Special Report: ENSONIQ'S NEW KEYBOARDS

Electronic MUSICIAN

MARCH 1988 A MIX PUBLICATION U.S. $2.50/CANADA $3.50

MIDI Sequencers— Use Them *Live*

Conversations With JOHN CAGE

Swing With Performer 2.1 For The Mac

REVIEWS:

IBM PC: *Sequencer Plus Mk I, II, and III*
C-64: *X-Lib DX/TX Librarian*
AMIGA: *Sound Quest DXII Master Editor/Librarian*
ATARI ST: *Savant and Synergy DW8000 Editors, HyperTek OmniRes Monitor Emulator, MIDImouse Fast Tracks Sequencer*

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Our Specs Are More Importantly, So

At Korg, one premise guides digital engineering: technology doesn't really achieve anything unless it brings you closer to your music. No matter how innovative a design appears on paper, the specs don't add up to anything unless they produce an instrument with superior sound and feel.

The DSM-1 Digital Sampling Module

Our new rack mount DSM-1 Digital Sampling Module is a case in point. To take Korg sampling a step further, our engineers used the latest technology to set new standards of sampling accuracy and realism. The DSM-1 has extended memory (a full Megaword) and sampling rates of 16, 24, 32 and 48 kHz. With 16 fully independent voices, 16 individual outputs and a mix out. Plus multi-timbral, multi-MIDI channel operation for total flexibility.

With all of this, the DSM-1 is one of the easiest samplers to learn and use. The control format is thoughtfully designed to use familiar synthesis parameters, so you can edit sounds quickly and easily. Yet the logical design will take you as deep into the sample recording/editing process as you want to go. There's even a high speed RS 422 data port to give computer software quicker access to internal memory.

The DSM-1 stands out from the crowd of current samplers as a truly advanced sound creation tool, one that will strengthen any MIDI system. The perfect complement for the DSS-1, it can use any sounds from the already extensive DSS-1 sound library, as well as its own high capacity library disks. There are over 70 DSS-1 and

Impressive. Are The Sounds.

DSM-1 disks available now, with hundreds of sampled sounds and synth waveforms.

The DSS-1 Digital Sampling Synthesizer

The DSS-1 has been making giant strides of its own. New options let you double, quadruple or multiply internal memory up to eight times (as much as 2 Megawords of sample storage). You can access hundreds of sounds instantly, with a touch of a button.

Performance improvements include new, enhanced disk operating software that cuts the internal disk's loading time in half. And there's an SCSI (Small Computer Systems Interface) port that communicates with one to seven external hard disk drives. It lets you store up to 99 Systems per drive, then load any one in a few seconds.

The SG Sampling Grands

The name, the look and the crisp, positive weighted actions are the same: the sound is more realistic than ever. The *new* SG Sampling Grands have four times the memory of their highly regarded predecessors. That lets us use longer samples and more of them to create a sound that recreates the original acoustic and electric pianos with startling accuracy. The new SG sound is also available as a retrofit to your SG-1 or SG-1D. And there are now ten new SG voice cards available (many with split keyboard sounds) to expand your creative expression.

Korg sampling is for players who delight in the complexity of acoustic sounds — and in the unusual variations that conventional instruments can't produce. Only the DSS-1 and DSM-1 deliver the unique combination of advanced sampling and additive synthesis. So if you'd like to shorten the step from inspiration to expression, investigate the new high-performance DSS-1, the newly expanded SG-1D and the new DSM-1 at your Korg Sampling Products dealer. When it comes to creative sampling, studio efficiency and on-stage flexibility, there have never been digital instruments more musical than these.

KORG® Sampling Products Division

SAMPLING IS ONLY THE BEGINNING

DSM-1 features

- Memory: 1 Megaword (1.5 Megabyte)
- 16 voices assignable to 16 separate outputs + Mix out
- 64 split points
- Multiple Zones, Multiple Layers, 4-Way Velocity Switches and Cross-fades
- High Speed RS 422 port (SCSI interface option available soon)
- Linear and Equal Power Cross-fade looping
- Additive synthesis
- Media: High Speed, High Density 2 Megabyte 3½" disks. Reads DSS-1 disks

DSS-1 features

- Memory: 256 Kword standard
- 61 note velocity- and pressure-sensitive keyboard
- 8 voices, 2 oscillators per voice
- 2 programmable DDLs
- 32 Programs in memory, 128 on disk
- Velocity Switching
- Sample Editing: Mixing, Linking, Reversing, Truncating, Sample Address editing
- Autolooping with Normal and Back-and-Forth modes
- Program Parameters include Octave setting, LFO's, Noise generator sync, 12 and 24 dB/octave filters, Resonance, two Envelope Generators per voice, Unison, programmable EQ, extensive pressure and velocity routing

New DSS-1 Memory Update

- Optional Memory Expansions: 512K (2X), 1 Meg (4X), 2 Meg (8X)
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New SG Sampling Grand Features

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- Superior audio performance with new, improved piano and electric piano samples
- MIDI Pitch/Mod wheels
- Local On/Off
- Retrofits available for SG-1 (76 note) and SG-1D (88 note) pianos

For a free catalog of Korg products, send your name and address, plus $1.00 for postage and handling, to: Korg USA, 89 Frost St., Westbury, NY 11590 or to Korg USA West, 7886 Deering Ave., Canoga Park, CA 91304

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MUSIC, COMPUTERS & SOFTWARE, August 1987

"The simplicity of 48 Track PC II's screen design belies its extensive range of functions — so extensive, in fact, that there's no way we can describe them all here."
Ted Greenwald, KEYBOARD MAGAZINE, August 1987

The MUART™ 4-PORT MIDI interface, including the SPIRIT™ Sequencing Software comes complete and ready to install. No additional purchase is necessary. For more information, contact your local Mellotron® dealer. Suggested retail price: $695.00.

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VOL. 4, NO. 3

MARCH 1988

Electronic MUSICIAN

A MIX PUBLICATION

DEPARTMENTS

COVER

MIDI connects every hue and shade of music and audio—from source to sequence to sound. San Francisco photographer Tony Carlson's cover shot suggests the complexity and variety of the MIDI connection with a controlled randomness of color-coded cables. Cables courtesy of Leo's Audio of Oakland.

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Display advertising rates, specs and closing dates are available upon request.

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Editor's Note

Oh no! Not another editorial on DAT! Well, the fallout continues, not just from my anti-copy-code editorial in the October '87 issue, but also the anti-stealing-copyrighted-material editorial in the December '87 issue.

Although pro-DAT letters have greatly outnumbered anti-DAT letters, I am nonetheless impressed by the sincerity of both camps. Those in favor of copy-code cannot understand why on earth someone like me—who earns royalties from records and is obviously sympathetic to the frustrations musicians face—is not embracing this particular copy-code concept. Those who are pro-DAT cannot understand why, when this new technology is so close to revolutionizing home recording, they are not allowed to use it. These professionals—many of whom would be the last people in the world to rip off an artist—have to go without DAT not because *they* bootleg tapes, but because *others*, specifically organized crime and individual consumers, bootleg tapes.

To reiterate, I'm against copy-code for two reasons. One, it's not a "transparent" solution as it alters the music it's supposed to protect. Two, the copy-code notch scheme can be defeated, and rather easily. Thus, we will be in the same position as those who buy copy-protected software: the honest people will be inconvenienced; the dishonest people will simply continue being dishonest, and figure out a way around the protection. One prominent artist told me that the record companies were far more concerned about organized counterfeiters than the occasional individual here and there who tapes a record. Yet I think the counterfeiters will be the first to build the $15 circuit necessary to defeat copy-code, and the casual tapers won't want to spend $1,000+ for a DAT when a cassette deck with dbx or Dolby C sounds pretty good anyway. Cassette tape is far cheaper, too.

In theory, since I want to use the DAT in my studio, it shouldn't matter if the DAT includes a copy-code chip or not. Fine, but I also like to *listen* to music, particularly on CDs, and we still have the problem of a willful altering of frequency response on a medium that was sold on the premise of offering "perfect" sound (and considering how much CDs cost, they *should* be as good as the technology allows). I might also add that early legislation was worded in such a way that virtually *any* digital recording device with a significant amount of memory could not be sold or traded without a copy-code chip, which would have put a crimp in my plans to upgrade my Emulator II sampling keyboard to an E-III. Maybe that wasn't the intent of the bill, but it just goes to show how good intentions can go awry.

To those who are pro-copy-code, please understand that one can be against copy-code *and* against the stealing of copyrighted material. We have a very, very serious problem that needs to be solved, but a clumsy and easily defeatable hardware "fix" is, I'm sorry to report, not the answer. The problem is far deeper and relates to the current state of human consciousness. Although I have been called "naive" for promoting education as the answer, I believe that appealing to people's conscience and sense of fairness is the right place to begin. The software industry, having dealt with the headaches of copy protection, is starting to educate the end user as to how stealing software hurts *everybody*. Music industry, it's your turn to do the same.

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CZ User Group

CZSOUNDS (formerly NEWSSOUNDS) is a users group that supports the Casio CZ series of synthesizers. We currently have over 100 members to which we offer: 12 issues of a monthly newsletter providing information about playing, programming, MIDIing, purchasing, etc., the Casio CZ synths and related products; and over 150 sound data sheets (over the course of the years's membership) written by us and our subscribers. We pay $2 for each sound written by our subscribers that we publish.

The current subscription price is $25 for a one-year membership. We appreciate your support to Users Groups such as ours. Thanks!

Steven Kowalec
CZSOUNDS
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Oh Boy, More Fan Mail!

When I first started reading EM several months ago, I couldn't even correctly pronounce the word MIDI. MIDI could have been a new dress style for all I knew. But, thanks to publications like EM and your sister publication *Mix*, I can now talk MIDI with the rest of the world. No longer do I have to be at the mercy of some MIDIfied maniac of a salesperson who suffers from myopia when it comes to dollar signs. Keep the presses rolling!

There is one suggestion that I would offer. Have you thought about going to a bi-weekly publication schedule? Just kidding, Craig.

Monte Allums
Atlanta, Georgia

Monte—Thanks for the note. We've always felt that even if EM seems a little intimidating at first, that all the pieces will fall into place if you just keep reading the magazine for a while. Your letter is a welcome confirmation of that assumption.

More About the "Illegal" Sweetener

I was somewhat disturbed by your reply to the letter from John Sanserino (EM, November 1987) regarding the alleged infringing of Mr. Ryckebusch's "$10 Harmonic Sweetener" on the patent of the Aphex Systems, Ltd. 602 Aural Exciter.

Remember that Mr. Sanserino's claims are indeed *claims*, subject to ultimate proof by a court. I believe that he greatly overstates the reach of the federal patent laws by stating that "any commercial use of the device shown violates our patent rights, including performing or selling a record or tape on which the device was used."

EM's reply bothers me because it assumes Mr. Sanserino's claims of infringement are true, and I worry that letters such as Mr. Sanserino's will "chill" EM's continued publication of mods and low-cost circuits useful to the electronic musician. EM's publication of

ILLUSTRATION BY DOUG BOONE

diagrams for devices to enhance the production of electronic music is one of the many fine points of the magazine. Letters such as Mr. Sanserino's may cause EM's editorial staff to re-evaluate certain features and determine that they should not be printed, for fear of risk to the magazine.

I am not an expert in this area of patent infringement, and Mr. Rykebusch's device, if produced in a commercial context, may indeed be found to infringe upon the patents held by Aphex Systems, Ltd. However, the immediate assumption by EM that Mr. Sanserino's claims are true weakens EM's ability to continue publishing this sort of article, and perhaps wrongly gives credence to Mr. Sanserino's claims. Indeed, the unfortunate use of the heading "The Illegal Sweetener" to the exchange of letters indicates that EM already concluded that in fact Mr. Rykebusch's device illegally infringes on the Aphex Systems patent. I suggest that with the paucity of evidence available, this infringement simply cannot be determined.

EM is the top magazine in the electronic music industry. I hope it continues its superb reporting, commentary and the publication of "how to" articles.

Philip L. Pomerance
Illinois

Phil—We appreciate your concern. First, let me assure you that we will continue to run projects; we cannot know about all patents out there, and people like Mr. Sanserino understand this. Occasionally it is possible that we will infringe on someone's patent, but if done without malice, I don't see anyone causing the magazine any trouble. Mr. Sanserino certainly didn't, and even though he had to protect his claim in his letter to us, personally he has been very pleasant and has not caused us any problems at all.

Regarding whether the Aphex patent is valid, I have dealt with patents quite a bit, and based on my admittedly limited and non-degreed knowledge, I think the Aphex patent would probably hold up unless someone could show prior art. This is why I accepted Aphex's claim at face value. However, I could be wrong. If anyone challenges the Aphex patent, we'll find out whether the Aphex circuit is indeed patentable or not.

Getting a Fix on Cybernetic Music

I want to thank Jim Johnson for his favorable review of my book, *Cybernetic Music*. Since it was published, I've been praying no reviewer would come across it because TAB managed to print it with more typos than a Toshiba technical manual. I advise anyone who buys it to write to TAB and demand the errata sheets I sent them. If that doesn't work, send me a large, self-addressed stamped envelope with at least 90 cents postage, and I'll run off a copy on my rapidly aging printer.

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More Feel Factor Comments

As a computer programmer and musician (for the most part keeping my two careers separate), I read your magazine with great interest and enjoyment. Keep up the good work. Your feature article on the "Feel Factor," however, brought out some concerns.

I welcome Michael Stewart's comments on psychoacoustics and the "feel spectrum." This is good musicological data. My fear is that this info will not be used primarily by the experienced musician to add feeling to a song, but by the new breed of technician/musician who, having limited stage experience, is sitting around dreaming up riffs with various sequencing gear.

These people are not a figment of my imagination. They are real. I have met them.

Let's get this straight. Getting feeling into music requires playing, dedication, sensitivity, and even more playing. There is no substitute for live performance, even just flat-out jamming in a basement. This is the only way to develop any real understanding of what we all mean by feel.

Michael is guilty of promoting this "easy approach" to feel. He wants to quantize feel and put it in a box. I find this analogous to giving a poet a rhyming dictionary. These are good tools for the artist, but he must judiciously use his experience, intellect, and emotion to craft something meaningful. I think Craig Anderton's aside on how he shaped his piece

using Michael's data is a good example of how an experienced musician can use this info.

I suppose this is a warning to the inexperienced. I do have one suggestion for getting feeling into music that was not mentioned in the article: turn off the quantization, shut up, and play your synthesizer. And don't forget to breathe with your phrasing.

Bob Walker
British Columbia, Canada

Bob—I appreciate your concerns that people will think "gee, I've shifted the tracks around a bit, so I guess I have feel now." But I certainly don't think Michael is guilty of promoting an "easy approach" to feel; he is merely telling us that feel is not something totally mysterious and elusive, but that some (not all) of its aspects can be easily quantified. In this respect, he is encouraging people to experiment. The beginners you talk about are making music primarily for their own gratification, and out of a sense of experimentation. Michael has given them one more parameter to experiment with, and if anything, this will hopefully make people aware of the importance that feel has to music, and inspire them to improve their craft to the point where they can, indeed, turn off the quantization and come up with a superb piece of music.

Sequencer Plus Revisited

I've recently subscribed to EM (for two years!), and I have a few comments I'd like to share with you.

In the Sept. '87 Letters column Al Hospers states that "...the Sequencer Plus program won't let you edit an individual pitch bend event!" This is somewhat misleading: there are three versions of Sequencer Plus, and Al should have stated the version to which he was referring. SP3 certainly does allow pitch bend editing in the MIDI Edit screen. That page allows the user to access pitch bend, mod wheel, program change, and other controllers. Events recorded in real time may be edited after recording, and MIDI events may be entered in step time as well. In my opinion, SP3 offers great control over all MIDI event data.

Your magazine is an exceptional publication: keep up the great work!

David Phillips
Ohio

Another Way to Control Cable Clutter

Regarding the article in the Dec. '87 issue about using Velcro and nylon tie-wraps to organize cables, I am writing to say that there is an even better way to "snake" your cables called Nylon Mesh Tubing; it expands and contracts to fit around your cables. It's kind of hard to find, but I came in contact with it where I work and can tell you it works great—very professional! Its brand name is Expando-Flex. I have written to both the manufacturer and to the vendor which supplies it to the company for which I work, but apparently, neither wants to deal with low-volume clients such as me. If anyone knows where to find this stuff in small quantities, please use this forum to inform the rest of the EM readers. It works so well that I can't believe it hasn't really caught on with musicians!

Next, I think it was a great idea for EM to design their own MIDI interface and publish software for it. Now let's take it a step further. I, like many other MIDI hackers, have written a number of small, simple, yet vital MIDI software applications (e.g. Data Filters, Split Keyboard Programs, Channel Re-Assignment Algorithms, etc.). However, these are such tiny programs that it is hardly worth the wear and tear on my computer to power it up every time I want to use them. Also, who wants to take a computer to one's gig! My suggestion is this: let's design a small 6502 single-board computer with a built-in MIDI interface, a small keypad for input, and an LED display for output. It could have a small amount of battery backed-up RAM, and room for several application ROMs which EM readers could develop and EM could feature from time to time. I have been working on a design myself, but I'm sure that there must be a couple hundred better computer designers out there than me. All EM would have to do is publish a PC Board Layout and we would be off and running. Let's do it!

Bob Damiano
Neo-Sync Labs
New York

Bob—Sounds like it's time to re-invent something like the PAiA 8700, which served a similar function a few years back. Any comments, readers?

Digital Sampler Users Group

The Digital Sampler Users Group (DigiSam) provides support and an information exchange forum for anyone interested in computer-based digital samplers and sound production involving digital sampling. Activities include publication of the journal *Gigabit Forum*, and the creation of a computer-based conferencing and electronic mail system. The BBS is on-line 24 hours a day, seven days a week, and supports 300, 1200, or 2400 baud communications. Set your modem for 8 data bits, 1 stop bit, no parity. Dial 612 / 944-8511. Copies of Gigabit Forum are free. To receive your copy write: DigiSam Users Group, 7808 Creekridge Center, Suite 200, Minneapolis, MN 55435 ☎ 612 / 944-8528.

Jean Groppoli
Minnesota

Kudos to Sokol

I completed Mike Sokol's wide-dispersion speaker system (July and October '87 EM) about three weeks ago, and finally got a chance to really let them loose! My brothers and friends got together with 400 Watts per channel and the speaker system sounded *great*. Just as Mike had mentioned, once you got used to them there was a definite improvement in "sculpturing" a good overall sound. Now everyone wants me to build them a set because they sound that good, and all without blowing your brains out! And no more monster PA cabinets, guitar amps, etc. to lift at 4 a.m. either.

Again, my compliments to Mike Sokol on a superb system. I hope more musicians will consider using it in the future. Anyone interested in comparing notes or having problems with this system is welcome to get in touch.

Mike Kakos
c/o Jimmy Nalpa Studios
28 Mulberry St.
Yonkers, NY

More Help for Chroma Fans

Alan Gary Campbell's Service Clinic in the Nov. '87 EM made reference to the Opcode librarian for the Rhodes Chroma, and stated it to be the only known librarian for this instrument. However, Chroma owners with an IBM compatible and the Syntech MIDI Converter can run an excellent librarian from Club MIDI called *PROLIB*. You can save and retrieve banks of 50 patches, or work with individual patches (reordering, sorting, naming). This is great for sorting or organizing banks of patches to suit individual project needs. More information can be obtained from Club MIDI (PO Box 93895, Hollywood, CA 90093 ☎ 818 / 788-3963).

Damase A. Giguere, Jr.
Massachusetts

Calling All New Age Music Fans

I have just recently subscribed to EM and I love it! Good work! I am 16 years of age (soon to be 17) and I am heavily into synthesizers (and I don't mean rock keyboards).

I really enjoyed the article, "High Tech Musical Electronics: It's All in the Game," by Matt J. McCullar. The article was most interesting. I learned a lot, but the thing I like the most is that I found that there are more people out there who like (love) new age and electronic music. I don't believe it. Someone has actually heard of Tangerine Dream, Synergy, Vangelis, and the one and only Jean Michel Jarre! Matt, let's get to know each other! Anyone else who likes this style and wants to get in touch can reach me at 501 Buckley Hwy., Union (Stafford Spgs.), CT 06076 ☎ 203 / 684-7379.

Once again—keep up the good work, EM.

Chris Caouette
Connecticut

The PCM Tape Streamer?

I've read article upon article on the PCM digital audio processor, but I'd like to know if it's possible to record MIDI information onto video tape as well. If my research serves me well, it wouldn't require D/A or A/D con-

THE DRUM MACHINE WITH TODAY'S SOUNDS, TOMORROW'S FEATURES AND YESTERDAY'S PRICE

Assuming you haven't already heard its incredibly low price, the first thing that will impress you about the new Roland TR-626 Rhythm Composer is the sound. We went back to the studio to create all-new high-resolution PCM samples of the finest percussion instruments to give you the latest in today's sounds. And that's just what you'll find on the TR-626: round woody-sounding basses, tight full snares (even including a gated-reverb snare) toms deep enough to please a Phil Collins, clear, vibrant cymbals, and the most complete selection of latin percussion instruments that'll really add some spice to those dance tracks. Thirty digital samples altogether, and each one is tunable as well as level programmable.

Then, since we'd come up with all-pro sounds, we just had to balance it out with the state-of-the-art in pro-performance features: like the most musically-natural and accurate programming software anywhere — combining the best of real-time and step programming with visual accuracy through its sophisticated LCD Display Window. To make the rhythms sound as real as the samples, we've included shuffle, flam and accent features.

On the TR-626 you'll also find songs up to 999 measures, eight assignable outputs for separate processing of the instrument samples, stereo mix, tape sync, MIDI sync and trigger out. Finally, in a fit of nostalgia, we threw in a price so low it sounds like the good old days: just $495.00.* But probably the most important performance feature is one you won't find anywhere else — and it's an idea that makes the TR-626 the first drum machine that's really usable in live performance. We've added a Memory Card Interface that allows you to load-in stored songs and patterns as fast as you can push a button. Up to 18 songs worth of drum data can be saved and loaded in a flash from the credit-card sized M-128D Memory Card.

If you think all this sounds like the most exciting drum machine to come down the pike in a long while, you're right. Because while the idea of a drum machine isn't new, the idea of a drum machine with some really new ideas of sounds, features and price is positively revolutionary. See and hear the TR-626 today at your Roland Dealer. *RolandCorp US 7200 Dominion Circle, Los Angeles, CA 90040 (213) 685-5141.*

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Sound Editor/Librarian programs from Opcode Systems, for customizing and storing sounds by the diskful–for almost every major brand of synthesizer on the market.

And Sound Designer, which lets you look at sampled sounds in a graphic form, then turn them into exactly what you had in mind.

Not to mention a full range of programs for more businesslike undertakings, from putting together bios and promo packages to designing logos and album covers.

So next time you find yourself

thinking about electronic pianos and synthesizers and drum machines and assorted MIDI paraphernalia, think seriously about connecting it all to a Macintosh.

It doesn't have any knobs or sliders. But it could very easily help give you the performance of your life.

The power to be your best.™

NO PATIENCE REQUIRED

Patience is not necessarily a desirable trait for a musician. When musical ideas are running through your head you need equipment that won't slow down the creative process. Make you wait. While you risk losing a great idea. Or the feel. Or the moment.

Instead your equipment must perform, document, and help you produce results. As fast as you can work. As fast as you can create.

Alesis didn't invent the drum machine and MIDI sequencer/recorder. We *reinvented* them. We think a drum machine should sound *exactly* like real drums. And a MIDI sequencer should be a powerful, flexible computer, yet work as simply as a multi track recorder.

With the **Alesis HR-16 High Sample Rate 16 Bit Digital Drum Machine** and the **MMT-8 Multi Track MIDI Recorder** you can work like a musician. Think like a musician. Create like a musician. And sound like a great engineer. They'll let you exercise your musical muscle, instead of your patience.

The drum machine and sequencer have arrived. The real thing. At last.

ALESIS
STUDIO ELECTRONICS

LOS ANGELES: Alesis Corp., P.O. Box 3908, Los Angeles, CA 90078 **LONDON.** 6, Letchworth Business Center, Avenue One, Letchworth, Hertfordshire SG6 2 HR

version, but only converting to and from a television code (NTSC in the U.S. or PAL/SECAM in Europe). If this is possible, the VCR could serve as a low-function digital recorder, depending on the capabilities of the processor and VCR. You probably wouldn't have punch-in or punch-out, but you would have as much as eight hours of information which could be sent back to any compatible MIDI device. One particular use would be recording the information from several floppies from (e.g.) a QX1, then playing it back—with eight hours' worth of data on one tape!

Terry Olson
Minneapolis, MN

Additions and Corrections

September '87:

Alan Gary Campbell writes: "In my review of the Elka and Fast Forward Designs' MIDI bass pedals (September '87), in the section pertaining to the FFD *MIDI Step* pedals, first paragraph, the sentence regarding the unit's adapter/DC power jack should include the text in italics, which was inadvertently dropped: 'The adapter plug polarity is the opposite of some adapters (e.g., Yamaha), yet the power supply is not, as far as I can determine, reverse-polarity protected. *The proper polarity is not indicated on the panel, or given in the owner's manual.*' This is important, because adapters frequently fail, and on the road, they're easy to lose. With the existence of two incompatible wiring standards for DC power jacks, the omission of a polarity-indication diagram is little short of techno-suicide."

November '87:

The following are a few clarifications and changes from Howard Cano for his Nov. '87 article, "Build SAM: A Simple Sound Sampler."

Schematic: The capacitor connected to pin 6 of IC2a should be C2. C15-C21 are 100nF (0.1μF) bypass caps that connect between power and ground to shunt power supply noise to ground; they are noted on the PC board layout and parts list, but not the schematic.

Parts Placement: In Fig. 2a C21 and C9 are incorrectly labeled as a 100μF capacitors; they should be 100nF. Connections just to the right of IC4 (2732) are A10 and A11. They must be connected to ground or +5 to select sensitivity, as stated in the article. Power down when changing A10 or A11.

Program: The INC HL instructions (23 hex) at program locations 007B, 00CF and 014C have been changed to SCF (37 hex).

December '87:

The "Mystery Word Matrix" on page 69 of the Dec. EM was mistakenly not credited to its clever author, Jack Orman. Well, we did get it on the contents page . . . sorry, Jack. Guess we were too busy doing the puzzle.

EM

Roland E-660 Digital Equalizer

ACCESSORIES

▶The new **220 Momentary Footswitch** ($29.95) connects the tip to the sleeve of the phone jack only as long as the switch actuator pad is pressed. Used to enhance the operation of effects units and keyboards, especially in performance situations, the Footswitch controls these units with the tap of a foot. The unit is exceptionally sturdy, comes housed in a hardy die-cast FX chassis with a non-slip rubber bottom, and has a soft-touch switch actuator. A single mono phone jack in the rear of the chassis connects to the equipment being controlled.

DOD Electronics Corporation
5639 South Riley Lane
Salt Lake City, UT 84107
☎ 801 / 268-8400

▶The **E-660** two-channel/four-band parametric equalizer ($1,995) and the **R-880** four-channel reverberator ($3,995) are designed expressly for all-digital studios. The inputs and outputs conform to the AES Serial Transmission Format Standard to process audio signals entirely in the digital domain, without digital/analog converters. The AES Standard allows interconnection of any digital audio devices—tape recorders, consoles, CD players, hard-disk production systems, synthesizers, samplers, or signal processors—without inter-stage analog conversion that would degrade the signal. Data can be transmitted on shielded twisted-pair cable, coaxial cable or optical fibers. The Format specifies no transmission speed in order to use devices with any sampling rate. The E-660 offers four bands of EQ on each of two channels, or eight bands of EQ on one channel. Center frequencies are adjustable from 60 Hz to 20 kHz; Q is adjustable from 0.3 to 9.0. Level is adjustable up to ±12 dB. The unit also offers various delay functions for creating complex effects using phase and frequency relationships. The R-880 reverb has two ins and four outs, and four independent delay lines to gang, split, or cascade configurations. Both units have a 20 Hz-20 kHz frequency response, 96 dB dynamic range, less than 0.03% distortion and (for conventional studios) boast 16-bit D-A/A-D converters.

RolandCorp US
7200 Dominion Circle
Los Angeles, CA 90040
☎ 213 / 685-5141

DIRECTIONS/TRENDS

▶Record sales of the IBM sequencer **Cakewalk** ($150) are reported despite the absence of copy protection on its disks. According to the manufacturer, factors in the monthly doubling of the software's sales include: ease of use and the help feature; power comparable to the $349 Texture and $495 Sequencer Plus Mk III; and Microsoft-compatible mouse support. Company founder Greg Hendershott says, "The best way to prevent piracy is to price your software so real people can afford to buy it rather than steal it. Most people like to be honest and like to get documentation and support."

Twelve Tone Systems
PO Box 226
Watertown, MA 02272
☎ 617 / 924-7937

EDUCATION

▶***Foundations of Music: A Computer-Assisted Introduction*** ($27), by Robert Nelson and Carl J. Christensen, is a music fundamentals course with a written text and double-sided diskette that contains at least 150 drill-and-practice options. It teaches a comprehensive course in music fundamentals to college-level non-music majors or interested high school students and runs on any Apple II computer with a minimum of 48K RAM. No additional hardware is needed.

Wadsworth Publishing Company
10 Davis Drive
Belmont, CA 94002

SSMT SSM 2016 Differential Audio Preamp

ELECTRONICS

▶The ultra-low noise, monolithic **SSM 2016 Differential Audio Preamplifier** ($4.50 each at 1,000 pieces) offers performance previously considered unattainable from a monolithic device. The fully differential IC is designed for state-of-the-art audio systems in applications including high gain mic preamps, signal summation, differential line receivers and low-gain balanced input stages. The 16-pin device can be operated off split supplies from ±9 volts up to ±36 volts for improved headroom and has an input-referred noise specification of 800pV per square root Hz, corresponding to 1 dB when operated from a 150-ohm source impedance. The output stage can source and sink a minimum of 40mA, allowing a jackfield to be driven directly.

Solid State Micro Technology for Music, Inc.
20768 Walsh Avenue
Santa Clara, CA 95050
☎ 408 / 727-0917

MIDI

▶Austin Development's popular **MIDIface II** ($119.95) is being marketed in a new package. The 1MHz MIDI interface for the Macintosh is fully opto-isolated and uses a built-in power supply (110V, 60 Hz), so it needs no power pack or batteries. It works with all Macintosh models from the 128 to the II, and is a 2-In, 6-Out unit with a DIN connector for each Mac serial port. It now comes with two 6-foot MIDI cables and one 6-foot serial cable. (Additional serial cables, $9.95.) The MIDIface II can operate in two modes: as two independent 1-In, 3-Out interfaces, or as one 1-In, 6-Out interface. The latter configuration reduces the need for a MIDI Thru box when used with computer software featuring MIDI Thru. Optional serial port expansion switches (including cables) are also available that allow the computer to access peripherals such as printer and modem when the MIDIface is not in use. The AB switch ($49.95 with cable) allows either Mac port to access two peripherals (one at a time), and the ABCD switch ($59.95 with cable), four.

Altech Systems
831 Kings Highway, Suite 200
Shreveport, LA 71104
☎ 318 / 226-1702

▶The **proMIX MCA-100 System** (from $1,995) adds up to 64 channels of high-quality fader and mute automation to any mixing console by patching in series with the console's audio path and connecting to any MIDI sequencer to store automation data in real time, without a computer. Each channel has a (real, physical) 100mm fader, a mute button and a mode control. The faders and mutes are used to record real-time moves during recording and, during the mix, real-time edits in two different edit modes. The class A VCA design eliminates the crossover problems of low-cost VCAs and the "zipper noise" inherent in many

AFTERTOUCH™
OFFICIAL NEWS FROM THE YAMAHA USERS GROUP MARCH, 1988.

DX11 Synthesizer brings new sounds to its price class.

YAMAHA® HAS JUST GIVEN KEYBOARD players good reason to expect more for their money—with the introduction of the DX11 FM Synthesizer.

It's an 8-algorithm, 4-operator synthesizer that lets you use 8 different waveforms to create complex sounds. And, with a polytimbral mode, it actually lets you play up to 8 voices at the same time.

The DX11 has a 61-note keyboard with velocity and aftertouch. It comes with 128 preset voices, all fully editable, and room to store 32 custom voices in its internal memory. A RAM4 cartridge gives you 64 more, for a total of 224 available voices. All voices are stored with a complete set of function parameters: everything from pitch bend, LFO and transposition settings to a new Reverb feature.

YAMAHA DX11 FM SYNTHESIZER.

It has stereo outputs and a Pan effect, which allows you to control stereo imaging by LFO, velocity or by keyboard split. Other effects are built in, too, such as a transposable repeated delay and a Chord Set function that lets you play up to 4 notes by pressing a single key.

The DX11 gives you the same microtuning function that's found in the DX7II, with 11 preprogrammed microtonal scales plus memory for 2 of your own. And it's completely compatible with voices used in the TX812 tone module and DX21/27/100 synthesizers.

Of course, the DX11 has an easy-to-read backlit LCD. As well as full MIDI implementation—so its eight voices can be driven remotely by a sequencer, computer, master keyboard or drum machine.

