included in the original system.

Until very recently, there haven't been any reasonably priced, totally software-driven synthesizers. We hope to change that with our DPM-3 synthesizer, which instead of using custom voice chips that lock the device into a particular voice architecture, uses digital signal processing (DSP) chips whose sound qualities and type of sound generation are determined completely by software. (Of course, the operating system can be updated as well.) DSP chips can do something as simple as simulate a wavetable synthesizer or as complex as respond to mathematical calculations that model a particular instrument.

Operating from a stable, flexible hardware base, software writers can change an instrument's personality as required by the marketplace. Next year's sounds will be on a floppy disk or ROM card that can be plugged into the machine, or perhaps downloaded via modem. While it would be foolhardy to say that truly software-based systems will never be obsolete, they should at least extend a product's useful life many times.

Marcus Ryle

Several manufacturers (especially those from the Far East) have predicated their entire operation on what appears to be "planned obsolescence," but eventually they too will have to embrace reconfigurable systems. (What this will do to their necessity to "maintain full employment" remains to be seen.) In any event, progress, like the tide, cannot be held back.

The musician will finally be free to concentrate on craft rather than buying new equipment to get the "latest sound." The additional time saved by not having to learn new instruments, as well as the money saved, can be put to better use by the electronic musicians of the future. I bet that five years hence virtually every electronic music system will be software-based and therefore upgradable. Of course, only time will tell.

Hartley D. Peavey *is president of Peavey Electronics. The company entered the high-tech age several years ago as the first company to build guitars using industrial robots; the company has since branched out into digital signal processing, MIDI, and pro audio, while continuing to refine products such as amps and fretted instruments.*

Marcus Ryle

The past decade has brought us the compact disc, stationary- and rotary-head digital tape recorders, digital audio mixers, and numerous digital signal processors. In the new decade, we can expect to see all these digital

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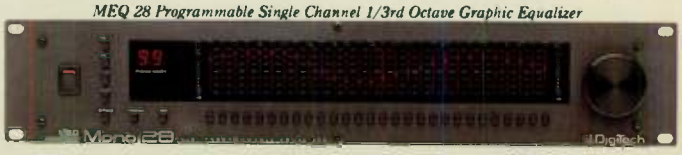
DigiTech

Start at the top

MEQ 28 Programmable Single Channel 1/3rd Octave Graphic Equalizer



MEQ 7 Programmable Quad Channel 1-1/3rd Octave Graphic Equalizer

devices functioning together entirely in the digital domain, and within the economic reach of professional and amateur musicians alike.

The home studio of the future will be able to keep the audio signal in the digital domain from the point where a sound source is digitized (a guitar or microphone into an analog-to-digital converter, for example), all the way to the final mix. The audio would then be converted back to analog before being connected to an amplifier and speakers. In fact, instruments with digital outputs will stay in their digital format throughout the entire production process, allowing a final CD to be an exact copy of what was originally played.

A standardized digital interface for the home studio would have as much impact on our industry as MIDI.

Once an audio signal becomes digitized, the limitations that most home studios have to contend with today (tape hiss, limited dynamic range, patch bays, signal degradation, etc.) will become things of the past. Of course, with each piece of equipment being digital, the entire studio routing and settings can be programmable, allowing for perfect reproduction of mixes and sessions.

For the final mixdown, the most likely device in this digital home studio would be a recordable compact disc (assuming the RIAA doesn't banish it). This device would allow for a digital final mix, playable on any standard CD player.

A standardized multichannel digital audio interface is the key to our digital home studio becoming an affordable reality. With such an interface, the need for individual analog-to-digital (A/D) and digital-to-analog (D/A) converters on each device becomes unnecessary. Stand-alone converter boxes would be able to perform A/D and D/A conversions, and the musician could purchase only as many channels of converters as required. A standardized digital interface for the home studio would have as much impact on our industry as MIDI has had during this past decade.

With the growing advancements in electronics, the cost of the devices described will soon be quite affordable. I believe it will be possible to buy the components of an all-digital multitrack home studio for under $10,000 before the end of the decade.

Marcus Ryle *has been involved in the design and development of the Oberheim Xpander, Dynacord ADS, Alesis HR-16/MMT-8, and the Quadraverb, among others. Ryle is also a keyboard player and programmer, having contributed to albums by such artists as Barbra Streisand, Christopher Cross, Chaka Khan, and El DeBarge.*

Jerry Harrison

I see the future of electronic musical instruments as a return to individual musicians shaping their own sounds. As the power of electronic instruments has grown, the ability to understand how to shape those sounds and custom-tailor them has shrunk. Thus, we have a tendency to become librarians, rather than creators of sound.

We have created a need for middlemen who become conversant and expert at a particular instrument to provide our sounds. I am as enthralled as anyone with the diversity of sounds that are possible, and many of the sounds that one comes across are indeed spectacular. Yet the sheer complexity of these professional sounds can be quite intimidating and further inhibits musicians from learning yet another complicated system. And so, another librarian is born.

Another dilemma is that because these sounds are almost universally available, there is an increasing sameness to the keyboard sounds on both records and, particularly, the demo tapes that have been sent to me. This certainly mitigates against listening to a particular song, because one spends time identifying sounds rather than concentrating on the heart of the matter, what the meaning of the particular song or piece of music happens to be.

ROBERT MAPPLETHORPE

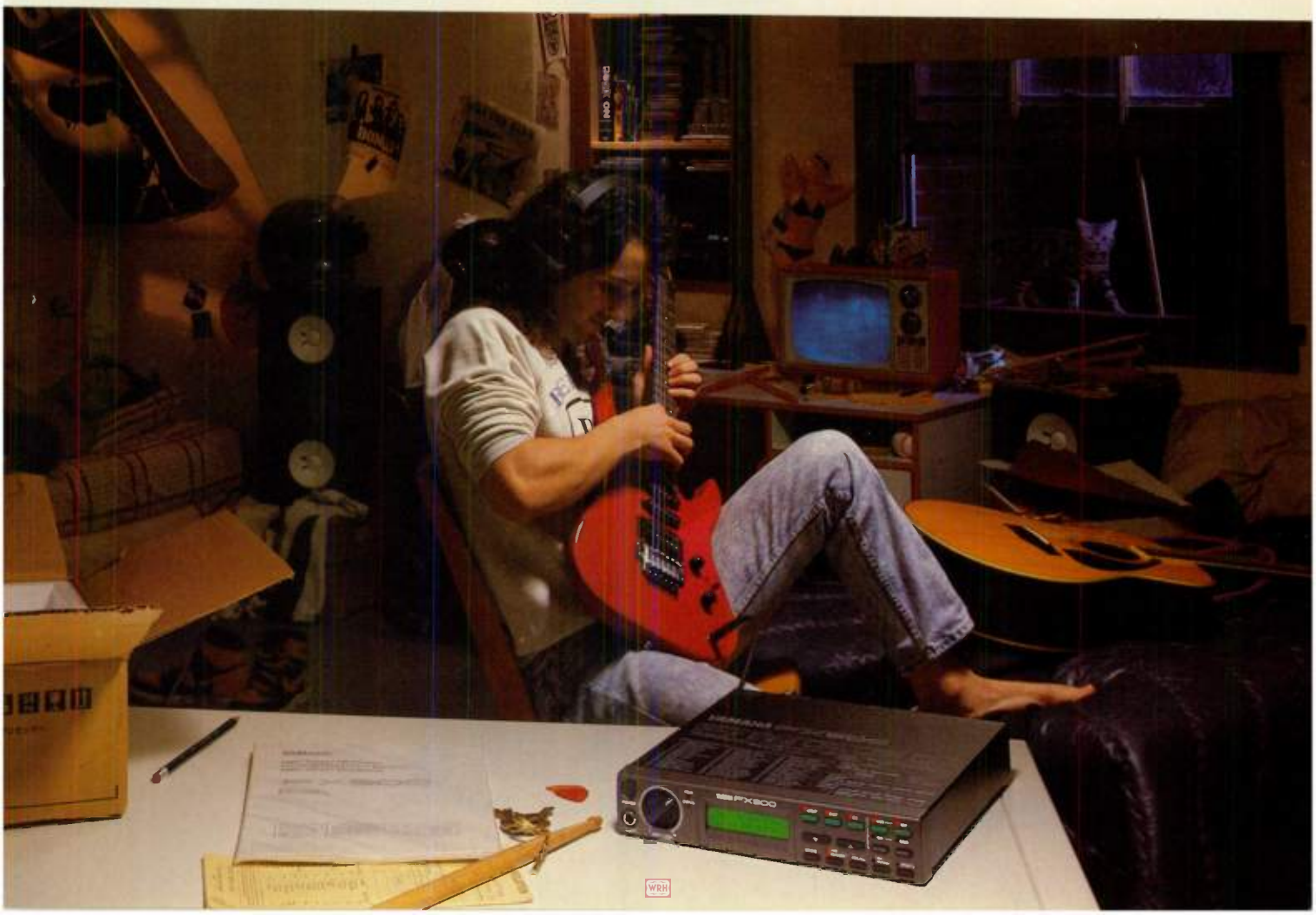
Jerry Harrison

With this in mind, I look forward to more sophisticated editing techniques that can mimic the immediacy of twisting a knob on analog synthesizers. Consequently, I welcome the Lexicon MRC and other devices like it; they represent a good start in returning us to this immediacy. At the recent AES show, I attended a demonstration of an additive synthesis device called the Technos Acxel. The demonstrator stressed the real-time nature of the instrument. His stress was correct, for it is when we have this immediate feedback that making sounds is both fun and intuitive.

Jerry Harrison, *keyboard player for the Talking Heads, started his successful music career with the Modern Lovers. In addition to producing bands like The Bodeans, Fine Young Cannibals, and the Violent Femmes, he leads the band Casual Gods.*

Dave Smith

The past decade saw the complete transition from analog to digital sound generation in virtually all synthesizers, from full professional models to toys at Macy's. Why? New capabilities (FM, sampling, etc.), more reliable operation, and cost. In these days of 16, 32, and more voices, it is impossible to



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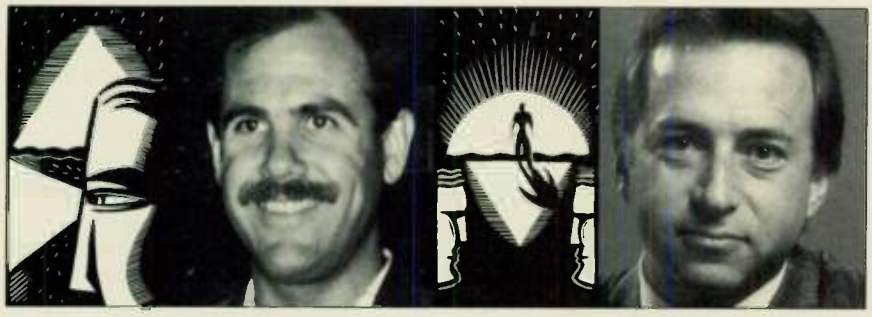


Dave Smith

David Schwartz

build a cost-effective instrument with anything but digital electronics. So, goodbye analog (save those Prophets-5s and Minimoogs).

The next decade will be interesting to watch. There are fewer new technologies available to pursue, and all require a major investment in hardware and software design. Hence, there won't be quick, new sounds. These days, most instruments use some variation of sampling technology, which is fairly easy to design. That also happens to be the reason why everyone is doing it. We instrument designers are all looking at the same new possibilities, but it's going to be a big gamble and take a lot of time to generate the next big hit. Keep in mind that there are so many sounds already available that it is harder for a great new sound to stand out.

But, lest I sound too pessimistic, there are a couple of strong possibilities that could yield some very nice new sounds, especially for nonstatic (i.e., not sample-based), more "natural" instrument sounds. But, since I'm not in a position to discuss these, you'll just have to wait for the instrument(s) to appear. *(Hopefully not too long, Dave.—BO'D)*

Overall, what does the next decade hold? First of all, the software side of things will grow even more (collective groans in the background). Hardware design is only about twenty percent of development in the current generation of instruments and will probably drop in the future.

Along those lines, many people believe that computers will become more inbred to the next generation, but I think otherwise. Personally, I hate using CRTs, QWERTY keyboards, and mice for music work. A perfect interface is a flat (not vertical) large LCD with a touch-screen. It would be fast, self-instructing, and totally soft.

Besides that, I prophesize we will eventually have everything in a little black box that will include multitrack recording (RAM-based), mixing, effects, and every type of synthesis and sound generation desired, and at a reasonable price. It's just a matter of time. And developing a perfect interface. And writing truckloads of software. And getting 16-meg DRAMS and 32-bit DSP processors for two dollars. Well, maybe by the end of the next decade...

Dave Smith *founded Sequential Circuits in 1974 and was designer of many of its products, starting with the Prophet-5. He was one of the designers and driving forces behind the development of MIDI and now works with the new Korg R&D Design Group in California.*

David Schwartz

Among the mighty challenges facing electronic musicians in the future will be the search for magic in the midst of the technology.

Throughout history, great music has provided emotional impact, raising the effect of the song way beyond the limits of artistic competence or credibility. There has always been a synergy at the heights of music whose sum is far greater than melody + lyric + sound + technique. It's the true inspiration, the quality that makes people laugh and cry. It's what makes music an important part of life.

For the last couple of decades we've been pumping up the volume, manufacturing never before heard sounds, and trying to build autopilot controls for our instruments and recording devices. We have all too often mistaken excessiveness for substance, control for imagination.

Technology has long been a friend to the artist. Every new tool has been a

chance for further creative expression, more personalized sound, or a more profound effect on the listener. Each tool has also presented a skill to master, to go beyond the awkward mechanical motion into natural and fluid response.

As we look back, say, 50 years from now, I believe we'll see this relatively short time span of today, give or take ten years, as a critical juncture in music making, where our tool building outpaced our creative musical development. Perhaps when we catch up, we'll see a new Renaissance in music making.

In a relatively short time we will see a maturity in digital recording devices, audio workstations, and digital signal processing devices. We will be lavished with memory capacity due to further breakthroughs in chip designs and storage media. We will be integrating new forms of media into our recording projects, as this new storage space allows us to develop hypermusic productions.

But today is also a time for refinement of the great leaps that have been made recently in technology, a time for smoothing out other rough edges, finding the human side of electronics. It is time for us to rise beyond gimmickry as a substitute for a real statement. It is a time to use our wonderful new tools skillfully in crafting our cultural legacy.

To paraphrase John Sebastian, "The magic's in the music, and the music's in you."

David Schwartz *is editor-in-chief and co-founder of* Mix *magazine (and you didn't even know it was lost). A former recording engineer and studio musician, he also co-founded the San Francisco Music Fair.*

Bob Yannes

The future of electronic music is...brainwaves-to-MIDI.

Well, maybe not. It will be exciting, though. With the advent of high-speed digital signal processors, manufacturers can now experiment with new techniques for generating sound. One trend in synthesis will be toward sounds that are distinctly new, yet have the complexity and quality associated with acoustic instruments. These techniques will be capable of re-creating acoustic instruments, but their real power will lie in creating sounds that can't be produced physically.

The challenge for instrument designers is not in developing these techniques but in mastering them. Turning an abstract mathematical model into a usable (i.e., understandable and friendly) system will take time and effort. This is not to say that wavetable synthesizers are obsolete. Since the sound of a wavetable synthesizer depends on the wave data in memory, there is practically no limit to the range of sounds that can be created; you just need the right data.

On the sampler front, expect more efficient systems. Because products are available now with the desired fidelity, one goal will be to make them more affordable and convenient. Sophisticated data encoding will allow samplers to hold more sounds, store more sounds on disk (or other storage media), and access sounds faster, yet still sound great. The idea of a "1-bit" sampler won't seem ridiculous (although it will confound techies who judge products solely by their spec sheets). Samplers will also approach the level of convenience offered by synthesizers, further increasing their usefulness.

Beyond instruments themselves, the market trend is toward home recording, hobbyists, and composers, with continued emphasis on personal studios and "workstations." Some see this as a move away from performing musicians and traditional bands, but this is actually healthy growth and a new direction for the industry. People who could never perform "traditionally" or who have no inclination to do so will have the freedom and tools to create their own music.

There are also problems ahead. The extensive use of custom integrated circuits and proprietary software is making it nearly impossible for "hackers" to hot-rod their products as they've done in the past. The complexity of new products has raised the technological ante sufficiently to force many companies out of business. It also prevents new companies from entering the market. This is one of the unfortunate characteristics of a maturing marketplace.

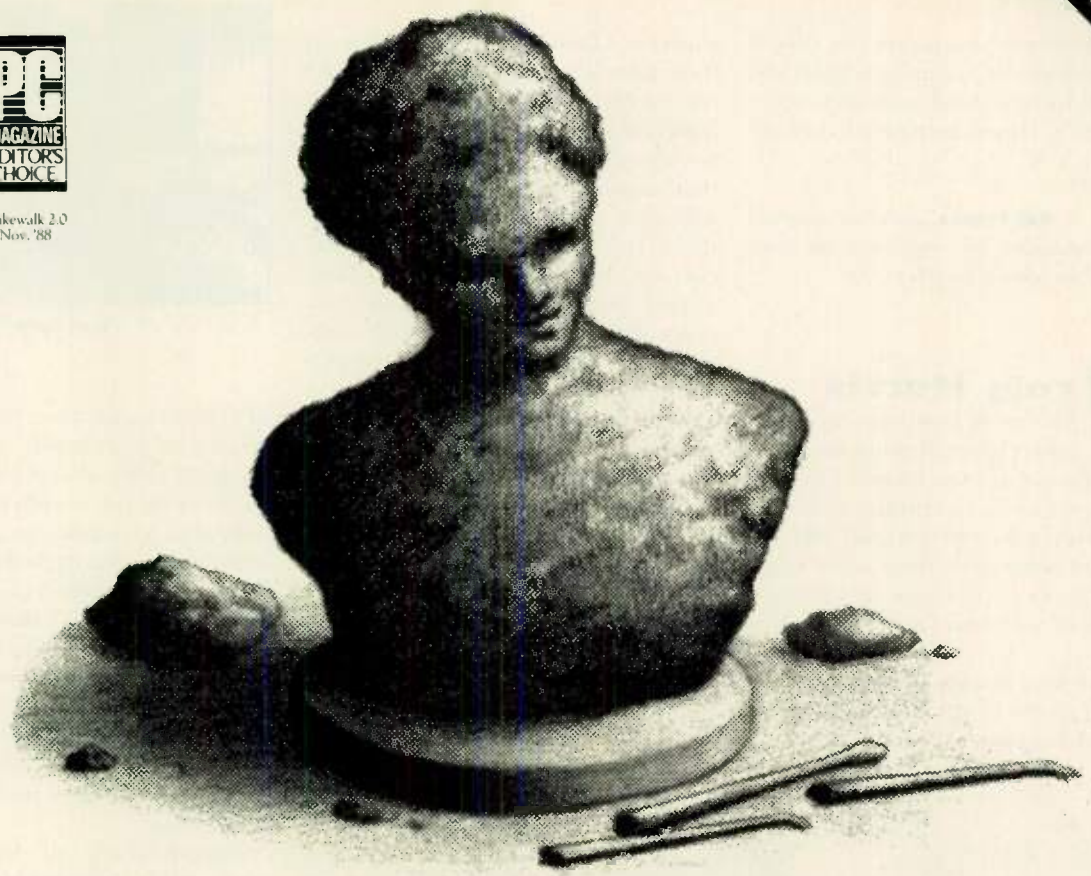
Expect the frenzy of technology to slow down as manufacturers attempt to recoup their development costs and efforts. Products will require longer market life to allow time for long-range development. This may come as welcome relief to musicians still trying to figure out how last year's products work.

Of course, the future of electronic music is a cooperative effort. While

NEW

MAGAZINE EDITOR'S CHOICE

Cakewalk 2.0
Nov. '88



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equipment manufacturers can supply the creative tools, it's up to readers like yourself to take those tools and create the future. (Insert inspirational music here...)

Bob Yannes, *one of the designers of the Commodore 64 computer, is one of the original founders of Ensoniq Corp.*

Craig Harris

Craig Harris

The use of electronics and computers in music is not simply an aberration. For over 60 years people have been using electronics in music, and for more than 30 years this work has included computers. What is not as apparent is the impact these new musical resources will have on our musical world.

There have already been remarkable achievements in the building of new musical instruments and musical resources. Considering how different these sounds and processes can be from our traditional conceptual and musical framework, a leap to understand what lies ahead stretches far beyond what we now know about how these instruments will work and about how we will use them. This goes further than MIDI and current synthesis/processing techniques, and also beyond traditional concepts about piano or organ keyboards, strings, drums, or even physical objects as instruments.

While one can simulate traditional instrument sounds and the musical processes of traditional music, this new technology offers an opportunity to develop fundamentally different instruments and musical resources. Unlike instruments with fixed acoustical properties and playing methods (strings, brass, etc.), computers have no inherent sounds or musical processes. This technology lets us design the instruments and the way of working with them dynamically, i.e., as we need them for a specific context. In this sense, restriction resides largely in the limitations of our imagination, whether we are designing and building the instruments, or whether we are using them to make music.

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An example of one specialized instrument is "The Hands," developed by Michel Waisvisz at STEIM in Amsterdam. This instrument is worn on your hands and can be dynamically configured to react in a variety of ways with the sounds and processes unique to a specific composition. Paul McAvinney at Carnegie-Mellon University has designed the VideoHarp, which senses gestures on a harp-like tablet and can be programmed to respond with sound. Extrapolating from this, it is possible to envision in the future a large "configurable space," which includes computerized display tables and walls, holographic images, and multidimensional sound.

Hypothetically, all elements will be configurable dynamically with any kind of visual templates for creating and performing music, sensitive to touch in ways designed according to specific musical contexts and capable of using any sounds and combinations of sounds imaginable. It is even conceivable to construct "sensitive space"—configurable, touch-sensitive, raw space—where size, shape, depth, sound, spatial characteristics, and styles of interaction will all coincide directly with the creative intent. This will be a completely integrated creative environment where the artist will control the machine, rather than the machine controlling the artist, allowing a musician to follow the natural flow of the creative energy, rather than being forced to fit into ways of making music that are imposed by a machine.

The challenges with this technology are to discover its fundamental nature as an expressive musical resource and to resist residing in familiar places simply because they are comfortable.

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In Craig Harris's "studio of the future", musicians will be able to configure the resources of the total environment according to specific creative contexts.

Craig Harris *is a San Francisco-based composer and multimedia artist, who also writes about music and does research in futuristic simulations of musicians' workspaces. He received his Ph.D. in Composition at Eastman School of Music, University of Rochester.*

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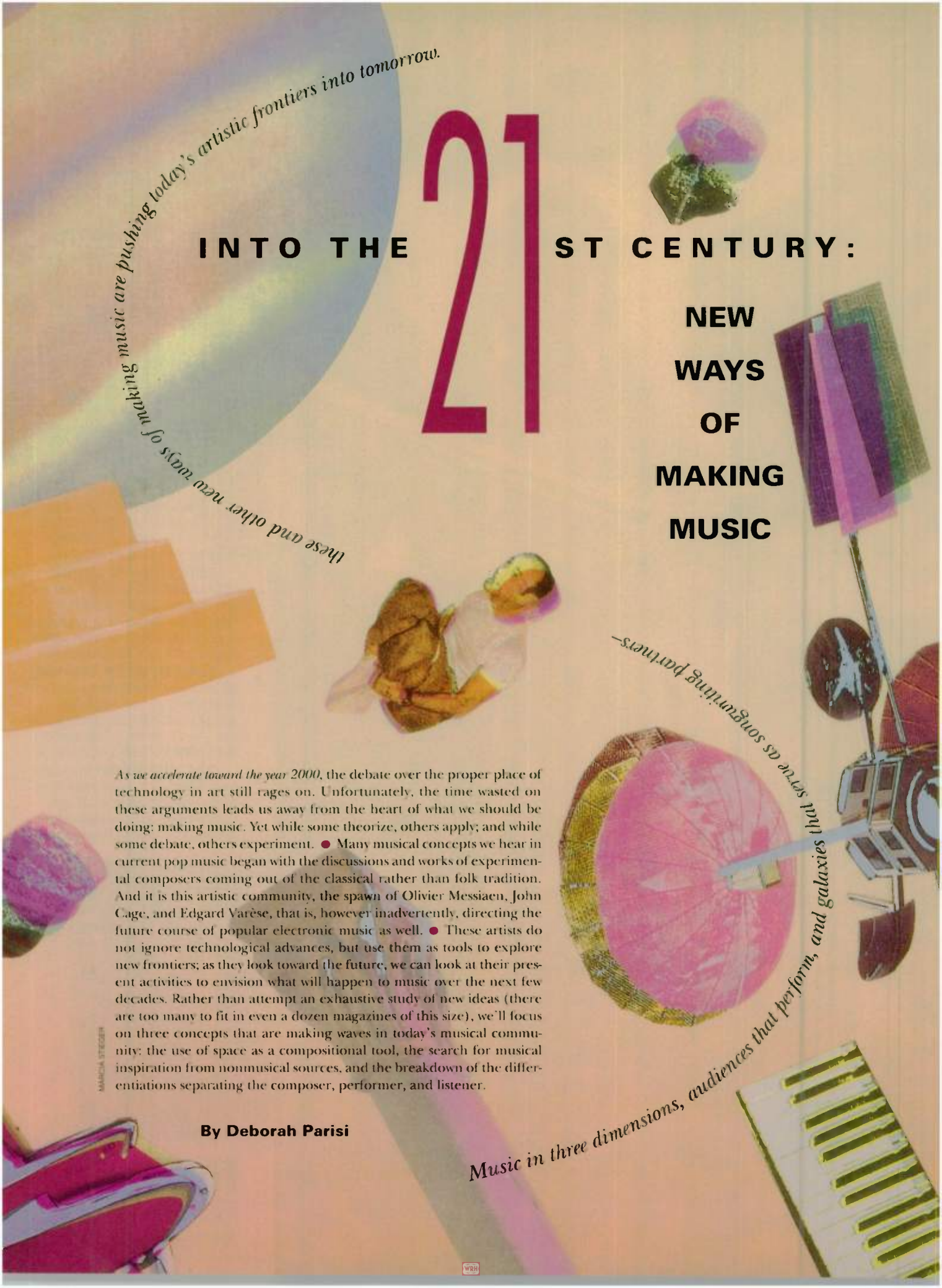
NEW WAYS OF MAKING MUSIC

Music in three dimensions, audiences that perform, and galaxies that serve as songwriting partners—



As we accelerate toward the year 2000, the debate over the proper place of technology in art still rages on. Unfortunately, the time wasted on these arguments leads us away from the heart of what we should be doing: making music. Yet while some theorize, others apply; and while some debate, others experiment. ● Many musical concepts we hear in current pop music began with the discussions and works of experimental composers coming out of the classical rather than folk tradition. And it is this artistic community, the spawn of Olivier Messiaen, John Cage, and Edgard Varèse, that is, however inadvertently, directing the future course of popular electronic music as well. ● These artists do not ignore technological advances, but use them as tools to explore new frontiers; as they look toward the future, we can look at their present activities to envision what will happen to music over the next few decades. Rather than attempt an exhaustive study of new ideas (there are too many to fit in even a dozen magazines of this size), we'll focus on three concepts that are making waves in today's musical community: the use of space as a compositional tool, the search for musical inspiration from nonmusical sources, and the breakdown of the differentiations separating the composer, performer, and listener.