With a suggested USA retail price of $995.00, you can be sure the DX11 is going to be generating a lot of interest. See it for yourself at an authorized Yamaha Digital Musical Instrument Dealer.

E! now available for DX7II series.

A company called Grey Matter Response has just released an expansion kit for DX7IIFD, DX7IID and DX7s synthesizers. It goes by the name of "*E!*," and gives you access to an impressive host of new features.

For starters, *E!* lets you play your DX7II in Octal Mode for 8-voice multi-timbral sound, with full control over individual voice volume and octal stereo pan.

It provides a built-in sequencer that can store 220,000 events on the DX7IIFD (22,000 events on the "D" and "s" models). So you can record in real- or step-time on 16 tracks and 16 MIDI channels, and call up your sequences right at your keyboard.

You also get the *E!* engine—a 16-track MIDI mapper, velocity processor and more.

And for added versatility, *E!* increases your on-board storage to 256 single voices and 128 performances. Each performance includes Octal Mode and sequencer information in addition to normal DX7II performance parameters.

E! also provides increased capacity in the FD disk drive, letting you save files as large as 128K. And it has "E-Ram," which loads—as one bulk file—all your voices, sequences, MIDI map and other data.

For more information on *E!* and where you can find it, contact Grey Matter Response at 312-349-1889. The kit's suggested USA list price is only $399.00.

E!

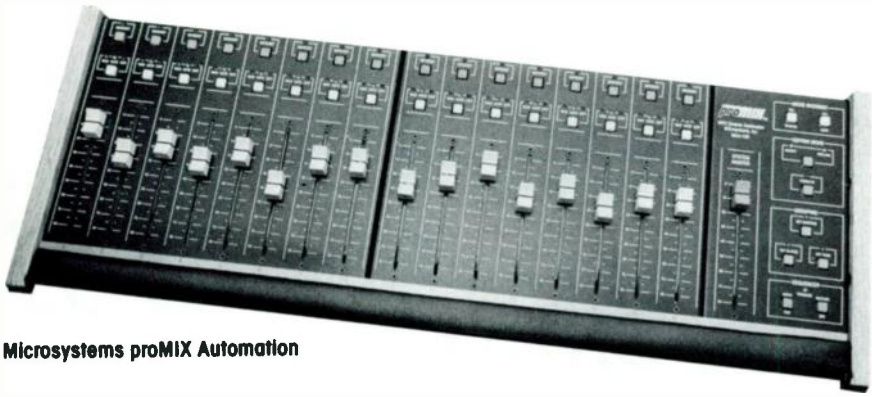
AFTERTOUCH is a monthly newsletter filled with the latest on Yamaha products. Get a year's subscription free by writing to: AFTERTOUCH, P.O. Box 7938, Northridge, CA 91327-7938.

YAMAHA

Yamaha Music Corporation, USA, Digital Musical Instrument Division, P.O. Box 6600, Buena Park, CA 90622.

DCAs. It provides excellent sonic quality with noise and hum less than -96dBV and THD less than 0.005%. ProMIX is a modular system expandable by eight-channel units. It uses separate rack-mount processor/VCA and power supply modules and optional VCA expansion modules.

Microsystems, Inc.
2500 East Foothill Blvd., Suite 102
Pasadena, CA 91107
☎ 818 / 577-1471



Microsystems proMIX Automation

▶The new **Apple MIDI Interface** ($99) was announced in San Francisco and at the January NAMM show, and is shipping immediately. It is intended to offer MIDI functionality and Apple quality to a broad range of Apple users and potential musicians. It works with all models of Apple's Macintosh and IIgs computers. It has one MIDI In, one MIDI Out and one serial port, and comes with two 6-foot MIDI cables and one serial cable. The unit signifies a strong effort on the part of Apple to support the musical applications of its computers. These efforts also include an Advanced Development Sound Group doing R&D on music, speech and other sound applications, and a Music Market Manager who will develop multi-media information, to be available at Apple dealers, about Apple equipment and music-related applications.

Apple Computer, Inc.
20525 Mariani Ave.
Cupertino, CA 95014
☎ 408 / 996-1010

PUBLICATIONS

▶***The Bulletin CEC Newsletter*** ($7 cover price) is a publication of the Canadian Electroacoustical Community (CEC), a non-profit organization promoting communications within the electroacoustical music community. Published three times a year, the Bulletin is bilingual, printing both French and English versions of its articles, and reports on conferences, composers, academics, performances and research in "electroacoustical music... music from loudspeakers."

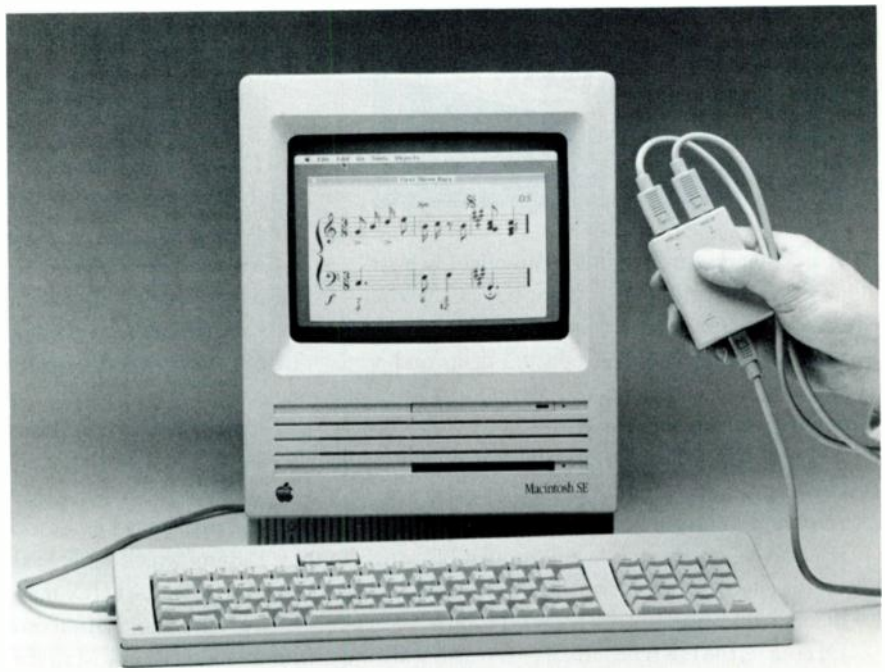
Canadian Electroacoustic Community (CEC)
C.P. 757, Succursale NDG
Montreal (Quebec)
Canada H4A 3S2

SOFTWARE

▶The **Keyboard Controlled Sequencer V1.6** ($249) for the Commodore Amiga offers 48-track recording, the ability to load 16 separate songs, a built-in variations generator, full editing of all MIDI parameters and complete, mouse-based cut and paste editing. It synchronizes via MIDI clock and Song Position Pointer, has a real-time live edit feature, automated real-time punch-in and -out, mouse-controlled step entry of notes, durations and velocities, and two kinds of quantization. You can mix and unmix tracks, adjust tempo, and send any MIDI system exclusive commands. It is compatible with all standard Amiga MIDI interfaces, allows for normal Amiga multi-tasking and loads and saves standard MIDI files. Functionally and visually identical versions of KCS are also available for the Atari ST and the Mac; all are fully file compatible.

Dr. T's Music Software
220 Boylston Street, Suite 306
Chestnut Hill, MA 02167
☎ 617 / 244-6854

▶**Soundfiler ST** ($299) for the Akai S900 and Atari 1040ST is a sample editor with, in addition to the standard features: 30 to 16 kHz digital equalization with high and low shelving, notch, bandpass, and peak filtering, full cut/boost and Q controls; free-hand digital envelope drawing, with unlimited cut and paste editing for splicing samples, and a gain normalization feature that boosts the level of a sample to maximum loudness before clipping; complete program and keygroup managing; translating sample dumps from any device using the MIDI Sample Dump Standard; and fast and efficient user interface. The looping screen accesses any point of a sample with a mouse click and displays loops in real time. Crossfade Looping digitally recalculates the waveform, and Waveform Drawing works with the mouse. The keymap screen displays up to



Apple MIDI Interface

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Address_____

Graphic Notes Inc.,
200 Seventh Ave. Santa Cruz CA 95062
Ph (408) 4760147 · Fax (408) 4764520 MPEM 02

If you need to translate MIDI to multitrack, here's a pointer.

Getting digital signals onto your multitrack has always involved compromises. But that was before Tascam's MTS-30 MIDI/FSK translator with song pointer compatibility came along.

The converters on sequencers and drum machines are handy, but all too often they slip out of sync due to conversion errors. Besides, they can only play back from the beginning of the song.

The MTS-30 neatly eliminates both of these problems. In addition to providing error-free operation, it uses MIDI Song Position Pointer data to allow you to play back from any point in a composition. A bright, easy-to-read LED display shows you exactly which measure you're on.

Like all Tascam products, the MTS-30 is loaded with features, like powerful error correction and an automatically switched MIDI OUT/THRU terminal to eliminate constant repatching. All at a very affordable price.

So let the MTS-30 simplify your life, with a lot of power and a little pointer.

TASCAM

16 keygroups at once. Drop down windows enable graphic programming of all S900 front panel controls, and parameters are displayed via software faders, buttons and graphic arrays, all mouse-programmable. Includes librarian and file managing programs and is completely GEM-based.

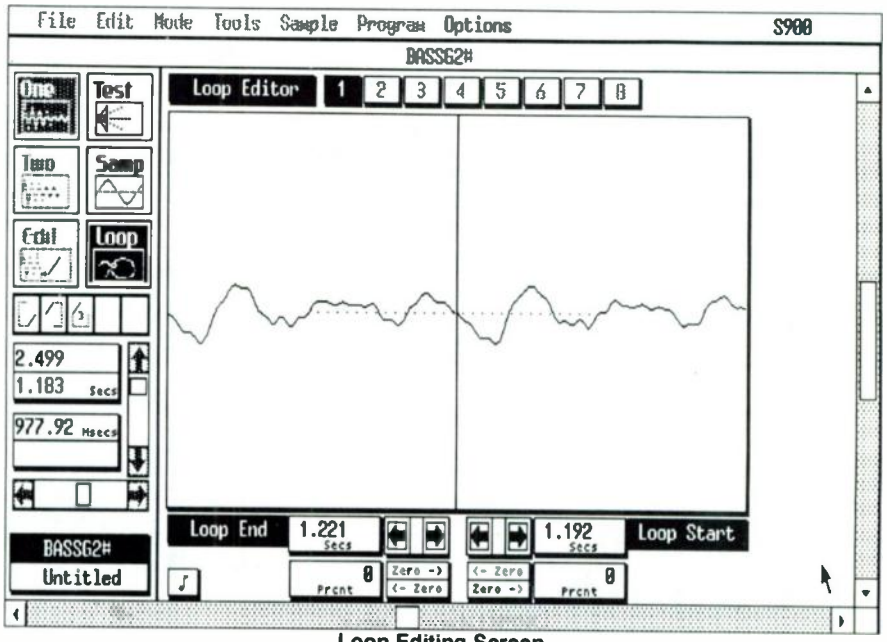
Drumware, Inc.
12077 Wilshire Blvd., #515
Los Angeles, CA 90025
☎ 213 / 478-3956

▶**Easy Key** ($65 incl. s/h) is a comprehensive, integrated macro system for Jim Miller's Personal Composer 1.35—the IBM-based composition software—providing the user with extensive graphics and over 600 new keystroke commands to streamline the automatically spaced and beamed entering and editing of melodies, chords, symbols, performance directions and so forth from the computer keyboard. Other features include an italic font, a 24-point Roman font (for titles), automated page layouts, labeled guitar chord diagrams, and cut and paste macros. An updated Easy Key will support Personal Composer Version 2.0.

John Clifton
175 West 87th Street, Apt. 27-E
New York, NY 10024
☎ 212 / 724-1578

▶A new series of affordable music programs for the Commodore 64 has been announced. **Passport Sequence Editor** ($9.95) allows step-editing of MIDI 4+ and MIDI 8+ sequence files. The **Studio One Editor** ($9.95) works with Syntech's popular Studio One program. **DX21/27/100 Librarian** ($14.95) stores banks and individual voices from Yamaha's 4-op FM synthesizers. **Juno 106 Librarian** ($14.95) stores 128 sounds in memory and includes random patch generator. The **Generic Librarian** ($19.95) is a 32K System Exclusive recorder that works with any instrument capable of bulk Sys-Ex dumps. These programs are all oriented towards the average professional or semi-professional musician who can't justify spending $50 or more per program for useful MIDI software.

SoundWare
PO Box 1913
Nederland, TX 77627

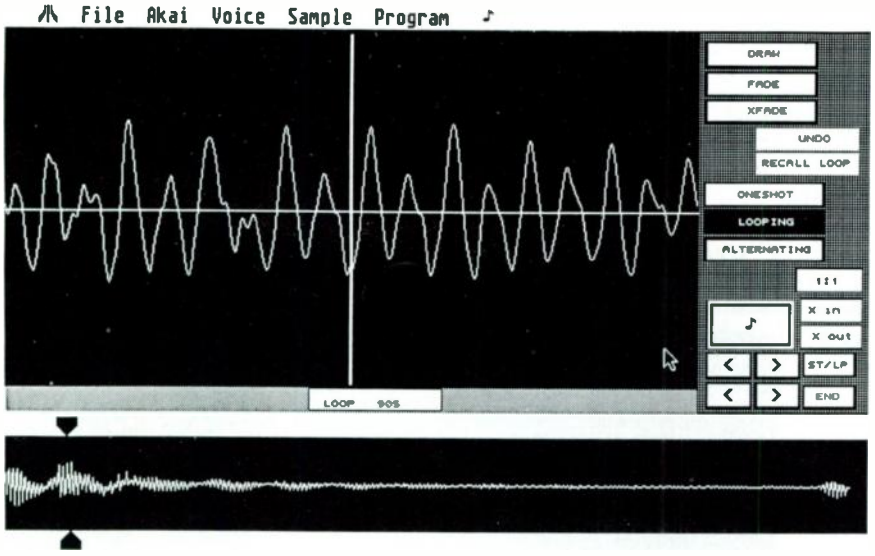


Loop Editing Screen

Turtle Beach Softworks Vision II

▶**Vision II** ($495) is a new line of sample editors for IBM and true compatibles, currently supporting the Akai S900 sampler. Versions for several other popular samplers are under development. Vision II uses an intuitive, graphic, user interface based on mouse/screen interaction and pull-down menus similar to the Apple Mac, and can read and write wave data files in Digidesign format, allowing access to large libraries of existing samples. Envelopes, loop points, and key assignments can be edited graphically, and a MIDI keyboard/step sequencer function eases the testing of sounds when using a keyboardless (rack-mount) sampler. For increased blending and modifying of sounds, all wave data is displayed and edited in 16-bit resolution regardless of the sample's original resolution. Features include digital EQ, wavetable analysis and modification tools, crossfade looping, variable resolution wave display, two active wavetable buffers and an interpolation function to improve resolution on older 8- and 12-bit samples.

Turtle Beach Softworks
PO Box 5074
York, PA 17405
☎ 717 / 741-4972



Drumware Soundfiler ST

UPDATES

▶The **Mirage Stereo Output Kit** ($60.50, complete kit, PC board, $20.50), as featured in the June '87 EM; based on Ensoniq's own design, and manufactured with their permission and approval. Includes a quality CAD-designed G-series epoxy PC board, all ICs and other components, including resistors for both versions, and hardware included. Prices include postage and insurance.

Musitech
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Chattanooga, TN 37404
☎ 615 / 894-9771

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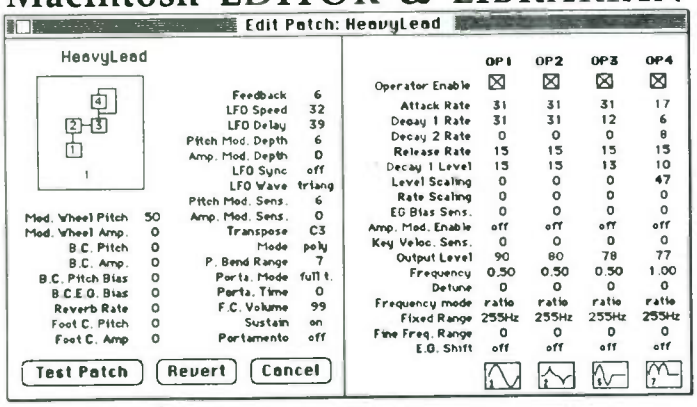

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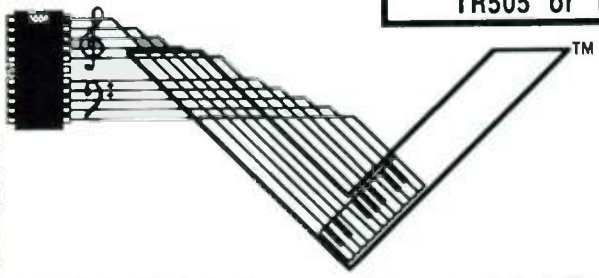

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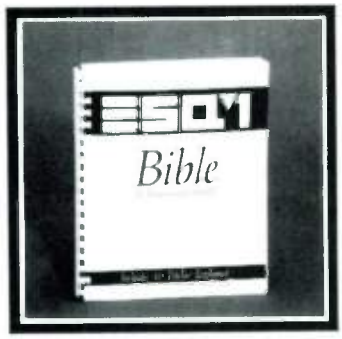

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'In summary, the ES1 program is a well-written and useful program.'
Excerpt of review by James C. Chandler for Electronic Musician January 1988

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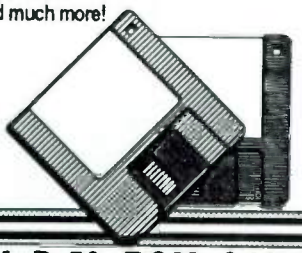

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Ensoniq's Mirage made sampling affordable, and the ESQ-1 put heavy-duty synthesizer/sequencer power into a very cost-effective package. What would they do for an encore? This in-depth report tells all.

Ensoniq Performance Sampler, SQ-80 Cross-Wave Synthesizer

BY CRAIG ANDERTON

BY ANY STANDARD, Ensoniq's ESQ-1 is a very successful synthesizer that has garnered a loyal—almost cult—following. A number of third parties provide program cartridges, voicing software, librarians, and so on, which is always a sign that an instrument has caught the public fancy. Now the second-generation ESQ is out, and it deserves a close look. While the SQ-80 doesn't represent any miraculous breakthrough—in fact, it is still based on the "Q" chip technology used in the Ensoniq Mirage and ESQ-1—the SQ-80 is well-positioned as the next step in the ESQ evolutionary chain.

The EPS is a far more radical departure; it is anything but Mirage II. The EPS is a quantum improvement in sampling technology for Ensoniq, and in many ways, for sampling in general. This is the most impressive sampler I've seen at the under-$2,000 price point, not just because it sounds good, but because it is *deep*. Brilliantly designed and filled with exceptional creative opportunities, I have a feeling this is the instrument that will break the sampling market wide open.

Let's begin by discussing areas of commonality between the two instruments, then branch off into individual reviews for the SQ-80 and EPS.

THE KEYBOARD

Since the "feel" of an instrument can be as important as the sound, let's start with the keyboard, which is the same for both instruments. It spans five octaves, has a lightly weighted response (it's no KX88, but it's no Farfisa combo organ either), is velocity-sensitive, and puts out true *polyphonic* aftertouch—just like the late, great Sequential T8 or Kurzweil MIDIboard. You can articulate each note individually (try assigning aftertouch to filter cutoff, and play a brass chord; you can make just one or two notes stand out if desired). While you might expect a so-so kind of action for this price, the aftertouch response is smooth, predictable, and adds a definite expressiveness to the sound you won't find on synths lacking this feature. (For the techno-fans out there, Ensoniq uses an ingenious inductance-sensing aftertouch system where pressing on the key pushes a metal plate closer to a tuned coil, thus reducing the inductance between the plates and changing the aftertouch value. It's simple, cheap, patented, and effective.)

One problem with systems that include both velocity and aftertouch is knowing exactly where aftertouch becomes engaged during the key travel. Fortunately, there is a definite, obvious "bottoming-out" of the key, whereupon aftertouch begins. In fact, when the key hits the bottom point, you'll hear a noticeable "clack" sound. This bothers some players; I don't find it particularly distracting, though. As a comparison, the noise is softer than, for example, the sound produced by the average computer keyboard.

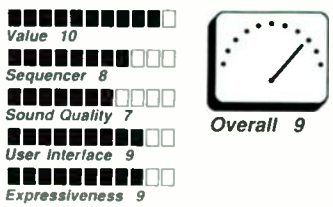
With the SQ-80, the keyboard can be split, and sounds can be layered on either or both keyboard halves—a nice touch. The EPS has its own sophisticated method of handling layering and splits, which we'll get into later.

PRODUCT SUMMARY

Product:
Ensoniq Performance Sampler
List price:
$1,995
Type:
Keyboard sampler with 8-track MIDI sequencer
Main features:
13-bit A/D conversion, disk drive (can also store Sys Ex information from other gear), polyphonic aftertouch keyboard
User interface:
Page-driven
Synchronization:
Song Pointer, sync-to-tape

PRODUCT SUMMARY

Product:
SQ-80 Cross Wave Synthesizer
List price:
$1,895
Type:
Keyboard synthesizer with 8-track MIDI sequencer
Main features:
75 waveforms, disk drive (can also store Sys Ex information from other gear), polyphonic aftertouch keyboard
User interface:
Page-driven
Synchronization:
Song Pointer, sync-to-tape



THE HUMAN INTERFACE

Thankfully, the SQ-80 retains the highly readable fluorescent display and "page-oriented" programming interface that made the ESQ-1 easier to program than other low-cost synths. For those who aren't familiar with the concept, rather than call up one parameter at a time and alter it with a data slider (or increment/decrement buttons), you call up an entire "page" of up to ten parameters. Each parameter is spelled out in the display, and there are ten corresponding buttons. To alter a parameter, all you do is punch the button above or below the desired parameter, and vary it with the data slider or increment/decrement buttons. When you change pages, the SQ-80 automatically inserts a "place marker" on the page you just left. This makes it easy to switch between specific parameters in several different windows.

The EPS has dispensed with the Mirage's dinky two-digit display and hexadecimal numbering in favor of a blue fluorescent display similar to the one on the ESQ-1 or SQ-80. However, this one has little words that light up when you're in certain modes, kind of like the displays in VCRs and some microwave ovens. The EPS also uses a page-driven user interface. It's not hard to figure one's way around the machine; for example, the preliminary manual I received with the unit said nothing about voice editing, but I was able to figure out about 90% of the functions anyway. It's generally very easy to use, although considering the sheer number of parameters, a computer-based editor would be welcome. I do have one suggestion, though: a "cheat sheet" listing all the available menus, and options for those menus, would be of great help.

COMPATIBILITY

The SQ-80 is compatible with ESQ-1 cartridges and patch tapes, although you generally cannot load SQ-80 sounds into the ESQ-1. Similarly, the EPS can load Mirage DSK disks, but EPS disks will not work with the DSK. While loading a Mirage disk into the EPS doesn't really do the EPS justice, the sound is better than what you get from the DSK. But that's not the point. Although Ensoniq is working full-time on developing a sound library for the EPS, it's good to know that the vast number of Mirage disks will work just fine with their second-generation sampler.

MIDI SYSTEM EXCLUSIVE

The disk drive on either machine can store System Exclusive data—up to 64K for the SQ-80, and up to 256K for the EPS. This is a great feature for live performance, as you can use either instrument as the "brain" of your system, and load and save patch data and such for the other instruments that make up your system.

NO RACK MOUNTS?

Ensoniq was emphatic in stating that rack versions of the SQ-80 and EPS will not be made available, in large part because they consider the polyphonic aftertouch keyboard a very significant part of each instrument.

That pretty much covers the similarities; now let's look at the details for both instruments.

The SQ-80 Cross-Wave Synthesizer

REGARDING VOICE STRUCTURE, the SQ-80 uses an eight-voice, multi-timbral architecture. Sounds are based on stored waveforms (wavetable synthesis), and there are a total of 75 multi-sampled sounds and synthetic waveforms (the original 32 found in the ESQ-1, plus 43 new waveforms; see the sidebar "Making Waves"). Since each voice consists of three oscillators, you can do tricks like assign a sampled attack to one oscillator, a sustained wave to the second oscillator, then cross-fade between the two (and have one oscillator left over)—hence Ensoniq's term of "cross-wave synthesis." If this sounds like the way the D-50 does things, you're right, and it works well in this case too.

There's more to a voice than oscillators, of course. There are 15 routable voice modulation sources, which include three LFOs per voice, four complex envelope generators, two velocity options (linear and exponential curves), keyboard tracking (again, two options), modulation wheel, foot pedal, external MIDI continuous controller (e.g. breath controller), and pressure (monophonic or polyphonic). That should be enough options to keep you busy, particularly when you start controlling parameters via the aftertouch and velocity. Hard sync and ring modulation effects are also available. The filters are four-pole analog low-pass types, and sound quite good. However, the SQ-80 still falls just shy of that elusive "fat" bass sound. It's beefier than the ESQ-1, but still doesn't hold up next to the Oberheim/Moog type of bottom end. I suggest a good graphic EQ as an excellent traveling companion for the SQ-80; proper EQ can make a significant improvement to the occasional "problem" patch.

Regarding grit and noise, some programs are very clear and clean-sounding, while others have a bit more of a noisy or muddy component. The SQ-80 is average in terms of noise—I've heard better, and I've heard worse. I would like it if the sound were a bit less "buzzy," but that's being picky and the sound quality is acceptable as it stands now.

The five-stage envelopes have a couple of clever features. First, they are time/level types, not rate/level types, which minimizes the confusion that can come when rates and levels interact. Second, envelope levels respond to velocity, but better yet, the attack time can also be tied to velocity. There is also a second release stage, à la TX81Z, for creating pseudo-reverb effects. This is more useful than you might think if

Making Waves

The first 32 stored waveforms (as found on the ESQ-1) include eight "classic" synth waves (sawtooth, pulse, square, sine, bell, and three flavors of noise; the noises are the weakest of the lot), three additive synthesis waveforms, eight sampled waveforms (bass, piano, electric piano, two voices, alto sax, organ, and kick drum), five "formant" waves (i.e. there is a prominent frequency peak within the waveform, as often found in string, voice, and reed sounds), and eight "band limited" waveforms. The latter remove particular harmonics from normal sounds; for example, the "Sqr 2" wave is a square wave with only the first seven harmonics left in.

The next 43 waveforms are unique to the SQ-80, and include a band-limited sawtooth, triangle wave, two reed sounds, three "grit" waveforms (raw, "nasty" waveforms), three "glint" waves (a single high harmonic that remains relatively constant for different notes on the keyboard), clav, brass, cello, two FM sounds, bell, and a vocal sound called "alien" (good for fleshing out those imitation "Fairlight voices").

Inharmonic loops include breath, voice (a few cycles from female vocalists singing "ooh"), steam (another candidate for "Fairlight voices"), metal, and chime. There are also several short-duration transient attacks meant to be used with other sounds. These include bow (the sound of a bow hitting a string), two guitar pick samples, vibes, slap bass, piano thump, and chiff; synthesized or re-synthesized transients include plink, pluck, plunk, and click, which I won't attempt to describe as the names say it all. Finally, there are five sampled drum sounds—log drum, kick, snare, tom, and hi-hat, and five additional arrangements of these sounds across the keyboard. Therefore, you can play all your drum sounds on one sequencer track.

Of course, you can take these sounds at face value, or you can get crazy. Try throwing picking sounds on top of cellos, or drums along with pianos, or . . . you get the idea.

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Turning Pages

The SQ-80's programming *pages* are given below. We don't have space to include a detailed description of each parameter, but for those with some familiarity with synthesis, Ensoniq's names are relatively standard.

Master page. Sets master tuning, keyboard status (like an improved "local control" function), velocity and pressure sensitivity adjust, pedal mode (volume or modulation), pitch bend wheel range, and bend mode (normal or "held"—only held notes will be bent; notes that are in the release phase but not being held down will not be bent).

MIDI page. Selects the basic MIDI channel, MIDI overflow on and off (when on, you can slave two SQ-80s together for 16-voice operation), external controller define (selects the continuous controller number, variable from 1 to 95, that will control a selected parameter), pressure (off, mono, or poly), MIDI mode (Modes 1, 2, or 4, as well as "multi-mode," where the synth sound itself and the various sequencer tracks can all respond to different MIDI channels), and MIDI enables for Program Change commands, Song Select, etc. Note that the SQ-80 will respond to volume messages coming over MIDI continuous controller 7.

Oscillator pitch page. Controls octave range, pitch transposition in semitones, fine tuning, waveform, modulation 1 source, mod 1 depth, mod 2 source, mod 2 depth.

Oscillator volume. Controls level, mute, and two modulation sources/depths.

Filter. Sets cutoff frequency, resonance, tracking, and two modulation sources/depths.

Final volume. Adjusts pan, level (useful for trimming programs for equal overall level), pan modulation source, and pan modulation depth.

LFO. Controls LFO frequency, reset (i.e. LFO re-starts when key is pressed), humanize (slight frequency variations), waveform (triangle, sawtooth, square, random), delay (with starting level and ending level—this doesn't just go from full off to full on over a period of time), and modulation source (depth is covered in the "delay final level" parameter).

Envelope. There are three level parameters (all tied to a velocity control parameter), velocity attack, four time parameters (i.e. the time it takes to get from one level to another), and decay scaling where the decay time decreases as you play up the keyboard.

Modes. This page controls sync, amplitude modulation, mono mode (not the MIDI mode, but rather, the keyboard only plays one note at a time), portamento (including "fingered portamento" for mono mode), voice restart, envelope restart (these latter two determine what happens if the same note is played twice in succession—how voices are "stolen," and whether the envelope continues or restarts with the new note), oscillator restart (initial phase sync), and trigger (or "cyc") mode—an envelope plays all the way through regardless of whether you hold a key down or just lightly tap it.

Split/layer. This controls splits and layers in the way you would normally expect.

Write Program. This covers the memory "housekeeping" functions—name programs, store programs, etc.

you're using the SQ-80 as a self-contained music machine; the quality of this type of reverb won't put any REV5s out of a job, but it can save some outboard gear in less critical applications.

LET'S GO FOR A DRIVE

One of the biggest advantages of the SQ-80 over the ESQ-1 is the built-in double-sided, double-density 3.5-inch disk drive. It stores up to 40 banks of 40 programs (1,600 programs total), 128 individually recallable single programs, and ten sequencer/System Exclusive blocks. But the drive isn't the only way to store data. An E2PROM cartridge will store two banks of 40 programs for instant recall (however, sequencer data cannot be saved to cartridge). Memory data can also be sent via MIDI to another SQ-80 or computer librarian, and there's even a tape interface for compatibility with existing storage formats (this is also used for the sync-to-tape function).

MIDILAND

The internal programs are accessed as MIDI program numbers 1 to 40, cartridge bank A as 41 to 80, and cartridge bank B as 81 to 120. Thus, you can access 120 programs at any given moment via MIDI. Actually, the SQ-80 not only has a good MIDI implementation, but one that is well-documented in the very thorough owner's manual. See the sidebar on "Turning Pages" for more information about MIDI and the SQ-80.

THE SEQUENCING SECTION

Far from being an afterthought, the SQ-80's sequencer is a pretty powerful tool in its own right, with several applications. One is to use the SQ-80 as a "sketchpad" for recording relatively full orchestrations with a single instrument. Or you could run a sequence as you change program parameters—this helps speed up patch development. Another use is less obvious. Polyphonic aftertouch puts out a lot of data, and it would be easy for all this data to tax the capabilities of a main computer-based sequencer. So, I prefer using the SQ-80 sequencer to record all the SQ-80 parts, and sync it to the main sequencer that drives all the other MIDI gear in the studio. This is not unlike slaving two multi-track recorders together; also note that the SQ-80 receives Song Position pointer, so it can also sync directly to devices like the JL Cooper PPS-1 or Harmony Systems' MTS-1.

The sequencer stores up to 20,000 notes internally, arranged as six banks of ten sequences (these can be chained into two banks of ten songs). There are eight polyphonic tracks provided, each of which can specify a program number, volume setting, and MIDI channel. Thus, the SQ-80 can sequence other MIDI gear via the MIDI Out jack. Tracks allocate notes dynamically, so even though you can't play more than eight notes at a time on the SQ-80 (although you can send more notes out via MIDI), you are not obligated to assigning a certain number of notes to a particular track.

Once recorded, a track can be non-destructively quantized down to 32nd

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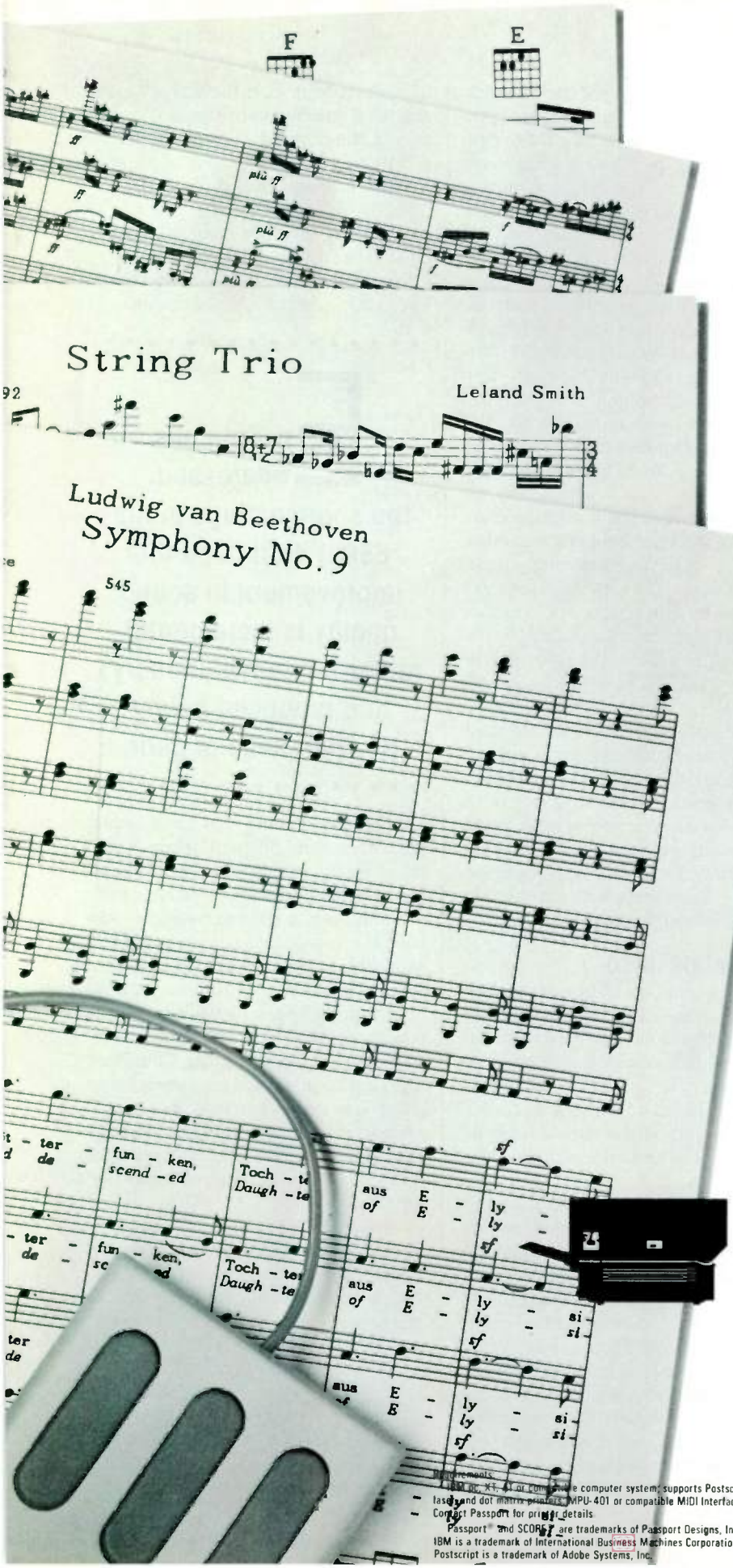

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note triplets (does anyone use quantization that fine?), mixed in relation to other tracks, muted, and synchronized to tape (if you're using the SQ-80 as a master) or via MIDI. There's the obligatory metronome, although I suspect a lot of people will simply record a drum track first and have that serve as the timing reference. This sequencer allows for a fair degree of track-level editing: punch-in, punch-out, looping, merging tracks together (sound-on-sound), transposing, controller filtering, erasing, and—no kidding—step editing. In step editing mode, you can punch out as well as in. You can also select a status for each track (whether the track will play on the SQ-80, over MIDI, or both).

Sequence editing options include: append one sequence to the end of another, add or delete measures starting at a particular measure, and copy. Each sequence can have its own tempo, and there are some thoughtful functions such as GOTO (finds a particular measure in the sequence) and BACKUP (backs up one measure).

Since this sequencer has a modular architecture (short sequences are chained into songs), there are song editing options as well, including song step or sequence transpose, sequence select, repeat the selected sequence for 1 to 99 times, insert step (for adding in another sequence), delete step, back up one step, and go forward one step.

IT ALL ADDS UP TO . . .

Overall, Ensoniq has addressed the shortcomings in the ESQ-1 (although the improvement in sound quality is incremental rather than revolutionary) and produced a very flexible piece of gear. The on-board disk drive gives quick access to a lot of sounds and sequences, and the sequencer can be used in a studio or live situation.

Is the SQ-80 worth the extra money compared to the ESQ-1? I would say yes. However, if you already have a significant MIDI studio and sequencing setup, and all you're looking for is new sounds, then the SQ-80 might not be your best choice for a new toy. Still, if you could only have one mid-priced keyboard to take to a desert island, this would be the one, thanks to its built-in "drum machine" (well, okay, the toms aren't so hot) and sequencer. And as a master keyboard, the SQ-80 has a better-than-average feel with a lot of capabilities, not the least of which is general-purpose Sys Ex storage. Couple these features with the polyphonic aftertouch—whose importance should not be underestimated—and you have quite a MIDI device on your hands.

The sequencer won't make me give up my Mac, but it does the job it's intended to do. There are some features I miss. For example, tempo changes cannot be inserted into a song; you must create sequences with different tempi, then chain them together. Also, you cannot insert Program Change commands into the middle of a sequence—again, you have to create a sequence for each Program Change, and chain them together. What this means is you have to give a bit of thought to how long you're going to make your sequences, and exactly how you will chain them together. Considering the price it would be somewhat ungracious to expect a lot more, but I don't want to mislead anyone into thinking that the SQ-80 will substitute for getting a $500 computer-based piece of sequencing software.

Ensoniq has addressed the shortcomings in the ESQ-1 (although the improvement in sound quality is incremental rather than revolutionary) and produced a very flexible piece of gear.

Any relatively minor reservations aside, Ensoniq has done their homework. With the SQ-80, they've at least preserved, and probably augmented, their reputation as a company that uses high technology to give excellent value for the money. The SQ-80 is a solid contender at the under-$2,000 price point, and unless I'm way off base, it should have no trouble gaining the same kind of loyal following that the ESQ-1 has earned over the years, and pick up some new fans as well.

The Ensoniq Performance Sampler

PROBABLY THE BEST WAY to start is to examine the EPS architecture. Sampling a sound creates what Ensoniq calls a *wavesample*. One or more wavesamples placed appropriately on the keyboard make up an *instrument*, and each wavesample can be panned anywhere within the stereo field. An instrument also includes eight *layers*; these layers are variations on the instrument—possibly consisting of some different wavesamples, different filter settings, different envelopes, etc. You can combine any number of these layers to make up a *patch* (up to four patches total). These patches are brought in with two patch select buttons located right above and to the left of the pitch wheel (as binary arithmetic fans will note, two buttons gives four combinations).

Up to eight instruments are available at any given time. Data defining the set of eight instruments, plus a sequenced song (described later), can be saved as a *bank*.

Doubling sounds live is simple. To double one instrument with a second instrument, just double-click on the second instrument button, and you're doubled. Want to add a third instrument? Double-click on its button, and now you have tripling. In fact, you can stack all eight instruments if desired.

In case you're concerned that all this doubling and such will cut into the available polyphony, note that the EPS has *20 voices*. Although you can play "only" eight voices per key, per instrument, you can literally hold down eight keys, select a *new* instrument, play eight more keys on top of that with a different sound, let *them* sustain too, and select yet a third instrument and play four notes on top of the already-sustaining notes from the other instruments! You have full *ten-voice* polyphony if

The Command Pages

Pressing the *Command* button, then one of the other page buttons, accesses even more pages; these are of a more system-oriented nature. For example, the Command/Instrument page (accessed by pressing the Command button, then the Instrument button) takes care of instrument housekeeping, such as make/copy/delete/save instrument, and save bank. Command/Layer allows for similar layer housekeeping. Selecting the Command/Seq page performs the same function for sequences, as well as letting you change the sequence length and edit song steps. Command/MIDI turns the disk drive into a general-purpose MIDI System Exclusive data recorder; Command/System sets the number of voices, lets you load Mirage DSK sounds, make a directory, change storage devices if something's connected to the SCSI port, copy the operating system to floppy disk, and so on. Here are what the other pages do:

Command/Env 1. This contains some diagnostic routines that are best left alone—kids, don't try this at home!

Command/Pitch. This lets you re-define any key to any pitch, with 1 cent resolution, and is ideal for creating microtunings.

Command/Amp. One of the most powerful command pages, this lets you mix, merge, splice, fade in, and fade out wavesamples; normalize gain so that a wavesample hits its maximum available level; and smooth volume, a compression-like function that makes it easier to loop signals with varying volume levels.

Command/LFO. This provides low-level wavesample editing functions, like add, scale, clear, copy, replicate, reverse, and invert data.

Command/Wave. Now we get into some truly serious digital weirdness. You can make, copy, and delete wavesamples; truncate unneeded portions to save memory; try a crossfade loop, reverse crossfade loop, ensemble crossfade, or "bowtie" crossfade in search of the glitchless loop; convert the sample rate if you didn't need to sample that kick drum at 52.1 kHz after all; make the loop longer; or synthesize a loop if your real-world signal proves to be, despite all the digital processing options, unloopable.

Command/Track. This sequencer-related page provides a means to quantize, merge, copy, erase, or transpose a track (quantize goes from quarter-notes to 1/64th-note triplets, and like most of the following functions, can be restricted to a specific number of bars in the track); scale or erase controllers; erase pressure (this helps save memory); erase all notes within a particular keyboard range for the given track for a given number of bars; erase program changes; shift the track forwards or backwards up to 48 clocks (quarter-note), or event edit a track.

you layer two sounds, and *five-voice* polyphony if you layer four. With the EPS, notes cutting each other off is something you don't have to think about too much. And if you don't need all 20 voices, you can reduce the number of voices to increase the playback rate and thereby improve fidelity. For example, with 20 voices the playback rate is 31.2 kHz, which yields a 15 kHz frequency response. While this is respectable, selecting 12 voices allows a playback rate of 52 kHz, thus allowing a full 20 kHz bandwidth.

Each instrument can cover a specific range of the keyboard; that's nothing special. What *is* special occurs when you start loading different instruments on to the keyboard. Ensoniq uses the model of overlapping sheets of paper. For example, **Fig. 1** shows one possibility: a one-octave electric bass instrument, four-octave guitar instrument, one-octave bell instrument, and two-octave piano bass instrument. As shown, you would hear only the exposed top "surfaces" of the layers—bass and guitar. Now suppose you select the bell instrument. It now goes to the top of the pile, and replaces the top octave of the guitar sample. Finally, let's select the piano bass sound (**Fig. 2**). It replaces the electric bass and the lower octave of the guitar, so the keyboard now provides two octaves of piano bass, two octaves of guitar, and one octave of bells. This technique allows for up to eight split points of different instruments, with each split capable of playing up to 20 voices (voices are dynamically assigned)—pretty significant stuff. I might add that changing an instrument's range is a very simple operation, as are almost all the performance-oriented features.

BITS AND MEMORY

The EPS is a 13-bit machine, although all internal processing uses 24-bit resolution. Thanks to floating-point output conversion, the dynamic range is an excellent 96 dB. Although 13 bits isn't 16 bits, Ensoniq need make no apologies. The EPS does seem cleaner than 12-bit machines, and thanks to some clever design elements discussed later (like sample interpolation), the sound quality is definitely pro level.

Regarding memory, the stock model includes 480K of internal RAM. This allows 4.95 seconds of sampling at a 52.1 kHz clock rate and 41.7 seconds at 6.25 kHz. Memory can be expanded by the user to 896K or 2.1 Megs; in the latter case, you get 22.9 seconds of sampling time at 44.6 kHz, and an optional SCSI port. The SCSI port will presumably be used for such tasks as dumping samples to hard disk (the EPS is set up to work with generic Apple-compatible hard disks). Apparently the EPS is also capable of recording directly to hard disk, but the folks at Ensoniq wouldn't elaborate except to say that they didn't want to emphasize that feature too much just yet. Hmmm....

THE DISK DRIVE

Instruments can be saved to disk as instrument files, and deleted or (of course) loaded. There is one awkward aspect to disks, however. The EPS contains no operating system (OS) of its own, so before the EPS will do anything the OS must be loaded from disk. There are also times when, during the normal course of operation, the EPS will need to access the OS from disk. It would therefore seem that putting the OS on all your disks would be a good idea—except that the OS takes up

about 10% of the available disk space. So if you want to cram the greatest number of instruments on a disk and not include the OS, then boot from a disk that contains the OS, load the instruments from an instrument disk, and be prepared to re-insert the OS disk from time to time.

FIXED SAMPLING RATE

The EPS uses fixed sampling rate technology. Rather than shifting a clock to create transpositions, the number of samples is altered instead. To explain the ramifications of this in full would be rather time-consuming, so here's the bottom line: the samples sound real good when you transpose them. What's more, when you transpose down, the EPS interpolates new samples in between the existing samples, which produces exceptionally good sound quality—even when you take a note and transpose it down several octaves.

TIME TO SAMPLE

Sampling is simple. Select the instrument into which you want to sample, and go. There are 40 available sample rates between 52.1 kHz (highest rate) and 6.25 kHz (lowest rate). You can also choose the input filter cutoff frequency (when you change sample rate, the cutoff defaults to the optimum value for that rate). There's also a "pre-trigger" function, where the sampler stores a bit of the signal prior to reaching the threshold and therefore always catches the very first transients of a sample. You can also select between line or mic level input levels (although there is no associated sample input level control—oh well), and check on the available sample time.

What about multi-sampling? Again, it's simple. Specify the root key for a new sample, and the EPS will automatically choose a split point located midway between the root key and the root key of the nearest sample.

Regarding auto-loop, I thought I'd try it out, so I sang "ah" into a mic and sampled it. I then enabled autoloop and set an arbitrary loop start point. Next came four tries at finding the perfect loop; it wasn't necessary to do five. The loop was perfect—not a click, pop, or ping. But then came the *coup de grace*. Just for kicks, I tried a bunch of additional end points. *For every two new end points I tried, one of them gave a perfect loop.* Maybe I got lucky, but based on my other sampling experiences with this machine—including looping (thanks to the crossfade loop option) an "unloopable" OB-8 unison voice with eight detuned oscillators—it sure seems like this is one autoloop function that really works. Incidentally, you can adjust the end (and start) points in a number of ways: as a percentage of the sample, in coarse sample increments, and (with the data slider) in fine sample increments.

THE EDIT ZONE

We'll cover editing *concepts* in this section; for a blow-by-blow description of what's on each page, refer to the "Pages" sidebar.

Let's start with my favorite sub-mod-

ule, the filter. The EPS has two fully digital filters in series, F1 and F2. There are four ways to set up these filter stages:

	F1	F2
1	3 lowpass filters	1 lowpass filter
2	2 lowpass filters	2 lowpass filters
3	3 lowpass filters	1 highpass filter
4	2 lowpass filters	2 highpass filters

F1 and F2 can be set individually for cutoff frequency, modulation from Envelope 2, keyboard tracking, and a single modulation source/amount (amount can be positive or negative). So, if you choose 2 LP + 2 HP and set F1's cutoff higher than F2's cutoff, you'll create a bandpass filter—just like the old Moog modular synths, where coupling together a lowpass and highpass filter would give you a bandpass response.

The three six-stage envelopes (nominally for pitch, filter, and DCA, but cross-assignments are possible) are equally innovative. (Also note that there is a second release for adding pseudo-reverb effects.) You can of course specify time and level parameters, but the really interesting part is that you can define both a *soft* velocity amplitude shape and level, and a *hard* velocity shape and level. For velocities in between these two extremes, the EPS will actually interpolate an appropriate value between the soft and hard envelopes! This dual envelope approach cries out for a computer editing program where you can grab the envelope breakpoints with a mouse, but I'll settle for programming them via the display until a com-

Main Voice Editing Page

The EPS has a lot of pages, which I've arbitrarily broken up into "Voice" editing pages and "Command" editing pages. Here's the rundown on the voice editing options.

Envelopes. Choose from the following parameters: Mode (normal, cycle, and repeat), five hard velocity and soft velocity levels, five hard velocity and soft velocity times, second release parameters, attack time velocity (ties attack time to velocity), keyboard time scaling (envelopes get shorter as you play further up the keyboard), and soft velocity curve on/off. You can also recall any of eight envelope templates.

Filter. In addition to the parameters mentioned in the main text, modulation sources include WL+PR (wheel and/or pressure), pressure, external MIDI continuous controller, pedal, mod wheel, pitch (wheel as well as any other pitch modulators), keyboard, three separate velocity curves, one of three envelopes, random modulation, and LFO.

Amplitude. DCA-related options include wavesample volume, pan, A-B fade in, C-D fade out (the latter two provide the velocity crossfade/switching and special effects alluded to earlier), and the same modulation source/amount choices as in the filter section. Each sample can have its own fade characteristics, which makes it easy to fade from one multisample to another to camouflage the split point.

Pitch. This page adjusts the root key of the wavesample (semitones and fine tuning), LFO amount, Envelope 1 amount, randomize (adjustable frequency and depth), bend range (0 through 12 semitones or global), and modulation source/amount (same as the filter section).

LFO. Parameters include waveform (square, sawtooth, sine, triangle, and S/T—kind of a pointy sine wave), speed, depth, delay, LFO reset (on/off), and LFO modulation (although there is no amount parameter to go along with this).

Wave. Here is where we get into some more digital magic. Set the sample start and end points, loop start and end, loop position (once you've set loop length, the loop can be moved around in the sample), loop modulation and amount (you can actually shift the loop position with the modulation options available to the filter, DCA, etc.!!), and loop mode (forward with no loop, backwards with no loop, loop forward, bidirectional looping, and loop and release).

Layer. A number of parameters affect a given layer, including: monophonic or pedal glide (turns glide on and off with the footswitch) with variable glide time, legato layer (this chooses a layer that will act in a particular way when you play legato), layer velocity (with separately settable high and low parameters), pitch table (standard or non-transpose, but note that the entire pitch table can be edited if you're a microtonal fan), and layer name.

System. This page selects autoloop on/off, memory remaining for both the internal memory and disk, master tuning, global bend range in semitones, your choice of 16 levels of touch-sensitivity from light to white knuckles, pedal mode (volume over MIDI controller 7 or modulation over MIDI controller 4), sustain foot switch mode (sustain or patch select), and aux footswitch mode (patch select or sequencer start/stop).

Edit Instrument. On this page, you can choose the instrument's name, patch (this shows which layers are active) for each of the eight instruments, which layers will be activated on key up and which will be activated on key down, pressure mode (channel, poly, or off), and the MIDI Out channel over which the notes you play (or the sequencer plays) on that instrument will appear, as well as an associated Program Select number. You can also set whether keypresses will go out via MIDI, activate only the internal sounds, or do both. Finally, there's a readout for the amount of memory taken up by the instrument being edited.

MIDI. Select the base channel; whether data will be transmitted over the base channel or the individual instrument channels; whether the base channel pressure is channel, poly or off; MIDI mode (omni, poly, multi, and two types of mono response); controllers, Sys Ex, program change, and song select on/off; and external continuous controller number (this is the controller that appears as the "external MIDI controller" in the modulation options).

puter editor comes along.

But, you say, programming six-stage envelopes is a pain. Well, apparently someone at Ensoniq agrees, because you can save up to eight of your favorite envelopes as templates which can be recalled later. If you've worked for years getting that perfect plucked string envelope, hey, save it as a template. The idea of being able to save and load envelope templates is one of those "why didn't someone think of this before?" ideas.

Another tricky technique occurs with the final DCA. When adding modulation, you don't just specify depth, but the (adjustable) modulation level at which the modulation reaches an (adjustable) maximum depth, as well as the (adjustable) level at which the modulation reaches a minimum depth (which is also adjustable). This allows for all kinds of velocity/pressure crossfade, velocity/pressure switching, and positional crossfade effects, as well as numerous special effects just waiting to be discovered by some musician with a lot of patience.

THE SEQUENCER

Just when you think there's nothing more than can be packed into a box this size, you find—the sequencer. This one is light-years ahead of the one in the Mirage.

One of the ground rules is a sample time/sequence length tradeoff; they both compete for memory space. However, if desired you can use the EPS strictly as a MIDI sequencer with 48 tick/quarter note resolution, and dedicate the entire available memory for sequencing other MIDI instruments. This gives about 80,000 available notes, even without memory expansion.

The EPS holds up to 80 nameable sequences, which can consist of up to eight polyphonic, dynamically allocated tracks. Each instrument plays over its associated track (e.g. instrument 1 over track 1). A track can be muted or soloed, mixed down with the other tracks, and panned within the stereo field. Sequences can also be chained together into a single song, and you can also record in song mode.

The editing is pretty decent, too. You can GOTO any bar number in the sequence; set the tempo; loop the sequence; set internal or external sync (Song Position Pointer is both transmitted and recognized); select metronome on/off, click rhythmic value, and click level—you can even pan the click, or send it to an individual output if you have the optional OEX output expander box (more on that later). You can change the sequence length, and program a countoff when recording. There's also an entire additional family of sequencer commands, as described in the sidebar "Command Land."

LIVE PERFORMANCE CAPABILITIES

We're talking True Genius here. You can indeed load a sound while another is playing, but there has to be enough free memory to load the new instrument; if you try to load an instrument and there isn't enough memory, you have to select an instrument to delete. This might be a problem if the EPS was an ordinary sampler, but it's not. Usually, you want a lot of memory in your sampler so you don't have to constantly load stuff from disk. With the EPS, you get used to calling up instruments the way you'd call up patches on a regular synth; all you have to do is remember to start loading the new sound before you actually need it. And don't forget about the two patch select buttons that let you change sounds "on the fly."

As mentioned earlier, with this sampler notes cutting each other off is almost a thing of the past. And this philosophy extends even to the optional multi-output expander, which is, simply stated, what we've been waiting for all along when it comes to multiple outputs: you simply assign one of the eight instruments, or a single wavesample for that matter, to one of the eight outputs. Yes indeed, we're talking *polyphonic*, non-mono-hardwired outputs that work just like you want them to. Am I complaining that it costs extra? Not a chance.

SO IS THIS THING COOL OR WHAT?

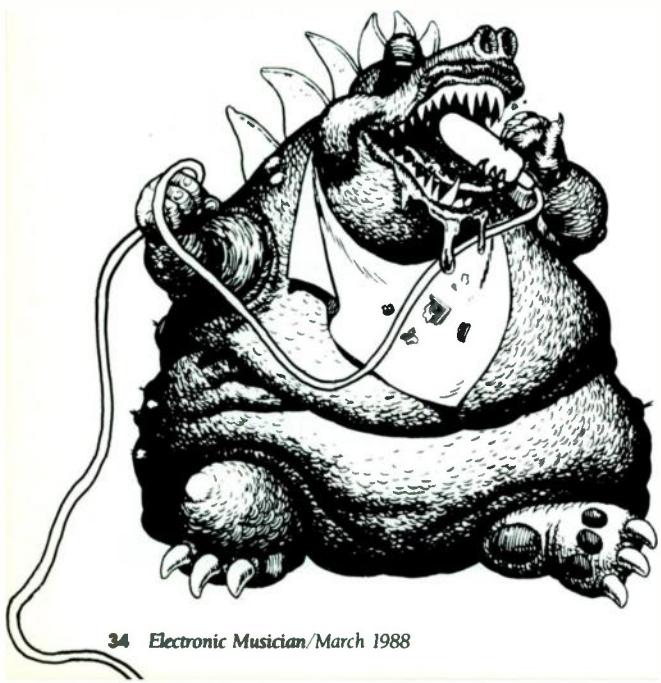
Ensoniq has more than done it again. The Mirage made affordable sampling a reality; the EPS not only makes affordable *high-quality* sampling a reality, but goes beyond what we've come to expect from an instrument with this kind of price tag. There's a lot of pent-up demand for a quality sampler at an under-$2,000 price point—well, here it is. This is one brilliant piece of musical engineering that richly deserves the success it will no doubt enjoy.

EM

There are good sounds,
and there are bad sounds.
And the worst sounds are
the ones that we don't want
there in the first place!
Here are some useful tips on
ridding your toys of noise.

Eliminating Noise

BY KIM DORELL



IT HAS HAPPENED TO US ALL. We finally finish our newest piece of music, mix it, run with it to someone else's system, and find our proud production buried in . . . noise.

Disquieting? Yes. Necessary? No, because noise is not one large, frightening phenomenon like data disappearance. It's a set of discrete difficulties, each with a traceable cause and at least one inexpensive cure. Let's look at the eight most common types of noise, and techniques to help banish them from your system.

1. HUM

Cause: The sound of 60-cycle current and its harmonics (120 Hz, 240 Hz, etc.) produces hum, which can invade audio lines in several different ways.

Solution: Check for loose or improper ground connections. Find these by wiggling the connectors located at the cable ends until the hum changes tone and/or volume; either the plug or jack could be corroded or dirty, so check for this first. Rubbing the connector surfaces with a mild abrasive, like fine emery paper, will get rid of corrosion. If the plug itself is bad, your choices depend on the type of plug. Molded plugs need to be cut off and replaced. Often re-soldering a non-molded plug in its place will solve the problem. If not, the cord will usually need to be replaced. You can often fix RCA plugs by merely pushing the outer, ground "petals" inward, creating a firmer contact between the plug ground and corresponding jack ground. If none of these solutions work, hack up the cable and toss it out. One bad wire in the pile can ruin an entire mix.

If none of these solutions work, hack up the cable and toss it out.

Hum also flows into audio systems by induction through cables or transformers. Loosely tie audio cables and route them *away* from AC lines (down opposite sides of the backs of racks), and remount power strips at least a foot away from audio gear. Shorten extension cords from wall to rack to eliminate "broadcast coils" of piled AC lines, and replace unshielded AC/DC adapter cords with the shielded variety. Keep these short too: *less line equals less potential for hum.*

If transformers are inducing hum into cables or other transformer-powered units, move preamps, amps, and reverbs at least several inches from their neighbors, and place them at off-axis (i.e., sloppy) angles. The biggest problem here occurs with high-gain units like preamps. Putting two power amps next to each other will probably not cause problems, but stacking a preamp on top of a power amp will often cause hum to be induced from the power amp into the preamp's sensitive circuitry. Some devices, like spring reverbs and guitar pickups, contain coils that actually serve as efficient receivers for hum (and RFI, see problem 8). Just as you might move your guitar to a different angle to minimize hum, try moving other sensitive pieces of equipment.

Sometimes equalization can help. Since hum is a low-frequency phenomenon, with midrange and treble-heavy signals you can often cut or roll off low frequencies to minimize hum without affecting the timbre of the main signal.

Finally, hum can be an inherent prob-

lem in a circuit. A fuzz, for example, greatly amplifies the guitar signal—so if any hum is present, it too will be greatly amplified. Some power supplies might have a bad filter capacitor in the power supply; this capacitor's sole purpose is to reduce hum, and defective filter capacitors should be replaced immediately (if you can't do this, find a tech who can).

2. HISS

Cause: Hiss is the product of electrons bouncing around into each other, creating random transients that produce a sound not unlike rain or running water. Since there will be few high-frequency signals to mask the hiss (most musical energy is concentrated in the midrange and below) hiss is most audible at high frequencies.

Solution: Put as much signal as possible, short of distortion, through signal processors and mixers. The amount of noise produced by a circuit will be fixed, so pushing more signal through that circuit will improve the signal-to-noise ratio. Another good technique is to reduce the treble in mixer channels that don't require extended high-frequency response (e.g. kick drum). If you feel you need to boost the highs, try reducing the bass and midrange instead. Often this will produce a lower perceived noise level.

To avoid *adding* hiss to recordings, de-magnetize your tape heads regularly (every ten hours or so of use), use top-quality tape and, most importantly, make sure the bias and EQ adjustments are set up for the type of tape you plan to use. If your decks have ineffective or no noise reduction capabilities, purchasing an inexpensive noise reduction add-on from a stereo store *(DAK also offers this type of product from time to time—Ed.)* will do wonders to remove the rest of the hiss.

3. SURF

Cause: What I call "surf" is the special kind of hiss emitted by nearly all analog time-delay devices such as choruses, flangers and phasers. It resembles hiss, but is louder and "grainier."

Solution: If you can't afford quiet, high-quality digital units, keep the effects levels low and send as much signal as possible into the signal processor. Try alternate means to create these effects: detune synth oscillators to create chorusing, or time-shift a copy of a sequencer track to create echo effects.

Every time a vocalist steps up to a mic, pronounces a "P" sound, and the speakers disappear in a cloud of smoke, you're seeing pop at work.

4. WHINE

Cause: The bothersome by-product of devices that count or control, whine most commonly comes from the high-speed clocks used in such digital devices as computers and digital delays.

Solutions: To wipe out whine, set volume levels on MIDI, SMPTE, synchronization, and trigger gear well above their noise floors. Dress (route) all cables carrying digital data far away from audio and AC lines. Separate synchronized equipment by at least six inches to avoid unit-to-unit interaction, and check that the cases are properly grounded (avoid ground lifters unless you specifically need to lift a ground to eliminate ground loops). If residues of whine remain, switch MIDI cables and listen for decreases; mark the poorly shielded ones, put them away, and use the shortest and quietest cords you have.

When recording, you can minimize or eliminate taped sync-pulse whine by rolling off the low end when recording the pulses. This brings out the spikes in the signal, allowing you to use much lower levels on both recording and playback—and lower levels means less whine.

5. SQUEAL

Cause: The sudden siren sound that portends the end of the sonic world, squeal is what happens when signals feed back and form ever-louder loops. It happens of course when mics or pickups and speakers or headphones are on all at once and point toward each other. Howl and feedback grow exponentially through time, and can torch entire systems within seconds.

Solutions: When powering up gear, keep levels turned down, and bring up each system element one at a time. It's also good practice to have some kind of "panic" switch in the studio; this could, for example, short the input of your audio power amp to ground, or trip a relay to disconnect your speakers. Be particularly aware of tape recorder connections—if you're recording on a given channel, it's easy to inadvertently feed some of that channel's output back into its input. Finally, avoid feeding "just a little bit" of an output signal back into an effect (with reverb, e.g., to lengthen the reverb time). You might be able to get away with this for a bit, but eventually the feedback could build up and cause problems. Develop the habit of turning one mic or pickup down whenever you use another.

6. POP

Cause: Also a level-related problem, pop usually arises from low-end overkill. Every time a vocalist steps up to a mic, pronounces a "P" sound, and the speakers disappear in a cloud of smoke, you're seeing pop at work. Turning equipment on or off while playing or recording will usually produce a pop, as will pushing virtually any piece of transistorized audio gear beyond its low-end limits. Pop can also appear in improperly designed stomp boxes when switching the effect status from in to out.

Solutions: Purge pop problems properly by cutting lows and lowering record levels (especially when using dbx noise reduction). Enable the low-end pop filters found on microphones, and the low-cut filters on mixing consoles, and put wind screens or similar acoustical filters on microphones. Teach vocalists proper mic technique: specifically, not to "swallow" the mic, since bass response increases exponentionally as the sound source

nears the mic, accentuating pop. Remember Trevor Horn's trick: reverb bursts on bass signals make them sound louder than they really are.

7. SNAP AND CRACKLE

Cause: The unsettling sounds of our speakers eating Rice Krispies, snap and crackle usually come from pushing audio equipment into unhappy distortion with overly dynamic signals. Another source of crackle is the unclean potentiometer or switch. Even when the control in question is not being moved, vibrations from monitor speakers can jiggle the control enough to cause crackling. Improperly seated connectors, bad cords, and other intermittent problems also can cause crackle.

Solutions: Avoid putting several time-altering effects (DDLs, choruses, etc.) in series. These devices have limited dynamic ranges yet often produce high-amplitude transients that overload subsequent stages to produce crackling. Use contact cleaner on all suspect pots and controls, and chemicals like Tweek on patch bay connections (see "Better Living Through Chemistry" in the January '88 EM for more helpful tips). Wiggle cords and if crackling occurs, fix or replace the cords.

8. RADIO FREQUENCY INTERFERENCE (RFI)

Cause: This writer learned first hand about RFI after moving a studio into a Manhattan apartment that featured a line-of-sight view of the Empire State Building —the busiest commercial transmitter in the world. Tears and whining, I learned quickly, did nothing to stop either the loud intrusions into the audio system nor the constantly changing background hiss that indicate the presence of RFI.

Solutions: Pay attention to anything in your system that can act like an antenna. Eliminate coiled wire loops of all kinds. Purchase line filters to remove RFI coming in from the AC line. Use heavy-duty shielded cables. If necessary, use shielded cable even for devices like AC adapters. Avoid the use of ground lifters, since a properly grounded case can help prevent RFI pickup. Install small-value bypass capacitors from the inputs of sensitive audio stages to ground, and add ferrite beads to wires carrying audio (these solutions require some technical chops, but can be very effective in stubborn RFI pickup cases). Shield the cavities of guitars, basses, and other instruments that use inductors (pickups and some tone controls). Avoid ground loops—where a piece of equipment "sees" two paths of differing resistance to ground—as these can serve as very efficient antennae.