MARCIA STEGER

By Deborah Parisi

SPACE IS THE PLACE (AND A COMPOSITIONAL TOOL AS WELL)

The idea that space can make a musical contribution to performance is hardly new. As far back as the 16th century, composers and conductors placed vocalists and instrumentalists in different locations, using the physics of airspace and the intangible aspects of geometry to explore new dimensions in music. Edgard Varèse carried this concept to an artform and actually collaborated with the architect LeCorbusier on the design of a building (the Philips Pavillion at the 1958 Brussels World's Fair) where the first performance of "Poème Electronique" would be held. Combining over 400 loudspeakers with a light and slide show, the direction from which a particular sound emanated brought a new physicality to electronic music.

Many have continued along this path, but perhaps none as arduously and lovingly as Stanley Schaff, who, with equipment designer Doug McEachern, has explored the concept of placement and movement of sound and space for over 30 years. Beginning with a mobile unit controlled by a specialized console that could route sounds to nine speakers, the pair have now designed and built their own facility in San Francisco, called Audium, which currently uses 136 speakers. It may be testimonial enough to the success of Schaff's work that Audium still exists, after thousands of performances of seldom-changing works.

"Technology has a way of pushing us, in almost an unconscious way," Schaff says of his life's work. "It's interesting to parallel the age we're in to what was happening in the Renaissance. At the beginning of the Renaissance, artists simply did not see three dimensions when working with a two-dimensional space, or, at least, they were unconscious of the fact that it was very important visually. Then, as people began to dip over the horizon and find they wouldn't drop off to Hades, space consciously became something that was viable. And artists began to find ways to express space, so visually the two-dimensional plane became three-dimensional.

"I don't think the musician today is conscious of space, except in a very vague, intellectualized way. And that's what Audium touches. It pushes the sound so that it becomes a viable spatial context, and you begin to sense that this is the time we're in now, in sound."

The design of the building itself is of

paramount importance to the resulting experience for the audience. Seating is arranged in concentric circles, with the control station along the back wall, always manned by Schaff. Speakers are carefully placed everywhere—under the seats, hanging overhead, behind and in front of the audience—not at all haphazardly, but based upon the years of experience Schaff has devoted to the space.

Inside Audium

"The overriding realization that emerged from our early endeavors was that the sound was beginning to be free, to be something quite different," Schaff explains. "As we began to pursue that notion, to free it up as much as possible, we began adding points in space, first including more speakers and then more ways to drive the sounds through multiple speakers.

"Then the environment itself began to be important, and in a way became another kind of language—the way the audience sat, the lighting, the whole ambience—all of it began to speak of a special kind of language. The space itself is a new kind of instrument; it is something to be played, to be performed, to be shaped.

"This kind of environment challenges our perception of the way we experience our listening, even though it's natural, in the sense that space is always around us," he continues. "But we really magnify it. The sound itself becomes free to be itself in full time, in full space. It isn't visual geometry; you can't measure and divide it up in a nice, 'inches and feet' way. It's a combination of points in space, but also an interior space, too, which become somewhat tied together."

Schaff feels that this revolutionary concept of sound and space may encourage future generations to get out of their houses again and actually attend contemporary music concerts. "What Audium represents, in a way, is a place where much of contemporary music should have been performed. Part of the problem has been that we've been trying to put a 20th-century kind of language, which is this new technology, into a 19th-century wrapper. And it doesn't work. Audium gives the sound an opportunity to really get to you, because you're in the middle of it. You become a part of it.

"Audiences are in need of a new form of entertainment," he concludes. "With television, we practically have theaters in our own homes. When people go out, they want something different; they want to be taken to a place they haven't been before. And that's why I feel that the environment itself is perhaps the next great adventure for the artist, to explore new avenues of creation. Audium in itself is not the thing. I see it as much more of a beacon pointing to an infinite number of new doorways through which we can walk."

Stanley Schaff

There are no commercial recordings f Schaff's work, since a pair of stereo speakers simply cannot re-create the effect of his labor. And for similar reasons he cannot tour around the country to promote the powerful imagery of his compositions. Nevertheless, his persistence has begun to reward him with national exposure, and he seems nowhere close to giving up on the dream. His vi-

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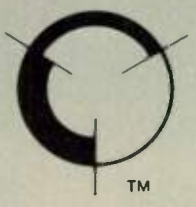

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sion of the future theater beckons us all to explore the compositional changes and performance possibilities opened with these beginning steps—steps into the 21st century that could be modified to fit into our own living rooms.

NEW SOURCES, NEW MUSIC

With the current state of synths and sound modules, packed to the brim with snappy presets, it's easy to forget that what was initially so exciting about electronic instruments were the new sound possibilities and the new forms of music that would arise from those fluctuating oscillators. While many major-league acoustic hitters still pursued the 12-tone strategy of Schoenberg, many early electronic musicians found that the power of manipulation over sound waves encouraged a freedom from the concepts of pitch, form, rhythm, and timbre that had held back composers of earlier Western music.

Since the 1950s, some composers have taken this concept even further, realizing that musical inspiration can actually begin with nonmusical sources. Since computers could analyze and extract all forms of data from natural resources (the topography of a particular geographic area, for instance, or the intensity and rhythmic pulse of a mountain stream), there was nothing to stop them from using these ones and zeros to create audible analyses as well. In some cases, the "composers" become translators, playing tapes of an ego-less music that begins and ends with computer-generated information; in others, the data music was used as a backdrop or grounding for human-inspired melodies played over the top.

Fiorella Terenzi at the Eclisse Studio in Milano, Italy

Fiorella Terenzi has combined her passion for music (having studied piano, composition, opera, and voice in her native Italy) with a knowledge of science—she recently received her doctorate in physics with a specialization in astrophysics from the University of Milan—to carry these concepts yet another step. As a researcher at the Center for Music Experiment, University of California-San Diego, her composition "Music from the Galaxy" has come closer to its finale.

"Basically, what I'm doing is collecting radiation from another galaxy and turning it into sound," she says in a rich Italian accent. "The actual collecting is done by staff researchers, astronomers, and astrophysicists, who in this case are studying a galaxy called UGC 6697. They collect the radiation using a huge radio-telescope, which is like a big antenna, and send the data directly into the computer at the University of California at San Diego's Center for Music Experiment. What is received are numbers representing the radiation coming from the galaxy.

"Usually in astronomy you use that data to produce an image for photos of the stars. What I want to do is say: Okay, you receive light from the sky, but you receive other kinds of radiation as well. You can receive X-rays, gamma rays, and electromagnetic radiation, which will let you hear what's going on in the universe. So I display on the computer the waveform representing the emission of the galaxy. Once I have the waveform on the screen, I have to take a big step because the radiation is received at an impossible frequency to be heard by human beings. Humans can only hear between 20 to 20,000 Hz; galactic radiation is at about 1 gigahertz (1,000,000,000 Hz). So with the computer I translate the data into the 20 to 20,000 Hertz portion of the spectrum."

Terenzi uses a sound synthesis language called cmusic (created by Prof. F. Richard Moore at the University of California, San Diego, Computer Audio Research Laboratory) to turn the numerical data received from the galaxy into a class of sounds for use in her music. (For more on computer music systems, see "Beyond MIDI: The Return of Computer Music" elsewhere in this issue.) The computer information is then processed through a digital-to-analog converter and played through conventional loudspeakers.

Terenzi explains that this particular galaxy transmits a very low frequency, which will make up a four-hour loop.

Basically, what I'm doing is collecting radiation from another galaxy and turning it into sound.

"And at the same time there are high frequencies that appear over the low spectrum," she says. "The sound is very complex and is not regular, because the galaxy itself is an irregular astronomical object. In the future, I would like to study a pole star, which would give me a beat every second. But this galaxy is interacting with an intergalactic medium and is thus quite complex."

Having a four-hour loop of galactic sound does little by itself, of course; Terenzi composes music based on her tonal translations of the pulses. "Then I use the sound to compose galactic music. I study the sound of the galaxy and try to recognize the intonations of this sound. This galaxy seems to be tuned at about B-flat, so I use a big ground sound from the galaxy, and over the ground I play different synthesizers, or I play oriental musical instruments to compose in a style respecting the sound coming from the universe. I can break the sound of the universe into small samples as well, two to three seconds long, and then loop the galactic sound and use the galaxy as a drummer. Or I can play a melodic line using the sounds from the galaxy, choosing a particular piece of the complete sound."

Terenzi's choice of galactic radiation as a stimulus for musical creation challenges the imagination: to what other nonmusical sources can we turn? Everything from a few grains of sand steadily dropping through an hourglass to the unexplored vastness of the ocean's depths calls us toward a new form of

composition, reflective of the environment in which we live and of the outer regions we can barely imagine.

THE END OF TRADITIONAL ROLES

If you were to search for the one philosophical conflict that caused the most heated arguments within the artistic community in the last 50 years, no doubt you'd encounter the principle of indeterminacy. With the early work of Karlheinz Stockhausen through the overwhelming challenge of John Cage, determining how much chance could be incorporated into music while still being able to call it music is a question many people have tried to answer.

Working within that philosophical realm and creating some strikingly beautiful and meaningful music along the way, are Barton and Priscilla McLean. In the '70s, Barton McLean directed university studios in which the first commercially produced digital sequencer-based system (Synthi 100) and the first sampler (Fairlight) were operational in this country. In 1983, the McLeans left university life in favor of touring internationally as The McLean Mix, an electroacoustic duo.

A bicycle wheel provides an unusual sound source.

Barton McLean tries to balance determined composition with random factors by inviting audiences to participate in the performance of his works. "I've become very interested in sharing creative work with the audience," he explains. "I think for too long the concert music scene has been such that the audience is in one category and the creator is in another category. So what I try to do is to figure out ways in which the creativity can be shared.

"Perhaps the most successful of these pieces to date has been 'Rainforest.' The listener walks into a large space and is immediately confronted by some very evocative sounds that are vaguely reminiscent of a rainforest, with a constantly shifting low bass pedal. It's the kind of music that is complete in itself but is also the kind that invites additions. And that's exactly what the listeners do. There are between five and eight stations throughout the hall, where listeners sit down and, after viewing very simple instructions, can proceed to add to the existing sounds in the hall.

"A station could be a keyboard, or it could be a microphone, where the listener can play an instrument if one is available. One of the stations includes my amplified bicycle wheel, which I put on a balsa wood box and amplify with contact mics, then send through digital processors via a mixer with routing capabilities, so that the bicycle wheel sounds like a huge orchestra. It can be bowed or stroked with various mallets that I have handy.

"The sounds are chosen ahead of time to be compatible with one another regardless of the order in which they are played. So no matter what the keyboardist plays, it will fit in with the already existing structure." This emphasis of sound over melody, harmony, or structure is one of the principle ingredients of much of contemporary music; McLean, however, takes the concept out of the realm of the obscure and provides a creative social environment.

"For too long we have divorced music from our social processes," he says. "It is unfortunate that the only viable Western ways of integrating music with social interaction are the current pop forms, and I think that classical music has an enormous contribution to make in this way. There is an ongoing creativity at all times in these performances, which is shared and compared with the creativity of the other people in the room. A lot of conversation goes on, a lot of interaction...this is very much a social phenomenon."

When asked what all this may do to the future of music, however, McLean describes a scene that's anything but social. What happens when you take the concept of interactive CDs to the extreme?

Barton and Priscilla McLean

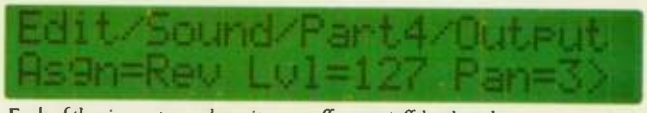
"Imagine yourself walking into a combination record store and software store in the year 2000," he suggests, "and buying something that resembles a compact disc, which would easily have over 1 gigabyte of memory. You take this home to your home control center, not unlike a computer, drop it into a drive, and the piece could be played very similarly to the compact disc of today.

"But this disc would also contain the equivalent of any number of synthesizers. Placing the equivalent of ten or twelve synthesizers in software plus a bunch of processors and mixing devices on the CD itself would be simple. You could easily re-create a Korg M1, an Emax, a Synclavier, a Waveframe, a Prophet 3000, and a Roland D-50 in a software base where all of these modules could be accessed easily and customized through the control center. It's already happening in a primitive way with such products as Digidesign's recently released Sound Tools.

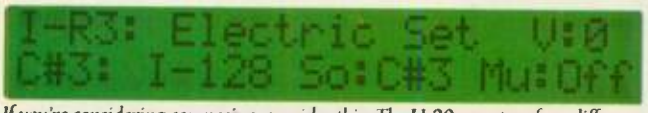
"The listener will start listening to the music and then, with a *HyperCard*-type application, will be able to press buttons to enter a number of levels of hierarchy in order to change the music in various ways. The first level may be very simple—you could change the equalization and some trivial parameters. But you'll have choices over the things that you want to affect, and each time you make a choice, that menu will come down and you'll have a bunch of new choices, so you keep blossoming out until you have an infinite number of choices on the lowest level."

What McLean is suggesting involves the destruction of the distinction between the music, the software, and the hardware—a distinction that has remained unquestioned since the first electronic tones were produced. And it's this boundary-basher that excites

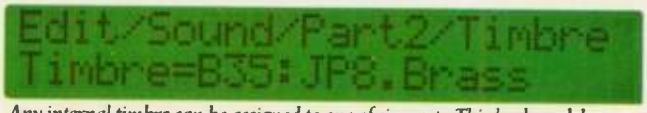
The U-20 can store 8 chord "sets," each consisting of a different chord assigned to each pitch in the octave.



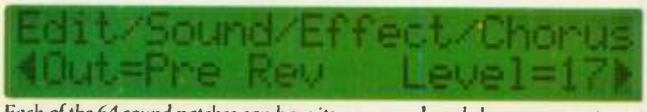
Each of the six parts can have its own effects on/off, level, and pan setting.



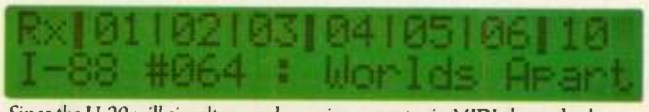
If you're considering composing, consider this: The U-20 can store four different drum and percussion arrangements, each with its own key assignment, level, panning and tuning.



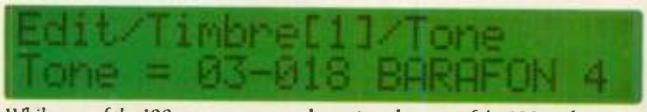
Any internal timbre can be assigned to one of six parts. This keyboard, by the way, is multi-timbral with a 30-voice polyphony, making it ideal for live performances.



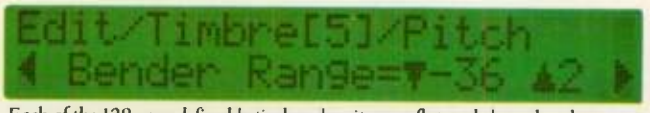
Each of the 64 sound patches can have its own reverb and chorus parameters, with each part being assignable to just reverb, just chorus, or both.



Since the U-20 will simultaneously receive on up to six MIDI channels plus a rhythm channel, you can create entire arrangements with an external sequencer, and split or layer up to six sounds on the keyboard.



While any of the 128 preset tones can be assigned to any of the 128 timbre locations, more exotic instruments can be accessed via U-Series ROM cards.



Each of the 128 user-definable timbres has its own flat and sharp bender range, making things like "whammy bar" solos as easy as the proverbial flick of a wrist.

One size fits all.

If we were to tell you that our new U-20 RS-PCM Multi-Timbral keyboard was perfect for any kind of performing, you'd probably mutter something about truth in advertising and go on about your business. So instead of telling you this, we'll let you come to that conclusion all by yourself.

And the reason we expect you to is this: The U-20 possesses an extraordinary diversity of sounds—to the tune of 128 multi-sampled tones, including both acoustic instruments and popular synth sounds, as well as a staggering array of drum and percussion sounds.

And since these sounds are the product of a Re-Synthesized Pulse Code Modulation technology, their quality is remarkable. (Basically, RS-PCM allows sampled sounds, which normally require massive amounts of data, to be re-synthesized so that they deliver great sound quality without taking up a great deal of memory.)

And because of a new, high quality signal processing, you can be as expressive with the sounds as you wish. The Roland U-20, unlike most sample playback machines, offers attack and spectra sounds that enable you to actually "synthesize" your own sounds.

All of which led one magazine to suggest, "...the only problem you'll probably have with the U-20 is finding enough time to explore everything it has to offer!"

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McLean the most. "The tremendous separation we have today in buying a synthesizer in a store and its ultimate realization in a piece of music is insurmountable to around 90 percent of the people that might be interested," he says. "That reality in effect inhibits and even destroys the capability of electronic computer music to be what it could be.

"By the year 2000, hardware companies will be pretty much out of business," he ventures, "although there will be a lot of activity in controllers, in various intuitive ways of controlling sounds, probably in the form of plug-in boards.

"We are seeing already a breakdown in the amount of actual music that is getting listened to, while at the same time we are seeing a tremendous upsurge in the amount of music being produced. It will be enormously easy to produce a piece on a CD, but it will be almost impossible to get someone to listen to it because everybody else will be producing music also. The real activity will be a creative one. Everybody will be creating because creativity will be so intuitive and demand such a short learning curve. And the composer will not be composing set pieces as such, but working with software companies to produce pieces that can be broken down by the listener and reassembled. This will be the cutting edge of the composer field."

CHANGING THE WAY WE CREATE

When you combine the basic tenets of these three forces, the possibilities for the individual's future as a composer gleams enticingly. If we are to expect increased user-friendliness in software, coupled with new, intuitive control over sound, along with new sources for inspiration and physically dynamic spaces in which to experiment and perform, we can also expect a resurgence of admiration for electronic and computer music.

How these revolutionary experiments will affect music as a whole depends solely on you—the chances you're willing to take, the imagination you're willing to invest, the vision you're capable of creating. Opening your mind now to the possibilities for the future brings the dreams of tomorrow one step closer.

Deborah Parisi *is a freelance writer in Poulsbo, Washington. With degrees in music and English, her career options became obvious. In her spare time she plays keyboards and bass guitar, raises Golden Retrievers, and writes drama and fiction.*

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Beyond MIDI:

The Return of Computer Music

By
Dennis Miller
and
Richard Boulanger

AS A MIDI-BASED MUSICIAN, you have surely experienced the frustration of running out of synth voices, having too few mixer channels, or not having enough effects. You've probably solved the problem by trading up to a new synth with more voices, a more expensive mixer, or a fancier multi-effects unit. But imagine if you could just type a few lines into your word processor and get 100 more voices, 200 new channels, or 60 more reverbs. Sound crazy? Well, computer music composers have enjoyed this power for years and today you can, too. Better yet, you don't need a Ph.D. from Stanford or MIT to do it. The answer is *software synthesis.*

Software synthesis gives you all of today's digital synthesis and signal processing techniques and allows you to use them in any combination. It provides you with an unlimited number of individually controllable voices and is, in essence, the equivalent of hundreds of the most powerful MIDI synthesizers. In its best implementation, it represents a true integration of composition and sound design. How does it do this? The answer lies within the computer program. In this article, we'll look at one specific music synthesis program called *Csound* and explore some general concepts.

PAMELA PRICHETT

IN THE BEGINNING...

Many of today's commercial synthesizers evolved from mainframe-based synthesis techniques developed over the years at research centers such as Stanford, MIT, the University of Illinois, and, of course, Bell Labs. FM, for example, was developed by Dr. John Chowning at Stanford and licensed to Yamaha for use in its DX and other models. But remember, MIDI did not exist until the early 1980s, so these researchers and composers have always used other means to control the sounds they created.

The first computer program to synthesize sound and control its output was written by Max Mathews and his associates at Bell Labs in the late 1950s. This early program evolved over the next few years into a highly sophisticated sound synthesis language called Music V. Music V, and its more recent descendants, provided the composer with a means to design digital instruments using sound-producing and processing modules called "unit generators," and to manipulate these instruments with extreme precision. These generators were actually little subroutines, invisible to the user, that performed certain operations when called up by the composer.

Music V's modules resembled, for the most part, the sound-producing components of analog synthesizers but were expressed as mathematical algorithms buried deep within the program. Included were components such as oscillators, reverbs, delay lines, and filters. Instruments were created by "patching" together a series of generators and assigning to them whatever values were needed by a particular module. A musical score was then created in the form of a "note" or "event list," which specified when and for how long each instrument was to sound. When the instruments were instructed to "play" the score, the program generated a digital representation of the sound (i.e., the samples), which it stored in "soundfiles." These soundfiles were sent to a digital-to-analog converter for playback on demand. The program did not run in real time; the ratio of computation time to actual music could run as high as 100 to 1.

BACK TO THE FUTURE

The Music V model is used in a commercially available program known as Csound. Written in the C programming language by Professor Barry Vercoe of MIT (see sidebar), Csound runs on the IBM, Mac, NeXT, or any UNIX-based computer, but is being marketed primarily for the IBM world. (Another related program, called *cmusic*, written by F.R. Moore from the University of California at San Diego, is not commercially available.) Csound is a highly sophisticated language that gives the composer vast control over the design of instruments and the way they are performed, and has sophisticated capabilities which allow the composer to define certain "conditions" under which events will take place. All this control clearly comes at a price—you won't find the slick, intuitive user-interface characteristics of most MIDI software. Instead, you'll be typing like crazy as you "code in" the various values and parameters that your instruments and score will need. You'll need to beef up your computer system by adding digital-to-analog (D/A) and analog-to-digital (A/D) converters, not an inexpensive proposition. The reward, though, is a level of control you will not get from your sequencer.

WHERE IT BEGINS

Working with Csound starts by designing one or more instruments in an *orchestra file*, a standard ASCII text file that can be created in almost any commercially available word processor or text editor. Our example (**Fig. 1**) begins with a line specifying the desired sample rate for the set of instruments. Most composers will work at a sampling rate of around 20 kHz because that rate represents a good trade-off between sound quality, computation time, and storage requirements; one minute of stereo sound at a 20K rate will require about 2 ½ megs of storage.

On the next few lines of the file, we've designed an instrument and named it "instr 1," referring to it as such when we create the score. Line 3 shows the first unit generator, an oscillator, which Csound calls "oscil." Every unit generator produces some "result"—it either makes a sound or modifies one. Label the result of this oscil "a1." We also have

BARRY VERCOE, THE MAN BEHIND THE BYTES

Barry Vercoe is indisputably one of the most important contributors to the growth and development of computer music today. His three software synthesis languages, ***MUSIC 360, MUSIC 11,*** and ***Csound,*** have supported the creative work and musical research of more composers and scientists over the past twenty years than any other. Most importantly, Vercoe is first and foremost a composer, whose inspiration and insights are drawn from his desire to develop tools that are rich enough to address the diverse compositional needs of the broadest possible base of contemporary composers.