FINAL TIPS

In addition to taking the specific steps above, there are several rules of thumb that will minimize noise:

- Set pots optimally. Pots and sliders are themselves noisy, often noisiest at their extremes, since dirt and oxidation can build up in these least-used areas. Setting levels at seven when ten is maximum will (except when the manufacturer indicates otherwise) help tame noise.
- When in doubt, leave it out. Don't use a mixer if you don't have to; plug that line-level output right into the tape recorder input. Not using your EQ? Don't just set the controls flat, *switch the EQ out.*
- Maintain high levels. The more signal, the greater the signal-to-noise ratio.
- Cleanliness is next to noiselessness. Put dust covers on your gear when it's not in use. Vacuum your studio frequently, and make it a non-smoking environment (smoke particles and tar are wicked when they stick to pots and switches). Clean the insides of your gear from time to time to remove any build-up of dust and detritus that can cause problems later.
- Use a noise gate. Why haven't we mentioned this before? Because only *now*—after eliminating level mismatches and impedance problems, and recirculating feedback and other equipment-executioners—is it time to add gates to kill what little noise is left. Think of noise gates as audio pesticides—to be used in small doses, and only to supplement good general practices. Remember: *noise isn't necessary.* Enjoy the silence. EM

Kim Dorell is a songwriter, arranger, and recording artist whose work has earned him favorable coverage in Variety, Op, After Dark, *and the* L.A. Times.

Want to generate a whole bunch of new sounds for your synthesizer? Here's a program that works for the Juno 106, DX21, and with suitable modifications, many other MIDI synths.

Juno 106/DX21 Random Patch Generator

BY CHUCK PIERCE

I like random patch generators. They're a great source of new ideas, sounds, and effects that you wouldn't normally think of when you're programming your synth, and a great help when you run into the dreaded "programmer's block" to which we all fall prey from time to time. I've even had randomly generated sounds suggest new *musical* ideas when I was stuck on a song.

Not all random patch generators are created equal, though. There are two types —the "intelligent" RPGs (the *DX-Android* program by Hybrid Arts comes to mind) and the totally random RPGs like the one we have here. Each type has its advantages. With the "intelligent" programs you don't have to generate (and listen to) a lot of junk sounds on your way to the useful ones. On the other hand, the intelligent program won't come up with the more off-the-wall sounds a random patch generator does. Personally, however, I don't mind wading through a lot of junk to get to the jewels, because in my experience the jewels are generally worth it.

ABOUT THE PROGRAM

Random Patch Generator was written for the Roland Juno 106 and the Commodore 64, but it will work with any programmable synthesizer that can receive MIDI System Exclusive information. More on that in a minute. First, type in the program (**Fig. 1**) and save a copy to disk before you run it.

When you run the program, don't forget to set the *Function* switch on the back of the Juno to position III. This enables the synth to send and receive System Exclusive information. After the patch values are printed on the screen, they will be sent out the MIDI interface, and the "edit dots" on the Juno's Bank/Patch readout will appear. At this point, you can play the random patch. I have found that in many cases, a slight amount of editing is all that's necessary to end up with something that sounds pretty good. Generally some playing with the VCO and VCF modulation amounts, the LFO speed, and the noise generator volume is what's needed. There are some *really neat sounds* I've run across that use various amounts of these four effects, so don't just arbitrarily turn them all off before listening to the sound.

HOW IT WORKS

Here's a quick explanation of how the program works. Lines 30 to 40 set up the MIDI interface ACIA for data transmission. Use line 30 if you have a Passport or compatible interface, or line 35 for EM/SCI (see the May '86 EM for info on how to build the EM interface) compatibles. Line 50 sets the variable PARM to 18, which is the number of random numbers we want the RPG to generate. Lines 100 to 120 initialize the 64's SID chip, which generates the random numbers. The 64's Basic RND instruction could also be used to generate the random numbers, but I like this approach better.

Some Things Speak For Themselves.

And what these three programs are saying is revolutionary. Because they work with you to make your music. With intelligence. Warmth. Excitement. With some pretty daring results.

M is an extraordinary composing and performing environment. Its screen becomes a visual control panel, so you can explore and produce like never before. With Jam Factory, you teach your music to the program's four players, then arrange their improvisations until they sound just right.

UpBeat is a graphic rhythm programmer complete with fills and song structure.

And it even remembers the sounds of your drum machine.

But you've heard all this before. Through rave reviews and articles in Keyboard, Electronic Musician, Music Technology, MCS, Musician, Macworld, MacUser, Omni, and other magazines.

From the musicians all over the world who use them.

Now it's time to hear these programs yourself. Visit your local dealer for a demonstration.

Or contact us for more information and free brochures. Demo disks are $10 per program.

Just send us a check and specify the disks you want. M for the Macintosh, Atari ST, or Amiga.

Jam Factory and UpBeat for the Macintosh.

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In lines 130 to 150, the 18 random numbers are generated and poked into temporary storage locations. Pay special attention to line 140—each time a number is taken from the SID chip's noise source, it is ANDed with 127. This is because all MIDI data bytes, including System Exclusive messages, must be less than 128. The AND statement acts as a sort of "logical limiter" in this case, since any time a number above 127 is generated, the AND statement "clips" the high bit of the number, which is equivalent to subtracting 128. We'll talk about the REM statement in line 150 later.

Once the 18 numbers have been generated and poked into memory, the random numbers are printed on the screen, and the program creates and sends a Juno 106 System Exclusive header. When this has been done, the synthesizer is ready to receive the parameter data sent out by the FOR/NEXT loop in lines 320 to 340. Finally, an End Of Exclusive message is transmitted, and the program is ready to start over for the next patch.

MODIFICATIONS

This should be an easy program to modify for use with almost any instrument that can receive voicing information one patch at a time. However, this section assumes the reader has some familiarity with BASIC programming. If you don't have this familiarity, I recommend a book called *All About the Commodore 64* by Craig Chamberlain (Compute! Books, PO Box 5058, Greensboro, NC 27403).

Let's look at the changes necessary to make the RPG work with the Yamaha DX21. The first thing we'll have to change is the variable PARM. The Juno 106 version of the program is set up to send 18 bytes of data. The DX21, however, needs to receive 93 bytes of voice data. So, the first thing to do is change line 50 to read:
50 PARM=93

Next, the System Exclusive header in lines 260 to 300 has to be redone:

```
260 WAIT SR,2:POKE TD,240
270 WAIT SR,2:POKE TD,67
275 WAIT SR,2:POKE TD,0
280 WAIT SR,2:POKE TD,3
290 WAIT SR,2:POKE TD,0
300 WAIT SR,2:POKE TD,93
```

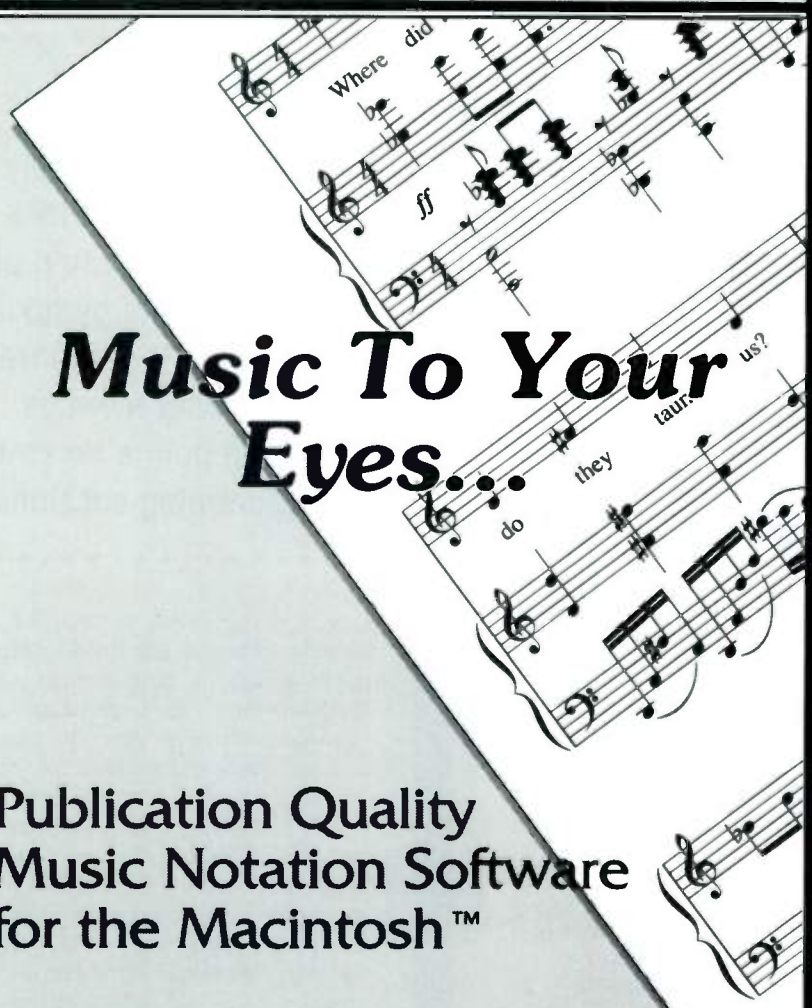
You should be able to find the System Exclusive information you need in the back pages of the manual for your synth. Only one problem remains: the DX21's

```
10 REM JUNO 106 RANDOM PATCH GENERATOR
20 REM BY CHUCK PIERCE
30 REM 723 CHICAGO
40 REM NEDERLAND, TEXAS, 77627
50 REM (409)-727-1751
60 PARM=18:CW=56840:TD=56841:SR=56842:REM FOR EM-CW=56832:TD=56833:SR=56834
70 PRINT"■        ■106 RANDOM PATCH GENERATOR■"
80 REM SETUP NOISE GENERATOR AND POKE RANDOM VALUES INTO HIGH MEMORY
90 FOR A=1 TO PARM
100 S=54272
110 FOR L=0 TO 24:POKES+L,0:NEXTL
120 POKES+14,121:POKES+18,129:POKES+18,128
130 POKES+24,143
140 X=PEEK(54299)
150 REM INSERT CONDITIONAL STATEMENTS HERE IF NEEDED
160 IF X<128 THEN GOTO180
170 GOTO140
180 POKE 49152+A,X:NEXT A
190 REM PRINT RANDOM DATA VALUES
200 FOR A=1 TO PARM
210 PRINT PEEK(49152+A);
220 NEXT A
230 REM INITIALIZE ACIA
240 POKE CW,19:POKE CW,17
250 REM SYS EX HEADER FOR JUNO 106
260 WAIT SR,2:POKE TD,240
270 WAIT SR,2:POKE TD,65
280 WAIT SR,2:POKE TD,49
290 WAIT SR,2:POKE TD,0
300 WAIT SR,2:POKE TD,0
310 REM SEND DATA
320 FOR A=1 TO PARM
330 WAIT SR,2:POKE TD,PEEK(49152)
340 NEXT A
350 REM SEND END OF EXCLUSIVE
360 WAIT SR,2:POKE TD,247
370 B$="":PRINT:INPUT"'RETURN' FOR NEXT PATCH('E' TO END)";B$:IFB$="E"THENEND
380 GOTO70
390 REM "■=SHIFT/CLR:■=CTRL/9:■=CTRL/0

READY.
```

Fig. 1: Software listing

HB Music Engraver



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- Alterable phrase marks, slurs and ties (MacDraw™ and Illustrator™-like handles)
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- Cue, rhythmic, string harmonic and solid note head shapes

SYSTEM REQUIREMENTS:
- Apple Macintosh Computer
- 1 Megabyte of internal memory
- Imagewriter, LaserWriter, Lynotype typesetter, or any PostScript printer.

voice parameters have different ranges for different parameters. For instance, the operator attack rate can be any number between 0 and 31, but the release rate has to be between 0 and 15.

Oh, boy. What now?

No problem! All we have to do is customize the RPG's output so that it doesn't put out numbers for a parameter that are outside the range allowed for that parameter. There are a lot of ways to do this, but my favorite is the brute force method—just use a *conditional statement* (a line in a program that sets up a particular condition or set of conditions) to look for "illegal" numbers, and create a new random number any time one is found.

For example, suppose we replace the REM statement in line 150 with:

```
150 IF X>32 GOTO 140
```

This line tests each number the noise source produces, and allows the program to drop to line 160 (where X is POKE'd into memory) *only if the number generated is less than 32*. Otherwise, it returns to line 140. So all we need to do is add a conditional statement that sets an upper (or lower) limit for each of the PARM data values.

Let's start with the attack rate which, as mentioned before, will be between 0 and 31 for any of the DX21's four operators. Delete line 150, and we'll insert some new lines between lines 140 and 160:

```
141 IF A=1 AND X>32 GOTO 140
142 IF A=2 AND X>32 GOTO 140
143 IF A=3 AND X>32 GOTO 140
144 IF A=4 AND X>16 GOTO 140
145 IF A=5 AND X>16 GOTO 140
146 IF A=6 AND X>100 GOTO 140
```

In each of the above, *A* is the parameter number and the number *X* is compared to *one more* than the highest value the synthesizer will accept for parameter A. Lines 141 to 143 test the attack, decay 1, and decay 2 rates for operator 1. These values must be between 0 and 31. Lines 144 and 145 set the release rate and decay 1 level for operator 1; their values must be between 0 and 15. Lines 146 is the keyboard scaling level, and its value can be from 0 to 99. With a synth like the DX21, you may need to put in a conditional statement for each parameter. In this case, just renumber the program so you have room for them between the lines that are currently numbered 140 and 170. With this information and the System Exclusive info in your synthesizer's manual, you should be able to adapt the Random Patch Generator for almost any MIDI synth.

The technique above could also be used to limit parameter values for LFO speeds and amounts, portamento, etc., thereby adding a little "intelligence" to the program. One thing to watch out for, though—sometimes a synthesizer may go bananas if it receives an illegal parameter value, so *save your patches* before experimenting with your own RPG program.

With any truly random RPG (like this one), you'll get the best results by taking the sounds it generates and using them as starting points for your programming sessions.

A final reminder: with any truly random RPG (like this one), you'll get the best results by taking the sounds it generates and using them as starting points for your programming sessions. I hope you'll take the time to experiment with the RPG program. It has paid off for me in patches that I would never have come up with on my own. I'd be glad to field any questions or comments; send them to Chuck Pierce c/o EM. EM

(Editor's note: We'd like to thank Jim Johnson for his assistance in verifying and tightening up the program.)

***Chuck Pierce** works as a freelance musician and runs SoundWare, a small music software company. His current projects include building a studio in his backyard and adding MIDI capabilities to his '74 Karmann Ghia.*

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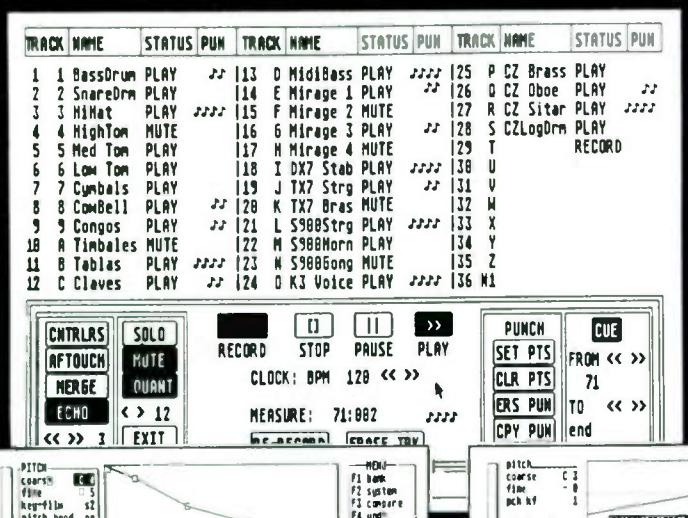

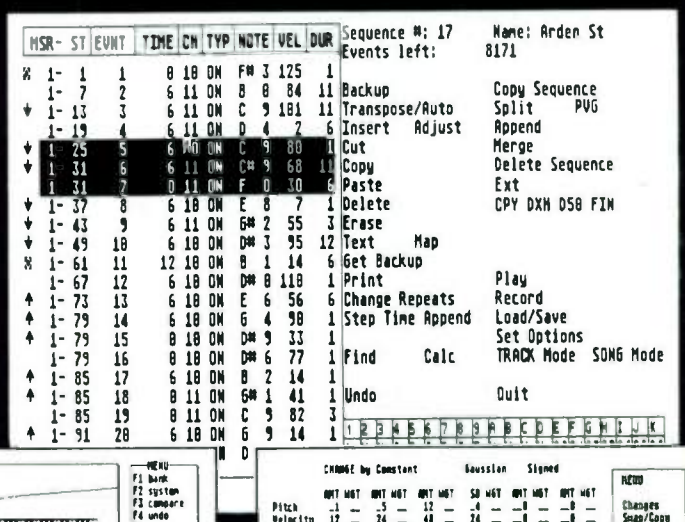

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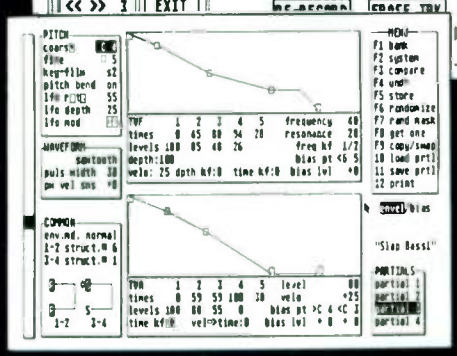

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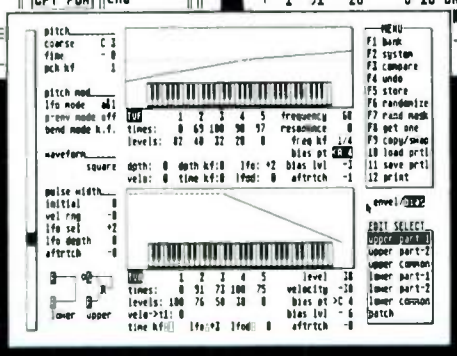

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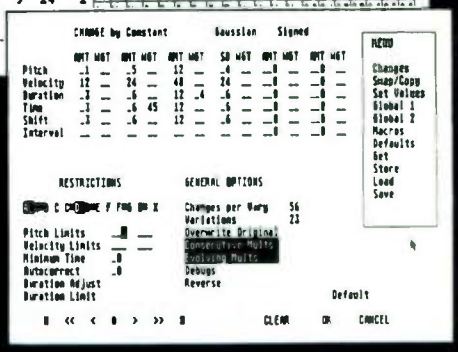

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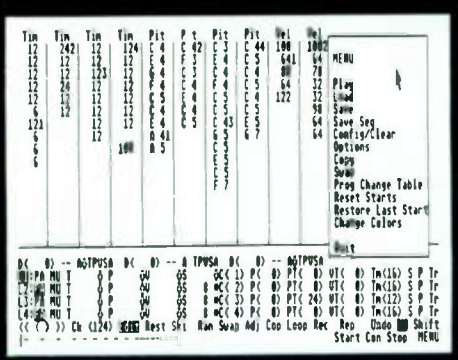

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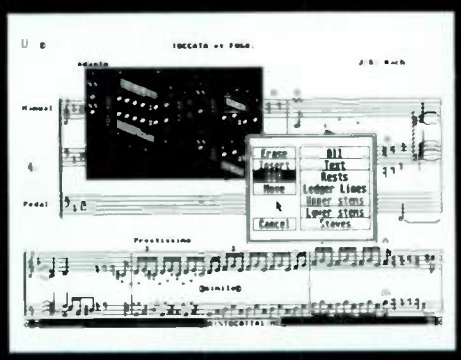

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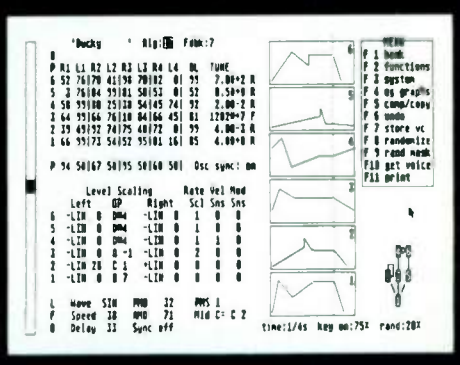

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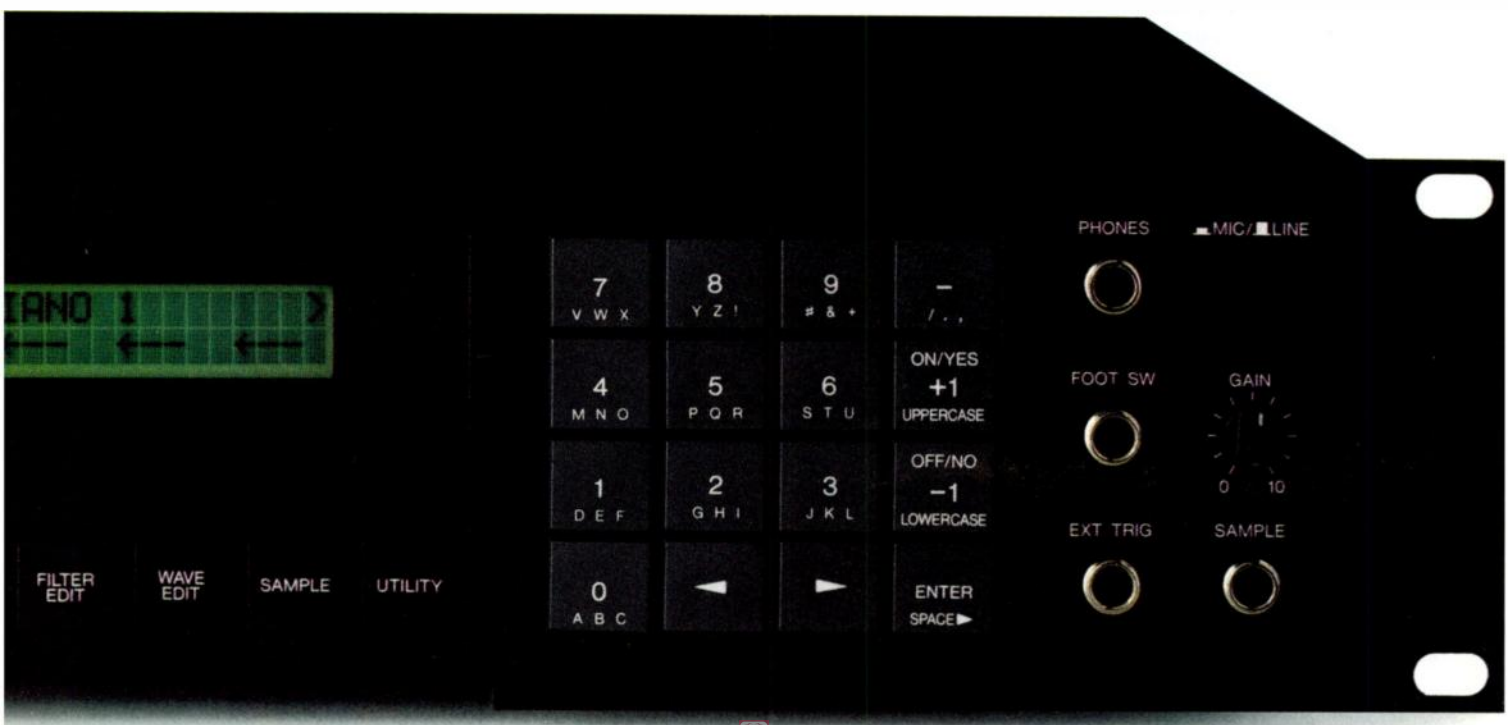

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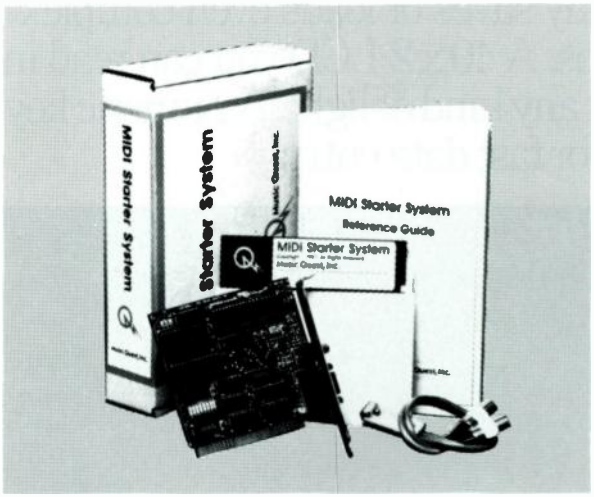

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If it seems like you have to put dozens of footpounds per key to get an aftertouch response from your Roland JX8P, this mod's for you.

A Light-Touch Aftertouch for the Roland JX8P

BY MIKE METZ

The JX8P was one of the most popular analog synths that Roland ever produced and, although discontinued, remains in very wide use today. This synth was one of the first to feature aftertouch, and when first introduced, had a sensitive keyboard that needed very little pressure to activate it. Apparently, someone at Roland thought that it was *too* sensitive (even though there is an aftertouch level control), and in later models the aftertouch was set to a level that required white knuckles to activate. If you own one of the latter models, read on for a mod that will cure the problem and is so simple that even a non-tech with no more than basic soldering skills can do it. By the

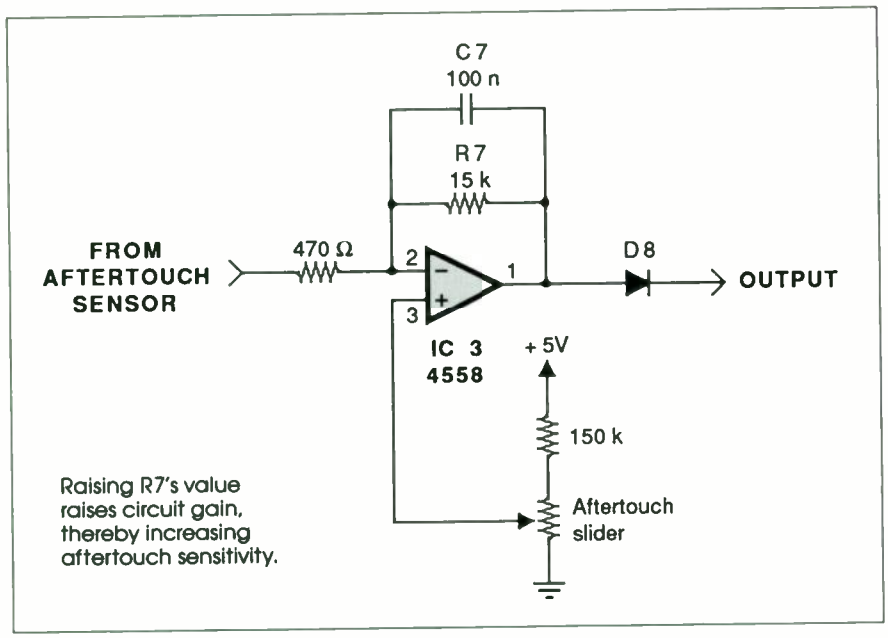

FIG. 1: Aftertouch linearizer circuit.

way, the Roland JX10 has been known to exhibit this problem also, though to a less severe degree than the JX8P. This mod will work for it too. The procedure is basically the same, and I've noted where it differs from the JX8P's.

ABOUT THE MOD

To produce aftertouch, the JX8P uses a small sensor mounted at the end of a bar running under the keyboard. The voltage output of this sensor changes with the amount of pressure applied to the keyboard, and sends its output to a circuit called a linearizer (see **Fig. 1**), which is basically an inverting amplifier. The sensor voltage goes through R8 and into IC3A, a 4558 op amp. Capacitor C7 smooths out the voltage (hence the term linearizer) and resistor R7 amplifies the voltage before it goes through D8. From there, the voltage goes to the synth's computer for processing.

The aftertouch slider feeds a bias voltage to the non-inverting input; resistor R7 sets the gain of the circuit and is normally 15k. Raising R7's value raises the circuit gain, thereby increasing the aftertouch sensitivity. Changing R7 to 220k will do wonders for your keyboard's aftertouch response.

PROCEDURE

Start by unplugging all the cables from the synth, *especially* the AC cord. Hold the keyboard with its back panel down and remove the screw beside the bottom left foot, and the screw about 4.5 inches above that. Lay the synth back down flat and remove the three recessed screws in each of the side panels. At this point, the top of the JX8P will rotate up on its hinges, giving you access to the insides.

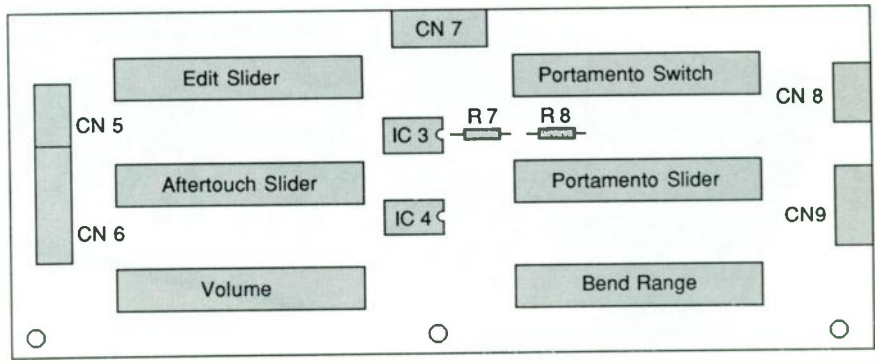

FIG. 2: Where to make the modification.

The circuit that we need to get to is located on the volume board, just under the pitch bender. To remove this board, you must first pull six knobs off the front panel sliders. Then remove the six screws that hold the volume board to the panel. Gently lift up on the board and pull it away from the panel, being careful of the ribbon cable directly below it. With the board lifted away from the panel, you will see IC3 and R7 in the middle of the board, between the edit slider and the portamento switch (see **Fig. 2**). Using a solder wick or some other desoldering tool, unsolder R7 from the board and replace it with a 220k ¼-watt resistor, soldering this to the board and clipping its leads off flush with the board.

For those of you who are modifying the JX10, instead of replacing R7, replace *R2*, located around IC1 on the volume board, with a 220k resistor. Be advised that this mod will void any warranty that the JX10 may have.

Gently put the board back into place, pushing the shafts of the sliders through the foam covering the panel slots, and replace the screws that held the board down. Make sure there are no wire clippings (or tools) left inside and take the opportunity to clean out any dirt and cobwebs that may have accumulated. Rotate the panel back down on its hinges, making sure that no wires are under the frame support bracket on the right side of the volume board.

Hook up your audio and AC cables and give the keyboard a test. You will find that it requires much less effort to activate the aftertouch. If it's necessary, re-adjust the aftertouch control to suit your needs, and once you are satisfied with the results, replace the remaining chassis screws and the knobs.

For those of you who feel the mod makes the JX8P *too* sensitive, using a 100k ohm resistor for R7 will yield less drastic results.

That's about all there is to it. Now you can give yourself white knuckles by practicing your keyboard chops instead of trying to use your aftertouch. EM

***Mike Metz** owns Thesis Audio, a musician's electronics repair center in Wichita, Kansas, in business for ten years and authorized for over 30 major brands of synths and MI gear. When not repairing or modifying equipment at work, he composes and plays electronic music in his home studio.*

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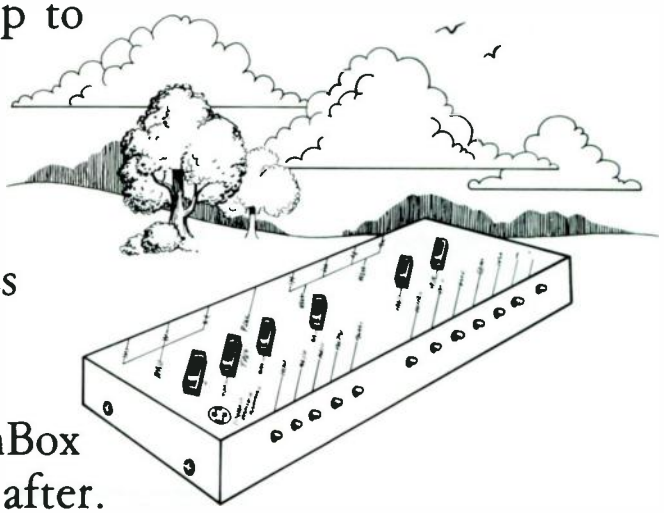

Pretty soon everyone had a JamBox and they all lived happily ever after.

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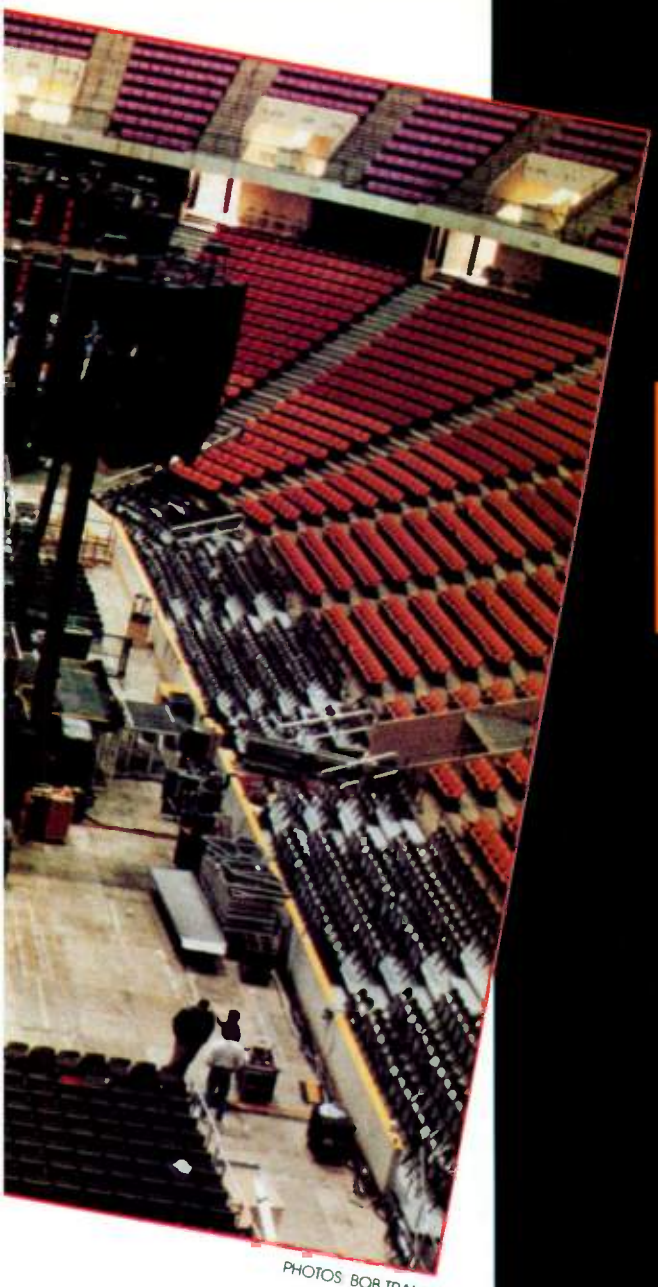
Above: Dwarfed by the massive sound and lighting rigs, technicians at center stage begin setting up Rick Allen's intricate electronic percussion system. At left: Sound engineer Robert Scovill (in blue sweater) poses with drummer extraordinaire Allen.

MIDI meets METAL:



PHOTOS: BOB TRANO

BY JAY SAVEL

Def Leppard Goes HIGH-TECH

IN RECENT MUSICAL HISTORY the idea of using technologies such as sampling, MIDI, and electronic drums has to a large degree been coupled with certain styles of music. Heavy metal music has not been one of these styles, but Def Leppard may be consciously or unconsciously changing that tradition. The advancement of technology has progressed so far so fast that it has taken musicians, as well as mixers and technicians, a certain amount of time to assimilate the many new applications now available. In addition, as time goes on, it becomes clear that technologies such as MIDI offer far more than was originally envisioned.

In the world of metal music, Rick Allen (drummer extraordinaire for Def Leppard) and

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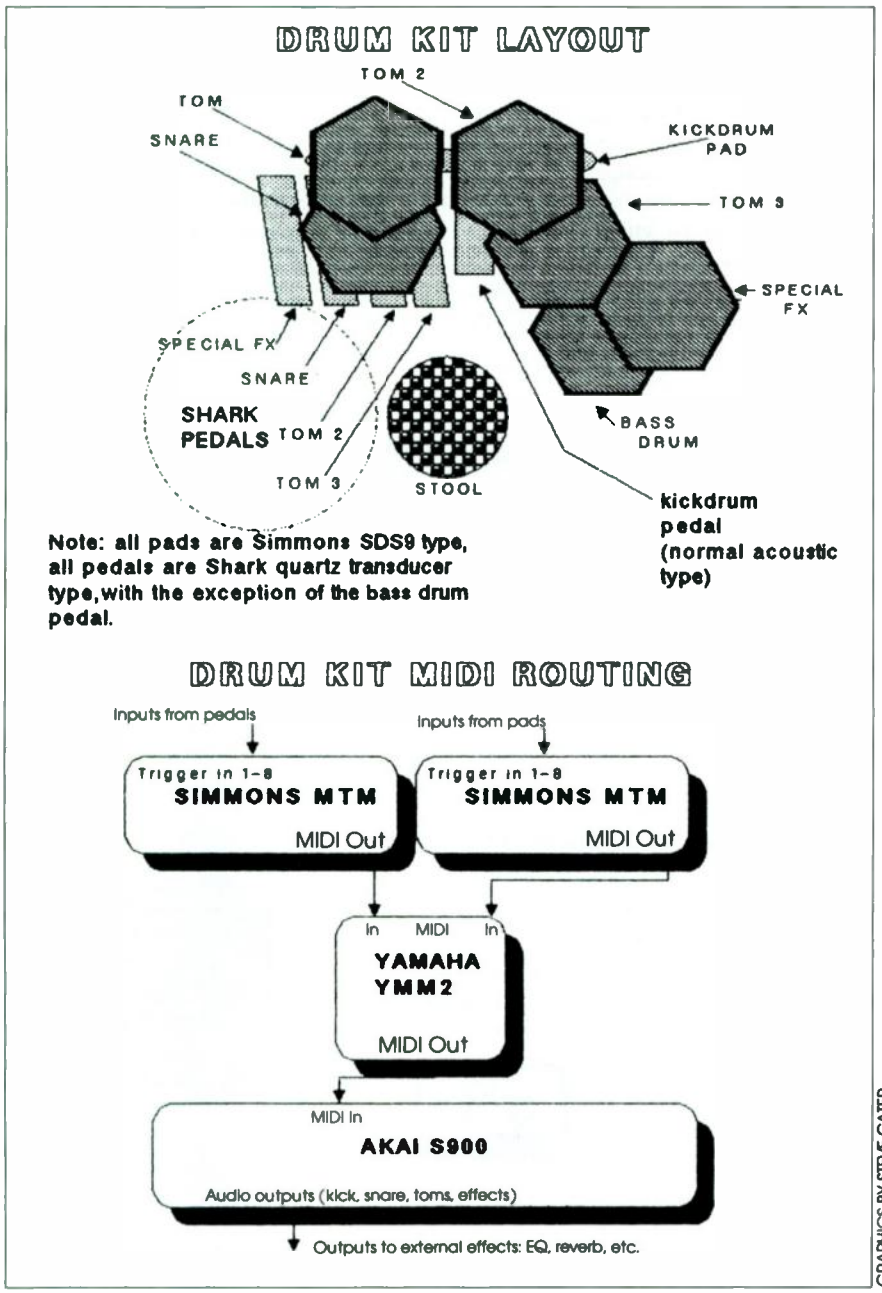
Robert Scovill (Def Leppard's front-of-house sound engineer) are taking full advantage of the latest MIDI gear—as the block diagrams of Rick's unusual drum kit, and Scovill's use of MIDI in a live mixing situation, will attest. But the story of how Def Leppard became associated with the world of high-tech musical electronics is pretty unusual as well.

WHO ARE THESE GUYS, ANYWAY?

Many people have heard the Rick Allen story, but if you haven't, let's start with a little background. In 1984 Def Leppard was sitting on top of the music world with their critically and publicly acclaimed album *Pyromania*. They had finished the tour supporting that album, and were set to go back to the studio and give it another go. Then, tragically, Rick Allen was involved in a severe car crash which cost him his left arm.

Under any other circumstances, or at any other point in musical history, Rick's career as a drummer would have most likely been over. But, with the advent of



GRAPHICS BY STEVE CATER

FIG. 1: Rick Allen's drum system setup.

electronic drums and particularly sampling technology, Rick was not only able to carry on, but to even open some new doors with regards to playing style and technique.

Robert Scovill is an independent mixing engineer who provides his services for a number of acts. Def Leppard approached Scovill to utilize his expertise after hearing him mix sound on Alice Cooper's "The Nightmare Returns" tour. As an engineer, he has been touring constantly for about eight years now, and has worked with a very diverse clientele (including Rick Springfield, Laurie Anderson, Air Supply, Psychedelic Furs, and Alice Cooper, to name a few).

THE DETAILS

Rick is currently playing a fully MIDI-triggered kit; his setup includes no acoustic drums. This is not to say that no acoustic drum sounds are used—in fact, quite the contrary. Rick and drum technician Derek Simpson spent a lot of hours obtaining samples of drums while the band was rehearsing in Hilversum (the Netherlands) this summer. **Fig. 1** shows his system setup, which is relatively basic. The various Simmons drum trigger pads feed the Simmons MTM interface pad inputs, and the MTM converts the pad hits to MIDI signals that feed the Akai S900 rack-mount samplers. There are also inputs for the Shark trigger pedals; Rick uses these to trigger the snare and toms with his left foot. The tricky part is getting the sensitivity and the attack/release settings to work for him, as Derek will attest:

"Adapting to this new setup has been particularly difficult for Rick for a couple of reasons. Playing in this configuration was like starting over; although he has been playing with this new type of setup for a few years, he had never played on tour with this kit before. Now, over time, he has grown much stronger as a player. That, coupled with the fact that he has become very familiar with the feel of the kit (as any musician would) requires constant attention to correctly setting any parameters that relate to sensitivity. Quite frankly, he has probably already outgrown the resolution of the system he is currently playing." As you can see in the photo of the rack-mount gear (**Fig. 2**) there is a complete backup system that can be enabled at the flick of a switch. There is a also a switch pad that selects a particular drum kit for any given song (i.e. kits with different samples in them). The kit was designed, constructed, and is currently maintained by Steve Cater, who is on the tour as the "electronics overlord." Steve also designed a regulated power distribution system for Def Leppard that is surge- and RFI-protected—a wise move (to say the least) when dealing with electronics of this nature. To sum it all up, Rick and a couple of very talented technicians have taken an unusual and not so enviable situation, and turned it around into something uniquely their own.

Robert Scovill's setup is fairly simple also, but extremely effective (**Fig. 3**). "I came up with this scheme on the Cooper tour because there were such big mood swings between songs. It allowed me to

Akai S900

The Boys and Their Toys

Rick Allen's equipment list includes:

3 Akai S900 Rack-Mount Samplers
These were chosen because they were not exactly a new item; we wanted something that was reliable and easy to use. The S900 has been around and on the road awhile, and has proved its roadworthiness. I might also add that Akai, like Simmons, provides excellent customer support.

2 Simmons MTMs
These convert pad strikes to MIDI data, and are used as an interface between the pads and the Akai S900s. They have very intricate parameter controls, plus on-board delay capabilities (among other features).

Miscellaneous
7 Simmons pads, 4 Shark trigger pedals, 2 Simmons selector pads, and Zildjian cymbals.

Yamaha MEP4 MIDI Events Processor

Robert Scovill's equipment list includes:

1 Yamaha MFC1
I chose this unit as sort of a remote unit for the MEP-4s. It also makes it very simple to set up "chains" of Program Change commands, and to set up a couple of different set lists (as well as help with sound check setup).

1 Yamaha MJC8 MIDI Junction Controller
This very useful tool patches and routes MIDI signals among a number of MIDI devices (it provides up to 50 programmable patch configurations). It will keep your hands out of the back of your rack, and also allow you to repatch MIDI for the opening act at the push of a button.

2 Yamaha MEP4 MIDI Event Processors
This was chosen for ease of operation, and the ability to instantly assign Program Changes and Note On/Off filtering to anything connected to it via the MJC8. This is invaluable when working with a number of acts on one show who all want to have their own programs.

1 Yamaha D1500
This was the first MIDI delay line (that I knew of anyway), and sounds real fine. It hasn't had a day off since I bought it.

1 AMS 1580-L
This is a stereo delay unit with harmonization available for both channels. It has a sound quality for which you definitely have to pay! It's used primarily as a lead vocal delay and for double-tracking.

2 Yamaha SPX90
Very simply put, this box delivers unbeatable price-vs.-performance. It's used for vocal delays and gated reverb programs.

2 Yamaha REV7
Ditto previous remarks on the SPX90.

2 DeltaLab DL-4 Digital Delays
These were the first delay units I ever purchased (they're non-MIDI), and I still think they sound better than most. They're used on backing vocals for double-tracking effects.

3 Barcus-Berry 802
These harmonic enhancement "exciter" units are inserted on various subgroups. I wish I had more of them; I love the way they sound.

2 ADA Pitchtraq Pitch Transposers
Used primarily on Phil Collen's guitar solo. It's a nice device, but it's a shame it doesn't have MIDI considering how new a unit it is.

1 AMS RMX-16
This contains some of the most brilliant sounding electronically generated reverb I have ever heard.

2 Electrospace Development VCA Noise Gates
These are superior noise gates that use VCA technology. They're used to gate down some of the Simmons sounds, and also as a ducking system for vocal delays.

1 Electrospace Development Spanner
A toy built for the boy in all of us, this is a high-quality auto panner used mostly for guitars and sound effects.

3 dbx 160x Compressors
The 160 is a kind of standard unit for live engineering. It's used on Joe Elliot as a channel insert.

1 Ashly SC-50
This provides compression on the bass mic. It's a workhorse unit that I use consistantly.

1 Brooke-Siren DEP-2
The DEP-2 is a superior quality stereo compressor/de-esser/limiter. It is inserted on the backing vocal subgroups, and is worth its weight in gold.

3 Simmons SDS1000
These are the drum sound generators used in conjunction with the DSS-1.

1 Simmons TMI
This interfaces the console's line outputs to the DSS-1 by converting audio to MIDI—a very handy unit.

1 Simmons SPM8:2
Nothing like a rack-mount, MIDI programmable mixer to take care of loose odds and ends.

1 Soundcraft 40-Channel Series 4 Console
This is the main audio traffic center.

—Robert Scovill

make a large amount of effects changes without having to push a lot of buttons. With MIDI control I can concentrate on mixing instead of button-pushing, which has become a luxury to say the least."

FIG. 2: The rack-mount modules that make up Rick Allen's drum setup.

In the block diagram you can see that most of Scovill's use of MIDI is for program changes. The Yamaha MEP-4s store the set list and a bit of filtering needed to trigger the DSS-1 and to distribute the program changes. "Unlike on Cooper where the program changes were drastic, here I am just using MIDI so I can tailor settings such as vocal/guitar delays and drum effects to any given song. I wish every effect I owned was capable of being MIDI-controlled. I find it tedious now to change programs on units such as the AMS and the DL-4s during the show; just getting spoiled, I guess."

In addition to Rick Allen's sampled drum sounds, Scovill takes line outputs from the front-of-house mixing console and feeds three Simmons SDS1000 units and a Simmons TMI (Trigger MIDI Interface). "When we were in rehearsals in Holland, Rick and I sat down and discussed how we were going to approach using this kit and decided that we would try to keep it simple. By that I mean we would try to sample a really good-sounding kit, maybe with a few slightly different snare drums, and then use some external triggering in the house to augment it. This would make life for the monitor engineer easier, and also give it some consistency in the all-too-inconsistent atmosphere of very ambient arenas." Aside from the Simmons sounds used on the SDS1000s, Robert also uses a Korg DSS-1 in his setup which has some snare effects and some ambient kick drums; these are triggered from Rick's kit via the TMI. "I think Rick and I have only scratched the surface on what we can achieve with this stuff. It may be a cliché, but the rest is left to the imagination really." And like most musicians, imaginations have a tendency to run wild. It will be interesting to see what the next developments in this story turn out to be. EM

Jay Savel is an independent mixer who has aspirations of being a record producer or some other type of H.I.G. (Huge Industry Giant).

DEF LEPPARD FRONT OF HOUSE MIDI ROUTING

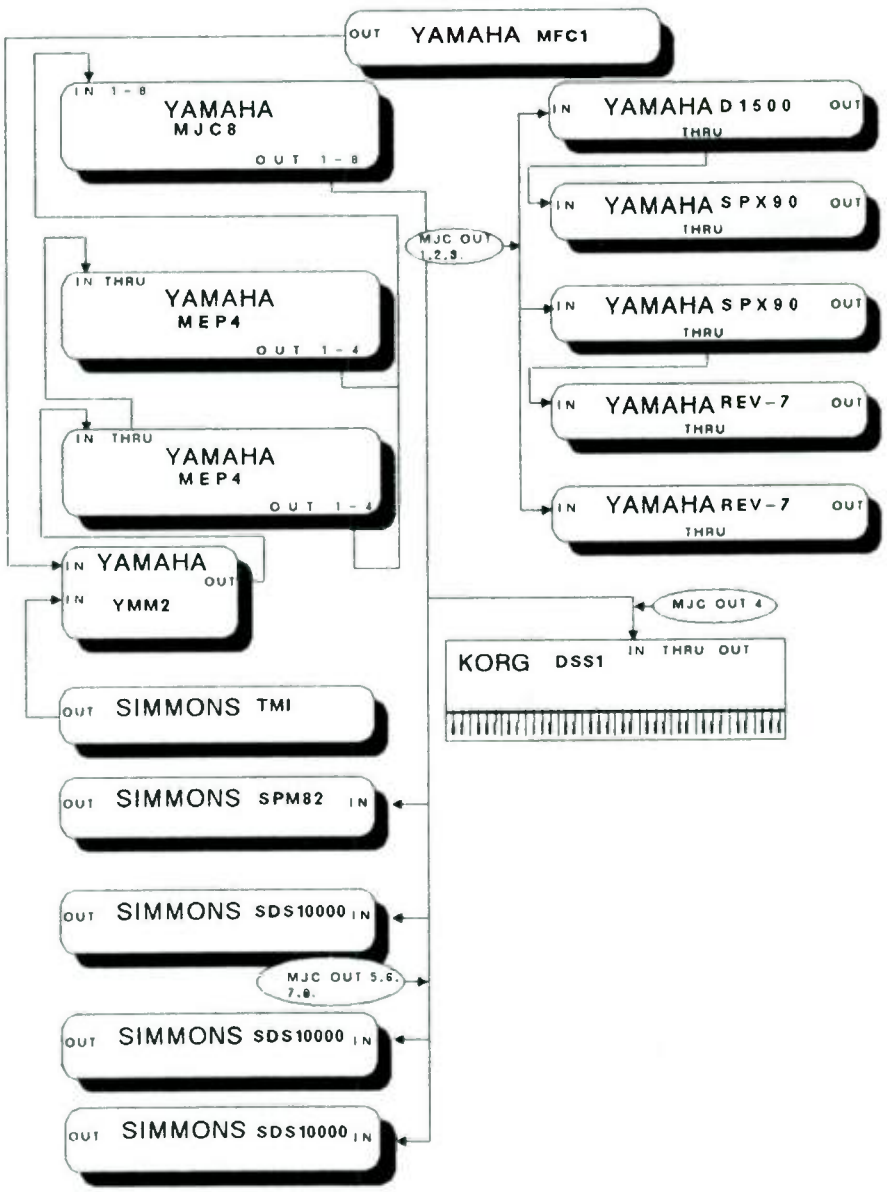


FIG. 3: Robert Scovill's signal processing rack setup.

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Quantization can clean up sloppy playing—but it can also make your sequences sound stiff and lifeless. Follow these techniques, though, and you can gain the advantages of quantization without the drawbacks.

Sequences That *Swing* With *Performer*

BY KALLE NEMVALTS

FOR THOSE OF US whose real-time performance chops are less than perfect, sequencers that quantize the parts of a composition are real life-savers. The cloud around that silver lining, however, is that quantized parts can sound stiff, and lack the *feel* that music is all about.

When you quantize with Mark of the Unicorn's Macintosh-based sequencer, *Performer*, you can specify time values to a resolution of 480 *ticks* per quarter note; at 120 beats per minute, one tick is just slightly longer than one millisecond. This fine a resolution goes a good way towards letting you capture most of the nuances of real-time performance. For example, you can take a part that consists of eighth notes and quantize it in a specific fashion to give varying degrees of *swing*.

It's difficult to define "swing," let alone to show it in notation, but look at the jazz ride cymbal part in **Fig. 1**. Swung, this would actually be performed more like **Fig. 2**—or somewhere between the two—with a tendency toward straight eighth notes as the tempo increases. As difficult as it is to define, most of us know swing when we hear it, and even those of us with computer-assisted chops can approximate it.

FIG. 1: Jazz ride cymbal part, as notated.

FIG. 2: Jazz ride cymbal part, as performed.

Although the word swing is usually

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associated with jazz, many other kinds of music (rock, Latin, funk) also swing in a subtle way, and I think the quantization techniques we talk about here can be useful whether you're sequencing Bird solos or producing techno-funk dance tracks.

QUANTIZING FOR SWING

In sequencer terminology, swing simply means that, for each pair of eighth notes, the eighth note on the down beat—the first note—lasts slightly longer than the one on the up beat—the second. The degree of swing can be expressed as a percentage. For example, 57% swing means that the first eighth note lasts for 57% of the beat while the second eighth note lasts the remaining 43%. Some drum machines have a swing function similar to this that allows you to select various swing percentages. While Performer doesn't have an explicit swing option, it does allow you to produce swing in a few easy quantization steps, using its *grid*, *offset*, and *sensitivity* functions.

Of course you should make a back-up of the track you intend to quantize—copy all of it to a second, vacant track. This way, you can recover the original track if you don't like the results of the quantization. The first example assumes that your original material consists entirely of eighth notes or multiples of eighth notes. It will not work for other note values (e.g. triplets, 16ths).

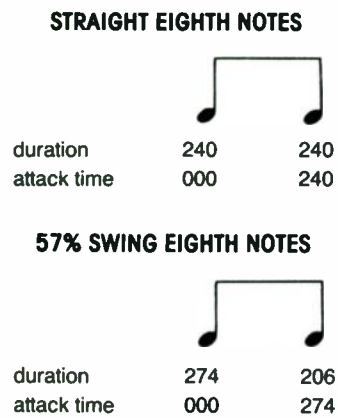


FIG. 3: Duration and attack of straight eighth notes vs. 57% swing eighth notes.

In translating the swing percentage into ticks, we need to know both the *duration* of the notes we're quantizing, and the *tick number* at which each note is attacked. For example, 57% swing means that the first eighth note lasts 0.57 × 480 = 274 ticks, while the second eighth note lasts 0.43 × 480 = 206 ticks. **Fig. 3** shows us the duration and tick number of the attack of both straight and 57% swung eighth notes. To create a 57% swing, delay the attack of the second eighth note by 34 ticks so it starts at tick 274. (**Table 1** shows the tick numbers for the attacks and delays of various swing percentages of eighth notes.)

Ratio	Percentage (ticks)	Attack Times (ticks)		Delay
3/4	75.0	000	360	120
5/7	71.4	000	343	103
2/3	66.7	000	320	080
5/8	62.5	000	300	060
3/5	60.0	000	288	048
4/7	57.1	000	274	034
5/9	55.6	000	267	027
6/11	54.5	000	262	022
1/2	50.0	000	240	000

TABLE 1: Tick numbers for swing eighth notes.

Once you've made at least a preliminary guess at the percent of swing you want (it's easy to re-quantize later if you don't like your first attempt), quantize your original material to a grid of straight eighth notes, as in **Fig. 4**.

Now *re-quantize*, using a grid of quarter notes, an offset of +274 ticks, and a sensitivity of 25%. Notice (see **Fig. 5a**) that the offset option displaces the *grid* (before quantization), not the notes (after quantization), so that the displaced grid falls 34 ticks behind the off-beat eighth notes—right at tick number 206.

Performer's sensitivity option in turn limits the *field of effectiveness* within which quantization is done, so the off-the-beat events (attacks and releases) near the grid are quantized, while the on-the-beat events fall outside of the field of effectiveness and are left alone. **Fig. 5b** is a grid showing the resulting note placement.

Repeat the previous step, experimenting with different offset values to get different feels. You might also have to experi-

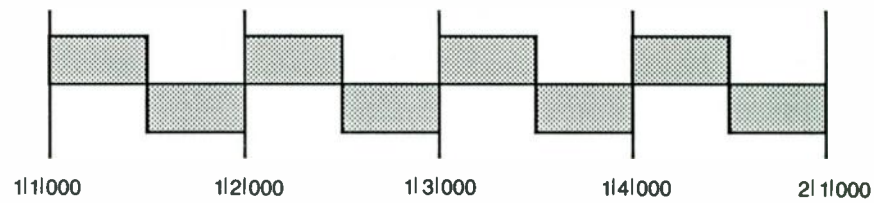


FIG. 4: Grid of eighth notes.

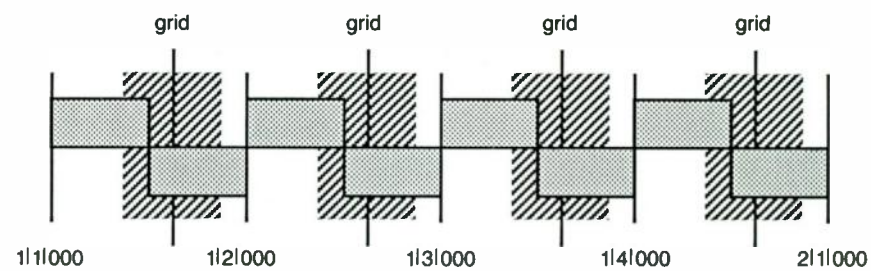


FIG. 5A: Re-quantizing eighth notes.

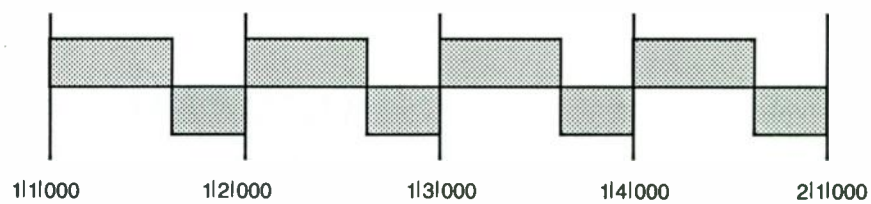
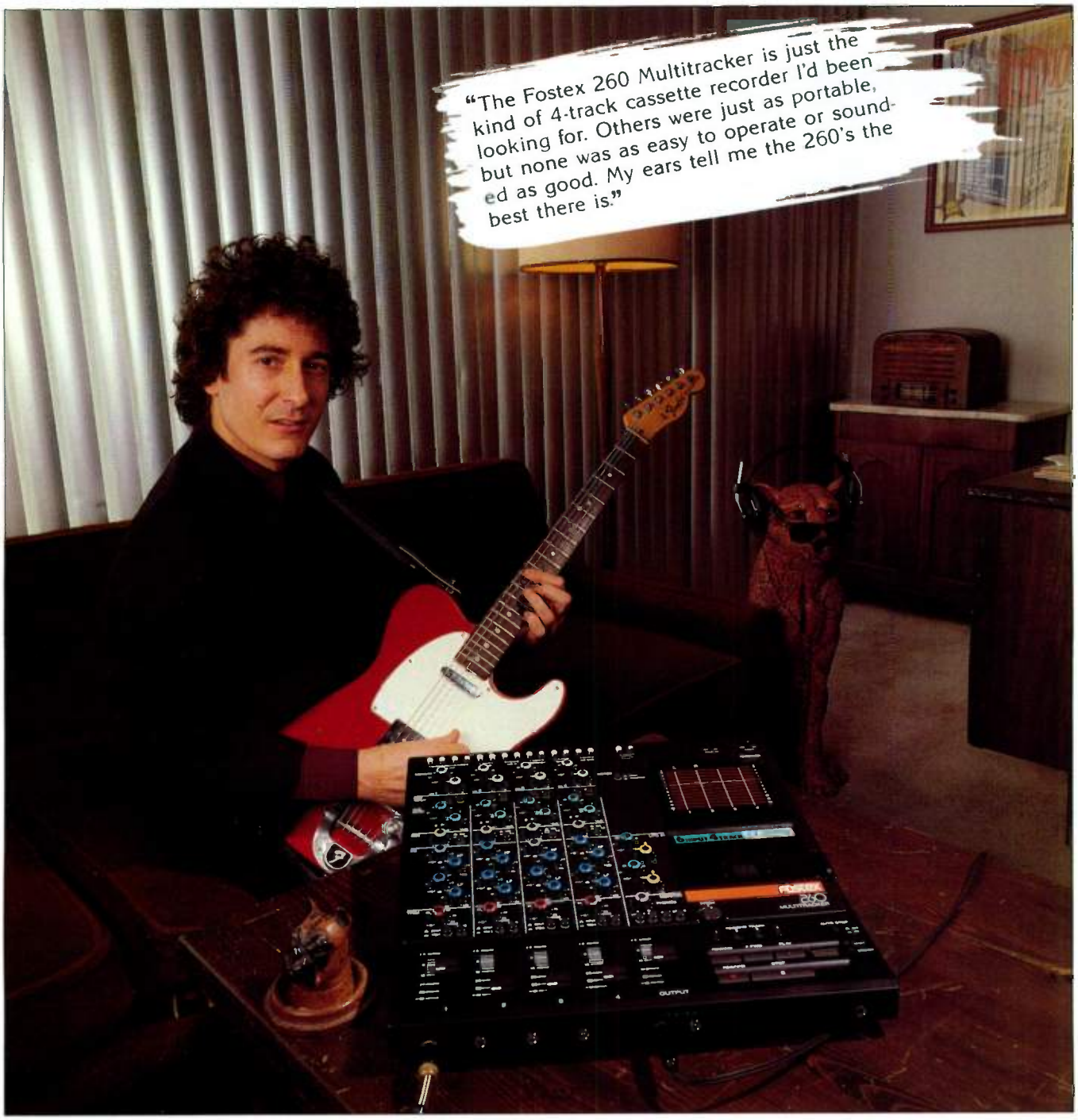


FIG. 5B: The resulting note pattern.

STAN RIDGWAY ON FOSTEX

The former lead singer for Wall of Voodoo iscurrently working on the follow up album to "The Big Heat," his first solo endeavor. Stan also composes for film soundtracks and performs with his new band, Chapter Eleven.