Vercoe wrote his first software synthesis language, MUSIC 360, in 1969. The composer would input a score by punching holes into paper cards—one card for each note. Tedious as this may seem, the program was used at some 40 universities and produced over 100 major works.

In 1971 Vercoe was invited to establish an electronic music facility at the Massachusetts Institute of Technology. His first two years were spent designing a real-time digital synthesizer, and he wrote MUSIC 11 as a means of working out his hardware ideas in software. Unfortunately, this language was written in such a way that it could only run on limited hardware, so in 1984 Vercoe decided to rewrite MUSIC 11 in the more portable C programming language, and Csound was born.

Most recently, Professor Vercoe has achieved a major breakthrough by rewriting Csound so it will run in real time on a Mac II. This advance was made possible by the use of a digital signal processing (DSP) chip, the Motorola 56001, which provided an inexpensive source of high-speed audio processing. Vercoe has also added many new unit generators to Csound, including several that support MIDI input devices.

THE MORE THINGS CHANGE, THE MORE THEY STAY THE SAME.

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to give the oscil three values: amplitude, frequency, and a number that references a statement in our score containing a description of its waveshape. We could set the first two values here, for example, "1,000" for amplitude and "440" for frequency, but that way the instrument would only be able to play one note at that amplitude. Instead, we'll use pointers that say, "Go look at the score to get these values." The oscillator will get its amplitude from the fourth column in the score, which we'll refer to as "p4," and its frequency will come from column 5, or "p5." Line 1 will contain the waveform.

What happens to the sound the oscillator creates? Well, the "output statement" on line 4 sends the "a1" statement from line 3 to an output.

Think of this line as the patch cord between your synth and your amplifier (by way of a D/A converter, of course). Line 5 merely tells the program that we're done designing this instrument.

At this point, you could add reverb, or numerous other effects, or you could design another 50 new instruments. For now, let's take a look at a score.

THE BIG SCORE

The first thing we need in the score (**Fig. 2**) is the function statement that describes the oscillator's waveform. We've told the oscillator to look for "statement 1," so we'll put an "f1" for "function statement #1" at the beginning of this line. Using a set of routines called "Generative functions" (Gen functions) we can build any waveform we want by specifying its individual frequency and amplitude components. Let's start out with a sine wave.

You'll see in the f-statement (see line 1 in Figure 2) that we only need a few values to define this waveform. After the "f1," you'll see a "0," which refers to the start time for this function; the number "512," which specifies the size of the wavetable; and a "10," which refers to the specific Gen function we are using to build the wave. Gen function 10 assumes we want in-phase, harmonic partials, so by specifying a partial's number, we are also defining its frequency in a ratio to the fundamental. How many partials in a sine wave? One, of course, so we end the line with a "1" to represent the fundamental.

How about some sound? Immediately following the f-statement we created some "note-statements." The first column in lines 2 through 9, "i1," tells Csound to use instr 1 from our orchestra, which at this point is the only instrument available. Column 2 represents the note's start time, while column 3 is its duration (both measured in seconds).

A Csound Instrument

```
1) sr=20,000;          sampling rate
2) instr 1;            name of instrument
3) a1 oscil p4,p5,1;   unit generator with amp, freq, and waveform #
4) out a1;             output to amplifier
5) endin;              all done
```

FIG. 1

A Csound Score

```
1) f1 0 512 10 1 ;     function statement describing waveform
```

p1 (inst no.)	p2 (start time)	p3 (duration)	p4 (amplitude)	p5 (frequency)
2) i1	0	1	1,000	440
3) i1	1	1	2,000	494
4) i1	2	1	3,000	554
5) i1	3	1	4,000	587
6) i1	4	1	5,000	659
7) i1	5	1	6,000	740
8) i1	6	1	7,000	831
9) i1	7	1	8,000	880

FIG. 2

A linseg for Frequency Envelope

```
          [1st value]   [duration]   [2nd value]   [duration]   [end value]
k1 linseg (p5 x .1),    (p3 x .9),    (p5),         (p3 x .1),    (p5 x .1)
```

FIG. 3

A Csound Instrument with Reverb and Envelopes

```
1) instr 1
2) a1 oscil p4,k1,1
3) a2 reverb a1,1
4) out (a1 x .25) + (a2 x .75)
5) endin
```

FIG. 4

We told the instrument that it will find its amplitude in column 4 so we'll build a nice crescendo by raising the level of each note. The frequency values are stated in column 5 in cents per second, or cps; it's an A-major scale.

Of course, you could also build chords by having all the notes playing at once (just give them the same start time), or you could create numerous delay effects by letting each note start, say, 100th of a second after the previous one. Since we're working with cps for pitch, microtonal scales constructed of any intervals would be a snap, while tempo changes merely involve adding a simple, one-line "tempo statement" anywhere within the score.

We haven't said much about processing yet, and we certainly haven't designed a very sophisticated instrument, so let's see what can be added to the picture.

FIX IT IN THE MIX

So far, the instrument has no envelopes. We'll use another unit generator called "linseg" to build an envelope for frequency (see Fig. 3) and use its output to modify what the oscillator finds in p5 of the score. This linseg will only serve a controlling function, so we'll label it "k1" for "Control Statement." We'll save the "a's" for things we want to hear.

A linseg in Csound needs a starting value, a duration for each segment (relative to a note's duration as stated in p3 of the score), and an end value. Although you could use a couple of thousand break points, let's just start with two.

Look closely and you'll see that we start at 10% of the value of p5 ("p5 x .1"), move to the full value of p5 over 9/10th of the total duration ("p3 x .9"), then move back quickly to the starting value in the remaining time.

The effect will be a long, slow gliss upward followed by a rapid gliss down on each note. The last thing we have to do is switch the oscillator's frequency value from p5 to k1—that way it will use our linseg instead of just the value it finds in the score (see Fig. 4).

You could also use an envelope for amplitude if you created another linseg and substituted it for p4.

EFFECTS, E F F E C T S . . .

So what about processing? Multi-effects units are hot these days, and Csound knows all about reverb, filters, delays, etc. It has built-in unit generators for these and other effects, any or all of which can be used in any combination. We've added a reverb to our instrument (line 3 in Fig. 4), which you'll notice takes two values: a signal to be modified ("a1") and the amount of time for the reverberated signal to decay completely (we chose "1" for a one second fade). We'll call the reverb output "a2" since we will want to hear it. Next, we changed the "mix" on line 4 to get ¼ of the original signal ("a1 x .25") and ¾ of the reverberated signal ("a2 x .75"). This new instrument can now be performed with no changes whatsoever to your score. Bear in mind that you could also use a pointer to tell the instrument to look for decay rate in the score (you'd use the next p-number, p6), which could give you varying fade rates for every note. You would also probably change your sine wave into something a bit more complex by adding as many partials as you wanted.

What sort of spatialization can you do with your synth? Maybe a little panning, right? With Csound, you can move a

sound source around in a three-dimensional space, creating the illusion that it buzzes past at high speed, stops short of smacking into the listener from behind, executes a slow, counterclockwise circle, and then hobbles off to the left. You'd do this by calling up a bunch of tape delays, set to automatically calculate the natural Doppler shift associated with these spatial effects, and feed them to Csound's four-output, channel "pan" generator.

AND THAT'S NOT ALL, FOLKS!

Other synthesis techniques are possible. Subtractive is simply a matter of generating a lot of random noise with one of Csound's numerous noise generators, sending the output through a bank of, say, twenty bandpass filters, and cranking up your amp. If you're interested in L/A synthesis, sample a bit of an acoustic instrument through your A/D, (that's right, hard disk recording), crossfade the attack segment of your sample into a steady-state synthetic tone, and you're all set. Nor have we forgotten

A software synthesis program such as Csound approaches, if not reaches, being the ultimate synthesizer.

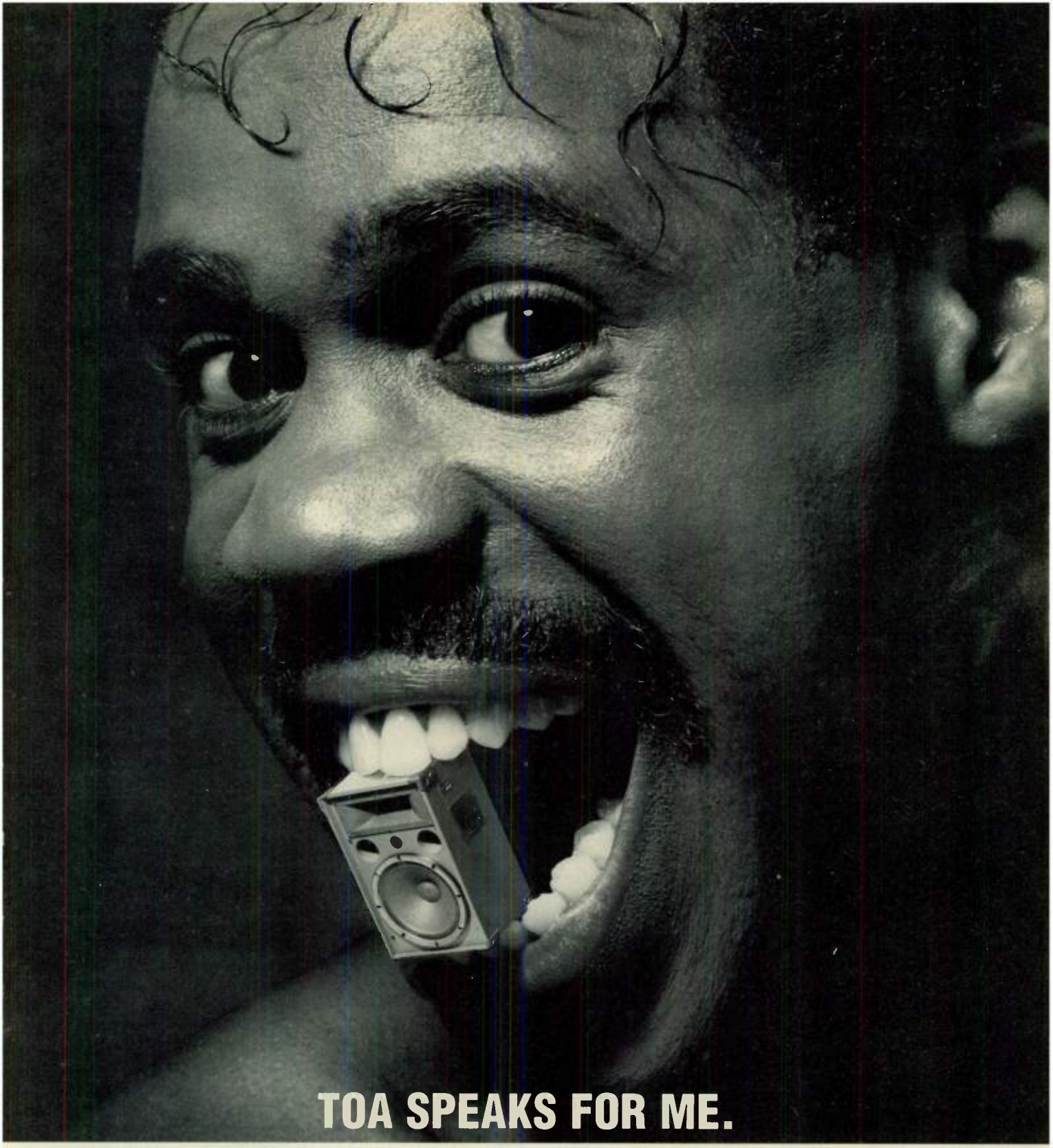
FM—a two-operator unit generator is built into the program and you can easily "patch" a roomful of them together. Really!

Last but not least, we can do very fancy analysis/resynthesis in Csound using values generated by Mark Dolson's Phase Vocoder, provided with the IBM version of Csound as an add-on utility. This feature works well with both pitched and unpitched source material and allows for the independent time-scaling or pitch transposition of a resynthesized file. The results can be virtually indistinguishable from the original unless, that is, you choose to shift or stretch things a bit.

THE MIDI CONNECTION

A software synthesis program such as Csound approaches, if not reaches, being the ultimate synthesizer. But nobody's saying you have to ditch your gear and start over—numerous developers are attempting to link Csound-generated sounds to MIDI devices.

To mention just a few, there is a "MIDI Trigger" written by Micro Technology Unlimited (MTU), which allows you to play back soundfiles by sending a note-on command from any MIDI controller. A set of utilities developed by a group at the University of Texas at Austin converts Csound soundfiles into files readable by *SampleVision*, Turtle Beach's graphic wave-editor program for the PC, thereby allowing you to



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● COMPUTER MUSIC

transfer any Csound-generated file to any commercial sampler. From the University of Southeast Louisiana comes a pitch-changing sampler providing multifaceted control and transposition of Csound files in real time via MIDI; and a program for translating MIDI sequencer files into Csound scores is available from the Center for Art and Technology at Carnegie-Mellon University. In addition, Alek Brinkman's powerful *Score11* program and Bruce Pennycook's version, *M-SCORE*, offer yet another means of generating note lists algorithmically.

Another point worth mentioning is that computer music systems are not just for creating cerebral concert music. If you've heard the distinctive, rap-influenced music found in recent Reebok, Porsche, Coke, and Labatt's commercials, you've heard the work of Andy Milburn and Tom Hajdu, two former Princeton graduate students, who use *Cmix* (another complex computer music language, written by Paul Lansky of

WHERE DO I GO FROM HERE?

If you want to get started with *Csound*, Micro Technology Unlimited (MTU) has been the leader in developing the program for IBM and compatible systems. MTU sells a turnkey computer music system that includes Csound, high-quality A/D-D/A converters, and all the associated support programs. The company has announced a new product, the MicroSound AT, which includes a DSP chip with up to four A/D-D/A channels. Because it offers AES/EBU standard digital input and output, the MicroSound can be used for computer music or for other applications such as CD mastering. We've run the MTU version of Csound on PCs, and everything we've described above works fine, right out of the box.

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Princeton) on a NeXT computer. They only use the Digital Ears 16-bit A/D converters from Metaresearch and their extensive record collection in addition to the NeXT. All sounds are first sampled into the NeXT, where they are heavily mutated and processed with Cmix, and then they're output via the computer's built-in D/A converters.

YESTERDAY, TODAY, AND TOMORROW

So where is software synthesis heading? Will it "trickle down" to MIDI and move from the university research center to the corner music retailer? Here's the way we see it: The first wave of MIDI gear was represented by specialized digital synthesizers capable of producing sounds according to one (and only one) synthesis method—FM, additive, subtractive, L/A, etc. Today, we're on the second wave, where we find manufacturers expanding these keyboard-based synthesizers to include signal processing, sequencing, and sample playback. These systems are being marketed as high-powered workstations, but in reality they are still quite limited.

The third wave will probably see the dawn of the virtual synthesizer—a software-based synthesizer that supports all forms of signal processing, sound synthesis, and resynthesis. They will respond to MIDI but not be limited by it, and will totally integrate the making of sounds and the making of music. The most wonderful surprise is you can have much of this power now by running Csound on your desktop at home. A suitably equipped computer costs under $2,000, and the A/D and D/A converters, the Csound program, and a 100-meg hard disk will cost about $3,000 more.

Csound represents an environment where the sounds and music that can be created are subject to very few limitations, save for those the composer brings to the process. Without a doubt, it provides any synthesist access to the most powerful set of tools available today. You owe it to yourself and your music to check it out.

Dr. Richard Boulanger *is an associate professor in the music synthesis department at Berklee College and has just received a Fulbright Lectureship to teach electronic music in Poland.* **Dr. Dennis Miller** *is head of the music theory program at Northeastern University in Boston.*

HUNTING FOR HEADPHONES

Before you plunk down a sizable amount of money for headphones, make sure you know what you're looking for.

J. OTTO SEIBOLD

Chances are you have a few headphones kicking around your studio that you use for overdubs, practicing parts, or working out rough mixes. You know you're not *supposed* to use them for serious mixing, but if your studio shares your living space, you probably do so more often than you care to admit. Perhaps it's time to ask how carefully you chose those headphones and what criteria you considered.

Using headphones for critical listening may have as dramatic an effect on your ultimate sound as any other piece of gear you use. Most of us have proudly played one of our mixes over monitor speakers for friends only to hear something entirely different from—and usually inferior to—what we thought we had created. Even if you only use headphones for live monitoring during session work, the right set can make a difference in the recording.

SPEAKERS VS. HEADPHONES

The discrepancies between headphone- and speaker-monitored sound are not necessarily due to inferior headphones. The psychoacoustic experience of listening to music on headphones is inherently very different than when using speakers.

First, with headphones there are no room reflections to affect the sound. Second, stereo separation is total; there is no "interaural crosstalk" to build up a phantom center channel. Sound from the left channel is heard exclusively by the left ear. (This explains the "hole-in-the-middle" effect that's nearly universal when listening to commercial music productions over headphones.) On headphones, stereo sound plays *in your head.* As a result, creating a natural stereo mix for ultimate playback on both loudspeakers and headphones is all but impossible. Finally, the perceived frequency response (octave-to-octave tonal balance) of headphones varies wildly and will almost always be very different from that heard from speaker listening.

This variance is because objective measurements can be made with loudspeakers as they project sound into a room, but the acoustic load on a pair of headphones is the listener's ear. The "unit-to-unit" variation of human heads

By Daniel Kumin

and ears is such that, according to one study, subjective responses of a single headphone design can vary much as 10 dB from person to person.

Because of this intimate situation, designing a headphone to produce technically flat response at the earcup is emphatically not what you want to do—exactly opposite from loudspeaker design. Good headphones have a response curve that creates a subjective tonal balance as similar as possible to that of accurate speakers.

Manufacturers still differ substantially on just what this equalization curve should be. The variations come from different measurement techniques, dummy heads, measurement mics, personal tastes, and cost. With headphones, there simply is no objective reality.

One attempt to establish a standard for headphone response is the "diffuse-field-equalized" design, which is based on a standardized measurement technique (explained more completely in papers written for the Audio Engineering Society, 60 East 42nd St., New York, NY 10165-0075). Implemented by big headphone names such as AKG and Beyer Dynamic (to name a couple), diffuse-field equalization attempts to precorrect for the acoustical effects of an "average" outer ear, resulting in a more natural and predictable subjective response. Just the same, headphones from equally competent designers still sound different.

PROS AND CONS

Because you don't get room reflections on headphones, there's a tendency to overuse reverb. Low bass from speakers is "heard" with the body as well as the ears (and definitely is *not* with headphones), so mixing with headphones often causes you to put too much mid-bass on tape to compensate. Positioning stereo signals is difficult because subjective separation is substantially different from that of speakers. Also, wearing headphones for hours at a time—especially in a hot control room—can be quite fatiguing.

So, what are the benefits? High-quality headphones are *much* less expensive than equivalent-performance loudspeakers. They are eminently portable from studio to location and back, and they'll sound *exactly* the same wherever you use them because the sound isn't dependent on the room's acoustic space—a big plus. Since there are no

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room effects or ambient noise, it's quite a bit easier to hear noise, small changes, or defects in your mix. What's more, headphones don't require a large amplifier to drive them and, as a result, have no problem reproducing the most formidable dynamic range.

The answer to the headphones/monitor speaker conundrum, then, is to do like the pros: use both. A decent pair of monitor speakers is indispensable for basic mixing, but a good pair of headphones is every bit as useful—especially late at night, when you don't want to wake the neighbors. The question becomes, "What's the best headphone design for you?"

THE WORLD OF HEADPHONES

There are many headphone types. The most fundamental difference is the earcup design. *Circumaural* (over-the-ear) models enclose the outer ear, making a more-or-less tight seal to the head, a form originally developed to permit good bass reproduction from small headphone drivers. Many "pro" headphones are circumaural because they are best at keeping playback over headphones from leaking into mics when recording.

Supra-aural (on-the-ear) headphones sit atop the ear and usually weigh less than circumaural headphones. They don't form a tight seal, so substantial playback sound can leak into the room, and you may get feedback when overdubbing vocals and monitoring at fairly high levels. However, supra-aurals let you hear outside sounds such as telephone bells, shouting musicians, and tidal wave warning sirens. You seldom see a microphone plugged in at many of today's MIDI studios, so supra-aurals can be every bit as professional as circumaurals. In addition, recent developments in driver design let many supra-aurals equal the response of circumaurals.

Signet EP500

Once, headphone driver technology was limited to simple dynamic transducers, essentially, tiny cone loudspeakers. Today, a much broader array of driver designs and materials are on the market. Dynamic drivers, both cone and dome types, are still the most common. They often employ exotic neodymium or samarium-cobalt magnet structures (as well as other, equally exotic,

driver materials) to eke out high sound levels from tiny, milliwatt, headphone-level signals.

Some very fine headphones employ relatively simple dynamic elements to great effect. Another type employs a miniature variation of the planar driver: a thin, conductive membrane sandwiched between two perforated magnet structures. Planars have a hard time moving lots of air (not a problem in headphone design), but many people feel planars have advantages in transient response and definition. Electrostatic drivers, most of which require an outboard, step-up transformer component (to charge the electrostatic driver) between the headphones and a small power amp, are found on a few of the finest and most expensive headphone designs. Since there are excellent designs using all three driver types, you can't pick your headphones purely on transducer technology.

SOME PURCHASING CRITERIA

A critical element often overlooked when choosing headphones is comfort. Everybody's head is different. What fits one individual nicely may seem like an Inquisition interrogatory device to another. Some comfort factors to consider are: weight, headband adjustment, and earcup design.

The heavier the headphones, the more fatiguing they will be. Supra-aurals tend to be light and comfy, sometimes to the point of not remaining firmly anchored to your head if you move quickly. Generally, circumaurals are heavier, though some recent models are surprisingly light. Supra-aurals usually use a foam earpad that is fairly comfortable. Circumaurals employ various outer cushion materials, often filled with foam or a liquid dampening fluid, and an equally broad array of interior sizes, depths, and finishes. Some ears are bigger than others, so make sure there is sufficient depth inside the earcup to accommodate your personal physical parameters.

Give headband adjusters a thorough check. The most common system is an over/under arrangement with a wide fabric band underneath to steady the headphones on the head and a stronger upper structure to support the weight of the set. However, many lighter designs use a single band with a sliding adjuster for each earcup. Another variable is the amount of pressure applied to the outer ear by the cups; this varies quite a bit from design to design. Try before you buy, and if you wear glasses, make *sure* your chosen model accommodates your specs comfortably.

Sometimes, little things are a big deal. Headphone cords come in two types, straight and coiled. Coiled cords tend to stay out of your way better but can get tangled with other cords more easily. Leads may be individual (one from each earcup), joining at the neckline, or a single lead from one side. (For guitarists, a single lead from the *left* earcup can be a pain unless you play left-handed.) One personal peeve is headphones that don't clearly mark left and right. A session with the channels accidentally reversed can ruin your whole day.

Many consumer headphones now arrive with a stereo mini phone plug as the standard connector and are shipped with an adapter to a 1/4-inch phone plug. This can be a problem if the adapter gets lost in mid-session. Also consider that headphone cords *always* get stepped on, eventually. Many designs now use steel-stranded cables and beefed-up strain

FOR THE BEGINNER:

Driving Your Headphones

The signal level coming from your mixer needs to be amplified so it is high enough to drive (move the sound producing elements of) either a set of headphones or a speaker system. A speaker system requires a lot of current amplification to produce enough power to move a lot of air, and therefore a power amp is essential (see "Basic Studio Series, Part 2: Power Amplifiers" in the December 1989 EM). Headphones don't require as much level, so a headphone amp is sufficient. Headphone amps are often built into mixers, tape decks, and other gear. They are also commercially available, or you can build your own (see "Two-Chip Project: Not Just Another Headphone Amp" in the March 1989 issue).

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• HEADPHONES

reliefs at all connection points. At least one maker (Sennheiser) designs all its headphones with user-replaceable, modular cords, earpads, headbands, and so forth. These are worthwhile features in the strenuous studio environment.

SYSTEM SPECIFICS

Before buying, think of how you're going to drive your headphones (see sidebar). Most modern designs are quite efficient, requiring no more than a few milliwatts to reach very high playback levels. Actual headphone input impedances can be anywhere from 16 ohms to 600 ohms. If you're going to be using a distribution system in which several headphones will be driven by the same source, a higher input impedance is better because the headphones will then be less likely to load the headphone amp.

Generally, a modern amplifier or mixer equipped with a headphone output will drive any of this wide impedance range to satisfying levels without strain. However, headphone output quality from your upstream components may vary; it's worth checking into. Often, if you have a quality preamp or integrated amp downstream from your mixer, better headphone audio quality will be available there. (The best of such designs employ a dedicated headphone amp section instead of just tapping off the amplifier's line-amp circuit.)