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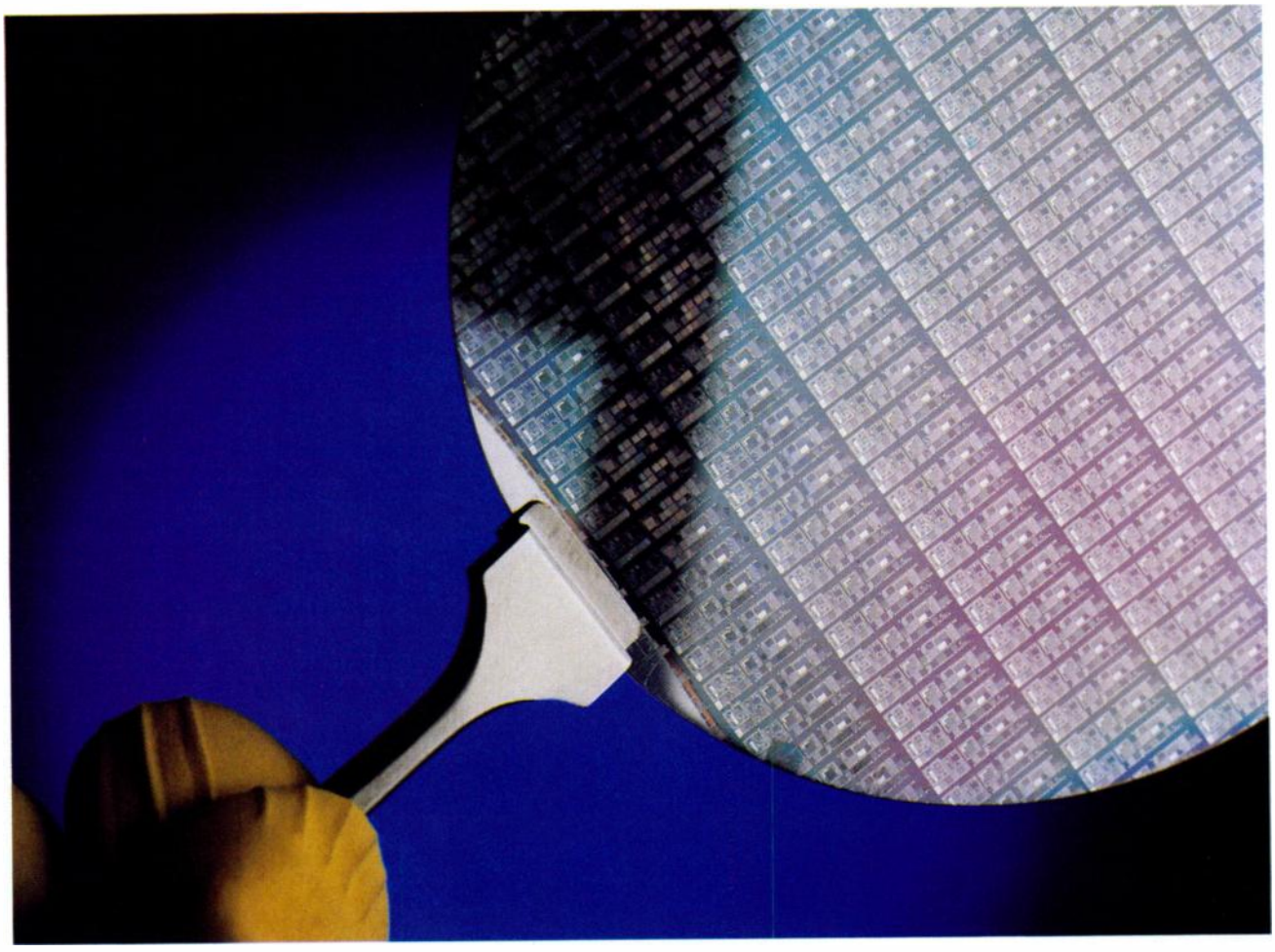

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THE WORLD'S FIRST RESYNTHESIZER

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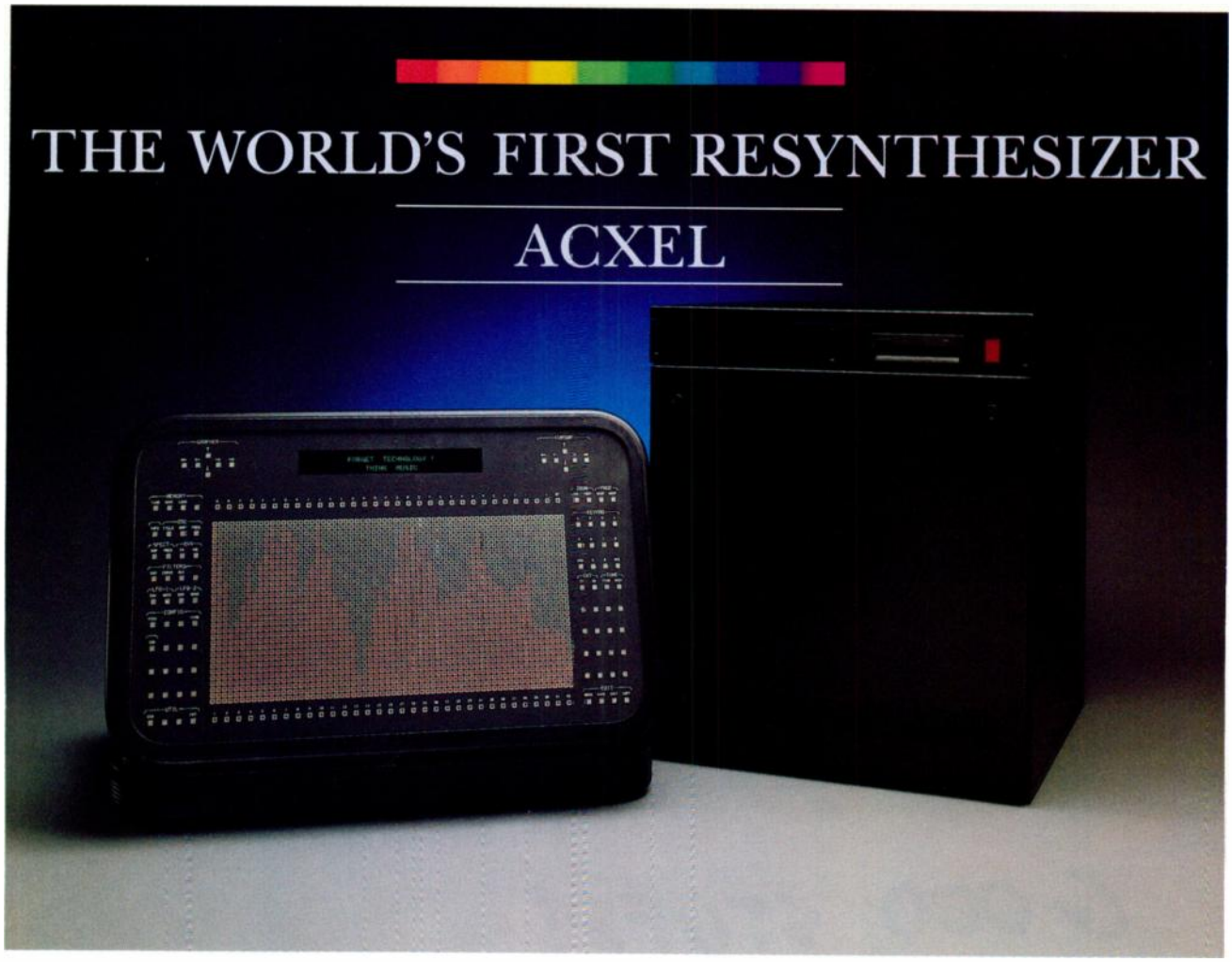

The ACXEL is the very first system to use Artificial Intelligence for simulating musical sounds. Simply enter your sound; the ACXELIZER (Acxel's sound analyzer) will *automatically* program a large number of "Intelligent Synthesis Cells" (ISC) and combine them so as to form your *resynthesized* sound.

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**An actual comment made by N/DYM user Ken Freeman, San Diego, CA. All user comments quoted in advertising are on file at the Electro-Voice corporate headquarters, Buchanan, Michigan.*

WRH

ment with the sensitivity value, so that the field of effectiveness *captures* only the events to be quantized. Check your results by opening an Event List edit window and examining the attack times and durations.

A slight swing feel can also work with 16th notes, especially in rock and funk styles. To get this effect, first quantize to a grid of straight 16th notes. Then re-quantize with a grid of eighth notes, an offset (for example) of +129 ticks, and a sensitivity of 25%. This will delay *every other* 16th note by nine ticks and produce a subtle *loosening up* of the feel. See **Table 2** for typical attack times and delays.

Ratio	% (ticks)	Attack Times (ticks)				Delay
3/4	75.0	000	180	240	420	060
5/7	71.4	000	171	240	411	051
2/3	66.7	000	160	240	400	040
5/8	62.5	000	150	240	390	030
3/5	60.0	000	144	240	384	024
4/7	57.1	000	137	240	377	017
5/9	55.6	000	133	240	373	013
6/11	54.5	000	131	240	371	011
1/2	50.0	000	120	240	360	000

TABLE 2: Tick numbers for swing 16th notes.

These diagrams assume you want to quantize both attacks and releases. If you are sequencing staccato notes, e.g., a drum part, you might quantize only attacks and select the *Don't change durations* option.

You'll find that the overall feel of a part depends not only on the swing factor, but also on tempo, placement of accents, and timbre of the instrument used. A part might sound lame at a slow tempo but hip at a fast tempo, or vice versa; a variety of accent levels (velocity values) can add life to a part; and the same part might sound better played on a hi-hat than a snare drum. Experiment with different combinations of these factors until you get exactly the feel you want.

By the way, the sensitivity option allows selective quantization. You might find this useful in cleaning up a real-time performance, e.g., by forcing all on-beat notes to fall exactly on the beat while leaving off-beat notes alone (and thus preserving some of the feel). As always, back up your tracks first, then experiment with quantization.

FEEL IN OTHER METERS

There's no reason to limit yourself to straight swing. You might try applying a different delay to each of a group of four 16th notes (**Fig. 6**). This gives a slight 16th-note swing superimposed on a slight eighth-note swing. To get these timings, first quantize to a grid of straight 16th notes. Then do three more quantization steps, using the following options:

duration	136	114	125	105
attack time	000	136	250	375
delay	000	016	010	015

FIG. 6: 16th-note swing superimposed on an eighth-note swing.

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Step	Grid	Offset	Sensitivity
1	quarter	+136	25%
2	quarter	+250	25%
3	quarter	+375	25%

Listen to the results and experiment with the offsets until you get a feel that you like.

QUANTIZATION STRENGTH IN PERFORMER 2.1

Performer Version 2.1 provides a *strength* option that allows you to move notes a specified fraction of the way towards grid locations. This can tighten up a part in the way ordinary quantization does, while still preserving some of the original feel. It can also be used to play some interesting games with a part's feel.

For example, suppose you have a rhythm part that is a rough approximation of two quarter-note triplets (see Fig. 7). You can achieve a feel somewhere in

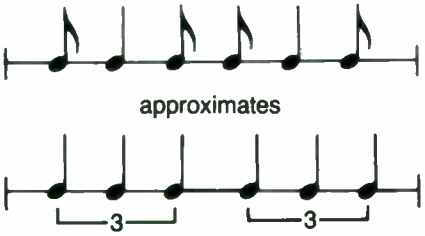


FIG. 7: Experimenting with quantization strength.

between the two parts by quantizing the first to a quarter-note triplet grid, and using a strength of 30% to move the notes *part way* towards the grid.

Experiment with different values of strength to get the feel you want. Similarly, a pattern like the one in Fig. 8, (a double-time bossa nova beat) could be stretched to sound more like Fig. 9.

Performer 2.1 allows you to combine

FIG. 8: Double-time bossa nova beat.

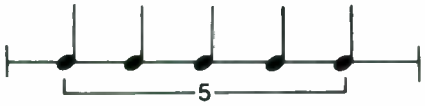


FIG. 9: "Stretched" double-time bossa nova beat.

the offset, sensitivity, and strength options to produce complex changes in a single quantization operation.

LOSE THE METRONOME—USE THE DRUMS

You can also use these quantization methods to create basic drum tracks for overdubbing. If you've got a good feel on your drum track—even if it's only a scratch track—you can find the right feeling in your other tracks a lot more easily than if you're just playing over a metronome. Besides, it's easier to *hear* a drum machine than the metronome click on your Macintosh.

You might find it useful to maintain several *template* files containing basic rhythm tracks as well as other configuration parameters (track and channel assignments, marker setups, etc.). To start a session, simply open the appropriate template file, save the file under a new

—continued on page 110

You've heard about shifting sequence tracks by a number of clock pulses to alter the "feel" of a piece. Here we discover how to correlate clock pulses to time, and get a handy look-up chart for use in the studio.

The Feel Formula

BY DAVID W. EDWARDS

AFTER READING Michael Stewart's article "The Feel Factor" in the October '87 EM, I became very interested in how I could apply his research to my sequences.

One of the most important applications for his technique is in track-shifting drum and percussion parts. However, this requires knowing how to relate sequencer clock pulses to timing shifts. For example, if you shift a snare part back by one clock pulse, what is the net time change in milliseconds? The tempo of the sequence and the sequencer's clock resolution must be taken into account, so I decided to develop a formula that would give me the number of milliseconds per clock pulse at any given tempo and for any given resolution.

The equation for calculating the time per pulse was derived in this manner:

x = beats per minute = beats per 60 seconds
y = pulses per quarter note
Therefore,
1 pulse = (60 × 1/x × 1/y) seconds
which is equivalent to
(60,000 × 1/x × 1/y) milliseconds.

I then wrote a short computer program to create a reference chart that would allow me to compare the lengths of pulses with different sequencers, as shown in **Fig. 1**.

Analyzing this chart leads to some interesting conclusions. Suppose you want to shift a track by 5 ms; at the standard MIDI clock resolution of 24 pulses per quarter note (ppqn), this isn't possible even if you record a track at 240 beats per minute (bpm). In order to do a 5 ms shift at a more reasonable tempo (let's use 120 bpm), you would need at least 96 ppqn resolution. Since many sequencer users report that shifts of 2 or even 1 millisecond are desirable, especially when it comes to dance-oriented music, for a tempo of 120 bpm you would need a resolution of 240 ppqn to provide for 2 ms track-shifting. A resolution of 480 ppqn would allow you to obtain 1 ms shifts.

To improve resolution, you have two choices. One is to double the tempo, and change note values accordingly (e.g. treat quarter notes as eighth notes). This will halve the time between pulses and double the resolution. The other option is to switch to a sequencer with greater resolution. The chart includes two very fine resolutions, 768 and 1,024 ppqn, which are just starting to be considered for high-resolution sequencing.

As a practical example of how to use the chart, let's assume a tempo of 120 bpm, a resolution of 240 ppqn, and that we want to shift the snare drum track in a sequence by 5 ms. According to the chart, we see that at this tempo and resolution each clock pulse lasts 2.08 ms. Therefore, if we shift the track by two clock pulses, the time shift will be 4.16 ms; if we shift the track by three clock pulses, we obtain

***David Edwards** is a computer-aided design manager and has written several CAD-related articles. He is currently involved in shareware MIDI programs for the Atari ST and the production of 3-D video animations. He is also a MIDI consultant and MIDI percussionist.*

a shift of 6.24 ms. You will have to use your ear to decide which would be the best alternative for your tune. You can also see why having a sequencer with the highest clock resolution possible would give you the greatest potential for control over the tune's feel.

Besides track-shifting, you can also use this chart to determine echo or slap-back delays when you want to offset identical tracks. I hope this chart helps you out when using these sequencer techniques, and that it will contribute towards improving the feel of your tune. EM

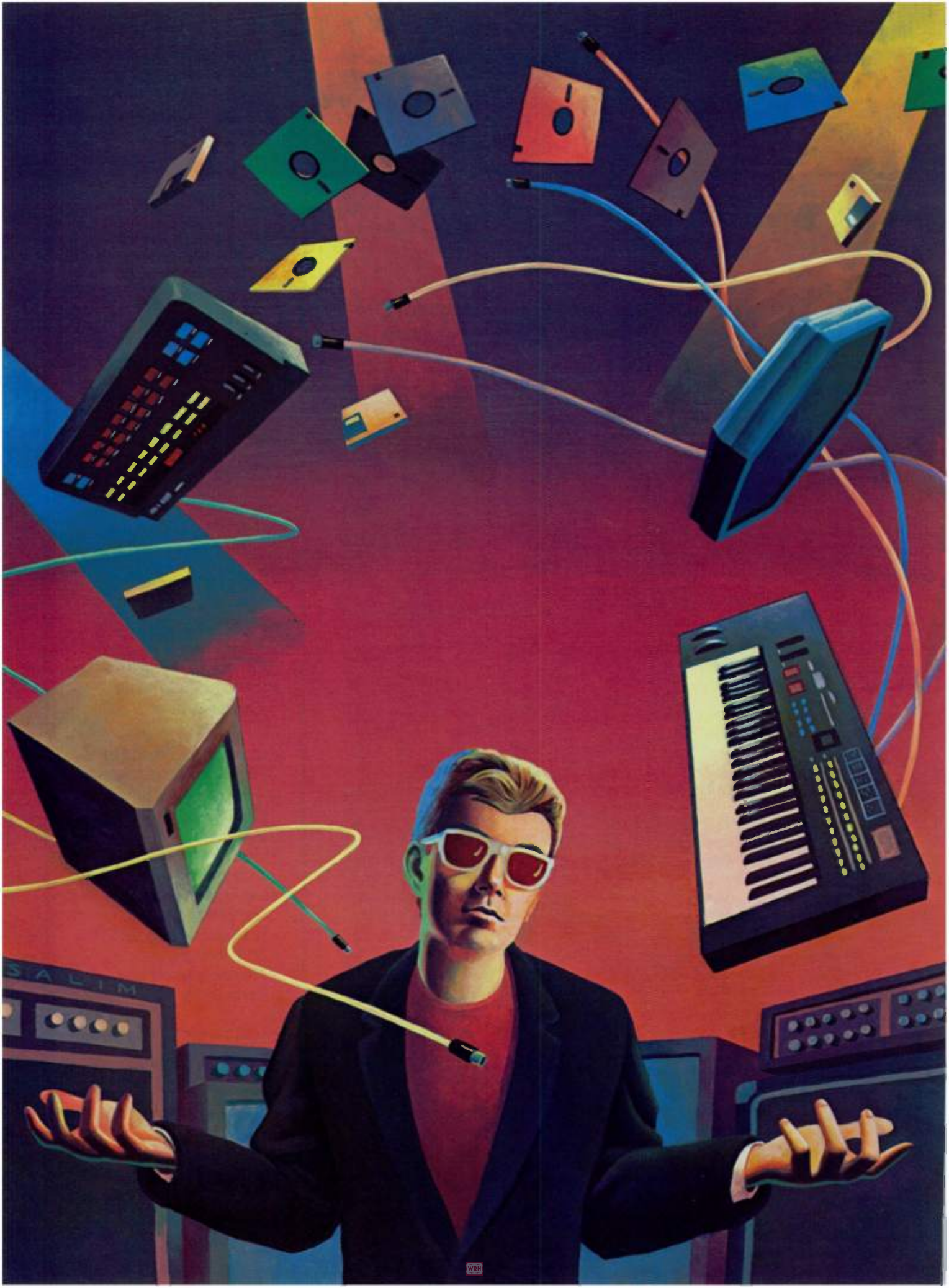
TIME SHIFTING TABLE

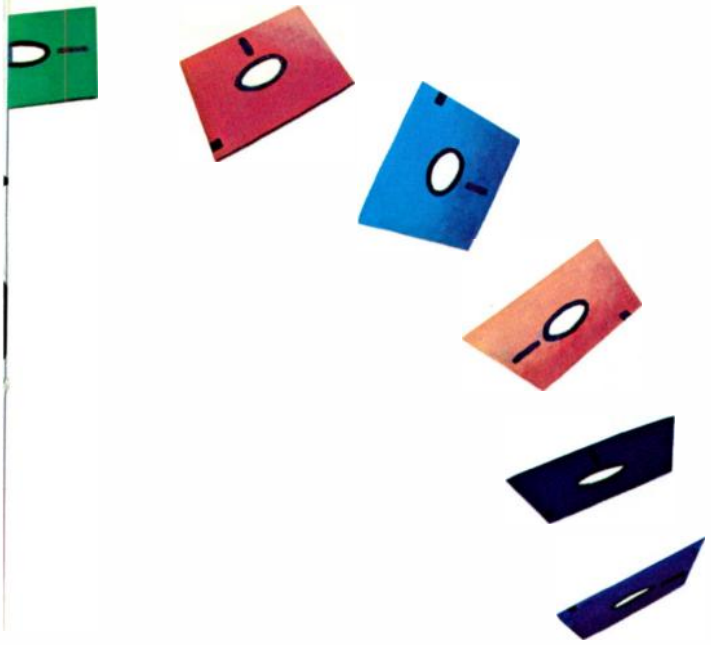
By David W. Edwards

Resolution (pulses per quarter note—ppqn)

Tempo (beats per minute)	24	96	192	200	240	384	480	768	1024
40	62.50	15.62	7.81	7.50	6.25	3.90	3.12	1.95	1.46
45	55.55	13.88	6.94	6.66	5.55	3.47	2.77	1.73	1.30
50	50.00	12.50	6.25	6.00	5.00	3.12	2.50	1.56	1.17
55	45.45	11.36	5.68	5.45	4.54	2.84	2.27	1.42	1.06
60	41.66	10.41	5.20	5.00	4.16	2.60	2.08	1.30	0.97
65	38.46	9.61	4.80	4.61	3.84	2.40	1.92	1.20	0.90
70	35.71	8.92	4.46	4.28	3.57	2.23	1.78	1.11	0.83
75	33.33	8.33	4.16	3.99	3.33	2.08	1.66	1.04	0.78
80	31.25	7.81	3.90	3.75	3.12	1.95	1.56	0.97	0.73
85	29.41	7.35	3.67	3.52	2.94	1.83	1.47	0.91	0.68
90	27.77	6.94	3.47	3.33	2.77	1.73	1.38	0.86	0.65
95	26.31	6.57	3.28	3.15	2.63	1.64	1.31	0.82	0.61
100	25.00	6.25	3.12	3.00	2.50	1.56	1.25	0.78	0.58
105	23.80	5.95	2.97	2.85	2.38	1.48	1.19	0.74	0.55
110	22.72	5.68	2.84	2.72	2.27	1.42	1.13	0.71	0.53
115	21.73	5.43	2.71	2.60	2.17	1.35	1.08	0.67	0.50
120	20.83	5.20	2.60	2.50	2.08	1.33	1.04	0.65	0.48
125	20.00	5.00	2.50	2.40	2.00	1.25	0.99	0.62	0.46
130	19.23	4.80	2.40	2.30	1.92	1.20	0.96	0.60	0.45
135	18.51	4.62	2.31	2.22	1.85	1.15	0.92	0.57	0.43
140	17.85	4.46	2.23	2.14	1.78	1.11	0.89	0.55	0.41
145	17.24	4.31	2.15	2.06	1.72	1.07	0.86	0.53	0.40
150	16.66	4.16	2.08	2.00	1.66	1.04	0.83	0.52	0.39
155	16.12	4.03	2.01	1.93	1.61	1.00	0.80	0.50	0.37
160	15.62	3.90	1.95	1.87	1.56	0.97	0.78	0.48	0.36
165	15.15	3.78	1.89	1.81	1.51	0.94	0.75	0.47	0.35
170	14.70	3.67	1.83	1.76	1.47	0.91	0.73	0.45	0.34
175	14.28	3.57	1.78	1.71	1.42	0.89	0.71	0.44	0.33
180	13.88	3.47	1.73	1.66	1.38	0.86	0.69	0.43	0.32
185	13.51	3.37	1.68	1.62	1.35	0.84	0.67	0.42	0.31
190	13.15	3.28	1.64	1.57	1.31	0.82	0.65	0.41	0.30
195	12.82	3.20	1.60	1.53	1.28	0.80	0.64	0.40	0.30
200	12.50	3.12	1.56	1.50	1.25	0.78	0.62	0.39	0.29
205	12.19	3.04	1.52	1.46	1.21	0.76	0.60	0.38	0.28
210	11.90	2.97	1.48	1.42	1.19	0.74	0.59	0.37	0.27
215	11.62	2.90	1.45	1.39	1.16	0.72	0.58	0.36	0.27
220	11.36	2.84	1.42	1.36	1.13	0.71	0.56	0.35	0.26
225	11.11	2.77	1.38	1.33	1.11	0.69	0.55	0.34	0.26
230	10.86	2.71	1.35	1.30	1.08	0.67	0.54	0.33	0.25
235	10.63	2.65	1.32	1.27	1.06	0.66	0.53	0.33	0.24
240	10.41	2.60	1.30	1.25	1.04	0.65	0.52	0.32	0.24

FIG.1: Time (in milliseconds) per clock pulse, based upon tempo in beats per minute and resolution in pulses per quarter note.





As the number of modules in your MIDI system grows, it gets harder and harder to find the bugs. This is a drag in the studio—and a disaster playing live. Here are some tricks to smooth out your live sequencing setup.

Sequencing for LIVE PERFORMANCE

So—you've just purchased a new Samurai Systems XX-9000 digital sequencer program for your Mach 1040 computer system. Great! Now all you have to do is learn how to use the gadget, enter your songs into it, and you're ready to take it on stage with the band, right?

Well, it won't be quite that easy. Leaving aside the issue of learning to use your sequencer (not to mention learning to use it to its fullest potential), there are a number of things to take into consideration before you go on stage. For instance, what do you do if your guitarist accidentally trips over (and disconnects) the power cord to your MIDI-controlled effects rack? How can you ensure that all 27 MIDI units in your setup are receiving data correctly, without spending two hours on a sound check? And what do you do during the interminable 30 seconds of disk load time?

Problems like these can be both frustrating and embarrassing—especially while the audience is waiting—but if you've done your homework, they can be no more serious than a broken guitar string.

As in all electronic musical endeavors, the key word is *preparation*. You may never be able to give your guitar player the on-stage grace of a Nureyev, but there *are* things you can do to minimize the problems of playing live with a sequencer. You *can* be confident that you won't look foolish the first time you push your sequencer's START button in public; that a minor slip-up won't cause a

BY JIM JOHNSON

ILLUSTRATION BY SALIM YAQUB

major disaster; and that your set will flow smoothly from beginning to end.

The answer to this lies in simply adding the proper information to your sequences ahead of time.

TEST AND TUNE

I've discovered a trick that's an enormous help in setting up my MIDI system for a gig. I call it a "test and tune" sequence. It's a sequence (or a set of sequences, depending on what works best with your sequencer) that sends data to each instrument in the system in some orderly fashion. This data will help you (or your roadie, if you can afford one) make sure all your machines are patched into the system correctly, and that all operating parameters (channel assignments, system exclusive enables, etc.) are set up properly *before* you press the START button in front of the audience.

Depending on your sequencer's capabilities, your test and tune sequence can be as simple or as complex as you want it to be. If you're using a setup that's just a DX7, an FB-01 and a sequencer, you'll probably only need to send each instrument a few simple patch changes, note messages, and some simple System Exclusive messages to ensure that everything is set up properly. If you've got a more complex rig, you may need a more extensive test sequence. My last band, for example, used a Commodore 64 running a Dr. T's sequencer to control six synthesizers and two drum machines.

This system—like most of the ones out there—had been built up from a combination of "early MIDI" period pieces and various state-of-the-art equipment, all connected by a series of mergers, thru boxes, and daisy-chain connections. The system was complex enough that its test and tune sequence was *essential* to getting everything working in a reasonable amount of time.

Because this system was so complex and so typical, seeing how the elements of its test sequence worked should give you a good idea of how you could create a test and tune sequence for your own system. Not all the things we did will work on all MIDI devices, but the concepts are valid.

THE SYSEX RUNAROUND

The first portion of our test and tune sequence sends a series of MIDI System Exclusive messages to the Oberheim Xpander, causing it to display text messages about the various manual settings of

each synthesizer in the setup. This technique can also be used with the DX7, which, like the Xpander, also allows messages to be printed on its LCD via sysex commands. (Check your synthesizers' MIDI implementation charts to see if any of them will display messages like this, or what messages they will send to a synth that will display them.)

This system—like most of the ones out there—had been built up from a combination of "early MIDI" period pieces and various state-of-the-art equipment.

Each message is separated from the next with a feature of Dr. T's Commodore 64 and Apple sequencers called a "vamp" sequence. A vamp sequence (in this case a very short, dummy sequence) repeats indefinitely until you press a footswitch. This lets you read the message, change the manual settings, and press the footswitch to advance to the next message. On sequencers that don't have this feature, you'll need to leave plenty of time between each message in the test sequence, or perhaps set up each message as a separate sequence that loops until stopped from the master keyboard.

TUNING THE SYNTHS

After the manual controls are set and the analog synths have had a chance to warm up, the test sequence sends a MIDI tune command (a single byte: decimal value 246). This rarely used message tells analog synthesizers to tune their oscillators. When the instruments that can respond to the tuning command begin running their calibration programs, the test sequence sends a single high C to our Juno 106. While the Juno plays the high C, we fine-tune the synths that need manual adjustment. We use the Juno, by the way, for no other reason than that its tuning pot, tucked away on the back panel, is hard to reach. Send patch changes to each instrument that select sounds with no chorusing, vibrato, or other cyclic pitch or timbre changes. These effects can obscure minor tuning discrepancies. This procedure solves the knotty problem we've all run into: how to adjust a tuning pot while holding down keys on two separate (and usually nonadjacent) keyboards.

MIDI CHANNELS

After the synths are tuned, the test sequence plays a few notes on each channel to verify that all your connections are okay.

If your synths have any other features that you consider your system defaults—that is, you always use them in your performance (this can be patch change or controller reception, for example, or a certain level or range of response to MIDI Continuous Controllers), program your test sequence to send a few of each of the appropriate messages to check that all the manual settings are okay. For example, set the pitch bend range, and then play a few bent notes to see that correct range has been set.

Don't forget your drum machines. If you're using them as drum expanders, play a few drum hits at different dynamic levels; if they are being used in their normal mode, send Song Select and MIDI Start commands to verify their operation.

Now that the MIDI connections are all straightened out, you can use the test sequence to play a portion of your set while you wander around the room and check the mix and/or local talent. Use your sequencer's editing capability to create a medley ("pastiche" would probably be a better word) of sections from a few of your songs, choosing material that highlights the rough areas in your sound (that low Memorymoog bass note that always distorts in the horns, the piercing squeal that punctuates the break and frequently punctures eardrums as well, and the flute solo that always gets buried by the guitar).

INITIAL SETTINGS AND PANIC BUTTONS

In addition to the controls that must be set by hand at power-up, most modern synthesizers have a number of global controls that respond to System Exclusive or

Program Change messages. Find out which of these your equipment recognizes and include them in your setup sequence. My Sequential Drumtraks, for instance, always powers up in Omni On mode; if it isn't sent a Mode Change message it will try to play every note the sequencer sends on every MIDI channel. The obvious time to set this and other global parameters is during the test and tune sequence.

But what happens if an instrument gets accidentally turned off during a gig? What if you want to set a synth to a different patch for just one song? To cover both problems, have the sequencer send all the setup data for every instrument at the beginning of each song. This way you're set up for each song, even if you rearrange your set at the last minute, or if you have to stop a song in the middle and then move on to another, as in a rehearsal.

Another occasional problem that occurs in live MIDI setups is that a MIDI cable might become disconnected briefly. If this happens while a note is playing, that note will play until the synth receives the correct Note Off command. Even worse: if a MIDI cable is disconnected in the middle of a pitch bend, the receiving instrument will miss the end of the pitch bend and remain horribly out of tune until another pitch bend comes along. The "panic button" for this situation requires a sequencer that lets you play multiple sequences independently. Program a sequence that does nothing but send out a string of Note Off and Zero Pitch Bend commands. This will affect all the voices in your system momentarily, but it's better than leaving a note hanging throughout a song.

If just one of your instruments is prone to stuck notes, create a panic button that only sends Note Off messages on its channel. In any case, make sure the panic button sequence doesn't loop, or your music will sound like someone is attacking your sequencer with a chain saw.

THE DISK LOADING BLUES

One of the biggest problems with sequencers from the day before yesterday is the amount of time they need to load a new song. Fortunately, this is less of a problem with today's faster disk drives, but bad software design can negate the advantages of even the fastest computer. Given the level of current hardware, if you're using any computer more powerful than a Commodore 64 and it doesn't let you load a full set (eight to ten songs) into memory at once, you've got the wrong sequencer for live use.

Sure, it may take only five seconds to load the next song from disk, but by the time you've selected the sequencer's disk access menu, selected the proper file, and returned to the play screen, 15 seconds or more will have gone by—and that's *plenty* of time for the dancers to find their seats. On the other hand, a sequencer that lets you chain songs together to play an entire set in one shot is a good compromise, but you'd better hope that your lead singer's shoes don't come untied during the first song, because you won't be able to stop between songs. (If you do have this kind of sequencer, break your set into "subsets" of two or three songs, and get your singer some new laces.) Ideally, your sequencer should be capable of loading and playing individual songs, as well as chaining songs for those times when you don't want to break your momentum.

ELECTRICAL CONSIDERATIONS

One other important point is AC power conditioning (see "Solving Power Problems for the Electronic Musician" in the Jan. '87 EM). About one-third of all computer glitches can be traced to electrical problems, so make sure your AC is as clean as you can make it. An EMI/RFI filter is essential for your computer and any other instruments that contain microprocessors. It is *not* the same thing as a surge protector, though most EMI filters have surge protectors built in. An EMI filter is used to remove small amounts of high frequency noise which can cause subtle glitches to occur in computer circuitry. Surge protectors are meant to protect against lightning strikes and other large signals that can fry your instruments completely. Be sure that whatever you buy is labeled EMI/RFI filter or suppressant, as many computer salespeople are apt to sell you the less useful surge protector—inadvertently, of course.

Even if you have got good power line conditioning, check out the on-stage electrical system thoroughly, especially your first time in a room. One club I used to play had a faulty spotlight that put all kinds of junk on the power lines whenever it was activated. Another had the bar's refrigerator on the same circuit as the stage, so my sequencer would start and stop randomly whenever the cooler went on or off. The best solution to problems such as these is to try out the lights and other electrical devices in the club while your test sequence is running, and listen for glitches in the sequence.

THE WRAP-UP

So, be prepared. List all the things you have to do to get your system booted, and put them into a test sequence that also lets you check for any setup errors. Create panic button sequences to fix the various snafus that occur during the show, and keep your eye on the power.

Then you can stop wasting energy worrying about the technical details, and worry about more important matters—like how your hair is holding up. EM

In between writing, learning to program the Atari ST for music and programming the ESQ-1, ***Jim Johnson*** *occasionally finds time to eat and sleep. His original goal was to become a renowned Dixieland trumpet player; he modified his aspirations when his high school bought a PAiA modular synthesizer.*

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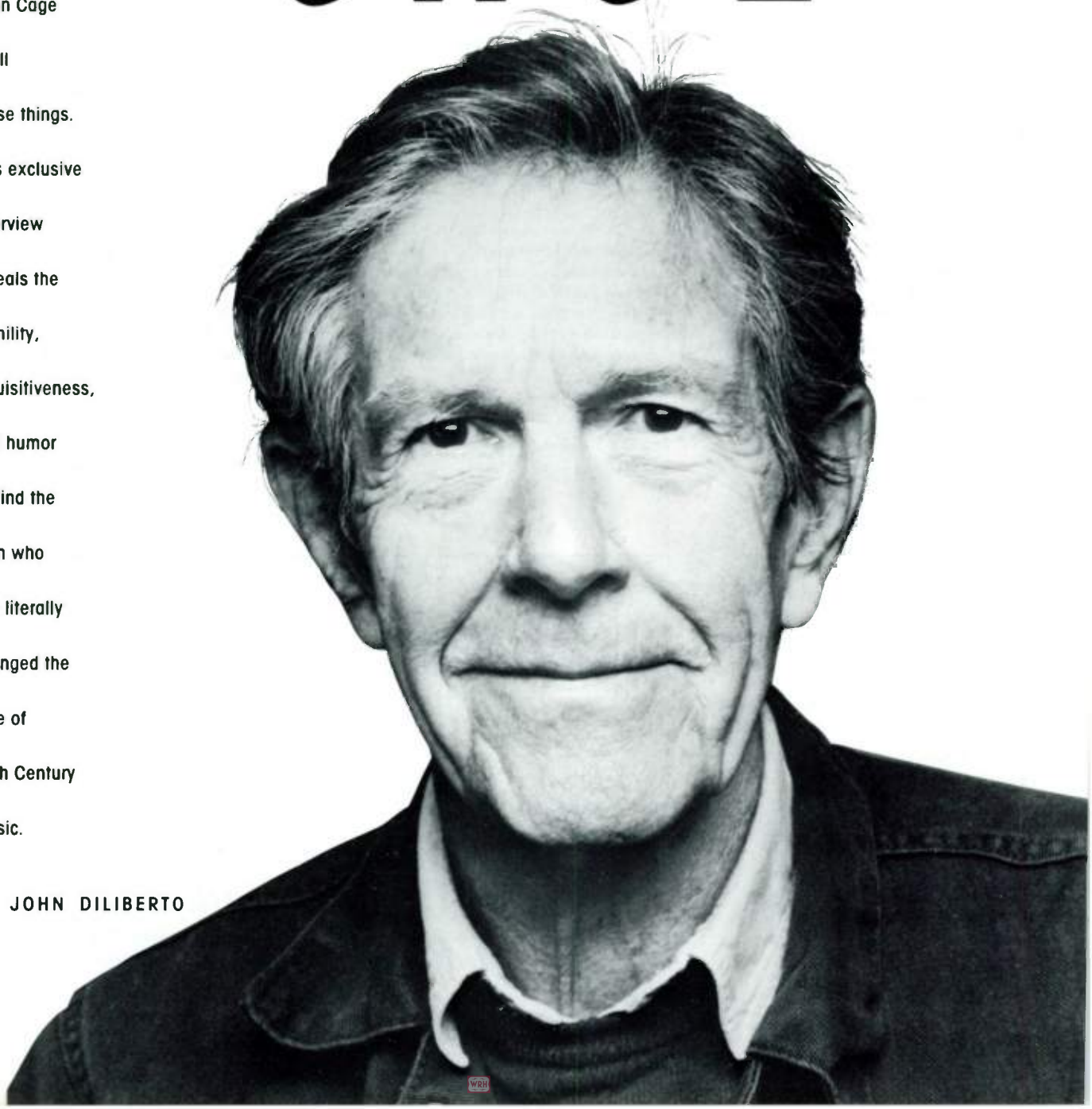
乾 Conversations with CAGE

Musician, composer, writer, lecturer—John Cage is all these things. This exclusive interview reveals the humility, inquisitiveness, and humor behind the man who has literally changed the face of 20th Century music.

BY JOHN DILIBERTO



I have never spoken with a less presumptuous and more humble icon than John Cage. There's nothing in his presence that suggests a man who changed the course of 20th century music; he moves hesitantly, his tall gaunt frame slightly hunched over. His voice has a gentle quality, with a laugh that occasionally bursts his weathered face in a broad grin. While many think of Cage as the clown prince of new music, a frenzy of Dadaistic discontinuity, Cage lives in an atmosphere of elegant contemplation. His home, a loft space in the Chelsea section of New York City, is based on a Japanese garden.

There aren't many human beings who can claim to have altered the course of history, be it music, art or human history. John Cage could make that claim easily, but he'd be the last to do so.

Entering his 75th year, John Cage has the quiet aura of Zen humility. He relates familiar stories of his past with an almost embarrassing hesitancy, as if the telling will elevate the stories to legend far beyond his own ego. After all, the only thing Cage did was bring chance into music, popularize the prepared piano, be in the vanguard of tape music, predict the rise of electronic instruments 50 years ago, and establish the concept of noise as music. If Cage had done nothing except publish his 1961 collection of essays, Silence, his influence would've been of Einsteinian proportions.

Silence is cited by composer John Adams as the turning point of his career. Steve Reich and Philip Glass cite it as a work that gave them permission to do anything, including the right to be repetitive and tonal. Brian Eno once called Cage "the most influential theorist . . . a completely liberating factor." Eno's Oblique Strategy cards were his own adaptation of Cage's I Ching chance operations.

Like the Bible, Silence supports many interpretations. It's this kind of multiplicity that Cage thrives on. For instance, he predicted the rise of electronic instruments and sampling devices in 1937 when he said, "I believe the use of noise to make music will increase until we reach a music produced through the aid of electrical instruments which will make available for musical purposes any and all sounds that can be heard."

"The use of noise to make music will increase until we reach a music produced through the aid of electrical instruments which will make any and all sound that can be heard."

John Cage, 1937

Yet, Cage has actually recorded few electronic works. After making that statement, he went on to create his tape works like Fontana Mix and Williams Mix, recording sounds from the real world (often with Bebe and Louis Barron, the creators of the Forbidden Planet soundtrack), and reconstructing them on the editing block. Variations and the Imaginary Landscapes were live performances using radio receivers to create surrealistic juxtapositions and environments. His Cartridge Music was an audiophile's nightmare, as Cage and David Tudor jammed and scraped objects into phono cartridges and microphones. HPSCHD was a computer work realized with computer music pioneer Lejaren Hiller in 1969. The Nonesuch recording of HPSCHD (H-71224) included a program called Knobs, with personalized mixing instructions for the listener, who could adjust volume, treble, bass and balance controls on one's receiver.

The bulk of his music consists of the early percussion and prepared piano works like the oft recorded Sonatas and Interludes for Prepared Piano, sound-text pieces like Indeterminacy (with an electronic accompaniment by Tudor) and Song Books, and collaborative works with dancer Merce Cunningham. For the last several years he's been working with mesostics, which are like acrostics only the letters occur in the middle of words. He's gone through James Joyce's Finnegan's Wake five times, using different formulas to dismember the work into new arrangements.

Cage's use of the I Ching and other chance operations to compose his music are legendary. One series of pieces that includes Atlas Eclipticalis, Atlas Australis and Etude Borealis uses star charts placed on a musical staff. The placement of stars on the staff determines the notes. Like most of Cage's work since the 1950s, he tries to remove his ego from the music, to make his music seem as natural as events in life.

As I set up for the interview, the sounds of jack hammers, horns and air conditioning permeate the atmosphere. I mention that I usually try to eliminate all these extraneous sounds from my interviews but I thought in this case, it wouldn't be appropriate.

"Right," Cage replied.

PHOTO: REX RYSTEDT

JD: This is a very noisy environment in which you live.
JC: Oh, yes.

Do you enjoy that?
I do. For me it's a great pleasure to hear all the sounds.

And I know that noise and the environment have been very important to your work, but when you're trying to concentrate or trying to focus in on something, don't you find it distracting?
No, I don't. I find it just plain musical, because the sounds are happening constantly and unpredictably. The only thing that really annoys me in an environment is when there is some organized sound, in other words, music, in a more conventional sense. I think the regular beat of music and the sequences and repetitions of patterns is what bothers me the most.

So how do you feel then when you go back and listen to some of your earlier works, especially the percussion pieces that have very repetitive patterns in them?
I think of them as coming from the past, which they do. Though in the new piece called *Music Four*, one of the elements is a single repeated tone, preceded and followed by silence so it's actually a sound which is one part of three, the other two parts being silence on the part of that musician. But it's not a repeated pattern.

You were one of the people who predicted the emergence of electronic music-making devices. You were involved in the various phases of it early on, yet it appears that you've almost abandoned that whole area of your work.
I think you would consider a work with computer to be in that family. Well, one of my most recent pieces is called *Essay* and that's done with the computer at Brooklyn. And I also used a derivative piece from that *Essay* for a recent dance of Merce Cunningham, which is called *Voiceless Essay*. Thirty-six tapes are involved in that *Essay*, and they will be used, all 36, in an installation in West Germany this summer. That will last for a hundred days and the music won't repeat itself.

Twenty-four hours a day for a hundred days?
Not 24 hours but the hours of the exhibition. And it'll be in a church.

These will be prerecorded tapes of computer-generated sound?

Yes. They'll be played on auto-reverse cassettes, and since the machines are not synchronized there'll never be a real repetition. It'll change all the time.

Essay is short for a longer title which is *Writings Through the Essay on the Duty of Civil Disobedience of Henry David Thoreau.* And I made a mesostics through that essay on the title of Eric Satie's *Mass de Pauvre*, because I thought of them as a present from Thoreau to Satie. Satie was known as Monsieur le Pauvre and Thoreau said that the best thing a man can do when he is rich is to carry out the projects he had when he was poor. So I made the 18 writings through, and the first ones are long, something like 22 minutes to read, while some are very short. . .like 30 seconds. But with the computer facility it was possible to compress the long ones to a chance-determined length of 16 minutes and 47 seconds and to stretch out the short ones to the same length, never losing the pitch of my voice.

Sort of a harmonizer process?

The computer analyzes both consonants and vowels of what I read, then re-synthesizes them at a programmed time length.

So unlike *HPSCHD*, this wasn't a piece where the *I Ching* came in as part of the random process?

I Ching determined the length of the 18 tapes, 16:47, and also determined the next 18 which are 14 minutes and some seconds. The first group are called unstratified because they stay at the same pitch, whereas those on the 14-minute length are stratified because through the *I Ching* they were broadcast within a two-octave range: an octave higher than my voice and an octave lower. And that gives a much more choral effect than the unstratified one.

It is a similar effect to *Songbooks* and *Empty Words*, the one that came out on the Wergo label?

I haven't heard the record but it's related to the *Songbooks* because there again, Thoreau and Satie were connected. But that present from Thoreau to Satie is part of a longer text which is now accessible electronically through [the telecommunications network] The Well in San Francis-

co. I decided to make it available without publishing it as a book.

So people can access that and generate it themselves?
Right. I told a young man recently who visited here that he could do that and gave him the information and he wrote a letter saying he now has it at home. He's able to get it.

Have you gotten involved in any self-generated computer processing on your own?
No. I have two young people doing programming for me: Andrew Culver and Jim Rosenberg. Andrew Culver is also a composer and Jim Rosenberg is a poet, and Rosenberg has made for me, I guess what you'd call a mesostic intelligent word processor. So I'll be able to do quite elaborate poems and change their nature in the course of a single work.

That means you could take the mesostic formula, apply it to a text and the program will figure out the mesostic for you.
[The computer picks] the central words and then I would add the wing words, but the spine words would be made with the facility of the computer. And it's possible then to make either a poem that goes linearly through a source or, I don't know if this is the right term, or globally, that is to say go from one part of a source to any other, say, chance-determined part of a source.

Why does it seem that your most enduring works are the *Sonatas and Interludes* and other pieces you did for prepared piano, *Music for Changes*?
Some pieces are difficult for people to use. For instance it's easier to use a piece for one piano than it is to use a piece for two pianos because if you work with a piece for two pianos you have to rehearse with a second musician. Also my two pieces for two pianos: *A Book of Music for Two Pianos* and *The Three Dances* are also not easy to play. I used to be able myself —and I was never a virtuoso—to play the *Sonatas and Interludes*, and if I do say so, to play them quite well. In other words that work is quite accessible in terms of being played and then it turns out that it can also be, people tell me, enjoyed just being heard.

One nice thing about it that another composer might not agree with is that each time the *Sonatas and Interludes* are

being played they sound differently, or each time they're recorded, they sound differently. For one thing, the hardware that I used to put into a piano no longer exists. That was classical hardware and there were sizes of screws that don't exist anymore, and I think also the metals that used to be used to make screws are not used anymore. Also each piano is different from another. I became very sensitive to that. So instead of being annoyed by all those changes I accepted them; it's a part of the experience of moving from control

Instead of being annoyed by changes I accepted them; it's a part of the experience of moving from composition as the making of choices to composition as the asking of questions.

to acceptance of what happens, and that also means the acceptance of chance operations—the whole thing of moving from composition as the making of choices to composition as the asking of questions.

You want your music to be more like life, like nature; yet what would that evolve into?

We can't go about everything like that because we want to cross the street, for instance, without being killed. I think it's very useful to remember the four divisions of activity characteristic of Indian law. The first is ar-tah, that is to say moving to a goal, having a goal and moving toward it; orkarma, having an idea of what is pleasing and giving or receiving pleasure; dharma, which involves distinguishing between good and evil; and mooksha having to do with not following any of those restrictions—which is what I do with the music.

A lot of people who are not familiar with your music or are only familiar with it on a superficial level would think that the performance of it is a random factor, that precision in your music is not necessary. I suspect that that's not actually true for many, if not most of the works.

The performances of my work, I think, just as the performances say of any other composer's work, the good ones, are few and far between. Most musicians are satisfied by reading through music and if the notes are correct they have the feeling that the music has been played. But that's far from the truth. There's a great deal of music to be heard that is not worth hearing.

I had an experience about three years ago when I was invited to Banthe at the School of Arts in Canada. They had a kind of festival of my work and among the pieces played—or rather scheduled to be played—was the *Etude Borealis for Cello Solo*. I've written also for piano and cello, and the piano can join together or each can be played separately. It was such a difficult piece to write that the Kirsteins, for whom I wrote it, never played it. And actually, Jean Kirstein, who made that beautiful Columbia record of some of my piano pieces, found it too difficult and then apart from that died before she was even able to attempt it. When I got to Banthe, the cellist who had been scheduled to play it told me he found it very, very difficult and that he couldn't play all four pieces, but he could play one. When he played the one it was absolutely magnificent. He had paid attention to every single detail in the piece and he came out with an exciting, lively performance.

Recently I was invited to Detroit and they also wanted to play the *Etude Borealis*, and a recording exists now of Michael Pugliese and Frances Marie Uitti, who never played the piece together but they played it independently and then combined the parts in the studio. And in this case Frances wasn't free to come to Detroit and I remembered the Canadian cellist. I thought that since three years had passed that he had perhaps learned the other three etudes. He had not only learned to play all four etudes, but he had gained his Master's degree in music by writing about my

work. And then when Michael heard him play, Michael was amazed. He said he is a great cellist. He teaches cello now at a school in Edmonton.

Are performance flaws something anyone notices or only John Cage notices?
No, I think anyone who pays close attention. But we're spoiled and we're spoiled by poor performances. For instance, all of our orchestral work is played poorly.

Ours in general or yours in particular?
I mean ours as the human race goes. I don't think any orchestra plays...they don't have time to play well.

Which is why a lot of people are going to computers and synthesizers.
And also to records, where they're forced to play well since they know that someone could check up on whether it was right or wrong.

You've talked about removing your own ego from the work, but do you want people to project in their own ego, or as a listener, should they be removing their ego too?
Well, you know the old adage. You can lead a horse to water but you can't make him drink, and I think we're involved in that situation. I try to make a music in which people can listen each in his own way, and I give the example of what my way is, suggesting naturally that if I were listening that's how I would do it. But I don't think you can force people to do what you do.

When you say you were listening, how would you do it?
I'd listen just as I'm listening now to the noises around us.

And are you accepting them as just noises or are you putting meanings to them or organizing them in your mind?
No, they're music for me. They are, in fact, my silent piece.

There's a a group of so-called minimalist musicians, and you probably know most of them—Steve Reich, Philip Glass, John Adams—and they all cite you as one of the most significant influences on their careers even though their music is like nothing you have done.
It may be because I've written so many books. I also did some music that was very minimalistic in the '40s. I don't know if you know a piece called *Four Walls*. It's been played a good deal by Margaret Leng Teng and it uses only the white keys of the piano and there are long passages repeated many times. It's really not unlike the music you just mentioned.

When I've spoken with Glass and Adams, I think the thing they got from you that influenced them the most was the idea that anything was possible.
But that already comes from Debussy. He said that we live now in the situation

Electronics brings about a situation in which our lives are concentrated on the interconnectedness of everything.

where any sound can follow any other sound.

But I don't think Debussy put it into practice the way John Cage did.
Well, nor the way someone else will (laughter).

I think those composers felt they were growing up under the shadow of serialism and Schoenberg and 12-tone music, and your music went in a completely opposite direction of giving more possibilities.
I think something has certainly happened. I'm not sure that I brought it about, or I am sure if I had not brought it about that it would have come about anyway—namely, the opening of doors and the refusal to keep things in the strict sense that they formerly were. When I was young there were only two ways to write new music and one was to follow Schoenberg and the other was to follow Stravinsky. We didn't even take Bartok seriously. And I think now the situation is very

different. Schoenberg actually said that his discovery of the composing by means of the 12 tones insured the supremacy of German music for the next 100 years. And it's not true.

Regarding the prepared piano pieces, I know how that came about for Syvilla Fort and how it was a case of necessity being the mother of invention. *(Ed. note: Apparently Cage was intending to use a percussion ensemble, and had only a piano available. Undaunted, he "prepared" the piano by muting strings and such to turn the piano into a percussion instrument.)* How did you determine the sounds that you wanted in the preparation?

I did it very much as trial and error—the way one looks for shells on the beach. You pick up the ones that catch your eye. In contrast to that I always tried to include some sounds that were not especially interesting. I thought that in a collection of sounds, not all of them should be catchy. Some of them should be not too interesting.

And was that work influenced by Balinese gamelan music, Indonesian music? Had you heard that music then?

It derives quite clearly in my work from the work of Henry Cowell, who had put his hands inside the piano and who had also let me learn a great deal about Oriental music through his classes at the New School for Social Research. I used to sit at the keyboard of the piano holding the pedal down with my right foot while Cowell would go to the rear of the piano and play his *Banshee*.

You've talked about how electronics have made it easier for the anarchist to be anarchistic. I would think it's quite the opposite.

It's a little difficult for me to take something like that, so to speak, out of the context that I'm in now and respond to it. Electronics, of course, is very much a part of our music physically and of our lives generally and it is what [media analyst Marshall] McLuhan said, an extension of the central nervous system rather than an extension of our ability to walk. It's not like the wheel. Electronics brings about a situation in which our lives are concentrated on the interconnectedness of everything.

I remember, for instance, giving an electronic concert with David Tudor in which one of the machines that I had to

play with was not turned on, yet sounds came from it and I said, "Isn't that strange, David. It is producing sounds without being turned on." And he said, "Well, it would be strange if it didn't," because it was in a *situation* that was so turned on. Maybe that's what's meant by totally wired (laughter)—that we're even wired when we aren't wired.

In your own music, outside of the seriously electronic ones, like some of the *Variations* and *Landscapes*, there's a real pastoral quality to your music. Thoreau has been an influence on your work and I think that turns up a lot. It seems almost contradictory to the environment that we're in.

We live in a world which has, as is said in Buddhism, sentient beings like ourselves. We perceive the world of relativity with our senses and then it has plants and stones and so forth, which we don't think of as having senses. Sometimes people think of plants as having senses, although I think it gets harder for them to think of rocks as having senses. But all of those things are together so that I can, live in New York on what would seem to be an urban technological situation, yet have the pleasures that I had when I lived in the country.

What were the pieces that you worked on with the Barrons—was *William's Mix* one of those pieces? This was the piece where you catalogued the sounds.

Yes that was the *Williams Mix*, and I used the same catalog in making the *Fontana Mix*.

One of the things they talked about is that you would take the sounds, cut them up into tiny, tiny pieces like buckshot and then lay them into editing tape.

That was for the Morton Feldman's *Intersection Three*. He would put a number on graph paper and then he'd give the amount of time and he'd want three different sounds, he didn't care which sounds, in that amount of time. We came to one section where he had about half an inch and the number was 1,047, and we did it.

In the last few years your works have involved language quite a bit. Why did you move into that area?

I moved into it first in the '30s when all of my work excited people to ask questions, so that has involved me in talking and also in writing. My writing, as I say in the introduction to *Silence*, is often not as instructive as it is exemplary. I try to make the writing in the same way that I make the music. And this has brought about in my writing, more and more as time goes on, various forms of writing that are not about ideas but which come from ideas and I think produce ideas, but they're unintentional in the same way that my music is unintentional.

Are you familiar with Laurie Anderson's work?

Yes. Not terribly familiar but I enjoy it.

Because most of what she's involved with is the use of language. Yours seems less intentional then hers.

I guess so. She's a very interesting performance artist and what makes her work especially interesting are its magical characteristics, that is to say, brilliant things happen that you can't explain any more

than you could if some pigeons flew out of her hat. (laughter).

In the early days, electronic music seemed unlimited, with infinite possibilities. And I think you were one of the people who felt that way. Do you still feel that way?
Well, I think that life is characterized by not having limits . . . that the moment we come to a point where we seem to feel confined, we open a door. I think it will always be that way. Gradually, more and more people believe that this is not the only inhabited planet, that there are many, many places in the universe where intelligent beings live. When you see that that's the case, then the advent of a real connection between one inhabited planet and another will bring about unpredicted and unknowable interconnections of mind. We might think we know everything there is to know but at that point, when that happens, that meeting, we'll know that we know nothing (laughter).

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you could if some pigeons
flew out of her hat.

Your collaborations with Merce Cunningham, as I understand them, are not collaborations in the strict sense since you're not composing the music for his dancing and he's not choreographing his dancing to coordinate with your music. Is that accurate?
Right. I mean to say they're not fitted together. They take place at the same time in the same performance space and we've worked together for so long that we have confidence that the work goes together very well.

And are his dances choreographed with the types of techniques that you use to put your music together?
They're different because he's a different person and dancing is different from music. His work is dependent not only on his composition but upon the excellent performance by his company whereas I don't have a group of performers. There are some composers like Philip Glass and Steve Reich who have their own groups of performers and they resemble Merce; I'm an old-fashioned composer who still writes music. I think Philip and Steve also write music but they take care to train performers. I don't do that.

You've said, "Whenever I'm fond of what I'm doing, if even one person is pleased with it, I redouble my effort to go on to the next . . ."
Yes.

Don't you ever want to spend time with a process, spend time with something that you did and develop it further?
I do that enough but I prefer getting another departure.

Can you tell me how *Cartridge Music* came about?
Oh, it came about through a suggestion from David Tudor to think of ways to use microphones and amplification other than just for making something louder. One of the things you do in *Cartridge Music* is to go and change the amplifier, and you don't know, nor does the person who's playing an instrument know, whether you're affecting him or not. The same with the tone controls and so on.

In a piece like *HPSCHD* you have the program *Knobs*, which I thought, was . . .
That was Jerry [Lejaren] Hiller's idea and I think it was a good idea to let the listener perform his own hearing of the record.

How did you come across the *I Ching* and what made it click in your mind that this could be used to compose music?
Well, I've written a text about that. I haven't published it but it's being published in a magazine in France called *Hexagram*. My first encounter with the *I*

Ching was in San Francisco in the '30s, about 1937, when Lou Harrison introduced me to it in the San Francisco public library and I saw the chart of the 64 hexagrams. It stayed in my mind but I didn't use it. Then later, maybe around 1951, Christian Wolff gave me the copy of the *I Ching* which his father had just published. And then when I looked at the chart for the second time I immediately saw in it the possibility of a composing means. I think it's because I had just before that been working some years with the magic square in which I made moves on the square, not from numbers to numbers as they would be if it was a magic square, but from sounds to sounds.

Would you please explain what a magic square is?

Benjamin Franklin made the biggest one. It's a square which contains numbers, and all the rows and files and diagonals add up to the same number. That's why it's called magic. So I made squares in which I put sounds and then I made moves on those squares, and I could change moves getting different kinds of continuities. That's how the *16 Dances* was written, and also the *Concerto for Prepared Piano and Chamber Orchestra.*

未濟

Most musicians are satisfied by reading through music and if the notes are correct they have the feeling that the music has been played. But that's far from the truth.

***Atlas Eclipticalis* was performed by the New York Philharmonic in 1962 and there was some controversy about that.**

It was perfectly awful. It wasn't a controversy; it was vandalism on the part of the orchestra. Each day I provided each instrument with a contact microphone and I had a large mixer that had been made at Bell Labs, and each day after the performance the musicians, not all of them but many of them, took the microphones off their instruments and stepped on them and destroyed them. And each day I had to repurchase new microphones and have the wiring done. Each day I did that for five performances. Finally on the Sunday when I went off the stage having received the applause and boos of the audience and of the orchestra, as they went by they were unashamed and they said "Come back in ten years. We'll treat you better." But that's not true. They will never treat me better. There are some good people in it, but the orchestra as a whole is equivalent to a gang bent on destruction.

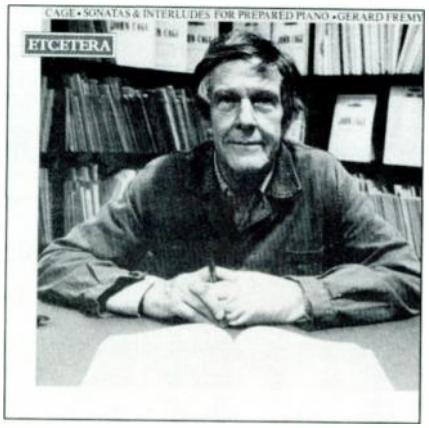
I suspect this isn't in your personality, but have you ever thought about revenge?

No. I just go on writing. The two most professional orchestras that I have come into contact with in the United States are the Boston Symphony and the Cleveland Orchestra. I think it was last summer, I was in Hungary and they made a recording with the orchestra there under the direction of Utverst Pater and at one point the rehearsal time came to a conclusion and Utverst said "Shall we continue? Or shall we stop?" And the orchestra with one voice said "Let's go on." And though it was a communist orchestra and they were being paid and so forth, unlike any orchestra in the United States, they wanted to continue working.

After the New York Philharmonic type of experience and similar situations at other places, do you feel like saying, "Forget it. I'm not going to compose for orchestra."?

No. I continue anyway.

I did cancel one performance in Holland where they thought my music was so easy that they didn't rehearse at all. And so the first time when I found that out, I rehearsed the orchestra myself in front of the audience of 3,000 people and the next day I rehearsed through the second movement—this was the piece *Cheap Imitation* —and they then were ashamed. The Dutch people were ashamed and they invited me to come to the Holland festival and they promised to rehearse. And when I got to Amsterdam they had changed the orchestra, and again, they hadn't rehearsed. So they were no more prepared the second time than they had been the first. I gave them a lecture and told them to cancel the performance; they then said over the radio that I had insisted on their cancelling the performance because they were "insufficiently Zen." Can you believe it?



The compositions of John Cage have been recorded by many artists throughout the world for half a century. *Sonatas & Interludes for Prepared Piano* (Etcetera Records KTC 2001) features French pianist Gerard Fremy on prepared piano, who has given more than 30 performances of this work over the years.

Given the problems of working with an orchestra of human beings, have you ever thought of just programming your work into something like a Synclavier? You know, just put the instrument on stage and let it go.

No.

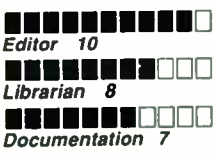
John Diliberto is the producer of Totally Wired: Artists in Electronic Sound, *a weekly program on eletronic music produced for Pennsylvania Public Radio Associates and broadcast on public radio stations across the United States.*

FIRST TAKE

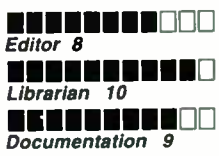
THE RATING SYSTEM: *First Take* is just that—people's first impressions of some of the latest products. Two different sets of ratings are provided by each reviewer according to their particular standards. The 11-step "LED meters" show a product's rating in a *specific* category (ease of use, documentation, construction, etc.; categories are chosen by the reviewer), while the 11-step "VU meter" shows the *overall* rating. The latter is not a mathematical average, since the reviewer may judge some specific categories as having more weight than others. For example, if a guitar synth is well-constructed, has great documentation, is easy to use, but doesn't track worth a hoot, it could have several very high LED meters but a low overall rating.

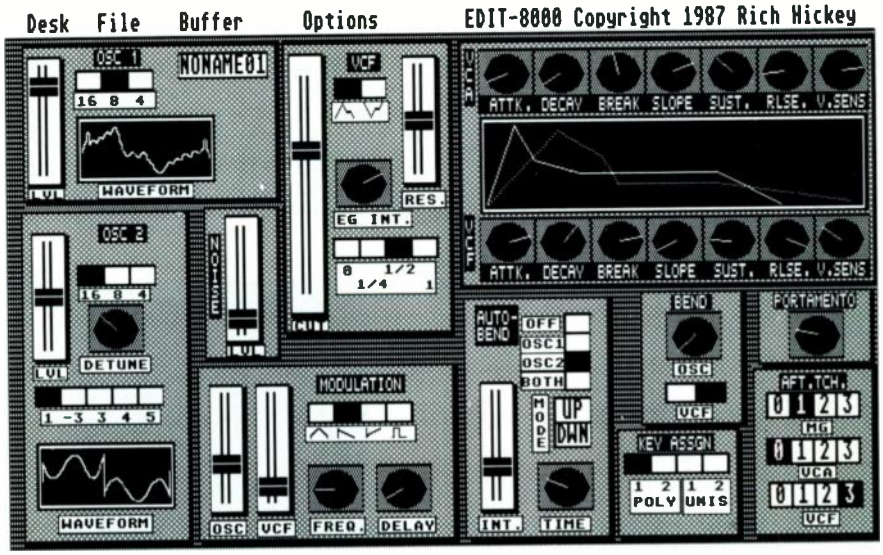
We would like to remind you that these are opinions, not gospel, and as always, **EM** is a communications medium that welcomes opposing viewpoints. We urge you to contact manufacturers for more information and, of course, tell them you saw it in **EM**.

Savant Audio Atari ST Edit-8000 ($80)



Synergy Resources Atari ST SynthView ($50)





Savant Audio Edit-8000

The Korg DW-8000 (also available in rackmount as the EX-8000) is a nice-sounding synth with a lot of possibilities, but, like so many synths these days, its parameters are adjusted by one front panel control, which makes it tough to program.

Savant Audio has done an excellent job of creating *Edit-8000*, a dream DW/EX control panel on the ST's screen. The program displays a full set of control knobs and sliders, along with graphic representations of oscillator waveforms and envelope generator settings. Raise levels by clicking on a knob or slider with the right mouse button, lower them with the left button. Mouse-controlled switches select aftertouch levels, auto-bend parameters, oscillator octaves, and so forth.

In an unusual approach, most of the controls are not labeled with parameter or level numbers. Instead, a completely separate numerical editing window lets you adjust parameters with the mouse, and see (and print) all the parameter and value numbers. You'll appreciate having a choice between entering numbers and the old analog-style approach of "who cares what the numbers are, let's get a sound!"

The digital delay parameters are accessible together in a window; drop-down menus access a Mini-Sequencer and a "Patchomatic" auto patch generator; and there is a MIDI Thru function so you can play an EX-8000 from a controller keyboard as you edit.

I have a few small complaints: the sequencer doesn't loop and won't run while either the delay parameter window or the numeric editing windows are open, and the auto patch generation is always global (you can't select the parameters to change). However, the auto patch generator does have some nice features. Three of its four levels—from slight to bizarre—generate patch changes based on a set of ten "key" patches of your choice, giving you a unique and powerful method of experimenting with variations or combinations. There is also a patch merging function to create a new patch from two source patches.

Although the Edit-8000's librarian can hold up to eight banks of patches in memory at once, unfortunately it displays just one at a time. In addition, the program only runs in medium resolution, so monochrome system owners won't be able to use it (although as we go to press, Savant Audio says that the new version will support monochrome systems).

SynthView, from Synergy Resources, loads up in the librarian mode, at which it excels. Two GEM windows, each with a full bank of 64 patches, can be opened simultaneously. To move patches between banks is as simple as grabbing and dragging icons with the mouse. As with Edit-8000, you can name patches in

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Synthview even though the DW/EX won't load or display the names—great for archiving voices.

For editing, a full-screen window opens up and displays a complete set of DW/EX controls as mouse-driven switches and sliders, along with the parameter settings of the selected patch. As with Edit-8000, SynthView sends all changes to the synth instantly during editing.

One very nice feature of SynthView is the extensive help screen. Double-clicking on most of the sliders brings up an explanation of that slider's function.

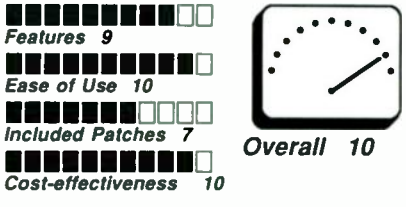
A built-in simple sequencer (non-looping, darn it), can record phrases to play back while editing. There is also an area of the screen where you can play the synth with the mouse at any pitch or velocity level. This is useful when editing the keyboardless EX-8000, especially since there is no MIDI Thru function to play an EX-8000 from another MIDI keyboard while editing.

Both of these programs are solid, useful, and well-written. Both also include desk accessory programs that send patches to the DW/EX from within another GEM program. Because of the MIDI Thru function, Edit-8000 seems better suited for EX-8000 owners; the graphic editing screen's layout and its auto patch generation also work in its favor. However, I preferred SynthView's price and librarian functions.

—Jamie Krutz

Savant Audio
2140 Bellmore Ave.
Bellmore, NY 11710
☎ 516 / 826-6336
Synergy Resources
754 N. Bolton Ave.
Indianapolis, IN 46219
☎ 317 / 356-6946

X-LIB Patch Librarian for Yamaha DX/TX synths and the Commodore 64 ($45)



After buying a couple of Yamaha TX81Zs a while ago, I rapidly filled their editable memory and found myself facing a grim prospect: either spend $100 on a librarian program, or use the dreaded *tape storage*. I finally bowed to the inevitable and started calling software houses in search of a librarian. At that time none of the bigger companies had librarians ready to ship, so I put my faith in a classified ad that advertised a $45 TX81Z librarian—one of the first I'd seen that was ready to ship.

X-LIB arrived promptly. While not fancy, it turned out to be excellently designed: a compact all-machine-language program that boots in just a few seconds. It performs librarian functions for all Yamaha DX and TX synthesizers except the FB-01. Performance memory dumps are not currently supported, but the manufacturer says that later versions may include this feature.