Most of our MIDI-based, home studio setups can get by without the headphone distribution amplifier and cue system found in the big professional rooms. Most consoles can easily drive two sets of headphones, wired through a Y-cable (available at your local hardware store or Radio Shack). Or, a second (or third) pair can be plugged into an amplifier, tape deck, or another headphone jack-equipped piece of gear. But if you routinely work with several live musicians at once, you will eventually need such a system.

Plenty of commercial systems are readily available and reasonably inexpensive, but building your own is simple enough. A cue system consists of a small power amp (25 watts per channel is ample) connected to the cue outputs of your console. Each amplifier channel drives a ladder of 100-ohm, 5-watt (or so) resistors wired in parallel to one side of each set of headphones. (Traditionally, headphone cue systems were often wired in mono, which you may want to consider.)

CHOOSING YOUR EARS

Deciding on a pair of headphones for serious listening is among the most individual of audio choices. If your studio does much recording with microphones, and you don't have a separate control room, you'll want a circumaural design for a high degree of isolation. Otherwise, any of the completely sealed circumaurals, open-back designs, and supra-aurals should be considered, and they may come from either the "pro" or consumer audio worlds. Don't forget the comfort factor; you may be wearing these things for days at a time.

Sennheiser HD 450

No two people will hear exactly the same sound, even from the same set of headphones. You'll have to do lots and lots of listening to as many different models as possible. However, a few items of strategy can be added to the list.

The optimum situation is to listen where you can compare to a known-quantity pair of speaker monitors, ideally the same model as in your own studio. (Even better is if you can listen *in* your own studio.) Bring your own source material, selections that are both familiar and well-produced and recorded. Include a few cuts with natural, live acoustics with excellent stereo imaging. CDs get the nod for wide dynamic range and quiet background. Include music of the type you listen to; a quality dub or two of your own music is an excellent idea.

Listen to several different headphones, paying attention to differences in overall tonal balance, top-end clarity, midrange naturalness, and "inner detail." Be on the lookout for "tizzy" high treble or smearing of cymbals and other high-frequency transients. Play a tape with the noise reduction off and compare the spectrum of audible noise to get an idea of variations in treble balance. Next, listen closely for midrange colorations such as honk, "chestiness," or a hollow, boxy sound. Well-recorded, spoken male voice is a terrific test here; ditto for well-done female vocals.

Check for bass smoothness and accuracy. Headphones tend to differ quite a bit in the low end: Some are overly warm, with substantial "extra" mid-bass, resulting in a noticeably "tubby" or boomy sound. Some are a bit thin, with a dry, deficient bottom end. Pay particular attention to bass detail; good headphones produce solid, palpable bass without blurring the timbres of low-octave instruments. Resist the temptation to favor "extra" bass response in an effort to compensate for the physical impact of loudspeaker listening because this coloration of the

sound will give you an inaccurate response.

When you've narrowed the spectrum from a dozen choices to two or three, begin comparing them (preferably) to a well-set-up, highly accurate monitor speaker. This can be a tough assignment. Set the speakers' amp for a decent listening level; if possible, drive the headphones from a second amp, or a board with independent volume, so you can subjectively match levels. The headphones may produce more apparent deep bass than small near-field monitors. Otherwise, listen for similarities in tone colors, balance, and soundstage presentation, remembering that imaging is bound to be quite different.

In the course of this process, you inevitably will get headphone cables tangled around your neck, catch your hair in a headband adjuster, and become listening-fatigued; everything begins to sound alike. Take a break, but stick with it! The set that sounds—to your ears—the closest in tonal balance and spatial qualities to your monitor speaker reference is the right choice. Take them home and plug them in.

A HANDFUL OF EARFULS

There are over two hundred different headphone models available in America today, ranging from $12.95 Walkman-type disposables to multi-kilobuck electrostatics. Here is a brief and by no means encyclopedic selection, intended only as a jumping-off point for your investigations.

AKG K 240 DF

AKG, a mainstay of the professional's mic bag, produces over a dozen 'phones; most of them are winners.

The K240DF ($150), one of the industry standards, is a circumaural, diffuse-field-equalized design. It provides excellent sound, moderate isolation, reasonable comfort, and exemplary ruggedness. A new model, the K270-S (price to be announced), is a sealed model for more complete studio isolation, with twin drivers (two drivers for each earpiece to provide even more amplification) and an added twist: a switch in the headband silences the headphones when they are taken off, preventing accidental leakage during live recording. It is expected to be available by the time you read this.

Beyer Dynamic DT 770Pro

The Beyer Dynamic DT 990Pro is a personal favorite. Superbly comfy, lightweight for a circumaural, extremely accurate, with excellent bass response, the 990 is a first-rate dynamic headphone design at a substantial price ($259). Beyer also makes a model specifically intended for studio use, the DT 770Pro, a sealed-back circumaural with an unusual bass-reflex earcup design at $239.

Fostex makes the T-40, a cost-effective, circumaural headphone. A little heavier than some pricier models, the T-40 provides good low end, decent comfort, and an attractive price ($130). The company also manufactures two less-expensive models, the T-20 ($89) and the T-10 ($65).

Koss is credited with inventing the "stereophone" (the first commercially available stereo headphones for recreational listening) and today makes over two dozen models. The value pick for the studio is the PRO/99($99.95), a decidedly unfancy but good-sounding model. Balanced a bit toward the warm side, the dynamic, circumaural PRO/99s prove nice and comfy to some, a bit tight and heavy to others, but a first-rate value to all, with a no-questions-asked, lifetime warranty.

Sennheiser is another studio favorite with an extensive headphone lineup. The dynamic HD-450 Studio ($99), a "pro" successor to the classic HD414 open-air headphone, is a very lightweight, supra-aural model with terrific comfort and detailed, accurate, clean sound. It includes a ¼-inch phone plug, 600-ohm "pro" impedance, and a carrying case (price to be announced). A circumaural Sennheiser model, the HD-25 ($199) features high accuracy, light weight, unusually high sensitivity, and a rotate-off mount on one earcup to facilitate single-ear, "disco-style" monitoring.

The line of consumer-model headphones from Signet—an Audio-Technica company—provides some good choices, among them the EP500 ($125 suggested). This lightweight dynamic design produces good bass and a smooth overall tonal balance from a comfy, compact package with a nice price.

Another good value in consumer-type headphones is Sony's MDR-CD lineup. The midline MDR-CD555 dynamic, supra-aural model ($130) uses an unusual, oval, on-the-ear design for outstanding comfort and very light weight. A highly efficient magnet structure produces super sensitivity, and the headphones provide excellent low bass, open midrange, and vivid top end.

Yamaha's consumer headphone models are a bit different in that they employ a planar-type driver the company calls "orthodynamic." The YHD-2 is a notable value ($60). It's an open-back, supra-aural model with natural balance and outstanding transient detail, extremely light weight, and a neat, folding earpiece design.

Finally (and out of alphabetical order), we couldn't close without mention of Stax. This Japanese firm produces a line of exclusively electrostatic headphones from $200 on up—and up. Stax's flagship, the SR-Lambda Signature model, at $1,995, is the world's most expensive headphone. The Lambda-Sig is a bit heavy, but surprisingly comfortable, and requires an outboard amp and transformer (the unit includes Stax's SRM-T1 dedicated, Class-A, tube, headphone amplifier/transformer component, which can drive two pairs of Stax Lambda headphones). This, folks, is the best headphone in the world; verbal description would just waste column inches. If you've got unlimited scratch, run out and buy 'em. ■

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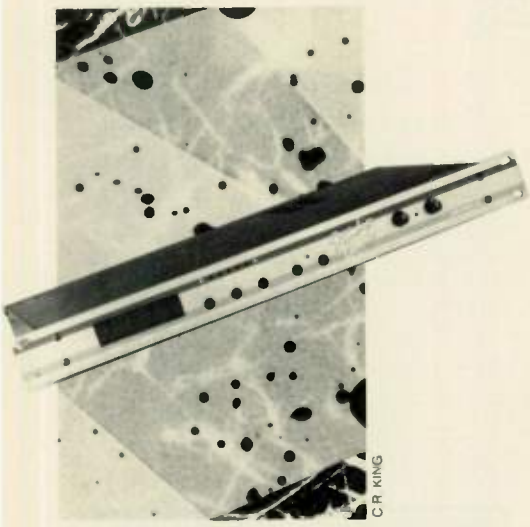
First Takes

The future is now: Voyetra's 1990s' IBM version of Sequencer Plus, the powerful L.M.P IBM notation program, and the amazing Studio Clock.



Aphex Studio Clock ($695)

By Daniel Alan Phillips

As a percussionist, I've always been sympathetic to drummers who gig with sequencers onstage. Burdened by headphones, grimacing at the click in their ears, they have been forced to accept the computer's usurpation of their proper place as time-keepers. Following in the footsteps of the Human Clock, Aphex's Studio Clock attempts to make them the masters of their machinery.

The Studio Clock combines a Tempo Detection Unit (TDU), which offers live control of MIDI clocks/song pointer data from musical sources, and a SMPTE/MIDI converter, which reads and writes all SMPTE formats. These two facets interact to produce Tempo Maps (a record of how the tempo and meter changes over the course of a composition), allowing editing of recorded tempo data, a crucial feature for studio use.

The TDU finds rhythms by isolating the transients of incoming audio. This means that source input isn't limited to drums; with a bit of EQ, it is capable of following bass, keyboards, or even (gasp!) full audio mixes such as the latest Peter Gabriel CD. It may also be set to sync to MIDI note ons. The Studio Clock (SC) compares what it's hearing with what you've told it to expect: the tempo (which it can also "learn" by listening to one measure's worth of time), meter (limited to eighth-note denominators between 3/8 and 12/8), and tracking algorithm.

This tracking algorithm is how the SC determines whether you're really changing tempo or just playing around with the beat. There is an inverse relationship between how tolerant it is toward rushing or lagging certain beats and how responsive it is to abrupt tempo changes; you can't play quintuplets and accellerando from 60 bpm to 200 bpm at the same time. Four algorithms are provided, ranging from a "fusion" program that can handle very complex input but only offers gradual tempo changes, to one that accepts only quarter-note clicks but can be dragged across the board from largo to presto.

What if the beginning of your tune features complex polyrhythms, but the solo in the middle is played with serious rubato? Using the Program Cue function, the basic settings of the SC (tempo, meter, etc.) may be set to change on a beat-by-beat basis. If your song goes from 4/4 to 5/8, accelerates from 90 bpm to 130 bpm, or uses the deadly

the EM rating system

All EM reviews include 11-step "LED meters" showing a product's performance in specific categories chosen by the reviewer (such as ease of use, construction, etc.) and a "VU meter" indicating an overall rating. The latter is *not* a mathematical average, since some categories are more important than others. For example, if a guitar synth has great documentation and is easy to use, but tracks poorly, it could have several high LED meters and a low overall rating.

The rating system is based on the following values, where "0" means a feature is non-functional or doesn't exist, while a value of "11" surpasses the point of mere excellence (a rating of 10) and is indicative of a feature or product that is truly groundbreaking and has never before been executed so well.

Please remember that these are opinions, and, as always, EM welcomes opposing viewpoints. We urge you to contact manufacturers for more information, and, of course, tell them you saw it in EM.

quintuplet/rubato dichotomy, just tell the SC about it before you play, and it'll keep up.

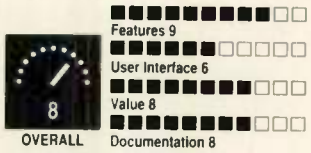
Tempo-tracking sessions may be recorded and edited using the SC's Tempo Mapping. By using this function, you can sync a MIDI sequencer to preexisting recorded tracks that don't have any type of sync tone. This feature references each eighth note to a SMPTE location, accurate to 1/80 of a frame. Each of these points may be shifted independently, allowing any glitches to be corrected. As completely avoiding tracking errors is virtually impossible, this feature is a necessity for discriminating studio work. Global adjustment of offset and start point are also provided.

In practice, I found the Studio Clock to be serviceable in its admittedly miraculous task, but not quite as tight as I had hoped. When the SC makes errors, they are corrected abruptly, often causing a stuttering effect. This is fine for string pads, but not for hi-hats. Synching Latin percussion parts to a dance record, as an ambitious DJ might do, works fine; small rhythmic inaccuracies are part of that feel.

I have several complaints. The SC doesn't support SMPTE values of over one hour. The user interface is altogether too clumsy, with only five buttons on the front panel, requiring (in the worst case of Tempo Map editing) a *minimum* of thirteen button pushes per parameter change. The software also contained a few noncatastrophic bugs, some of which were fixed in a recent software update. (*According to Aphex, the latest upgrade, V. 1.3, supports SMPTE hours, includes a modified user interface that reduces the amount of button-pushing, and fixes the bugs.—SO*)

These few drawbacks, however, don't significantly alter the unit's effectiveness. If you want to inject some "humanness" into your sequences, need to add sequenced parts to prerecorded tracks, are an ambitious DJ looking to sync up a new mix, or are simply a drummer looking to be freed from your chains, this box is your best chance for satisfaction.

Daniel Alan Phillips *is graduating with a B.A. in music from the University of California-Berkeley this December. He sings and plays keyboards in the Bay Area-based duo, Rapid Transit, along with guitarist Mike Brodhead, who insisted on being mentioned somewhere in this article.*



Aphex Systems Ltd.
11068 Randall St.
Sun Valley, CA 91352
tel. (818) 767-2929

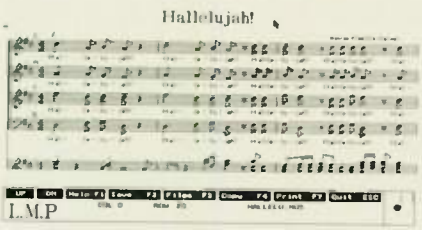
TEACH Services Laser Music Processor ($99)

By Dennis Miller

If you're like me, you're constantly on the lookout for a perfect piece of software that will make your life a bit easier. When I first got TEACH Services' *Laser Music Processor* (*L.M.P*), a new laser-printing, music notation program for the IBM, I thought, "Finally, the program I've been waiting for!" Well, after working with it I have to say that it's not perfect, but for a mere $99.95, your music will look better than you ever imagined.

L.M.P is no *Finale*. You can't draw your own symbols like you can in *Score*, and you don't have nearly the ease of use of *MusicPrinter Plus* (see the review on page 96 of this issue), but the printout is just about as good as it gets.

L.M.P works with the HP LaserJet or Epson and compatible dot matrix printers. It needs a minimum 512K of memory; will work with CGA, EGA/VGA, AT&T 6300, or Hercules graphics; and supports a mouse for nearly all of its commands.



TEACH Services Laser Music Processor getting a Handel on notation.

Most of the standard music symbols are here—note and rest values from a whole note through a 32nd note, key and time signatures, editing and articulation marks, etc.—but you won't find much beyond the basics. Anything you can squeeze out of your computer keyboard will work in L.M.P's text mode

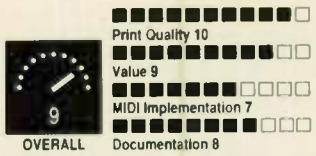
and can be printed out. Best of all are the beautiful, arching slurs and ties, which can be positioned easily to span almost an entire line of music and can be adjusted almost ninety degrees to fit smoothly over any stretch of notes.

L.M.P works a little awkwardly at times, but intuitively at other times. Putting notes on the screen is essentially a "point-and-shoot" process with a movable (and changeable) "default note value." Stems automatically appear with a note, but beams must be drawn manually. Block copies and moves work much like your basic paint program—"drag" the cursor around a chunk of music, click once, then position the cursor where you want the section to reappear and click again. Unfortunately, only notes and staff lines are copied as text, and most editing marks stay behind. Too bad.

There's a lot more that could be done with MIDI implementation, but if you remember we're talking $99, you probably won't be disappointed. You can input notes from your MIDI keyboard if you're willing to take it nice and slow and record one line at a time. This feature works more like a transcribing step sequencer than a real-time MIDI device, but at least you don't have to hit Enter after every note. You can also import a standard MIDI file (yes!), but again, it's rather cumbersome...You first load the file into a buffer, then print it to the screen event by event. It's not too slick, but it works as advertised. Playback is limited to data captured in L.M.P's Record mode; you can't just enter music with the mouse and hear it.

Lots of nice touches are included, such as a multifaceted Undo command, easily selectable font styles, a Locate command to find text or other symbols, and a portable printing utility that lets you print your files on remote systems.

All in all, L.M.P is a nice little bundle that will be perfectly suited for lots of printing jobs but may not meet more demanding needs. It's a real bargain, no doubt about that, and oh, those slurs and ties! By the way, if you come across the Perfect Software, give me a call.



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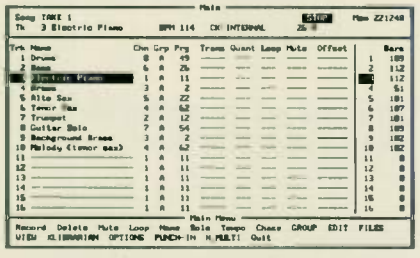
Voyetra Sequencer Plus Mark III, Version 3.0 ($349)

By Joseph Accurso

For those who are devotees of the IBM world (by choice or circumstance), *Sequencer Plus Mark III*, by Voyetra Technologies, has long been considered one of the leading sequencer software packages. Voyetra's latest update, Version 3.0, adds a universal librarian package and incorporates an impressive array of powerful features that place it among the most sophisticated sequencing programs available.

Features such as graphic note display, graphic measure display, cut-and-paste editing, and MIDI editing capabilities are standard fare in Sequencer Plus. The program also hosts a powerful group of "Transforms," which are valuable compositional tools. The Transforms consist of standard note-editing features such as transposition and setting note velocities, but also include some more esoteric tools such as harmonic inversion (inverting a track at a specified note axis-point and adjusting the pitches to a specified key) and track rebar (superimposing a specified meter on a track other than the one in which it was recorded and rebarring the music accordingly). The latter is extremely useful when working with video applications. In fact, the program supports a number of audio-for-video features such as displaying SMPTE time code.

Probably the most noteworthy addition in Version 3.0 is the integration of Voyetra's editor/librarian program, *Patch Master Plus*, into the Sequencer Plus program. Patch Master Plus supports over 100 synths and allows for uploading and downloading patches as well as rearranging patch banks. Another interesting and valuable feature is the MIDI Data Analyzer, which allows MIDI data streams to be viewed, captured, and analyzed. The advantage of including sequencing and librarian capabilities within a single program is convenient access to the sequence, instrument setups inherent to the sequence, instrument patches, etc., without having to exit and switch programs.



Voyetra Sequencer Plus Mark III Main menu.

Version 3.0 includes full mouse support for the first time. Almost all the functions previously controlled by the computer keypad, e.g., changing screens and on-off commands, can now be controlled by the mouse. Mouse control is strictly optional, though; all functions can still be controlled by the computer keypad. As in the past, the program defaults to 64 tracks. If 64 tracks are insufficient, a provision in Version 3.0 allows specification of the number of tracks desired (maxing out at around 4,000 tracks!) when the program boots.

In a look to the future, Voyetra has fully integrated the standard MIDI file format (SMF). Version 3.0 can save and load songs in type 0 and type 1 MIDI file format as well as load songs in type 2 format. The inclusion of this feature allows for compatibility with virtually all MIDI software that supports SMF (see "Introducing Standard MIDI Files" in the April 1989 **EM**), including many notation packages.

The documentation on V. 3.0 is very good and I've found the program to be virtually bug-free. I have worked with Sequencer Plus extensively, and it has never crashed. One feature I'd like to see added, however, is the ability to enter notes in step time from the keyboard. Maybe this will come in Version 4.0. All in all, Voyetra is to be commended for developing one of the most robust MIDI software packages available. They have set a new standard in MIDI software for the PC.

Joseph Accurso *is a professor of music and the director of the Electronic Music Facility at Brookdale Community College, Lincroft, New Jersey.*

Voyetra Technologies
333 Fifth Ave.
Pelham NY, 10803
tel. (914) 738-4500

ROM Cards for the Korg M1

By David Snow

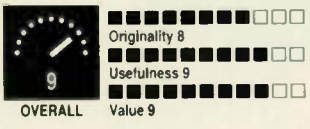
Evaluating commercial patch collections is subjective, but a few general guidelines hold: The work ought to be original

(not recycled factory patches), useful (with a minimum of novelty stuff), and represent good value (by balancing the previous two factors against the price). The last thing you want to discover after plugging a pricey ROM card into your M1 is that a program with the enticing title of "Venusian Carousel" sounds suspiciously like the "Magic Organ" factory patch, minus reverb. So, with those thoughts in mind, here's a quick run through eight ROM cards from five different manufacturers.

❶Leister Productions

(ROM card $49; data disk $39) 100 programs/100 combinations

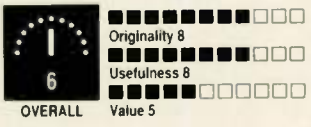
This set is characterized by highly expressive use of aftertouch modulation and good use of effects. The programs are loosely organized into banks of synths, pianos, flutes, vocals, basses, horns, bells, and strings. The synth leads ("Winwood," "OBX," "Sizzle," "Rockman," etc.) are raw and punchy. There are several enhanced acoustic pianos ("Baldwin" is a bit too similar to the factory "Piano 8'," though) and a passable trombone. "Real Flute" beats the M1's factory flute by a mile; I also liked "ViennaBoyz," a light choral sound. There are no drum kits. Only one program fell into the "sound effects" category ("SpaceCavern," kind of nice), and a half-dozen were basically clones of factory sounds. The combinations include many useful stacks and obligatory bass/treble splits. "FX Sweep" is nice and spacey, and "GtrTriads" makes clever use of transposition. This is useful stuff, well executed. **Leister Productions**, 14 Hill Blvd., Mechanicsburg, PA 17055, tel. (717) 697-1378.



❷Patch/Works M-SPECTRUM, Volume One

(ROM card $59.95; RAM card $109.95; Atari disk $39.95; program user's RAM card $39.95) 50 programs/50 combinations, two demo sequences

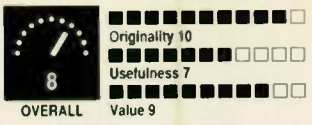
The 50 program/50 combination allocation of this card makes it less cost-effective than the others. The demo sequences are fine (especially "MarocoTime"), but that's not what I'd prefer to spend money on. Programs are organized in banks of assorted keyboards, brass, strings, choral, winds, pads, and leads. All sounds are usable, although few stood out as truly exceptional. "SidHar1," a deftly executed sitar, puts the original sitar patches to shame, and "NotreDame" is a nice classic pipe organ. The combinations are also grouped into banks of similar timbre, and on the whole they make a stronger impression than the individual programs do. (I upgraded my evaluation of this set after carefully auditioning the combinations.) A favorite was the super-grungy "PowerLead." **Patch/Works Music Software**, PO Box 450, New York, NY 10024, tel. (212) 873-2390.



❸Electron Artistries Sound Set #2

(ROM card $52; data disk in Opcode M1 librarian format, Omni-Banker ST, and SYS/EX librarian formats $32; program user's RAM card $29) 100 programs/100 combinations

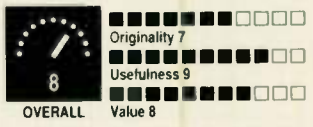
Packaging doesn't necessarily reflect the value of a product. Electron Artistries' Sound Set #2 arrived on a homely, hand-lettered RAM card with a dot matrix program/combination printout, but the sounds are another story altogether. This is innovative stuff with extremely imaginative effects programming. There are pads with gorgeous, phasey swells; drum kits from hell; nice synthetic sounds; and a few off-the-wall, psychotic episodes ("Sky King" stands out in my mind), all roughly organized in banks of similar timbre. At the risk of contradicting what I stated earlier about "novelty" patches, a few of the programs are closer to sound effects than musical timbres, but they are cool. There aren't too many of them, and judiciously applied, they might liven up an otherwise-dead roadhouse gig. This collection is not for players exclusively seeking conventional leads, pads, and basses, although these are represented. It is highly recommended for those desiring original sounds and would serve as a good tutorial to would-be M1 programmers. **Electron Artistries**, PO Box 40, Franklin, OH 45005, tel. (513) 746-4283.



❹Technosis M1 Proselect, Volume 1

(ROM Card $65; EPS diskette $35; Frontal Lobe diskette $35; program user's RAM card $35) 100 programs/100 combinations

This is a solid collection of programs and combinations immediately useful to the working musician. It was a little tough to grade on originality, though, because few of the patches really hit me. Those that did grab my attention include the aftertouch-controlled guitar feedback of "BE QUIET," the nifty slide on "Brass Hits," and several aggressive drum kits. Technosis gets the "Miss Congeniality" award for friendly documentation. The Proselect ROM card comes with an eight-page brochure that offers tips on M1 programming and useful notes about the programs included on the card. The review copy did not come with a numbered program/combination list, which would be helpful, as the sounds aren't organized in an obvious order. **Technosis**, 3960 Laurel Canyon Blvd., Suite 353-EMR, Studio City, CA 91604-3791, tel. (213) 656-3515.



❺Valhala M101, M102, M103, M104

(ROM cards $45 each; blank RAM cards: $80 each/one, $75 each/two, $65 each/three or more; add $15 per card for RAM cards loaded with ROM card sounds) 100 programs/100 combinations per card

Valhala deserves special credit for devising the most incongruous patch names encountered for this review (my favorites: "Laitril," "Coed," and "Chutney"). Well, why not; life is strange anyway. All the Valhala cards are well-executed, with the requisite assortment of leads, pads, and basses. They are not organized by timbre, but come accompanied by a printed program/combination list. The criticisms of individual programs noted below should be balanced against the overall high-quality of the cards.

M101: A generally solid, varied collection, with sounds that don't always make their M1 ancestry obvious. (I would have given it a "9" for originality but for the half-dozen programs that were too similar to their factory counterparts.) Many sounds have a conspicuously high output level and brightness that make them really cut through. One question though: Why call a lifeless, un-Pastorius-like fretless bass patch "Jaco"? The original M1 program is better.

M102: Another good one. Personal favorites: "Percussion" (an exotic, gamelan timbre), "Drums #4" (drum kit), "On Film" (almost gimmicky, but quite effective orchestral effect), and "Slow Orc" (beautiful brass pad). Clinkers: a "Jaco" not much better than that on M101, "Hammerhead" (another hammer/metal hit bangfest), and six sounds that closely resemble factory programs. Nevertheless, this is my favorite card of the Valhala collection.

M103: This card apparently has a few programming bugs. The most severe was encountered on patches entitled "TaylorDane" and "Mayan Bass"; the effects parameters were set in such a way that playing two notes simultaneously caused the output to saturate and cut out (I'm not making this up). (*According to the manufacturer, these problems have been corrected.—SO*) Similarly, the effects parameters for "Handel" caused unintentional distortion when played loudly. The output levels of "Ballerina," "Bayou," "Oye Crunch," "Icing," and "Townsend" were rather low for comfortable playing. More complaints? "Fretless" was boomy and flabby, and "Baby Grand" strident and unpleasant. I don't like your tie, either.

M104: The standouts: "Home," "Tinsel," and "Unicorn," all beautiful, glassy, digital timbres. The bummers: "Galileo," "Baldwin," and "Steinway," all unadorned acoustic pianos that don't immediately respond when you hit the keys. Yes, the notes lag because the effects assigned to these programs are all delays, with the output balance set to effect only. Is this some kind of joke? Inexplicable phenomenon: "Ju Ju Bees," another fretless bass patch with absolutely no nuance. What's going on here? This card also has a patch with an effects-related output overload problem similar to "TaylorDane" on M103 ("Saxy Leggs"). There are a number of raw, overdriven sounds with heavy (occasionally too heavy) doses of flanging/phas-

continued on page 115

Steinberg/Jones' Cubase

By Jim Pierson-Perry

If you're hungry for a professional Atari ST sequencer with all the trimmings and a logical, easy-to-use structure, then dinner is served.

In the competitive Atari MIDI market, *Cubase* stands out as the newest contender for "King of the Hill" of sequencers. Its litany of features reads like a "most wanted" list from users across multiple classes of MIDI programs. In addition, Cubase runs under the new MIDI Real-time Operating System (M-ROS) from Steinberg/Jones, which provides a true multitasking environment for applications—MIDI or otherwise—and supports some interprogram MIDI communication.

Cubase is fully compatible with *Pro 24* files giving Steinberg/Jones an upwardly compatible sequencer product line of increasing power—from *Twelve* at the entry level through Pro 24 to Cubase. (Note: Pro 24 will continue to be offered and supported, but there will be no more updates.)

Cubase requires an Atari ST/Mega with at least 1 meg of memory, a double-sided drive, and monochrome monitor. It uses a hardware dongle that attaches to the cartridge port for copy protection; the program disk itself is not copy protected, so you can make backup copies or install it on a hard drive, but you need the dongle installed to make it run. It supports both of the Steinberg/Jones auxiliary SMPTE interface boxes, the SMP 24 and Time Lock.

The program disk also contains the *Switcher* program for launching multiple applications under M-ROS, and *Satellite*, a patch editor/librarian desk accessory especially suited for use with the Steinberg/Jones *Synthworks* series. If you intend to run Cubase under M-ROS, plan on a minimum of 2.5 MB of memory. I found Cubase demanded a minimum of about 1.3 meg, and most other applications need at least 1 meg apiece.

Considerable effort obviously has gone into the Cubase user manual—one of the best I have seen. It is well-written, with numerous illustrations, and contains a tutorial, comprehensive index, complete coverage of all operations, a summary of keyboard commands, and an appendix explaining the basics of MIDI. A supporting tutorial disk is included with the program.

Unfortunately, Cubase shares the Achilles' heel of all current Steinberg/Jones programs that run under M-ROS; incompatibility with GDOS and the new TOS 1.4 (both parts of the Atari operating system). The problem also extends to PINHED, a popular shareware speedup utility for all ST/Mega computers that has similarities with some routines in TOS 1.4. According to Steinberg/Jones, a new version of M-ROS that remedies the problem with GDOS and TOS 1.4, but not PINHED, will be available soon. All other system enhancements I tested (replacement file selector, RAM disk, mouse accelerator, etc.) worked flawlessly.

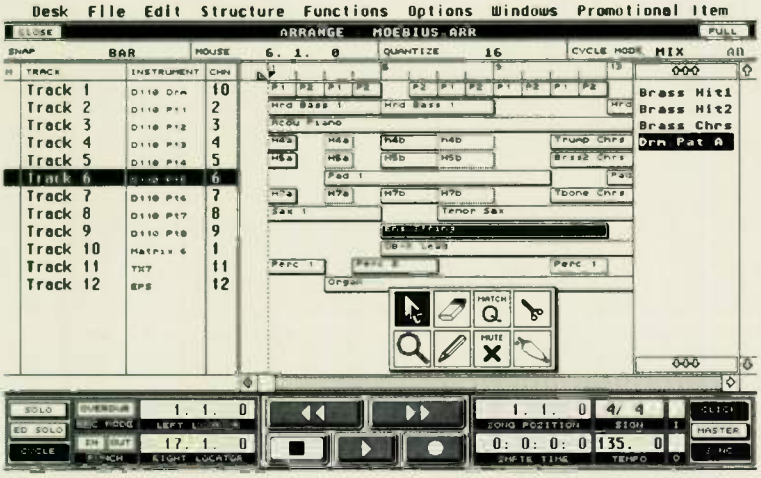


FIG. 1: The main workscreen.

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• CUBASE

SOME USER ASSEMBLY REQUIRED

Cubase has an extremely sophisticated yet flexible architecture for building songs. The simplest level is a part, a sequence of MIDI data. Parts can be of any length, from single to multiple MIDI channels, and contain anything from note on/off commands to sysex information. To record a part, you must select a track to contain it. A track can hold any number of parts, organized however you wish. Up to 64 tracks are available to create arrangements. Multiple arrangements may be open at the same time, each with an independent set of tracks, and saved together as a song file. You can use Cubase at whatever depth you need, growing into the program at your own pace.

The main workscreen holds the track list, a graphical representation of part assignments, status windows, and the recorder transport controls (see **Fig. 1**). Cubase uses a window system, similar to GEM, but with a few extensions. You can zoom in/out on the display view. This helps to squeeze more information in an edit window or to blow up a controller region for minute changes.

Tracks are added to the arrangement window on an as-needed basis. Each may be assigned an instrument name, MIDI channel, and output port. All parts in a track play back on the track's MIDI channel unless it is set to "No," and then they play on the channel from which they were recorded. Three output assignments are possible: the Atari MIDI out; any of four additional MIDI outs on the Steinberg/Jones SMP 24 interface box (if installed); and M-ROS, an "internal patch cord" for interprogram communication. Using the M-ROS connector assignment through Switcher lets you have the MIDI output of one program feed into the input of another.

Cubase has an outstanding graphical approach for managing tracks and parts. Parts are depicted as small rectangles and may be individually named. They are shown aligned vertically with their track assignment and horizontally against a scrolling time display. You can easily move parts around in time or to other tracks, and a snap-to grid function precisely aligns parts to one-sixteenth beat. Any number of parts, not necessarily contiguous, can be selected and manipulated together. Operations include standard editing features and other goodies such as creating ghost parts (ghosts are copies retaining linkage to the parent part so that changes made to the parent are propagated in the ghosts automatically).

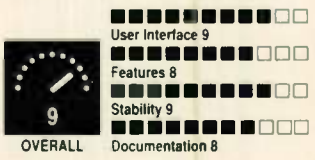
You can assign multiple parts to a group, which can then be manipulated as a single part. An example is to combine brass and woodwind parts for the chorus section into a horn group, then plug in the group for repeat choruses. Up to 64 groups may be assembled across all arrangements in a song, all of which are maintained in a directory window. The same part can be used in more than one group. Like parts, groups can be cut, copied, and pasted within and between arrangements.

Groups are particularly valuable for song development. Build your arrangements so that each is a different song element (intro, verse, chorus, etc.), then assign all parts in each to a single group. Changing the order of these groups in a special group track lets you easily experiment with new structures without having to manipulate all the individual parts.

The transport bar is always on screen, and it has controls for record, play, stop, fast forward, and rewind along with displays of the current song position pointer, elapsed SMPTE time, meter, and tempo. These controls have numeric keypad equivalents that are preserved among all applications running under M-ROS. You can specify remote equivalents to trigger transport controls from a MIDI keyboard. While playing/recording, a screen marker tracks the song position so you always know where

Product Summary

PRODUCT:
Cubase
TYPE:
Sequencer program
HARDWARE REQUIREMENTS:
Atari ST/Mega with 1 MB RAM , double-sided drive, monochrome monitor
RETAIL PRICE:
$495
MANUFACTURER:
Steinberg/Jones
17700 Raymer St., Suite 1001
Northridge, CA 91325
tel. (818) 993-4091



you are and exactly what parts are playing—very intuitive and useful.

THERE AND BACK AGAIN

The crux of any sequencer is how well it takes your MIDI input and reproduces it on command. Cubase offers a wealth of options to fit your needs. Recording modes include linear or cycled recording, single or multichannel (a maximum of four) inputs, replace or overdub on cycling, automatic punch in/out, and step-time entry. You can do both real-time and step-time recording in any of the edit windows.

Equally versatile are the synchronization options: internal SMPTE (default from M-ROS), external SMPTE, and external MIDI clock, with tempo control from a Cubase master track, the transport control, or "human sync" (tap tempo from external MIDI source). Multiple sync signals may be coming and going (e.g., send MIDI time code while receiving MIDI clock). For the record, Cubase has a timing resolution of 192 ppqn (pulses per quarter note) while the underlying M-ROS operating system runs at 384 ppqn.

Human sync is great for playing live with Cubase as a backup band. As you play, Cubase attempts to match its tempo with yours—speeding up and slowing down with you. This is one of the trickier features of Cubase, and you'll need to experiment with the settings to find what best matches your playing style. I had best success using a combined quarter-note and eighth-note sync pattern, setting the groove by playing a somewhat staccato bass part.

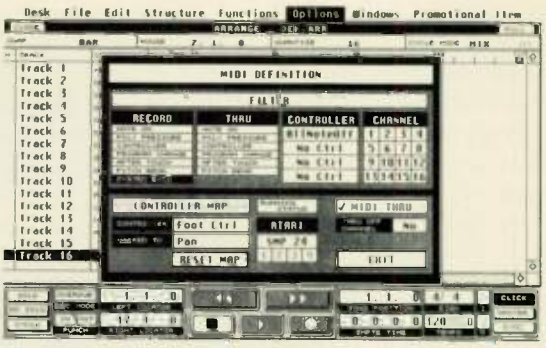


FIG. 2: Input Filter window.

Each arrangement window has a master track with preprogrammed tempo and meter changes. You can override the tempo from the transport bar or external control, but the meter settings are always in force. Changes can be made relative to measure or SMPTE-based timing. While Cubase does not directly support a hit list type of MIDI event management (of interest for video work), the manual has directions for using dummy tempo events to achieve the same purpose.

Additional goodies include sending the metronome click over MIDI, chasing controllers and program changes, import/export standard MIDI files (format 1), built-in MIDI delay effect processor, real-time controller remapping, and sophisticated filtering for incoming and outgoing MIDI data. The input filter (**Fig. 2**) will keep incoming MIDI events from being recorded and/or passing to

the MIDI thru port (up to four specific controller types can be filtered), and you can block input from any set of MIDI channels. You can set MIDI thru to pass all data except that from a specified input channel, which is useful if your keyboard does not have local on/off control.

Any controller may be remapped to any other, such as mod wheel to pan, but not to give channel messages such as aftertouch. Mapping is one-for-one and maintains MIDI channel integrity; you cannot have a foot control input changed to volume on one channel and pan on another, although that's easily done through the editing windows.

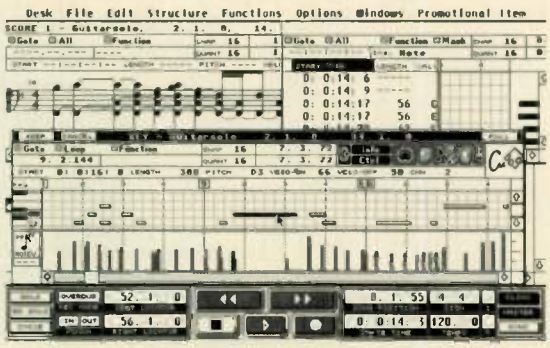


FIG. 3: Cubase editing windows.

EDITING I: FROM THE TRACK DISPLAY

One of Cubase's strongest features is that virtually all editing operations may be done while it is playing, giving instant feedback. Editing mechanisms are available from the track display or other specialized edit windows.

You can edit each part's name, MIDI output channel and port, pitch and velocity transposition, note duration and velocity scaling, and time delay. In addition, you can adjust settings that send a program change and MIDI volume valve and that filter selected types of MIDI data for playback. These same settings can also be directed to a single track or entire arrangement.

Additional commands provide cut/copy/paste within a track or across all tracks in an arrangement, unmix by MIDI channel, merge tracks/parts into a single new part, create a blank part of fixed length (which can be taken into an edit window for recording), thin or delete controller data, and remove doubled notes.

Quantization deserves special mention given the number of available types of time correction and places to apply it. Quantization may be applied to an entire arrangement, single track, or individual part and can be undone if the results are unsatisfactory. Alternatively, selected notes within an edit window may be quantized—each window having its own algorithm and time grid. The time grid spacing may be set from a whole note to a 64th-note triplet.

Quantization algorithms that shift the note-on time are: straight locking to a time grid, intelligently shifting note-on time allowing for the player's "feel," iterative note-on shifting (a little at a time for notes outside specified quantize value), and shifting to match the feel of another part or a predefined groove

pattern (Cubase comes with a groove library that can be edited to taste). Note lengths may be quantized to a fixed duration or so the durations lock into the time grid.

EDITING II: FROM ALL VIEWPOINTS

Cubase provides several specialized editing windows that may be used one at a time or in tandem (Fig. 3). While any one can handle most of your editing needs, each offers special advantages. High marks to Steinberg/Jones for maintaining consistent design across the windows; learn one and you should have no problems with the others. The windows reflect the same data pool; changes made in one are reflected across all others. All editing is kept on temporary status until you exit the window and are given the option of keeping or canceling the changes.

Multiple parts can be taken into any edit window except Grid Edit, which only takes one part or parts on one track. Edit operations are done on a single part at a time; inactive parts are displayed but not affected. This helps when trying to line up changes in one part to match something going on in another.

The edit windows are Grid Edit (event list format), Key Edit (piano roll note display), Score Edit (traditional notation), and Drum Edit (pattern programming). Common operations among windows include quantization, move events in time, cut/copy/paste, set all selected notes to the same pitch, reverse time, delete all except selected events, and delete all of an event type. Individual events may be selected and altered one at a time by entering new values in the info line. Note pitch and on/off velocity may also be changed through step-time MIDI input.

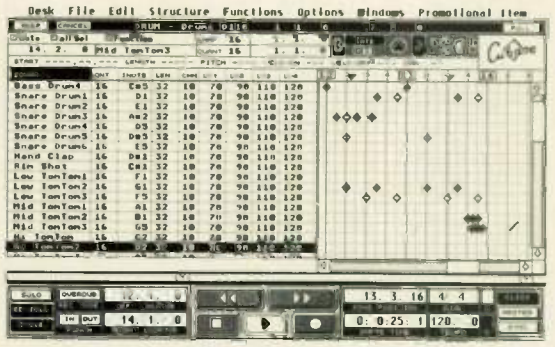


FIG. 4: Drum Edit window.

You access graphic controller editing through the Drum Edit and Key Edit windows. You can modify note-on velocity (not release), aftertouch (channel and key), pitch bend, program change, and controllers. You can only display one at a time. Tools from the toolbox support redrawing values, adding new ones, cut/copy/paste (keep reusing that perfect pitch bend), and building linear ramps (good for fade in/out). Selecting events from the velocity display is a good way to grab and delete or relocate off-screen notes without continually scrolling the display.

More a novelty than for practical use, the Key Edit window provides a chord analysis function. This names a chord as

you play it from a keyboard. Unfortunately, it only operates in real-time from MIDI input. It would be of more value, at least educationally, if usable in step-time or on notes selected from the screen display.

Grid Edit provides an event list editing environment. All events are listed by measure position or relative SMPTE time, with an adjacent graphical display of time position/duration and note-on velocity. All event parameters may be edited directly from the list. You can hide event types, making it easier to find a program change in a sea of pitch bend. A related masking function enables rapid selection of repeated events (all hand claps from a drum part) or an entire event type (channel aftertouch) for subsequent editing.

While the Score Edit window leaves much to be desired for notational accuracy and presentation, it is effective for step-time note entry and gives a rough visualization of parts. There is also something special about playing music and seeing it notated automatically. Controls let you modify clef, key signature, and the split point for treble/bass staves. Note entry via mouse is awkward as you must reset the quantize field value every time the note value changes; I'd rather pick and place from a note/symbol palette. The only symbols are notes, rests, and ties.

Anyone who has ever programmed a drum machine will be at home with the Drum Edit window (**Fig. 4**). Cubase comes with several predefined drum maps. These specify drum sounds by name, trigger note, output channel, duration, and allow four hit levels (note-on velocity) for adding dynamics. Maps are not restricted to drum machines; you can craft them to trigger samplers or synth notes (play with duration to get droning backgrounds). A more esoteric provision lets you augment the map to have the input trigger note actually send a different note over MIDI, which helps remap drum sounds between different machines.

A fifth edit window, the Logical Edit window, is available for the adventuresome. Similar in principle to Dr. T's *PVG*, it allows you to select events and transmute them to new values or even new event types according to logical constraints and math relationships you supply. While considerably more demanding to master, Logical Edit provides the types of specialized editing abilities you just cannot get any other way. Some uses would be to remap foot control to aftertouch on one channel and pan on another (remember the limitations with real-time remapping?), or to select and transpose horn notes within a velocity range to make a new doubling part. However, coverage of this section in the manual is too shallow, leaving quite a bit up to experimentation.

COMING ATTRACTION

As mentioned earlier, a new version of Cubase and M-ROS is being beta tested. According to the manufacturer, not only is the TOS 1.4 and GDOS incompatibility corrected but a whole new editing window has been added. Cubase now lets you create a software mixer, assigning knobs, sliders, and buttons to program functions or sysex messages

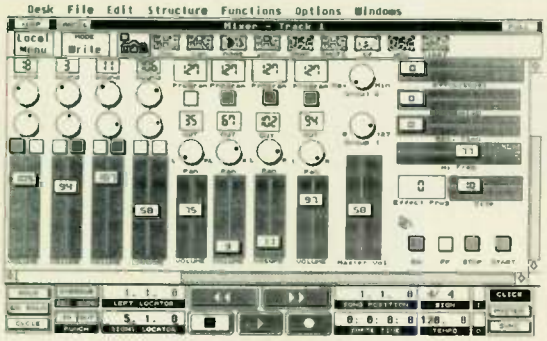


FIG. 5: A software mixer.

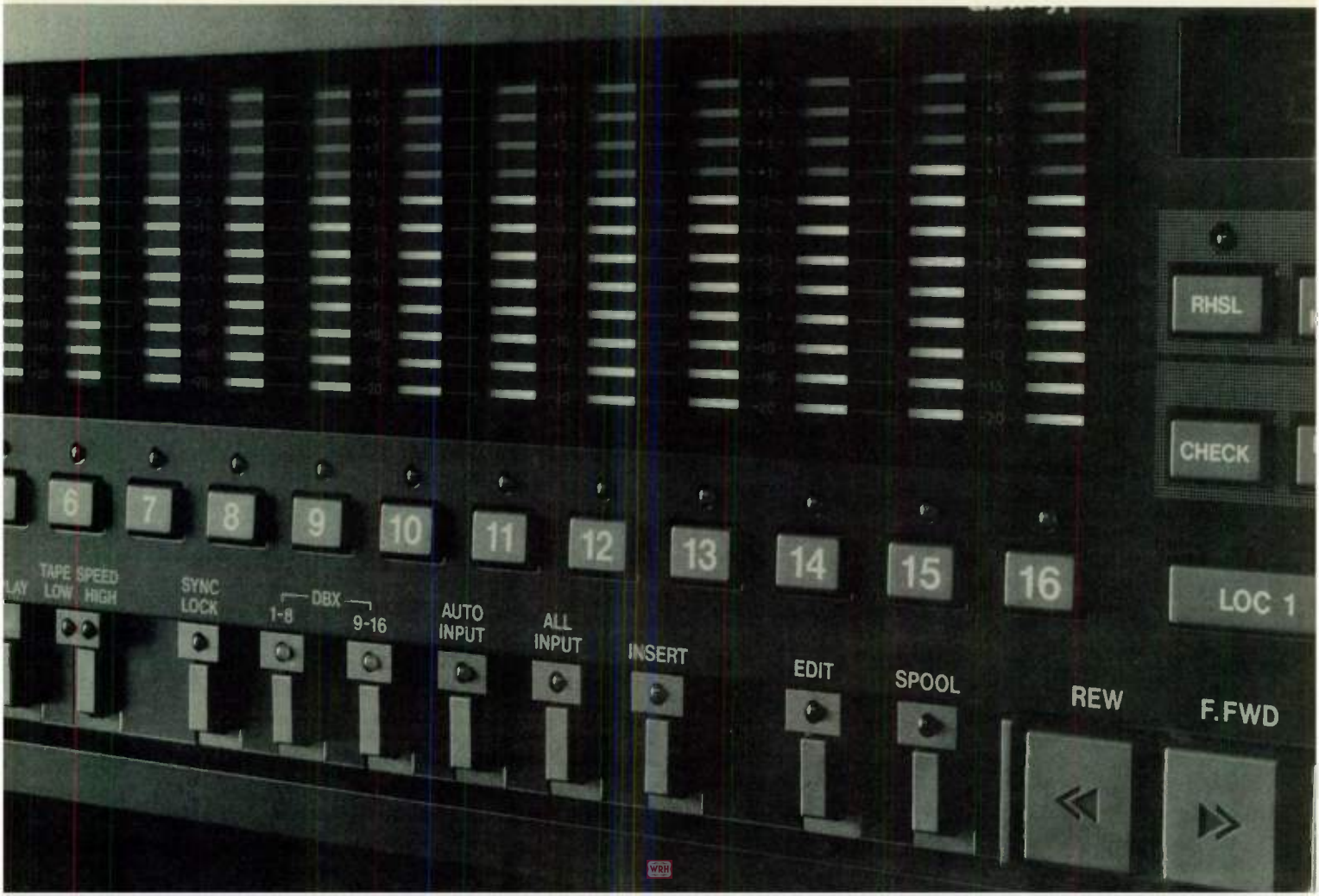
(Fig. 5), manipulate screen controls for real-time effects, and store snapshots of the settings for later recall.

During my evaluation, the weakest link was the M-ROS environment. Cubase itself was rock solid and only gave me problems once when trying to unmix a MIDI file that imported and played fine (still under investigation). This is a remarkable achievement for a new release, particularly one as processor- and graphics-intensive as Cubase.

I was never able, however, to get multiple applications running under M-ROS, although I know of others who routinely do so. Failures ranged from simply not booting, to bombs and lockup. Part of the problem may be that I did not have the most up-to-date versions of all the programs I tried. In addition, while my system enhancement programs were compatible with all tested programs individually, I do not know if there was a fatal unattraction when everything tried to run together. Heck, even "MaybeFinder" on my Mac still bombs inexplicably at times, and that has gone through significantly more development. Worth mentioning is the hidden cost of using M-ROS. As long as Steinberg/Jones continues to use hardware dongles for software copy protection, users must buy a multikey adapter (up to three keys) to run more than one key protected program (either simultaneously or sequentially, as you must turn off the computer to exchange keys), and the adapter currently costs over $200.

Multitasking aside, I'd snatch up Cubase in a minute for high-end sequencing. The graphics are glorious—getting a tremendous amount of information into a minimum amount of space, and operations show considerable attention to detail with a musician's emphasis, rather than a programmer's. Given Steinberg/Jones' history of solid support to the Atari MIDI market, and plans to expand M-ROS applications into Mac and IBM markets, I am confident that the initial multitasking problems will soon be resolved. A demo version of Cubase is available for $10 from Steinberg/Jones or may be downloaded from the MIDI roundtable on the GEnie national BBS service.

When not camped out with his Atari computer and MIDI setup, **Jim Pierson-Perry** *occasionally enjoys seeing daylight and pursuing the perfect bowl of French onion soup. His recent spate of telecommunications must have funded at least three new branch offices of US Sprint.*



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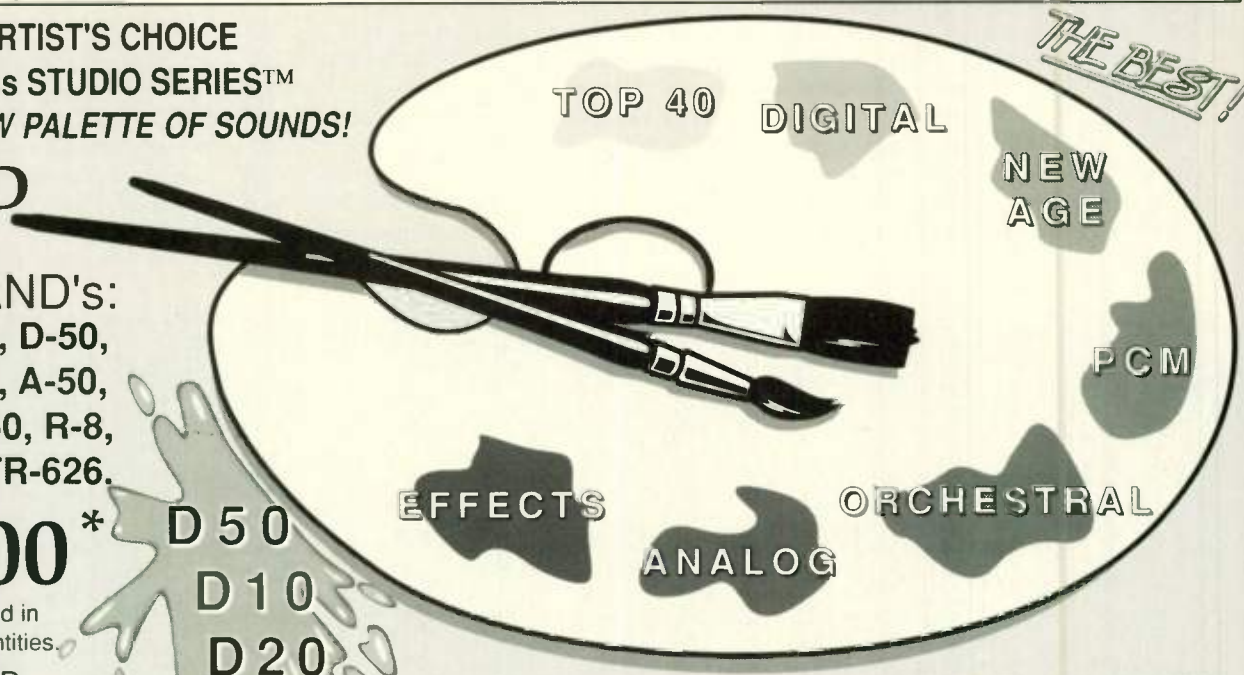

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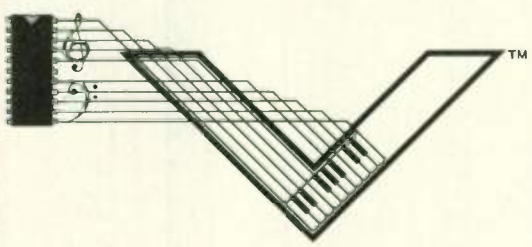

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Temporal Acuity Products MusicPrinter Plus

By Jerome Bixby and Brent Carter

One of the more highly touted notation programs for the IBM PC, Version 3.0 of this package includes real-time MIDI input.

Billed as "The Essential Software for Creative Musicians" *MusicPrinter Plus* (MPP) is a notational scoring/performance/printing package for the IBM PC and compatibles, with powerful and uniquely conceived features.

You enter notes on an onscreen score page via computer keyboard or MIDI, in real time or step time. Nearly every expression, tempo, articulation, and other musical marking you can (probably) think of is at your fingertips, with instant erasure/substitution of any character. Built-in functions provide easy manipulation of all aspects of the score, and many cursor functions are simplified via mouse support.

Entering MPP, you must select a score to work on. If you select a new score, it's wise to format a prototype page—clefs, fitted barline, etc.—and save it under another name, to be appended as needed. Now you have a blank staff system on which you will test that extraordinary statement, "What you see is what you get."

MPP maximizes the computer as a notational tool; you don't have to worry about icons that need to be dragged around and clicked into place. Each musical character is assigned to a logically chosen computer key, and at a keystroke, the cursor *becomes* that character: hit "q" and the cursor's a quarter note, hit "e" and it's an eighth note, and so on. Hit "#" and you get a sharp; hit it twice, a double sharp. Hitting note keys twice dots the note. Common categories are grouped under the same key; for instance, clefs are (you guessed it) on the "c" key, once for treble, twice for bass, thrice for a vertically movable C clef. The "/" key produces three-slash tremolando plus two measured tremolandos (one/two slashes), all functional when scores are played back over MIDI, in stems-up/down versions. Almost everything is there, convenient and learned in a few days. Getting around MPP is fast and easy; extensive use is made of the function keys, and comprehensive help is instantly available from anywhere in the program.

TAP MusicPrinter Plus running on an IBM PC Model 2.

You have complete freedom to place characters wherever you wish, using arrow keys or the mouse, and character entry and removal is simple. Any note-value in the cursor, entered over a note of other value, changes the note to cursor value, along with any chorded notes of like stem direction. All told, it's a truly impressive and agile means of entering notes via the computer. If you prefer to play, however, there's more.

PLAY IT IN, SAM

Version 3.0 of MPP includes a new MIDI real-time entry mode as a quick feed to the Editor. Note, however, that MPP

does not act as a recorder; it won't replace your sequencer. The entry is mostly for notation and subsequent playback.

You set up a number of parameters prior to entry, including the Lowest Note Value to Be Entered function, which serves two purposes. First, in real-time entry, placement of notes, rests, and bar lines is geared to the selected lowest note value—a bar with 32nds as lowest note would be almost twice as wide as one with sixteenths—so this value ordains how the score will lay out. Second, when you're playing in, MPP will notate (i.e., quantize) to the nearest lowest note value, allowing some compensation for rhythmic inaccura-

Product Summary

PRODUCT:
MusicPrinter Plus V. 3.0

TYPE:
Music notation/performance software

PRICE:
$595

FEATURES:
Single-key, computer note entry; real-time or step-time MIDI entry; MIDI playback; dot matrix and laser printout, no PostScript required

SYSTEM REQUIREMENTS:
IBM PC XT/AT or compatible with 640K RAM and IBM PC Music Feature card, Roland LAPC-1 interface with MCB-1 MIDI connector, or MPU-401-compatible interface; or PS/2 with DOS 2.0 or later and Roland MPU-IMC interface; or Yamaha C1; two disk drives; CGA, VGA, EGA, or Hercules graphics; printer (including laser printer)

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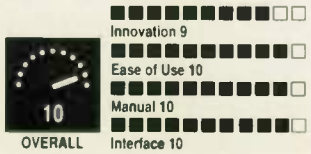


cies in playing.

When you choose one of three different notation modes—Notes and Rests as Performed, User-Imposed Rests: No Overlapping Notes, User-Imposed Rests: Overlapping Notes—the program looks for these types of notes and adjusts its notation accordingly. These modes offer great flexibility in entering different types of material.

In Scale mode, you decide default pitch spellings within the key signature. The Pitch Identification chart shows spellings that will actually be notated (reflecting Scale mode or individually assigned spellings). Last, there's a choice of MIDI transmit/playback channel(s).

When entering, notation starts to appear as you move on, and if you sneak glances, you'll probably blow what you're playing. The performance of MIDI real-time entry is infallibly slick. We did our best to confuse it with erratic entry (rhythmic and chordal horrors); crazy scores resulted, but note placements, note values, and entry settings (which we varied) were faithfully observed. Once you get the hang of it, any number of staves are quickly, predictably filled, vertically true, and ready for further work in the Editor. Pianists probably will use real-time entry as the primary mode, since entry *a tempo* is often possible. We found this feature extremely convenient, versatile, and seemingly bulletproof.

MIDI PERFORMANCE

The MIDI Performance menu is a revolving door, as one swerves here constantly to swiftly recompile and check edits. The choices of action are Edit MIDI Performance Configuration, Compile, Play, Save and Load, and Edit IBM Music Feature. (In Edit IBM Music Feature, all you can "edit" is Channel mode and base channel.)

A MIDI Performance Configuration consists of three page-through panels. In the first, you assign the number of score voices, rhythmic value for trills (Trill Value or At Note), Crescendo/Diminuendo mode (which is selected when initially configuring your document and can't be toggled within it), dynamic range, and slope (linear, wide top, or wide bottom). In the second, you assign voices per staff, stem direction per voice, dynamic balance for each channel, stereo pan, and synth patches. (Many entries that might conflict are autocorrected by cross-correlatation.) Finally, in the third, you transpose individual staves or the entire score up to three octaves either way.

Trill Value is the actual note value for trills in a document or portion of a document. Assignable from eighth notes to 128th notes, in duple or triplet form, it governs the duration of grace notes, breath marks, tenutos, and "shakes" in tremolandos, and quantizes gradations of volume in crescendos and diminuendos. It can be altered at any time via a program change. The alternative to Trill Value as governor of continuous volume change is At Note—chunks instead of curves—the best choice if you are exclusively using fast decay sounds that need sudden volume changes.

Compilation, which converts all the notation you've placed on the screen into a sequence of MIDI data, is quick, and all or any portion of the score can be specified, down to a few measures. Section repeat marks are implemented in MIDI, with first and second endings, plus *Da Capo, Dal Segno, Coda,* and *al Fine* combinations.

MPP's MIDI implementation is thorough and easy to use. For example, bounce, merge, and layer are accomplished notationally, via cut-and-paste block functions on a vertical score. All sixteen MIDI channels are used. Unfortunately, MPP doesn't support MIDI continuous controllers such as pitch bend—at least, not yet.

THE PLAY'S THE THING

MPP generates MIDI performance from notation, and most of the markings you applied are functional, including faultlessly smooth crescendos and diminuendos, accelerandos and ritardandos—the former two assignable, as are all dynamics, on a staff-by-staff basis. About the only marks not implemented in performance are slurs and arpeggio, and the latter is promised for future versions. Dynamic marks can be made MIDI-specific via text numbers 0 to 127.

During Play, your score is scrolled onscreen, with optional early page-turn, and tempo can be modified via ± keys. If an error is hiding behind real-time sonic flurries, MPP provides step-time play, forward and backward by musical events, to help you find it.

With such fine-tuning possible (plus continuous accelerandos/ritardandos between differing tempo marks), you have tremendous control over the expressive parameters of a MIDI performance. The program's byword is, "What you see is what you get." Sometimes you get it until you slide off your chair in dawn's light (just *one* more time; move the rit., change pp to ppp, recompile). In fact, playing with Play is so seductive, it should be classed as a controlled substance.

WHAT'S THE SCORE?

Up to 42 staves are possible, with a maximum of 128 voices that can play back simultaneously. You can scroll by staff, staff system, or page, or jump to a location. Graphics are attractive and old friends; the only nonmusical symbol is the Program Change "diamond." So within moments you are mentally working on "paper," applying familiar characters in a familiar fashion, and scores of immaculate perfection can be created, played, and printed.

On the other hand, in play-only short scores, there's no problem with notational black holes and hurricanes. Basic rules of notation must be followed—particularly, as in all scores, vertical

● MUSICPRINTER PLUS

alignment of simultaneous events. After that, you can paint with a roller. You can have up to thirteen ledger lines above and below the staff, and the distance between staves is adjustable. Most marks can be placed anywhere near or in their staves and can crowd notes to the point of appearing demented, overlaying ties, stems, sometimes even one another. Such mob placements can occur in pushing expressive capabilities. No matter; the extraordinarily supple and forgiving "free form" Compiler easily converts all to MIDI.

Likewise, a hash of irregular measures is no problem (time signatures, if you bother, are see-only), and bar lines can be omitted, along with many rests. On a few occasions the Compiler became confused, necessitating insertion of a rest or altered note value to "formalize" a measure, usually to sync to a bracketed staff. But such freedom to notate horizontally as you like—verification being irrelevant—permits effects that a more structured scoring system would make tedious or impossible. MPP's graphics-based ability to play eccentric writing can't be overstated.

Key signatures are built automatically by changing the cursor to the desired accidental and, in position, repeating "k." Ties spring forth with breathtaking ease. All mass manipulations of score elements are streamlined under the Block Functions mode. Punch F5 and skiploader brackets appear, with which you quickly enclose any portion of a system (one staff or all) and do as you please with its contents, from Beam to Transpose to Copy to Delete. (At a keystroke, MPP will beam a group containing differing and dotted note values. Beams adjust automatically in editing.)

MPP includes many specialized characters (such as cue notes, clefs, and lead-sheet symbols). A mini word processor enables you to freely mix text and music symbols, with Helvetica, bold, italic, and large text fonts (mixable in-line).

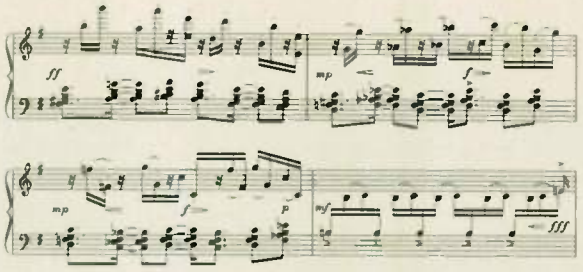
PRINT TO FIT

MPP prints on a wide range of 9-pin, 24-pin, and laser printers, in any desired format, each fully adjustable down to margins (with optional alternating right/left for bookbind) and page numbers (right, left, or alternating). Dot matrix graphics are high resolution, double-density (several sizes on 24-pin printers), and well-designed and de-

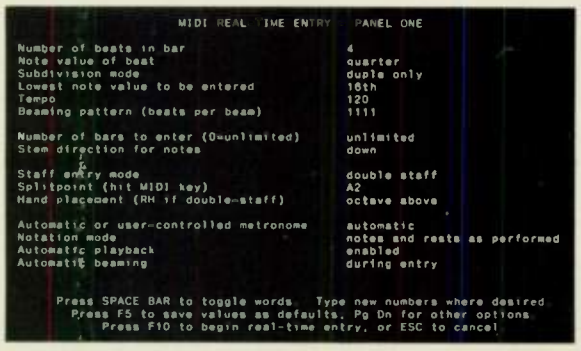
fined, with camera-ready 24-pin and laser output. Wide carriages are accommodated, and speed is at printer capacity. You can print a single staff or the entire score, with selectable starting page/system and endpoint.

If the proportions of your score don't match current printing needs, an automatic Reformat will move any number of measures up or down to fill newly set dimensions, changing length while preserving the integrity of the notation, and ending right-justified. Song lyrics are aligned under the appropriate notes at optimum vertical location. When done, Reformat gives you the option to accept or abort. This feature provides great flexibility at the printing end and is useful for clean-up.

Part extraction is via an external routine that saves parts as separate MPP files for editing or printing. Text, measure numbers, and all performance markings are copied. Various staves can be extracted from a large system, assigned to the same destination file, and combined as desired. A justification routine optimizes part layout.



TAP Music Printer Plus printout.



Prior to recording, you use MPP's MIDI Real-Time Entry page to set up the necessary parameters.

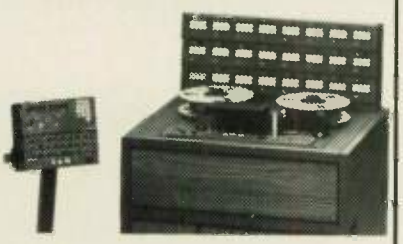
A NEW DIRECTION

No other program does what MPP does as intuitively as MPP. From notation, it performs with realism that approximates recording. Nothing technical is placed between the user and the music. No error can be destructive or entangling. Write it—you get it. Want it different? Change it. For those whose experience with similar programs has brought mostly frustrated yearning to break through to uncompromised musical expression, MPP is freedom to follow impulse and inspiration. Its comfortable interface, sleek operations, uncomplicated environment, and many capabilities amount to power steering and automatic transmission on the way to music.

In music education, MPP has valuable uses at every level, while the largely one-key notation entry will benefit musically creative persons whose only lack may be average dexterity. (All two-key operations in MPP involve Shift, Alt, or Ctrl. Utilities exist for the PC that lock these key functions until a second key is hit.)

With its wealth of shortcuts, MPP still works from the top. As entry-level users unfurl, experts can sail. A rare bonus offered by MPP is excitement—sheer delight and fun, as the deeper you go, the more it offers. Often scraps of behavior not immediately pinpointed in the manual are found amenable to logic and intuition, evidence of thoughtful programming by developers Jack Jarrett and Gary Barber. In addition, technical support is immediate, cordial, and thorough. For desktop "compusers" of a nontechnical bent, the secret life of Walter MIDI can find reality.

Jerome Bixby *is a composer and retired freelance writer whose credits include scripts for the original* Star Trek *TV series, numerous films, and science-fiction stories.* **Brent Carter** *is a music hobbyist and founder of Carter Computer Concepts, a systems engineering/consulting firm. He is interested in R & D projects for the handicapped.*



Green Oak Software Rhapsody

By Daniel J. Kumin

An inexpensive new Macintosh program approaches sequencing from an innovative point of view.

Rhapsody: chiefly, free fantasies of an epic, heroic, or national character.
—Harvard Dictionary of Music

The folks at Green Oak (formerly Gateway) Software clearly put some thought into the name of *Rhapsody*, a new MIDI sequencer/utility application for the Macintosh computer family. Rhapsody is a flight of fancy with some wonderfully innovative features. With several different functions and nearly a dozen different views of MIDI events, it's also an epic. And at a suggested price of under $150, a package that attempts so much, however perfect or flawed its execution, must be labeled heroic. Finally, as for national character—well, it could only happen in California.

Rhapsody 1.1 is a compact, non-copy protected, 225 KB application that differs quite noticeably from most other Mac sequencers, both in its user interface and in some basic concepts. Rhapsody functions like a self-contained drum machine sequencer; it groups musical elements into "patterns" that, assigned freely to tracks, make up a sequence (a complete song).

The real power of this scheme is found in what Green Oak calls "pattern instancing." Once created, any single pattern is endlessly available. Finished patterns—for example, a chorus, a turnaround, or a bridge—can be called up and inserted into any track, at any point, without laborious calculation or repetitive cutting-and-pasting. Each individual use of a pattern is called an "instance."

The kicker is this: Individual instances of a single pattern can be transposed or quantized independently at playback without affecting other instances of the same pattern. Even more valuable, changes to a pattern's "root" entity are automatically reflected in all instances of that pattern. (If you want to slightly change a single pattern, you'll need to make a copy of the original, make the changes, and rename the edited version as a new pattern.)

Say you have a simple, eight-bar drum track that repeats a dozen times. After days of work, you decide you want to move a single hi-hat hit in each bar by a 32nd. With Rhapsody's pattern-instancing system, you need only edit the original drum pattern; the other eleven instances update automatically. In this way, compositions can be assemble-edited, and it is uncommonly easy to fix uneasy or mechanical-sounding passages without getting down to the note-by-note level.

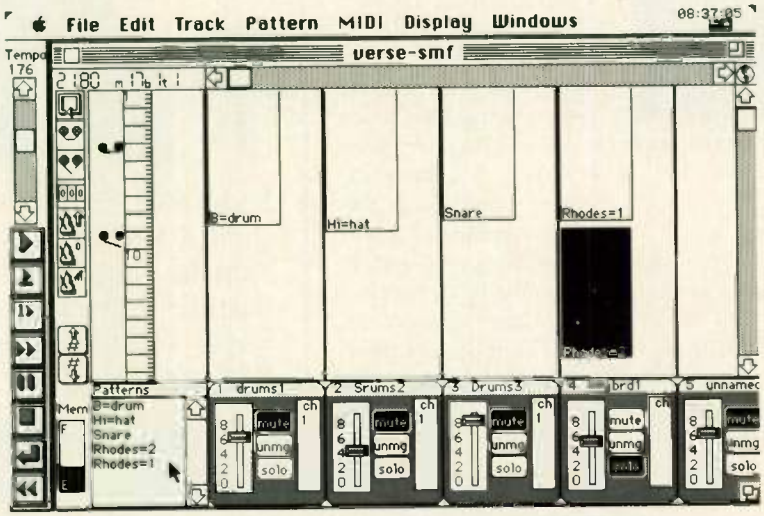


FIG. 1: Rhapsody's Track Editor screen, showing the overall representation of the sequence as well as a list of available patterns in the lower left corner.

TRACK EDITOR

Rhapsody's primary graphic elements are the Track Editor (see Fig. 1) and the Pattern Editor (see Fig. 2) windows. The

first presents a sequence overview. Each track—containing one or more patterns—appears as a vertical bar on screen. (Time moves vertically in Rhapsody, which takes a bit of getting used to; most sequencers treat time horizontally.) Unfortunately, the window's track segment does not scroll down as a sequence plays. However, when you pause the transport, the tracks leap to the window's top, resuming from there when pause is reclicked to recommence playback. This acts quickly enough, but makes it just about impossible to visually scan a sequence while it plays. (Green Oak is hard at work creating scrolling windows for the next version of Rhapsody, which it hopes to release by the start of 1990.)

A vertical time ruler divided into bars and beats indicates temporal location. Above are two counters: One shows the current mouse location in measures, beats, and ticks; the other in seconds and tenths. Other Track Editor elements include a scroll bar for tempo, a fairly conventional set of tape deck-

Product Summary

PRODUCT:
Rhapsody 1.2

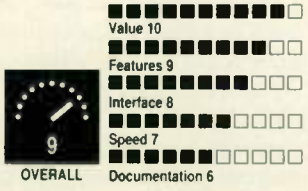
TYPE:
Sequencing software

HARDWARE REQUIREMENTS:
Mac 512K or better; system 6.0 or later; MIDI interface

FEATURES:
64 tracks/sequence; 192 ppqn resolution; sync to external MIDI time code, graphic editing of tracks, patterns, and controllers; pattern "instancing"; drum kit view; generic MIDI sysex editor/librarian; MIDI Manager compatibility

PRICE:
$149

MANUFACTURER:
Green Oak Software
4446 Salisbury Dr.
Carlsbad, CA 92008
tel. (619) 434-0823



• RHAPSODY

metaphor "transport" controls, and a column of nine icons to control such actions as tempo-changing, looping, and recording start-end and playback-start points. Below each track's slot is a mixer-metaphor control panel. A mouse-operated volume slider works by scaling note on velocities for an entire track, rather than operating on MIDI volume.

Three buttons are also in the track control panels. Mute and Solo are self-explanatory. "Unmg." stands for unmerge; any Rhapsody track can be remapped to a different MIDI channel, and tracks can be freely merged (a box in the control panel shows current channel assignments). Unmg. undoes any remapping or merging, reassigning a track to its original "home." This is a nice way of facilitating experimentation of track-instrument and doubling assignments.

But the niftiest Track Editor segment is the "pattern box" at the lower left. This presents a scrollable list of all the basic patterns recorded so far. A pattern can be click-dragged into any track and dropped at any temporal location as often as necessary to make up a composition. Start-points can be quickly readjusted by clicking on a pattern in a track and dragging it up or down; the bar-beat-click numeric display keeps track of the pattern's precise start point. Neat.

Even better, patterns can be grouped in the Track Editor window—much like grouping objects in *MacDraw*—and then be operated upon with transpositions and quantizations. (Individual tracks can also be selected by shift-clicking, as in most other Mac programs.) Grouped patterns can be separated at any time and regrouped in endless variations depending on the operator's needs, a powerful editing implementation. Undo is always available in Rhapsody, whatever the active window; an ingenious "take" implementation permits you to record up to sixteen takes of a pattern, then compare and save only those desired.

PATTERN EDITOR

The basic Pattern Editor window, like the Track Editor, shows time vertically, while a 108-key(!) piano-style keyboard across the top indicates pitches over nine full octaves. The transport window remains active along the left edge, and the time-ruler and bar-beat-tick counter

are also present and operational. In the Pattern Editor, the vertical icon bar at the left includes:

- an arrow cursor for selecting and dragging
- a pencil for drawing individual notes
- a paintbrush that can draw major or minor triads in root, first-inversion, or second-inversion positions with a single stroke
- a spray can that auto-improvises a phrase at the click point
- a finger that sets punch-in/points when it is dropped in the ruler
- wrench and pliers icons.

This last pair enables on-the-spot, detailed editing of existing events. The wrench brings up a series of dialog boxes for the note it is clicked on, allowing keyboard entry of values for note number, attack velocity, and duration. The pliers adjust a note, in-creasing or reducing its duration.

A powerful aspect of Rhapsody's pattern editing is its provision of numerous different control views of a pattern. These include event velocity or duration, keyboard or channel pressure, any MIDI controller number, pitch bend, and program changes. Editing any of the control views is similar. The vertical time dimension is unchanged from the Keyboard View, while control events are represented by horizontal lines. Icons are available for drawing new events and for changing existing ones in various ways, including truncation, augmentation and attenuation, and custom-contouring.

Rhapsody's Control View options are wonderfully powerful but occasionally a bit cumbersome. You must open a new control window from a hierarchical menu, then select or create events before you can edit them. This in itself is not too bad, but I question the wisdom of implementing such things as program change this way. It makes for a long journey by mouse simply to hear what a pattern or track will sound like on a different patch. It would be nice if program changes could be dropped into pattern instances at the Track Editor window.

Two other Rhapsody windows deserve special mention. The rather inelegantly named "Raw View" can show any pattern or selection of MIDI events in a basic, textual, event list fashion, such as "m.5, b.1, t.91,: Type: note on, Note 76 (E7): on vel: 63, dur: 210." This gets you down to the most detailed level you are liable to need.

DRUMS, QUANTIZATION, AND OTHER RHYTHMIC DEVICES

The next-to-keenest feature is the Drum View window. This displays a pattern's note data in much the same way as the keyboard view. However, the keyboard

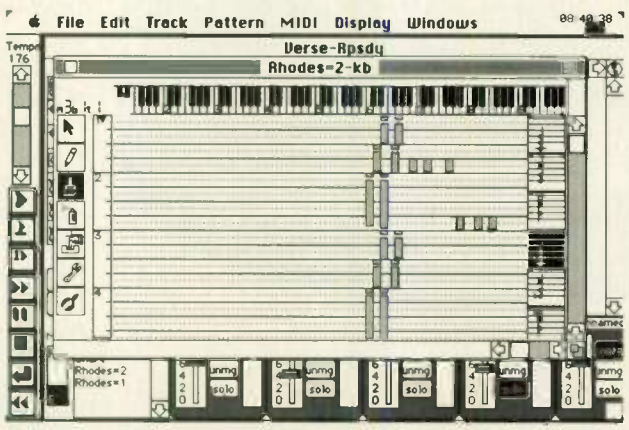


FIG. 2: The Pattern Editor allows you to graphically edit the notes in each individual pattern.

across the top is replaced by a "drum kit," a list of drum sounds, in ascending order of key-number assignments, that you build to order. A kit may be saved as a Rhapsody document template and recalled for more than just one sequence. Unfortunately, key assignments must be consecutively ascending note numbers. This makes things a little awkward for those of us—including most Alesis HR-16 users, no doubt—who prefer to perform drum parts from the keyboard instead of using the drum machine's pads.

Editing in Drum View is much like that found in the Keyboard View except that note durations (obviously) are fixed. Two new icons are introduced. A flam tool drops a flam—on whatever drum you wish—at the indicated beat, a rather handy gizmo. The paintbrush icon brings up a palette of six different fills of varying density and distribution, which can be similarly dropped in place. (The fill icons are only average representations; each time a fill is dropped in, it is randomized from its base icon.) Once a fill is selected, you drag a box for it in the drum window; width distributes the fill over more or less drums, height over a shorter or longer duration. You may not select individual drums to apply a fill to, a rather severe oversight, as you must keep trying till you get one you like. The fill concept is a neat idea, but it doesn't quite work ideally—yet.

Rhapsody handles rhythmic quantization in about the most complete and flexible fashion available. When a pattern (or pattern instance) or selection is called up, a rather intimidating dialog box appears. This allows you to specify both the offset from which quantizing starts counting—allowing notes to be shifted forward anywhere from a single tick to whole bars—and the quantizing interval, which determines where subsequent quantizing points will fall—also by measure, beat, and tick.

Rhapsody can specify a quantizing "window" in independent terms for both forward and backward time. This allows you to say, "Quantize notes that are an eighth note or less *ahead* of the beat, but only those a *sixteenth* or less behind," a handy feature for we who were born short on "feel." Once all these parameters are set, Rhapsody can be instructed to adjust events to approach the quantizing "grid"; 100 percent "adjustment" moves them bang on the grid, 50 percent moves events halfway closer, and so forth—a very nice, humanizing touch.

An even slicker quantizing feature is the Set Quantize Template command under the Edit menu. With this, you may choose an existing phrase that already has just the rhythm and feel you want, and Rhapsody will extract a quantization template from it. This template can then be called upon to quantize other phrases or patterns to match. It's clever, it's effective, and it works.

Another adroit gizmo is the Select command, a dialog box that sets criteria by which to select events in a pattern or selection. Criteria include event type (all, note on, channel pressure, etc.); time range in bars, beats, and ticks from and to; and min/max ranges for velocity, controller values, duration, and the like. A logical option allows you to perform multiple selections with different criteria, yielding complex specifications

• RHAPSODY

such as "all notes from C4 to B5, with on velocities above 63 *and* durations less than 27 ticks." This requires a bit of thought but can be quite useful when you want to modify only certain elements of a musical phrase.

AND SYSEX, TOO

Rhapsody includes a generic system exclusive editor/librarian that will probably prove useful only to those familiar with MIDI's nether regions. It lists sysex byte numbers followed by their value. The system allows you to create a template with any text editor so that your data pages will replace the byte numbers with something more meaningful, "Osc1_Coarse," for example. This might be handy for those with heavy sysex habits, a logical mind, and time on their hands. The rest of us probably will stick with outboard editor/librarian/sysex-filer programs and *MultiFinder*.

Rhapsody's feature list is an astonishing length for a $149 program. In fact, there are far too many to mention, so I'll only list a few.

Zoom controls magnify or shrink the display of the time dimension in any window. Snap To settings can define a time grid, with any resolution from bars to ticks, to which newly created events will auto-quantize. Tabs can be dropped into any window's time ruler to quickly locate a particular point. A spray can icon can be used to improvise a series of musical notes—with generally unpredictable and occasionally hysterical results—at any point in a pattern.

The MIDI menu offers handy items like event input filtering, individual channel mode message transmission, channel mapping, and an all-notes-off panic button. Transport functions can be commanded by user-assignable MIDI note numbers for keyboard-controller sequencer control. Rhapsody can open and "save as" standard (type 1) MIDI file format documents. The program's looping/repeat options operate both globally (on an entire sequence) and locally (on a single pattern instance) and are quite complete. However, their implementation is rather nonmusical, more reminiscent of subroutines in BASIC than of *Da Capo al Fine*. Rhapsody can sync to external MIDI time code (and hence, SMPTE via a SMPTE-to-MTC converter) or song position pointers. In addition, the 1.2 version of the program is one of the first sequencers to support

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Apple's new, multitasking MIDI Manager system.

ALL THAT GLITTERS...

But however capable, Rhapsody is far from perfect. Its main windows use a set of cross-hair lines across the screen to indicate cursor position. These flicker distractingly; in fact, screen flicker in these windows is occasionally more visible. Screen painting is a bit slow, and when a dialog box or small window is closed or moved back, Rhapsody stops to repaint the entire screen—sometimes maddeningly. Several actions that many will consider primary are surprisingly obscure: Changing the program's control of your MIDI port to the thru mode requires calling up the MIDI Setup dialog box, a lengthy procedure for something that may be needed following every record pass. Rhapsody doesn't "chase" program and controller changes when arrested midway through a sequence. (It does load a default "pattern," which you can edit, to set up a sequence's defaults.)

Perhaps more serious is the program's complexity. You can easily accumulate a dozen windows, and the variety of views of a single pattern can become confusing. To be fair, complexity is the unavoidable, unwanted child of computer power. While reviewers regularly complain about it, how many would care to meet a challenge to design a similarly capable application in simpler clothing?

Less excusable is the program's manual. Rhapsody's is incomplete, questionably organized, less-than-perfectly accurate, and sometimes hard to follow—particularly for the first-time user, which this high-value product is sure to attract.

To its credit, Rhapsody performed very reliably, even with some moderately large sequences. It did crash—"quit unexpectedly," to use Apple's euphemism—from within MultiFinder on two occasions. (Both were probably due to inadequate memory in its 384K default partition—larger, 512K partitioning seemed pretty bulletproof.) It appeared trouble-free on a plain-vanilla, 1-meg Mac Plus, and most operations—excepting the above-mentioned screen-painting slowdowns—while not blazingly fast, were acceptably quick.

IN THE END

This is a product that, even early in its evolution, provides a terrific bang for the buck. Though its lack of a few "pro" features may keep it out of the major hit factories, Rhapsody's overall power-per-dollar ratio makes it an attractive alternative to some of the bigger guns for us regular folks.

On the other hand, software sequencers are becoming more and more like musical instruments: a matter of taste. Just as there are Strat people and Les Paul players, the choice of a sequencer is mostly a matter of feel. Rhapsody's is decidedly different. Its sometimes unusual metaphors should prove to be second nature to some, totally alien to others. It's good practice to try any axe before you buy—and Rhapsody is one worth checking out—even if it's just for fun.

Daniel Kumin *writes regularly for* EM. *He is technical editor of* CD Review *magazine.*

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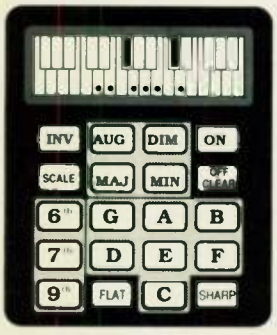

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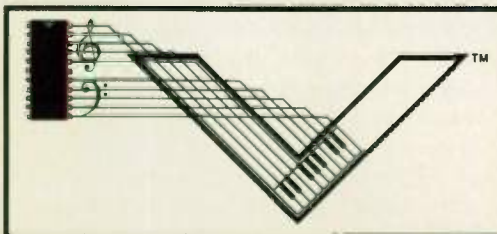

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Music: Voice of the Cheese, Part 1

By Robert Carlberg

Last July, we offered readers the chance to "Be a Reviewer" on three tapes we would send them. The response was nothing short of overwhelming.

We received a total of 173 "I Wanna Be a Cheesehead" requests for what was announced as 30 openings. I'm not quite sure how to take that. It could mean any of three things: 1. A lot of people feel they can do a better job than I; 2. More people actually read this column than the editors have led me to believe; or 3. A whole bunch of you really wanted those *free tapes.* Whatever the reason for the response, though, they got a big kick out of it at the post office!

I wish I could have fulfilled the most original and/or humorous requests (because there were lots), but we'd already committed to "first-come, first-served." When I wrote the column, there were enough tapes to send out 30 packets (and I was worried if there'd be *enough* requests!), but with the delay between writing and actually coming out, the total available almost doubled to 57 packets. Incredibly, all were claimed within the *first week* of the magazine's appearance (June 12 to 17). Winning first-week responses came from all over the country—from Fairbanks to Key West, Burbank to Burtonsville, MD—so it appears that everyone had an equal chance (and only three of the winners were Fed-Ex's). In fact, I received a half-dozen more Fed-Ex's after all the tapes were gone. Blame it on the delivery schedule of the magazine itself. For example, I didn't receive my copy until two weeks later.

I was a little disappointed that *every single one* of the early responses came from males—and 95 percent of the later ones, too. Come on, don't any women read *Electronic Musician?* Or is it just my column (yikes!)? Women make a vital, though under-recognized, contribution to the field of electronic music, and I expected a more equitable balance in the Cheesehead replies. Editors, there's a challenge for you—how do we get more women readers and get the ones we have more involved? (*See the November 1989 "Back Page" for a discussion of this issue.—SO*)

Are the readers of *Electronic Musician* computer-literate? A surprising number of the initial Cheesehead requests were hand-written, most with apologies to the effect that "if I typed this into my computer, it would take a week!" Others were obviously done on a Mac with *PageMaker,* though, and almost all of the reviews, not surprisingly, came back nicely word-processed and easy to read.

The number of reviews returned was higher than expected, with a total of 90 making the deadline cutoff (out of a possible 171). This was higher than expected because, remember, these were all tapes I had already declined to review myself ("If you can't say something nice, don't say anything at all"). Scott Mitchell of San Antonio asked, "So which is worse, listening to 150 tapes or reading 150 amateur reviews?" That's easy. Most of the reviews were quite entertaining, which is more than I can say for the tapes. There were so many excellent reviews, in fact, that it was impossible to squeeze them all into one column—hence, look for Part Two next month. Besides, I've already sat

Detwiler, Larry

Lehmann, Mark

Rauch, Mark Edward

through these tapes at least *twice;* once when deciding not to review them myself and again when I was putting together the packets and trying to keep them somewhat balanced.

All in all, this little idea was such a smashing succes that I'd like to make it an annual event. It gives some artists the chance to be reviewed who would otherwise be left aside, it gives musician/readers the chance to consider cassette packaging from the other side, and it relieves me of the guilt over neglecting mainstream (that is to say, unremarkable) electronic music. Of course, if it's announced ahead of time like this, we can't very well make it "first-come, first-served" again. Instead, I propose an essay contest, due July 1, 1990, with 100 words or less on "Why I Wanna Be a Cheesehead." That way, the post office isn't an inadvertent handicap, I get to read a bunch more funny stuff, and you get to show off your creative (and concise) writing. I'll choose as many winners as I have tapes available on that date, based on my own personal whims. What could be more fair?

So without further ado (we've had too much ado about nothing already), here are my favorites from the First Annual Cheesehead Tape Bashing and Clambake.

By Mark Lehmann of Skillman, NJ:

Of the three tapes received by this Cheesehead for review, two were slick-looking commercial packages and one was homemade, with liner notes printed on a sheet of yellow paper. Aha, let's save this plain one for last; he probably has something to say.

If you are planning an out-of-body experience, you may want to check out **John Sargeant**'s *The Cauldron of Thoth* (Plumrose Music Unltd., 28400 Greenwood Rd., Elk, CA 95432). Offered as an accompaniment to a shamanistic journey, this 22-minute piece is repeated on both sides of the tape, with side A including a voice-over to direct you through your trip. I listened to the B side. Bright, clean, plucked patches; rich, deep, bass pads; ethereal voices; eerie organs; sharp percussion, and sample-and-hold insects, tied together by a simple melodic theme. The recording quality is excellent. Unfortunately, the composition lacks a melodic or rhythmic structure that captures and builds interest. As traveling music, I sup-

pose, it is necessarily peaceful and undistracting. As listening music, it is of the background variety.

Clean arrangements and a tight ensemble make *Sarmand* fun music. **Sarmand** (Douglas Farish Dent) plays keyboards with first-class technique. These eleven pieces feature well-chosen synthesized sounds blended with piano, acoustic guitar, cello, bass, and trumpet. The compositions draw from a wide range of influences: I heard a little Chick Corea, some Jobim, and a touch of John McLaughlin's *Birds of Fire* on this tape, with perhaps a little less intensity than the previously mentioned. The liner notes claim that this is new age music. It may be, but my urge was more often toward toe-tappin' than crystal fondling (Be Hear Now Productions, Santa Barbara, CA).

Larry Wendt (the plain wrapper) certainly does have something to say. Too bad he doesn't say it musically. On *The Remembrance of a Technological Past* all he does is talk. There is not music on this tape. Larry has put his voice through various electronic effects, some described as "broken," while he talks, mostly about himself. Larry, get a grip (Another Fine Frog Hollow Tape, 3165 Arroba Way, San Jose, CA 95118).

It is becoming increasingly clear that technology does not equal creativity.

By Larry Detwiler of Wainscott, NY:
Thanks for the opportunity to review these tapes. I think it's a good thing that the technology has allowed more people to get into composing and recording music. I just wish we were hearing more innovation and less imitation. It is becoming increasingly clear that technology does not equal creativity.

Jingle Bells by **Mike Christopher** is a sequenced, sampled, synthesized, disco-beat version of the holiday classic. I'm not sure why this project was attempted, and I'm not sure why anyone would want to listen to it. Good sounds, good recording, but very little creativity (Mike Christopher, no address given).

Richard Sorrentino's tape, *Up, Down, Strange,* is a twenty-minute sound collage featuring some really clever tape manipulation or some very basic delay tricks. With no information from Richard, it was hard to tell which. This style of music was fresh 35 years ago with the compositions of Pierre Henry, but it seems a bit contrived today (Richard Sorrentino, 637 Campbell Ave., Long Branch, NJ 07740).

When is a factory preset not a factory preset? In his press kit for *Factory Presets,* **Bob Fugett** explains that the focus of his project was to incorporate only factory sounds in his compositions. Not a bad idea; however, further along he admits to tweaking and, in his words, "shameless use of EQ and editing." The music falls squarely in the repetitive bass line/soaring melody/soft pads underneath/unconvincing drum patterns category. None of the seventeen tunes have any real focus, and they do not inspire repeated listening (Bob Fugett, c/o Fantasy Factory, Box 31, Sugarloaf, NY 10981).

By Darwin ("just Darwin") of Carbondale, IL:
In his own words, the pieces contained in **Stephen Wolf's** *Sample 1* are "landscape impressions, visions in sound...not so much linear as they are textural selections of the richly woven fabric that is our perception of sound in space." It pains me to contradict such vaunted prose, but both songs on this seven-minute tape strike me as exceptionally linear. They move past the realm of "ambient" and ultimately grind to a halt in the general area of "soporific." As a backdrop for a film, they might be able to hold their own; as a stand-alone cassette, they miss the mark completely.

From Portland, OR, comes the **Fetus Jeopardy** cassingle "This Kind of Music." If a musical style were copyrightable, Frank Zappa would have these guys in court tomorrow. This twelve-minute suite (repeated on the B side without noise reduction) is essentially identical to the type of songs Mr. Zappa released in the mid- to late-1970s, accomplished with a musical expertise that would make any incarnation of the Mothers of Invention proud. Since Zappa appears to have abandoned this style, it's nice

someone has seen fit to pick up the ball and run with it (JEOPCO, PO Box 29032, Portland, OR 97229).

By Scott Downie of Norman, OK:

If you're looking for an apocalyptic vision of the future, *From the Greenhouse* by **Crack the Sky** may be worth a listen. Yes, the '70s are back; this concept album borrows from Pink Floyd, Led Zeppelin, Peter Gabriel, and the Beatles, among

Downie, Scott

others, thereby earning a Four British Flags rating. Imagine my surprise when, at a local record store, I noticed a PMRC "explicit lyrics/parental advisory" sticker on two of their three copies. Upon rereading the lyrics, I found no "offensive" four-letter words and only one section that could questionably be termed "explicit." This seems doubly ironic since an antidrug message and a plea for heightened ecological consciousness are the album's two main themes. The lesson: Tipper Gore must have had a bad experience with concept albums in the 1970s. (Postscript: If a group claims to be ecologically aware, shouldn't it feel a moral obligation to distribute its music on biodegradable media? Cassette shells hewn from oak? Cotton fiber/iron oxide tape formulations? CDs composed of recycled tin foil?)

By Scott Mitchell of San Antonio, TX:

Brian Coburn, "Armageddon" and "Sex." Brian Coburn records fragments of spoken dialog from films and television, and edits them together with a view toward juxtaposition. A Mirage supplies a rhythm background for a crazed rap music effect—come to think of it, you *may* have heard of this kind of thing before. "Armageddon" is about nuclear war, while "Sex" has floating references to promiscuity, abortion, and homosexuality. Coburn writes that "the intent is to explore serious political issues in a

pop format." Now, you may be one of those people who prefers to explore serious political issues without a lot of drums banging away, making it hard to think. But remember, there are much worse things that you can do with a Mirage and a couple of tape decks.

By Michael Henchman of Fairbanks, AK:
The Exiles, *The Only Cure* and *Breaking the Spell* (Esfoma Recordings). Both albums, utilizing a variety of acoustic instruments, reflect a very avant-garde style that is almost entirely free-from [*Michael may have meant "free-form"—but then again, maybe not.—Robert C.*]. Initially perceived as collages of agitation, subsequent playings and a change in listening focus revealed an apparent attempt to create pieces distinguishable of texture rather than structure or form. Fast, pounding piano passages in some selections are overlaid with brash, honking saxophone or with flute performances that are a unique and admirable mix of played notes, breathiness, whooping, and calling. Other selections include temple bowls, bamboo flutes, and various percussion instruments, with synthesizers added sparingly on *Breaking the Spell*. Provocative, unconventional, at times objectionable, the music requires determined attention. Not for everyday or background listening.

Mitchell, Scott

By Mark Rauch of Centralia, WA:
Role Models, *Bound To Play*. Role Models is **Hazlitt Krug** and **Gina Temple** playing at the Chicken Coop in New Rochelle (I assume this isn't the agricultural type). Live to 2-track (it really says that), they needed more. What you get is four songs on one side of a cassette. Side 2, I guess, is there for me to record some of my favorite tunes on. Why else would it be blank? Basic guy/girl duo with a drum machine. Interesting, perky songwriting, especially "Cry if You Want To" (check out the gripping count-in). What these people lack is a producer, a machine with real fat tape, ambience, and music on side B. Some good songs here, but a recording that really fails to deliver their full potential. I think a more humanoid-sounding percussion section would help, too (Paint the World Cassettes, PO Box 233, Scarsdale, NY 10583).

By Stanley Easparro of Coconut Creek, FL:
Leah Waybright's *Haunted Heart* is a smooth-sounding recording. The songs "Wardrobe Tardy" and "Fresh Flowers" are addicting. Leah has a wonderful talent to make her keys sing. She is a very creative composer who can really get to your heart. I'm impressed with the fact that she composed and performed the whole tape herself. This tape is a work of art, and it's a must for any modern jazz, modern age, or easy listening music lover.

Hermanos Guzanos's *The Worms Turn* has got to be one of the worst recordings I've ever heard in my life. The tape sounds like a couple of guys got real drunk one night, turned on a drum machine, and just played whatever came to mind. The songs are extremely short, with meaningless lyrics, and most of them lack the basics of almost all songs; they have no choruses or breaks. A couple of songs ("Space Dancer II," "Descent Into Hell") start out like something with potential is going to happen, and then they just die. The guitar work is basic to say the least, besides being saturated with distortion, delay, and chorus effects. The vocals also leave much to be desired. Only a masochist could possibly enjoy this audio spectrum torture.

And on that note, we're out of room. Next month look for Part Two, without all the introduction that took up so much room this time. Don't forget to submit your essay, "Why I Wanna Be a Cheesehead," in 100 words or less, by July 1. I figure everybody is eligible to enter, even those who "won" this time, since only a real masochist would want to do it again (thanks, Stanley).

Send albums, CDs, and cassettes for review to PO Box 16211, Seattle, WA 98116. To designate that your cassette should only be reviewed in the July Cheesehead Clambake, please write across it in large letters, "This tape will not interest you. Please give it to some other cheesehead who has no choice in the matter." ■

This button can be used to verify time code input and output. Any audio source can be used for the linear track, limited by the signal-to-noise ratio and the frequency response of the head/circuit design. When one disconnects from the mod port, the unit works as if it were unmodified. The modification may void the warranty, but its advantages are worth it to me.

I've gleaned much useful information from fellow EMers and would be happy to share the advantages of the mod with anyone who would care to correspond.

Joe Dixon
694 Holly St.
Memphis, TN 38112

ARE VCO'S CREATED EQUAL?

The article on interfacing dinosaur (pre-MIDI) synths with MIDI-to-CV converters (September 1989 EM) was revealing and informative. However, I cannot let certain personal views stated as absolutes go unchallenged.

The truth be known, there is no such thing as an exponential VCO. All practical voltage-controlled oscillators used in electronic music begin as *linear*. The "exponential" VCO is nothing more than a linear responding oscillator sporting an exponential front end. Stability problems are usually associated with the exponential-to-linear voltage converter. Many VCOs have an added linear control input, thus bypassing the exponential conversion circuit. It is a simple matter to bypass a poorly designed or troublesome exponential stage and tie in a wire-wrapped or breadboarded exponential converter of proven stability. This fix is cost-effective, considering the limited parts count (1% resistors, two or three op amps, two transistors, and a thermistor) and the alternative of dispensing with the instrument altogether. Schematics for breadboarding a replacement exponential front end are available from various sources, including old issues of *Polyphony* and *Electronotes*, and there are several synthesizer books that cover discrete VCO circuits from which the exponential converter can be gleaned.

The fact is, as long as a synthesizer breathes (makes sound), there is hope. In the electronic music community, euthanasia is given as a cure for non-MIDIfiable synths. Don't pull the plug yet! The fact is, almost anything is MIDIfiable. For instance, the article judged the PAiA budget modules harshly: "Low-budget kits with linear VCOs and almost cheesy designs. Don't even think about it" (p. 73). However, in the July 1989 EM, Thomas Henry acknowledges, "John Simonton's superb work on homemade polyphonic instruments really influenced this design." In 1977, Simonton, of PAiA fame, designed a 4-voice multiplexing DAC for his linear modules. I am sure many readers realized the implications of Henry's article. To use our old linear-response equipment with his 4-channel, MIDI-to-analog interface, one only has to change one part for another of different response.

The DAC0800 output is evenly stair-stepped to produce the 1 volt per octave necessary for exponential response VCOs. By changing the R-R2 ladder DAC to one that multiplies (Radio Shack used to sell an exact pin-for-pin alternative, the DAC801), linear response VCOs can be MIDIfied in 4-voice polyphony.

Even nonlinear, nonexponential synthesizers, such as the PAiA Gnome micro-synthesizer, can be MIDIfied. This involves "weighing out" every chromatic note produced by the oscillator to its corresponding MIDI address, which means every note on a custom DAC must be adjusted by individual trimmers. It makes the Gnome a low-budget Synthesizer Expansion Module (SEM) of sorts, and it's not as hard to do as it appears on paper.

Dale Dyer
Prototype Northwest, Inc.
Oregon

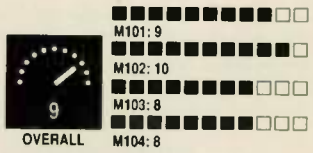
I WANT TO CONVERT

I am a faithful subscriber to EM and an experienced MIDI user and musician. I purchased Craig Anderton's book *The Digital Delay Handbook* and find it an excellent resource for new DDL ideas. My only criticism about the book is that it did not include a tempo chart that converts milliseconds to tempo (beats per minute) and milliseconds to click track. I can't locate such a chart; if you know where to obtain one, please tell me.

Jaymz J. Cerniglia
Florida

continued on page 116

ing/chorusing. **Valhala Music**, PO Box 20157-E, Ferndale, MI 48220, tel. (313) 548-9360.



In conclusion: My advice? If you're looking for programs and combinations suitable for pop/new age/commercial applications, you can't go wrong with any of the Leister, Technosis, or Valhala cards (especially M101 and M102). If you want to explore the deeper, darker world of the M1, spring for the Electron Artistries card.

David Snow *is a composer and self-styled domestic god (read "househusband"). His music has been premiered by such diverse ensembles as the Composer's Chamber Orchestra, the Harvard Wind Ensemble, the Ruby Shang Dance Company, and the Los Angeles Tuba Quartet.*

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If you detect an error in a schematic or listing, *let us know.* If a project doesn't work for you, contact us to see if anyone has reported any errors (wait at least a month for EM to be in circulation).

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● LETTERS *from page 115*

Jaymz—The Milli-Chart, *which converts bpm to seconds per beat; milliseconds per quarter, eighth, and sixteenth note; and quarter and eight note triplets, is available from J.S. LoBianco Enterprises, 36 Park Ave., Oyster Bay, New York 11771; tel. (516) 922-3958. In addition,* Click Tables in Beats per Minute and Frames Per Beat, *by Alex Cima, has a large number of conversion tables, including bpm-to-frames per beat at 24, 25, 29.97, and 30 frames per second; 16/35mm film frames per beat-to-bpm; MIDI sequencer tick resolution for a given tempo; and lots more. It is available from Neuron Music Publishing, 1501 E. Chapman Ave., Suite 100, Fullerton, CA 92631 or from the Mix Bookshelf; see the For Your Information page for details. —Steve O.*

LAPTOP MIDI

Thanks for your magazine; in reading it, I have found a lot of useful advice that saved me money and time. Maybe you or one of your readers can help me with a problem.

I use a Toshiba T1600 computer for my music work and would like to get a MIDI interface that fits into the special Toshiba slot. I'm now working with an expansion box, which is not very handy (another part to carry). If nobody has built such a MIDI card, is it possible to get a schematic and parts list for building one?

Erich Skrleta
Vienna, Austria

Eric—You may want to check out the WonUnder ($379 from Connect Computer, 9855 W. 78th St., Suite 270, Eden Prairie, MN 55344; tel. [612] 944-0181), an expansion slot designed for use with portables such as the Toshiba. As its name implies, the WonUnder fits underneath (but bolts onto) a portable and holds one standard 2/3-length or shorter PC expansion card. Because most MIDI cards are 1/2-size, you should be able to use any existing PC MIDI interface along with it. If you're willing to shell out $100 more, the WonUnder 2 offers space for two full-size expansion cards.—Bob O'D.

ERROR LOG

November 1989, "Lexicon LXP-5" ("First Takes and Quick Picks"): In praising the effects algorithms, the author overlooked Thomas Dimuzio's programming contributions. Sorry about that. ■

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Casio CZ series Oriental, Eastern, alternative, new beat, industrial, new age, acid, hardcore, metal, techno, and psychedelic patches. Eight patches from each type. Sound book with 90 patches plus programming tips is only $20. Send check or m/o to: Last Ray Productions, 934 Moyle Circle, Alpine, UT 84004.

Outstanding studio collections! Kurzweil K1000, K1000SE, K1200, PX1000 with sound blocks KXA, PXA, PX1000 Plus: "Waveform 2000," 64 sound programs. For **K1000, K1000SE, PX1000 without sound block:** "Waveform 1000," 64 sound programs. ObjectMover disk (Mac or Atari), $39.95 each. **Emax "Infinity,"** Volume 1. Ten disk set, over **550** presets of top synths from around the world. **Inspired!** $199.95. Full Logic Studios, 115 Railroad St., Keene, NH 03431; (603) 352-DISK. Visa, MasterCard.

Programmers of MIDI software for the ST, Macintosh, IBM, and Amiga. We are looking for top-quality programs to publish. Call/write: **MIDImouse Music,** Dept. EC, Box 877, Welches, OR 97067; (503) 622-4034.

ALGY—full-featured, **friendly,** algorithmic MIDI music composition/performance program. No protection. Source code included. Commodore 64 disk $25. Demo cassette $5. Don Malone, PO Box 32, Sharon, WI 53585; (414) 736-9434.

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Sequenced Top 40 songs. Large library of the most current and popular dance, pop, and rock songs. Join our many clients who say Tran Tracks sequences are the best they've used. We support most IBM, Macintosh, Atari, Amiga, Roland, Yamaha, Kawai, and Alesis formats. Free demo tape and catalog. See our display ad in this issue. **Tran Tracks,** 133 West 72nd St., Suite #601, New York, NY 10023; (212) 595-5956.

Mirage owners: now get **MIDI volume,** sostenuto, and transpose for only $39.95 + $2.50 s/h, with **SM-1** super MIDI disk. Other Mirage operating systems with microtonal scales, system exclusive storage, and format-copy capabilities. Upward Concepts, 85 Bennett Rd., Durham, NH 03824; (603) 659-2721.

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Sequenced background rhythm patterns for your original songs. Choose from 100 different patterns to make your songs come alive. All styles of music included. Bass, keyboards, and drum tracks on all patterns. Available for ESQ-1, SQ-80, Alesis MMT-8, Kawai Q80. $25. Specify equipment and drum machine. Demo tape $5. New Sound Music, PO Box 37363, Dept. EM3, Oak Park, MI 48237.

Discount ROMs and **RAMs!** Two new, exciting **Korg M1** ROM cards, each with 100 combinations and 100 programs! Specify KROM1 or KROM2, **$40** each. **Roland D-50, D-10, D-20, D-110, D-5,** four new ROM cards: **$35** each. Specify L/A synthesizer and RDROM1, RDROM2, RDROM3, RDROM4. **Ensoniq ESQ-1, ESQm, SQ-80:** Two 320-voice ROM cartridges, ESROM1 or RSROM2, **$75** each. Blank **Roland** M256-D RAMs **$65,** or blank **Korg** MCR-03 RAMs **$75.** Include $3.50 shipping/handling. Maryland add 5% tax. Alaska, Hawaii, Canada $12 s/h. All other countries must include $18 s/h per item ordered! Payments only in USA funds, payable through USA bank. Voice listings: send legal-sized SASE, specify synth. Patch Pro, PO Box 417-E, Conowingo, MD 21918.

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Alesis HR-16: affordable, quality software! Patterns Volume 2 now available! More hot, **usable** rock, jazz, Latin, and reggae rhythms! Still available: Patterns Volume 1. **Now** on **Mac, IBM, Atari ST, Amiga** disk or data cassette, $25 each. **Chrominance Productions,** PO Box 51-E, Madison, WI 53701-0051.

Monster Dan sequences are the best. Hundreds of Ensoniq owners agree! Massive amounts of monstrous material for ESQ/SQ-80. Selected titles now available for Macintosh, MC, EPS, etc. Call or write for title availability in your format. Convincing demo N/C. Danlar Music, PO Box 973, Tualatin, OR 97062; (503) 692-3663.

IEMUG is everywhere! The **International Electronic Musician's Users Group** is the only on-line MIDI information service available worldwide with or without a modem. If you have a modem, dial into one of these local IEMUG chapters. IEMUG Headquarters (405) 733-3102; IEMUG East (D.C.) (301) 460-9134; Atlanta, GA (404) 942-3387; Bridgeport, CT (203) 377-6758; Columbus, OH (614) 848-5947; Denton, TX (817) 565-1500; Sacramento, CA (916) 483-8624; Hong Kong 852-3-69-8647; Montreal, Canada (514) 744-7354; New York, NY (212) 879-2625; Ottawa, Canada (613) 749-2174; Phoenix, AZ (602) 864-0244; Rochester, NY (716) 223-7874; San Diego, CA (619) 698-7155; Sweden 46-766-54478. IEMUG's library contains over 100 meg of sequences, patches, programs, and MIDI information for IBM, Atari, Amiga, Mac. No modem, no problem. Write to IEMUG and receive all the information needed to join the fastest growing MIDI users group in the world. IBM and Atari ST owners send $6 for IEMUG's public domain software catalog and information on disk. IEMUG, PO Box 30995, Midwest City, OK 73140-3995.

1,900+ M1 voices on Opcode Macintosh, Atari download disk, or Commodore 64 download disk only $125. **3,300+ D-50** voices on Valhala, Sonus, Dr T's, Zero1, Opcode Macintosh, or Atari download disk $75. 3,300+ D-50 voices on Commodore 64 download disk $125. **1,100+ D-10, D-20,** and **D-110** tones on Valhala or Opcode Macintosh or Atari download disk $39; on D-20 3.5" disks $175. **950+ MT-32** tones on Valhala or Opcode Macintosh $39. **8,000+ DX7** voices $39 on DX7IIFD disk, Opcode Macintosh, Commodore 64 or Atari download disk, TX7 cassette. **2,000+ DX7II Performances** $39 on DX7IIFD disk, Opcode Macintosh or Atari download disk. **3,500+ ESQ-1, ESQm, SQ-80** voices on Opcode or public domain Macintosh program, Commodore 64, or Atari download disk $45. **4,500+ TX81Z** voices on cassette, Valhala or Opcode Macintosh $39. **4,500+ V50** voices on V50 disks $39. **800+ Juno-1, Juno-2,** or **MKS-50** tones on cassette, Opcode Macintosh, or Commodore 64 download disk $39. **1,800+ DW-8000** or **EX-8000** patches on cassette, Opcode or Korg ProEdit Macintosh $39. **2,000+** Casio **CZ-101** voices on Opcode or public domain Macintosh program, Commodore 64 download disk, or Atari download disk only $39. **160+** Ensoniq **Mirage** samples on Commodore 64 download disks or Digidesign Sound Designer Macintosh only $125. USA add $3.50 s/h. Michigan add tax. Alaska, Hawaii, and Canada add $12 s/h. (Canadian orders only by Canadian Postal Money Order in USA funds.) All others add $25 s/h per item, in USA funds on USA bank only! Send legal-sized SASE for complete information—specify synthesizer. PatchMasters, Box 746-B, Hazel Park, MI 48030-0746.

DSS-1 Volumes 1-6 DX7, D-50, ESQ-1, Kurzweil, MIDI Stacks, M1 winter special $50. **New** Volume 7 Saxophone $12.50. **M1** ROM cards $45, on Atari disk or your RAM loaded $25. **C-64 M1 Librarian** $19.95, with sounds $40. Frontal Lobe, call. GreenHouse Sound, 601 E. Walnut, Nappanee, IN 46550. (219) 773-2678.

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CZ super Casio programs! World renowned as the finest collection of CZ sounds anywhere. **Endorsed by Casio Inc.!!!** 64-voice RAM #s 1, 2, 3—$55 each. Synthetic Productions, 13 Laurel Avenue, Tenafly, NJ 07670; (201) 568-8282.

Public domain MIDI software/freeware for **Atari ST, Commodore 64/128,** and **IBM compatibles!** Utilities, librarians, patches, editors, sequences—thousands of files! Write today—**free catalog disk!** Please specify computer. **MIDI Software,** PO Box 533334, Orlando, FL 32853-3334; telephone (407) 856-1244.

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Used software: IBM TX16W GP-8, DX7IIFD E! Other hardware and equipment. (806) 747-5117. Ronald Dixon, 1916 56 St., Lubbock, TX 79412.

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MISCELLANEOUS

New age original music wanted. Exciting opportunity for exposure in expanding international markets. Send SASE for specifics. International Learning Institute, POB 60-J, Petaluma, CA 94953.

Independent label looking to sign three new acts. Send demo and promo to: C.E.I., 4625 S. Wendler Dr., Suite #111, Tempe, AZ 85282.

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Build your own acoustical drum triggers for $3 each! Parts available at local electronic stores. For plans, send $12.95 (U.S.). RMS Enterprises, 110 West Union St., Eagle Lake, TX 77434.

Shaping the Future

"As for the future, your task is not to foresee, but to enable it." —Antoine de Saint-Exupéry

By Craig Anderton

Why bother thinking about the future? Not so we can necessarily predict what will happen, but because it's important to anticipate various scenarios so that we can devise contingency plans. Also, by thinking about how we'd like the future to be, we can work toward making it the way we want.

In many instances, whether a situation resolves in a positive or negative way depends upon how we treat that situation. Take technology, for example. It's very easy to make the case that technology is a destructive force when we consider holes in the ozone layer, a dying biosphere, the cost of pollution control, or for something a little closer to home—stiff, sequenced music. Yet technology has also made it possible to cure diseases, feed a greater percentage of the planet than ever before, promote instant communications over thousands of miles, and allow the severely handicapped to play music.

In the future, the public may come to associate technology with something evil that's destroying our quality of life, which would most certainly mean a backlash against synthesizers and musical electronics. And electronic musicians would be perceived as part of the problem. Or, technology may be seen as the force that, if applied properly, has the potential to rescue us from ourselves. Musicians who apply technology in a similarly enlightened fashion will be looked upon as setting a positive example.

As musicians, we've benefited from technology. But the integrated circuits in our synths are helping to pollute the ground water in Silicon Valley, the paper used to make EM contributes to deforesting the earth, and instruments that become obsolete every few months encourage a destructive, throw-away mentality. What are our responsibilities in all this?

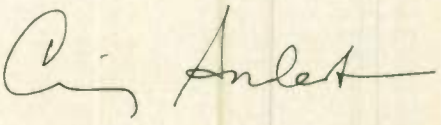
Our job in preparing for the future is to minimize any negative impact on the earth that results from pursuing our art. We must be responsible in the use of our "toys," and there are several ways in which we can exercise this responsibility. Paying the extra cost required by environmentally sound gear is a start (as just one example, it will cost money to replace the noxious chemicals used in de-fluxing circuit boards with more benign, but more expensive, substitutes).

As another example, Congress's Office of Technology has been investigating whether 60 Hz electromagnetic fields affect people negatively and concluded that "the emerging evidence no longer allows one to categorically assert that there are no risks." This doesn't mean there's cause for panic—our internal electrical systems already produce signals that dwarf stray fields, and while some reports claim that electromagnetic fields may produce changes at the cellular level, this change has not conclusively been shown to be permanent or damaging. But remember that fifteen years ago, no one thought CFCs were going to blast massive holes in the ozone. If there are problems with AC fields, we can expect to pay a lot more for well-shielded equipment.

We also must end the "throw-away" mentality once and for all. No one discards a Stadivarius just because it's old—we need equipment that's built to last, yet can be easily expanded to accommodate new features and functions. However, expandability costs money. Expandable equipment needs expensive connectors for additional cards, beefier power supplies to handle memory upgrades and such, and enough profit for manufacturers so they can afford to invest time in supporting and upgrading existing products.

Faced with the mounting expenses required to clean up our environment, as electronic musicians we have two options: We can either be part of the problem and insist on maintaining the status quo, or be part of the solution and set a good example by recognizing that it is our obligation to do whatever we can to make the world a more livable place, even if it requires personal financial sacrifice. And don't underestimate the effect that artists have in shaping public opinion—just look how many people got on the African relief bandwagon after a bunch of musicians conceived of Live Aid, or, for that matter, how many 14-year-old girls dressed just like Madonna when she hit the big time.

So what does the future hold? In truth, we can pretty much shape it into whatever we want. Let's not pass up the opportunity to show that at least one group of people can use technology in an artistic, responsible, forward-thinking manner.



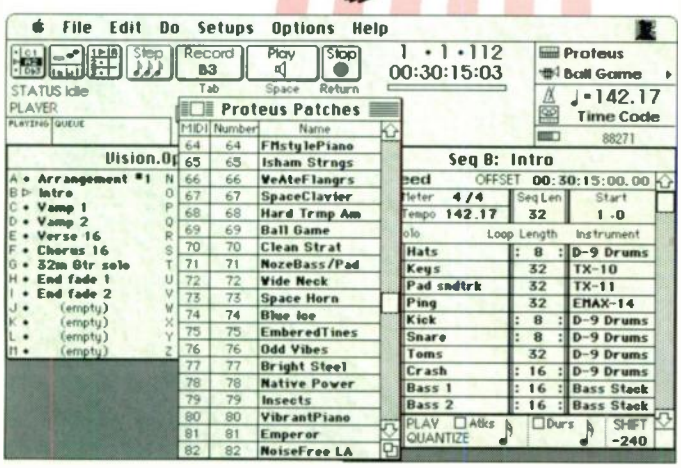
Two New Views

Introducing Two New Macintosh Music Software Achievements: Galaxy, Opcode's Universal Librarian, and Update 1.1 of Vision.

We've created a landmark connection between Vision and our Librarians. Here's how it works. Patch names from our new librarians are automatically transferred to Vision's instrument set-up. Then you can choose patches by name—not number. Choose the name, hear the sound. And when you change a patch name in the bank, the name changes in Vision too.

"The undisputed leader in Editor/Librarian technologies." ***Keyboard Magazine***

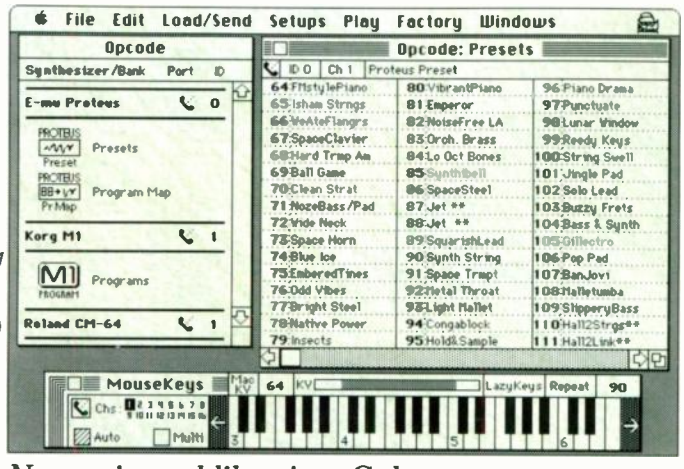
Galaxy™ stores data from any MIDI equipment with System Exclusive capabilities. We support over 70 MIDI devices. But you can easily create your own file type with our simple language called PatchTalk.™ And Galaxy is a full featured Opcode Librarian, with Patch Factory™ for random patch generation, and you can get and send single patches, banks, or Bundles. As always, we don't compromise.



New update 1.1 of Vision

"Vision is loaded." ***Keyboard*** ***"the best sequencer I've had a chance to use…"*** ***Mix***

And the reviewers haven't even seen the 1.1 update. Editing windows scroll on playback. You can import note names from Opcode Editors or type them in; perfect for drum sounds or samples. Select or move a note in graphic or list editing—you hear the note. Edit MIDI parameters with the new pencil and exponential curve tools. Create MIDI mixes with automated, moving faders. Tap Tempo on record or playback, or sync Vision to live music with our updated Studio 3 SMPTE/MIDI interface!



New universal librarian: Galaxy

"Expect to be amazed." ***Craig Anderton, Electronic Musician***

To see Vision and Galaxy, visit your Opcode dealer today. Vision is the winner of Keyboard Magazine's 1989 Readers' Poll for "Software Innovation of the Year."

Call us at (415) 369-8131 for a free brochure. Demo disks of Vision are $10.

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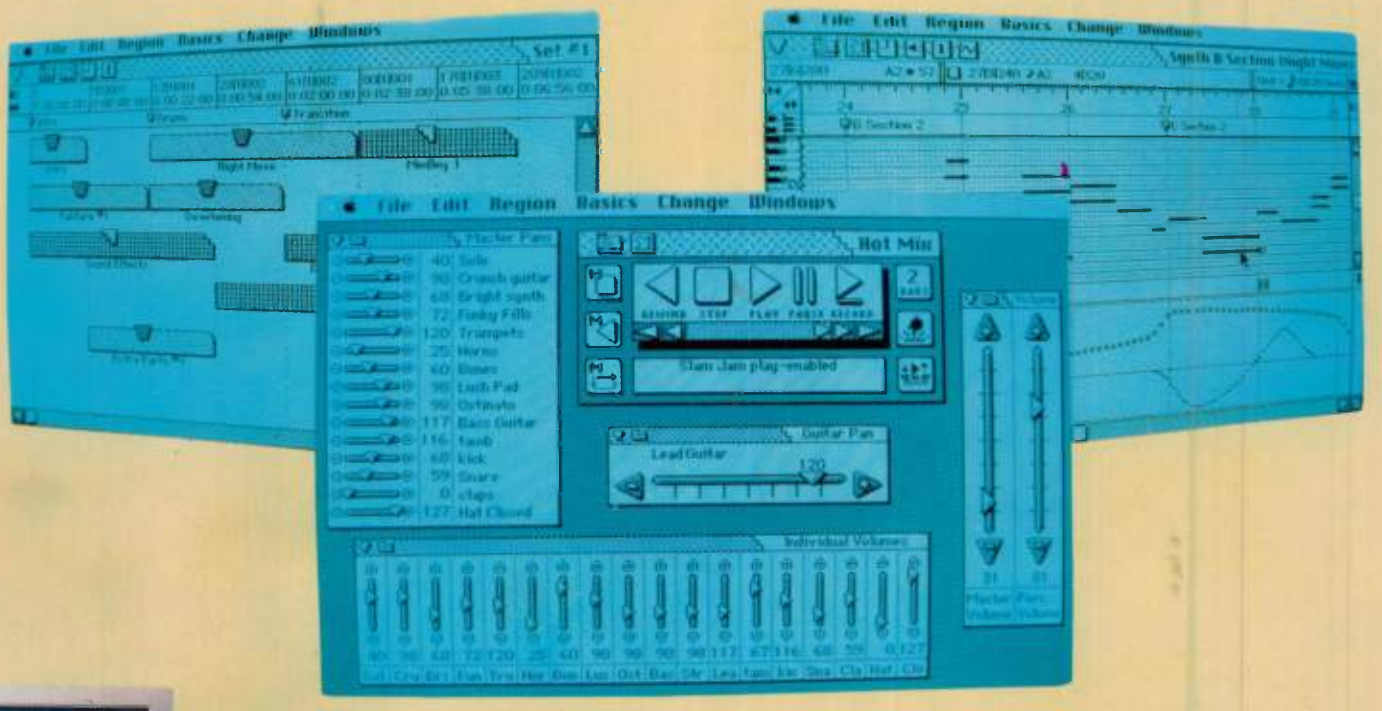

Fulfill your musical inspirations with Performer's powerful graphic sequencing environment.

Performer's *animated* Sliders give you unlimited faders to control volume, pan and other MIDI data with a familiar mixing board interface. Sliders can re-assign incoming MIDI data in real time, letting you route any controller on your MIDI hardware to a variety of functions. Performer's Master Sliders can control an entire bank of sliders. And you can customize your consoles with vertical and horizontal sliders in your choice of long or short throw.

Chunking™, Performer's revolutionary graphic arrangement feature, lets you chain and stack multiple Chunks™ of music for sequential and simultaneous playback. And Performer's Remote Controls let you cue and play any sequence on-the-fly, directly from your MIDI keyboard. Performer will even load your sequences automatically from disk as you need them!

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