The program handles ten banks of DX/TX programs at a time, displaying the bank names at screen-top, and the selected bank's voice names at screen-bottom. The selected bank/program is highlighted. Number keys select banks; cursor keys, the programs. A capital "X" at screen-top indicates six-op format, and four-op format shows a lower-case "x." Copying and swapping programs both require only selecting and hitting one key.

The main screen holds a lot of information because all commands are single-key presses. This eliminates paging through multiple menus to get to a desired function, but also makes it necessary to remember commands. X-LIB solves this with its memory-resident help screen that lists all the program's functions and can be called at any time by pressing one key. Load a bank of programs into X-LIB from a synth by pressing a C-64 key and initiating a dump from the synthesizer front panel; send a bank *to* the synth by selecting the bank and pressing a computer key.

You can create and save to disk multiple bank loaders that automatically load up to ten banks from disk. If you want, the multiple loader will automatically transmit banks to your synth as it loads them. The *Keyboard Thru* mode lets you audition programs on your rack-mount synthesizers without repatching, and is easily re-channelized so multiple synths can be played individually. X-LIB's six-op file format is identical to the Caged Artist, Passport, and Valhala file formats, so it will read any banks created with these programs.

So far, Music Design's customer support has been good. The first disk I received had a minor bug that took me a couple of weeks to find. About a week after I'd found the bug, the company sent me a free update disk with the bug fixed.

The X-LIB advertisement said that the disk would include 160 DX7 patches and 160 TX81Z patches. Only as I'm writing this, however, is a version of X-LIB being shipped that includes the TX81Z programs (and a re-written manual), so I haven't heard them yet. The DX7 patches sound okay to my ears—neither terrible nor A-1 premium; but exposed as I've been to thousands of DX7 patches, I'm not easily impressed. Most musicians will probably be able to use some of them.

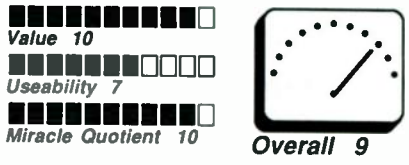
But this is all moot, because I rate the utility and value of X-LIB so high, it wouldn't matter to me if *no* patches were included with the program. X-LIB is easy and convenient to use. I like it so much I've transferred *all* my six-op and four-op patches to X-LIB, and use nothing else for routine DX/TX file maintenance.

X-LIB's multiple bank features should make it particularly attractive to TX816 users. My copy of X-LIB was not copy-protected, so I can put X-LIB on all my data disks. As for pirates: such classy software being available at such a good price gives *absolutely no one* an excuse for stealing this program.

—James C. Chandler

Music Design
PO Box 28001
Crystal, MN 55428
☎ 612 / 537-5457

HyperTek/Silicon Springs Atari ST OmniRes Monitor Emulator ($34.95)



It's a miracle! Believe it. The *OmniRes Monitor Emulator* software allows low and medium (color) resolution software to run on a high-resolution (monochrome) Atari ST system.

An Atari engineer I spoke with at Comdex said it couldn't be done, so naturally HyperTek/Silicon Springs has done it. To quote the manual, "We're a bunch of guys who like computers really a lot. We also *hate* to be told that something is impossible."

The program loads from an auto folder. From there, several different versions are available to handle different forms of emulation. These include a fairly fast version running in a quarter of the high-res screen, a slower version that emulates full-screen medium resolution or maps low resolution onto half of the screen, and an even slower, full-size, low-resolution screen emulation.

Mouse response is more sluggish than it would be if you were running on a color monitor without the OmniRes. But hey, it works—at least with the programs I've tried so far, including Savant Audio's Edit-8000, the DW/EX-8000 editor/librarian. At $35, this program is certainly cheaper than a color monitor.

Other versions of the program included on the disk handle the quirks of various color programs. A company spokesman says if one version of OmniRes doesn't work, another

—continued on page 101

Sequencer Plus, one of the first pro-level sequencers for any computer, has now been revised into three packages—suitable for anyone from the "potential musician" to the seasoned pro. Want to make music on your PC? Here's one way to go.

Sequencer Plus Mk I, II, and III

BY IAN GILBY

Believe it or not, there is an alternative to buying an Atari or Macintosh if you choose to "go soft" and join the growing throng of musicians who have already recognized the tremendous benefits computer-based music sequencing software can bring to any MIDI setup. IBM compatibles are getting downright inexpensive, and there is no shortage of good music software for these machines. The price of a basic model IBM compatible, sequencer software, and MIDI interface compares very favorably with the price of a dedicated MIDI sequencer with similar capabilities.

One of the best-known sequencing programs for the IBM and compatibles is *Sequencer Plus* from Voyetra Technologies. The program has been around for some time now, but was recently completely revised and re-packaged as a suite of programs. Being a pretty sharp bunch, Voyetra recognized the fact that you'll never entice any musician to buy a piece of software costing nearly as much as a computer, especially if it contains features seen as unneeded. So what did they do? They produced *three* versions of Sequencer Plus—Mk I, Mk II, Mk III—all differently priced according to the number of tracks and features they offer (see **Table 1**). Why waste money on the 64-track version (Mk III) if you think you'll never need more than 16 tracks (Mk I) or perhaps 32 (Mk II)?

One of the major problems with buying any sequencer these days is that however good a demo you get, it's only after a lengthy familiarization period at home or in the studio that you suddenly discover its quirks and limitations, and by then, of course, it's too late to change your mind. The only way to get a better model is to buy another program and sell the first one for less than you paid for it (the obsolescence factor).

To help get around this problem, all three versions of Sequencer Plus are fully compatible with each other—the commands are identical, the functions all work the same, and you can transfer song/track files from one program to another. Furthermore, Voyetra even runs an "upgrade" facility whereby purchasers of Sequencer Plus Mk I, say, can trade in the value of their disk against the cost of the Mk II or Mk III versions if they discover they need the extra features. Brilliant idea! Buying the program, of course, also makes you eligible for any future software updates, which will cost you a lot less than buying a new program from scratch. Since Sequencer Plus Mk III incorporates all the features of the other two versions, we'll concentrate the review on what it can do and refer you to the accompany-

(Ed. Note: From time to time, we will be publishing some of the best articles from Sound-On-Sound, *a British publication that is conceptually and philosophically very much like* EM. *This arrangement will give them a little more exposure on this side of the Atlantic, and give us an even wider editorial selection than we had before. We're pleased to start off with the following review, which is one of the more lucid descriptions we've read of the Sequencer Plus family of products from Voyetra Technologies.)*

SEQUENCER PLUS
By Voyetra Technologies

426 Mt. Pleasant Avenue, Mamaroneck, NY 10543
☎ 914 / 698-3377

COMPARISON OF FEATURES	SEQUENCER PLUS Mark I	Mark II	Mark III
Price	**$99**	**$295**	**$495**
Number of Music Tracks	16	32	64
Linear or Pattern based	Linear	Linear	Linear
Accepts songs from Mk III	Y	Y	Y
Same ease of use as Mk III	Y	Y	Y
Visual Note Editor	Y	Y	Y
Visual Track Editor	Y	Y	Y
Programmable time sigs	Y	Y	Y
Programmable Tempo	N	Y	Y
Memory Buffers	3	6	11
Compatible notation programs	Dr. T Copyist Pers Comp	Dr. T Copyist Pers Comp	Dr. T Copyist Pers Comp
Song Position Pointer	Transmit Only	Transmit & Receive	Transmit & Receive
Tape Sync	N	Y	Y
MIDI Sync	Transmit Only	Transmit & Receive	Transmit & Receive
Sync Chase Mode	N	Y	Y
Transform Commands ("global edits")	N	N	Y
MIDI Filter Commands During record	Y	Y	Y
After recording	N	N	Y
Independent Track Offsets (non destructive)	N	N	Y
Save/Load Individual Tracks	N	Y	Y
MIDI Event Editing	N	Y	Y
Network Organizer (download patches)	N	N	Y
Block Moves (edit multiple tracks)	N	N	Y
Hear Edit Note	N	N	Y
Preset Edit Notes	0	0	6
Advanced Cursor movement	N	Some	Y
Basic Help in each screen	Y	Y	Y
Command Help	Y	Y	Y
On-line Instruction Manual	N	N	Y
Choice of Screen Colors	N	Y	Y
Manual incl. DOS/PC help	N	N	Y
Manual incl. MIDI applications	N	Y	Y

TABLE 1: Product Summary comparing the three Sequencer Plus versions

ing table, which explains the essential differences between the three programs.

TAKING CONTROL

Loading Sequencer Plus calls up the Main screen (Fig. 1). This resembles a track sheet and lists the name, MIDI channel, and initial MIDI program (voice) number used by each of the 64 tracks (as only 16 tracks are shown at any one time, you scroll the display up/down to see the others).

With 64 tracks available, remembering which track does what could prove a nightmare, but fortunately you can key in a 20-character name for each one—much longer than most hardware sequencers will allow. Descriptive tags like "8 bar DX

String Vamp" are a positive boon when undertaking a spot of multiple track merging or when returning to a song you recorded six months ago! The usual "global" parameters you'd expect to find—those which affect all tracks such as time signature, song name, bar and beat counts—are also indicated on the Main screen.

With Sequencer Plus you build up your song by recording one track at a time in familiar multi-track fashion. This is a fast and immediate process: press R on the QWERTY keyboard to place Sequencer Plus into record standby mode, then press the spacebar and bash away on your MIDI keyboard. Pressing the spacebar turns off record mode and a further press gives you instant playback.

Each of the 64 possible tracks is an entity in its own right, totally independent, and once recorded you can alter its tempo (even during playback) from 16 to 255 beats per minute, set a loop point for continuous playback (although you can't tell it to play the looped section for, say, four times and then play the remainder of the track, which would be *very* useful), mute separate tracks or solo any one of them, transpose the whole track within a ten-octave range (even as it plays), as well as vary the MIDI channel and program number to hear the track played by a different instrument. In addition, you can individually set the quantize value for each track on the Main screen and slide whole tracks forward or backward in time to within an accuracy of one "click" (1/96th of a quarter-note) using the Offset command.

Sequencer Plus gives you plenty of freedom of choice when it comes to quantizing. You don't need to think about what quantize value you want before recording, because the quantization works only on *playback* and does not permanently affect the note data in its memory. Is that good? You bet—it means you can explore the effects different note resolutions have on your music without committing yourself, and freely mix quantization values between tracks. The quantize value open to you ranges from "no quantize" (which is actually the system default of 1/96) to 1/4 (crotchet), 1/8, 1/16, 1/32 and 1/64—plus all triplet variations in between. The higher the quantize value, of course, the more faithfully Sequencer Plus will replay your real time input.

A whole host of functions and (user-definable) defaults allow you to make changes as fast as you (or the producer) can think of them.

You can have some real fun and games with the independent track looping and programmable track time signatures. For example, you can easily construct those rarely heard beasts known as "polyrhythms" by giving one track a time signature of 4/4 and another of 7/4. (If you've never heard one, listen to Steve Reich records, virtually any "true" African music, or to the sequenced intro of "San Jacinto" on the *Peter Gabriel 4* album, and you'll hear polyrhythms in action.) Some people might never use the programmable time signature aspect of Sequencer Plus, of course, being perfectly content with the default "chart" setting of 4/4. However, the flexibility is there for those who want it—anything from 1/2 to 32/16 is possible, and you can change signature on every bar measure if you like. If that's still not good enough, by creating bars that are only 1/16th note long and stringing 16 of them together, you can fool the system into thinking that you are changing time signature every 16th note! (You can do the same with tempo, incidentally.)

Speaking of which, like Roland's MC500, Sequencer Plus (Mk II and Mk III versions only) has a dedicated master Tempo Track which can be fine-tuned to create super-smooth *rallentando* or *accelerando* effects, or be used to "push" or "lay back" the beat on important parts of the song to improve its overall feel.

VISUAL EDITING

Where computer-based sequencers score over their dedicated counterparts is in the provision of a large screen which allows them to display vast amounts of information *simultaneously*. They also make the manipulation of notes and bars, once recorded, considerably easier.

Within Sequencer Plus, bar and note manipulation takes place over three different screens. The *View* screen (see **Fig. 2**) uses a graphic system of small squares, hyphens, and dots to indicate bars that contain either music or MIDI data, recorded bars that contain only silence, and empty (unrecorded) bars. And because you can see 16 tracks, each 40 bars long, at a glance, you get an instant picture of how the tracks all relate in time as you scroll along, or up and down, the display to view more bars and/or tracks. To avoid the hassle of scrolling through, say, 300 bars to get to bar 301, the "Goto" com-

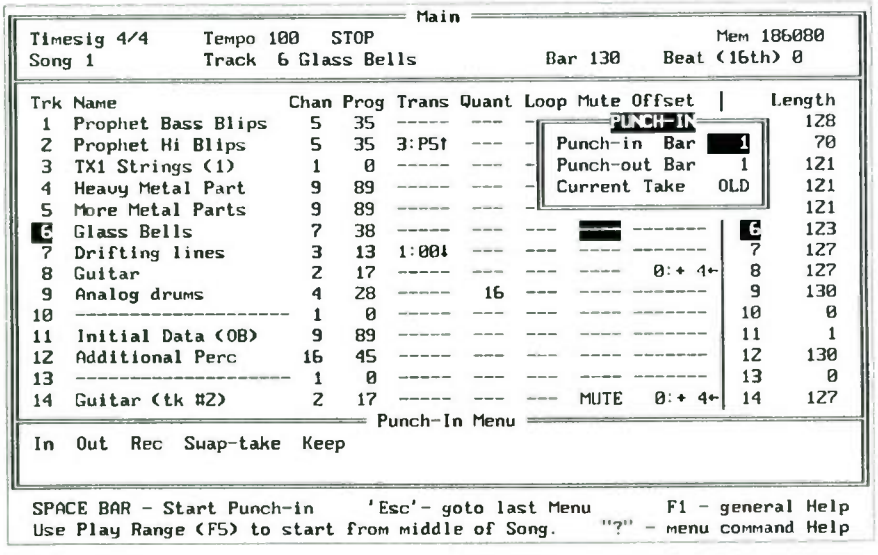
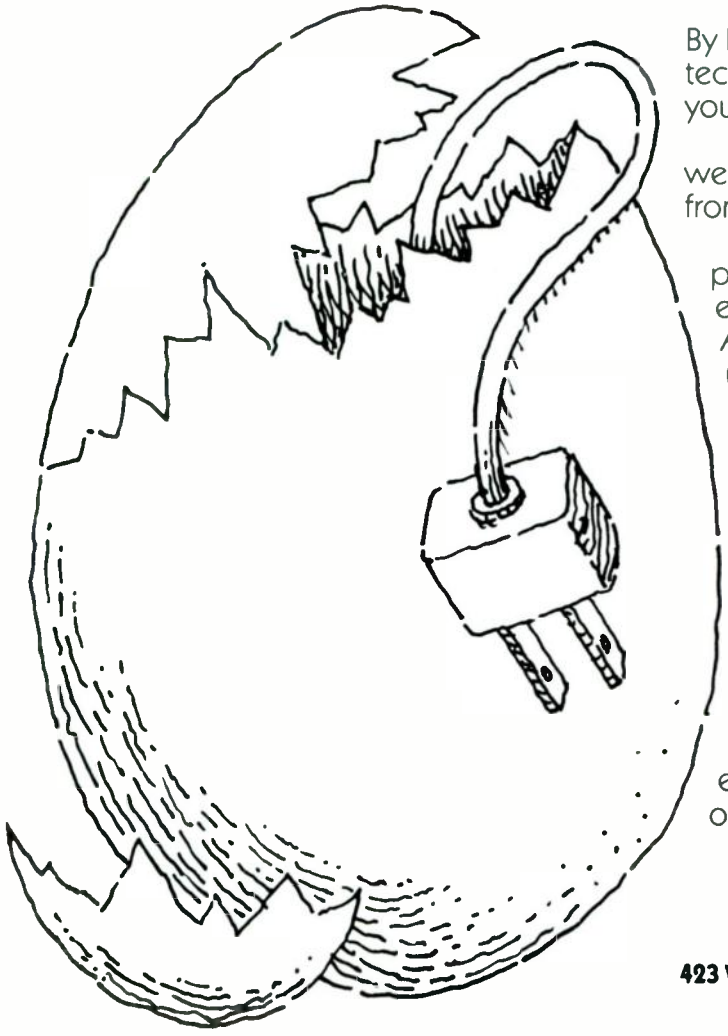


FIG. 1: The Main Screen for Sequencer Plus Mk III.

The next breakthrough in recording technology is due any minute now.



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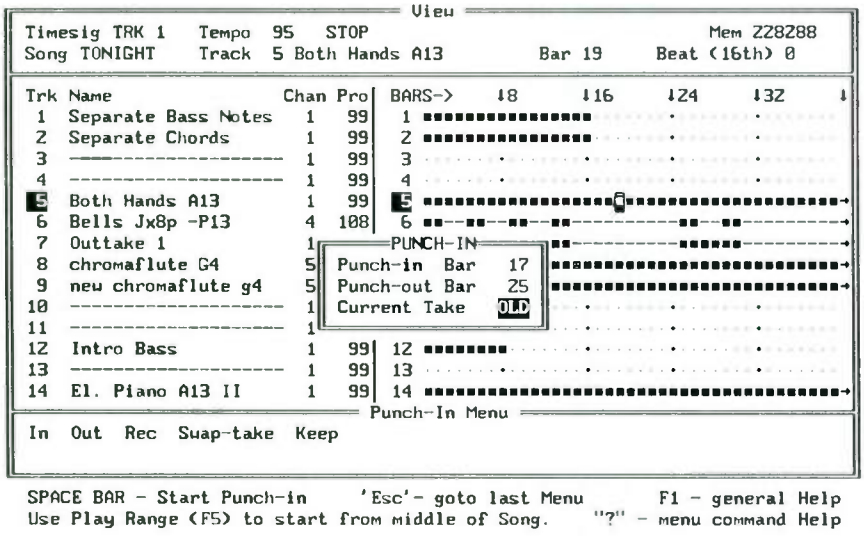

FIG. 2: Sequencer Plus Mk III's View screen, showing the activated Punch-In "window" (center).

mand takes you instantly to the bar number you specify.

The View screen is for playback (from any bar, by the way), not recording, but you are nonetheless provided with a wide array of editing commands which you can use to move, delete, copy, and insert existing bars or add empty ones anywhere you like (useful if you forgot to set a four-bar lead-in from the Options window before commencing to record). Restructuring your song in View really is simplicity itself—Voyetra has provided a whole host of functions and (user-definable) defaults which allow you to make changes as fast as you (or the producer) can think of them. And as with all screens, the command options available to you are listed at the foot of the display for quick reference and are each implemented with a single keystroke.

To edit what you played in real time when you first recorded a track, you have three options: re-record the whole track; leave the good bits and overdub new parts (you call up the pop-up Punch-In window and specify the start and end bar numbers); or take the step-time route and access either of the *Edit* or *Note Edit* screens and start manipulating individual notes.

Both Edit and Note Edit screens display one bar of music at a time, though not in conventional notation form (see Fig. 3). To represent notes graphically, Sequencer Plus uses a simple but effective system of horizontal bars where the length of a particular bar determines the note length, and horizontal position on a grid denotes the start time, while the vertical position defines the pitch of each note according to a chromatic scale running up the left side (it could do with being duplicated on the right side as well, for convenience's sake). Atari fans will recognize it as similar to the grid edit system found on Steinberg's excellent *Pro-24* sequencer.

To alter the pitch of a note you position the cursor over the relevant horizontal bar, press "P" on the computer, and physically move the on-screen bar up or down using either the ± keys, the open/close bracket keys [ ], or the left/right arrow keys < > depending on how large a pitch shift you want. The selected note flashes on screen to tell you it is being edited and you also have the option of hearing individual notes as you change the pitch.

Having 64 tracks at your disposal means that you can afford to compose your drum tracks on one or more of them —it doesn't always have to be music, remember! If you don't like the idea of doing this in real time you can take advantage of Sequencer Plus' excellent step time programming system. Various key combinations have been pre-defined to allow quick and repeated insertion of particular note types (whole, quarter, eighth, etc.) at the point marked by the cursor. Or, you can "grab" any existing note on screen that you want to use as a "template" and copy it to as many locations as you like.

Writing drum patterns is simple with Sequencer Plus—far easier than on any drum machine I've encountered—primarily because you can *see* what you are doing at all times. Using the program's *Accidentals* command, you can toggle the Note Edit screen so that the chromatic scale down the left-hand side shows all accidental note names as either flats or sharps (the default) or as MIDI *note numbers*. The latter feature is so handy, it's unreal! Provided you have access to your drum machine owner's manual, which should tell you which note numbers it uses for which "drum," you can scroll the Note Edit display to note number 64 (the low tom, say) and quickly program your tom pattern, then move to note 100 and

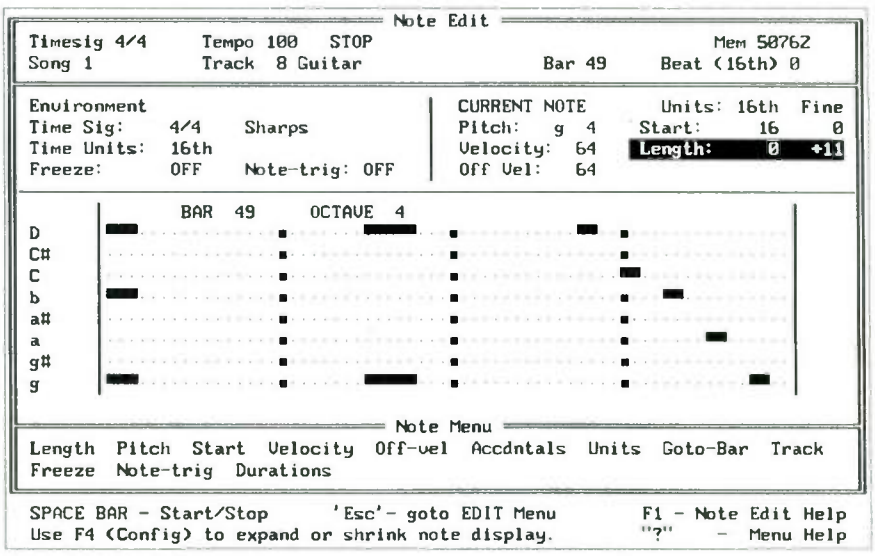

FIG. 3: The Note Edit Screen.

enter your claves part or whatever.

To help with this task, I jotted down my Kawai drum machine's note number/voice assignments using the word processor within *Sidekick*, a pop-up desk accessory program. This can be loaded into your computer's memory alongside Sequencer Plus, allowing it to pop onto the screen at the touch of a key when you need it and disappear when you don't (it works like a pull-down menu on a Mac or Atari). You can store anything you write in its own file so it won't get mixed up with Sequencer Plus data files. The reason I mention *Sidekick* is that it would be a good move if Voyetra incorporated something like *Sidekick* into Sequencer Plus. That way you could write extensive notes about the tracks, list chord progressions—even song lyrics—and store them on disk along with your music data. What about it, Voyetra?

Although you can edit individual Note On velocities (and Note Off velocities if your synth understands it—most don't) from within the Note Edit screen, all oth-

Which MIDI Interface?

In order to run Sequencer Plus (as well as many other IBM PC programs), you need a MIDI interface to physically connect your computer with whatever MIDI instruments you intend to use. In the PC world, the industry standard MIDI interface is manufactured by Roland: the MPU-401. Virtually every piece of professional PC music software has been specifically written to utilize this device. If you already own an MPU-401, you'll be glad to learn that it can be used with any version of Sequencer Plus. If you don't, then you may like to consider Voyetra's own interface, the OP-4001.

Like the Roland unit, the OP-4001 comes in the form of a short plug-in "card" (circuit board) which fits easily into one of the computer's internal expansion slots. The card terminates in a 25-way D connector and is designed to mate with the OP-4001's small connector box which houses MIDI In/Out, tape sync in/out (FSK), and metronome outputs.

Both the MPU-401 and OP-4001 are "intelligent" MIDI interfaces, in that they are effectively small computers in their own right which can handle all the vital MIDI "housekeeping" chores and leave the main computer free to get on with the important task of processing and manipulating your musical data. Each interface has some features not shared by the other, as illustrated by the following chart.

Incidentally, Voyetra has just released the OP-4000, a budget version of the OP-4001, which only has MIDI In and Out connections and costs $229 list. We've also heard rumors of a new product from Roland, the MPU-IPC, that will be the equivalent of an MPU-401 and MIF-IPC combined in a single unit, retailing for around $200.

FEATURES	OP-4001	MPU-401
MIDI In	1	1
MIDI Out	1	2
Clock In/Out (+5V)	Yes	No
FSK In/Out	Yes	Yes
FSK to Clock conversion	Yes	No
Clock to FSK conversion	Yes	No
Metronome	Unpitched	Pitched
Roland Sync Out	No	Yes
Internal speaker	No	Yes
Suited to portable PCs	Yes	No
List price	$295	$275

er editing of MIDI controllers takes place on the *MIDI Edit* screen. Here you can display, examine, and filter out any class of MIDI data, apart from System Exclusive messages which Sequencer Plus will not record. MIDI data is treated just as if it were note data, so you can insert, copy, delete, and move pitch bends, aftertouch or program changes as you fancy. This makes it very easy, for example, to carefully adjust the positioning of program changes so that they always occur in the gaps between recorded notes.

ROUNDING OFF

This may sound like a cop-out but it's absolutely true: Sequencer Plus has far too many features to list here, let alone explain! Hopefully, in this brief review I have given enough examples for you to gain a useful insight into its tremendous capabilities. It may not have the flashy-looking screen icons of most Atari and Mac sequencers, or allow you to use a mouse, but it doesn't need them—it boasts many a feature I've yet to see implemented on any Mac program, and it is *features* that count in my book.

I've had Sequencer Plus on test now for some three months and it hasn't "crashed" once. How many other programs can say that? It is thoroughly professional, dependable, extremely versatile, and very fast to use—thanks to its well thought-out "friendly" screen displays and strict adherence to single keystroke commands (mnemonics).

As far as hardware sequencers go, there is nothing to touch Sequencer Plus in terms of facilities or price. So if you haven't made the transition to a software-based MIDI sequencer yet, I suggest that you give it some serious thought. And if you don't already own a PC-compatible computer, may I also suggest that you get your hands on one of the available models, buy a copy of Sequencer Plus (or any one of the other fine sequencing programs available for the PC), and prepare yourself for a revelation!

Ian Gilby is the editor of Sound-On-Sound *magazine (The Coach House, 9 the Broadway, St. Ives, Cambridgeshire PE17 4BX, United Kingdom). Ian and SOS can be contacted over Esi (SOS-UK) and PAN (SOUNDONSOUND).*

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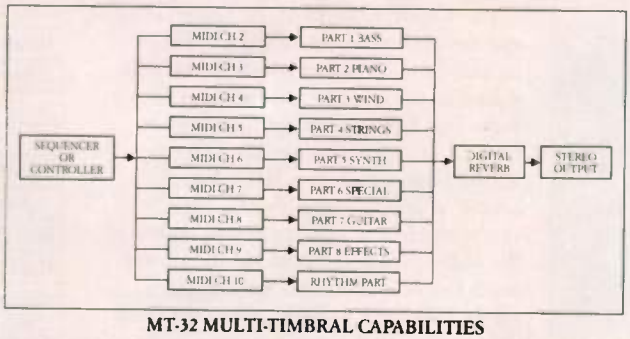

MT-32 MULTI-TIMBRAL CAPABILITIES

Equally impressive is the quality of the sounds produced by the MT-32. All of the 128 preset patches and 64 user-programmable patches are created through LA synthesis—the same synthesis technique used in the Roland D-50 (voted the Technological Innovation of the Year by *Keyboard* Magazine readers). Like the D-50, the MT-32 features 128 PCM digital sound samples, combined with digitally synthesized partials, and built-in digital reverb effects.

The preset sounds are arranged in Sound Groups including several different instruments and timbres from each group: Piano, Organ, Keyboard, Bass, Syn-Bass, Synth 1 & 2, Strings, Wind, Brass, Syn-Brass, Mallet, Special Inst., Percussion and Effects. But don't expect just *any* preset sounds until you hear what the MT-32 can do. Experience the breath of the flute, the bite of the brass voices, the chop of the bow as it moves across the strings—the kind of nuance that gives each patch life other digital synthesizers simply can't touch.

The power of the MT-32 really comes through when you combine these voices together under sequencer control. It's almost hard to believe the sheer amount of simultaneous sound the MT-32 is capable of producing—literally like adding eight synthesizer modules plus a rhythm module to a set-up. But fortunately, to get this much sound, you only have to buy one. And with a suggested retail price of just $695.00 that's not too hard to do. See your Roland dealer today.

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ENLARGING THE WINDOW

Graphic editing/librarian software for the PCM 70 Digital Effects Processor: a Lexicon applications brief.

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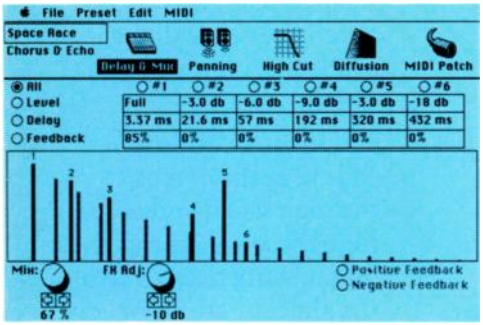
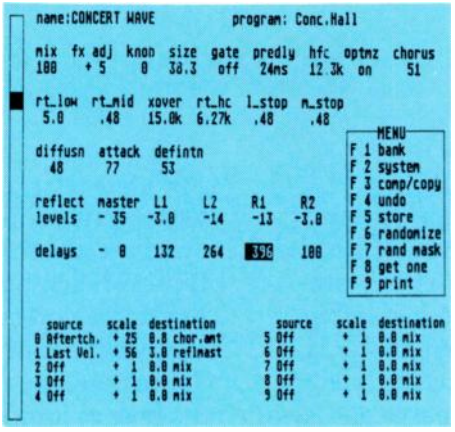
As soon as software developers got wind of our intentions, they began asking us to release the Sys Ex spec so they could write editors and register librarians. Not that there isn't ample storage space for your own sounds, or the tools to create them using the flourescent display "window" and the soft knob. But a computer does make it easier to fully explore the PCM 70's vast potential.

We released, they wrote, and now even those of you who haven't heard a PCM 70 can see what sets it apart. Just examine these screens from Digidesign's FX



Designer™ and the Caged Artist PCM 70 Editor by Dr. T's Music Software. Each expands the PCM 70's window in a different way, revealing the unprecedented intricacy of PCM 70 algorithms. With more parameters than typical effects have programs, these algorithms give you powerful, detailed control over your sound: computer-based editors help you make the most of it.

FX Designer uses Macintosh graphics to amplify the meaning of PCM 70 parameter values with informative displays. Each screen lets you edit several related parameters and shows you what you're doing. As you edit *Delay* values in this **Delay & Mix** screen, the bars move to show time relationships. They grow and shrink as you change the *Level* settings. FX Designer includes over two hundred pre-programmed registers to suggest avenues of exploration, and interfaces with Opcode Systems' PCM 70 librarian so you can store your discoveries.



The Caged Artist PCM 70 Editor widens the window to put all parameters of an algorithm on screen at once. You edit values as fast as you can move and click a button on the Atari ST (or Commodore 64/128 or Apple IIe) mouse. The other mouse button triggers a MIDI sound source so you can hear exactly what you're doing and how the sound relates to the instrument and the music you're writing it for: how chorusing spreads out a synth voice, or how BPM affects the echo delay times. In this patch, echoes and chorusing are panned to the PCM 70's two outputs, for independent mixing and balancing of the two effects.

If you're not sure what all this means, the Randomize function will explore possibilities for you: it varies the parameters you choose in the range you specify to generate new registers. The Compare/Copy function lets you shift *Dynamic MIDI* control patches and other parameters between registers (so Aftertouch could always add more chorusing, as it does in this Chorus & Echo program). The built-in librarian holds 200 registers.

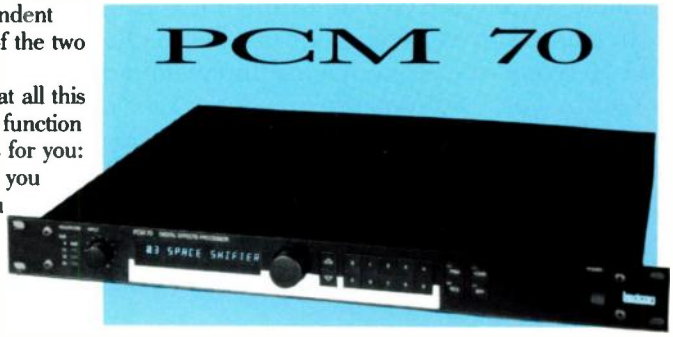
You may think you already know what the PCM 70 sounds like, but these editing programs will surprise you. Faster, more intuitive editing not only lets you tailor reverbs and delay effects faster, it will reveal capabilities you've overlooked until now.

Now that you can write more sounds in the time available, you'll need larger storage space. Computer-based editors let you store complete register banks: librarian programs from Opcode Systems (for the Macintosh), Club MIDI and Voyetra (for IBM PCs and compatibles), or Hybrid Arts (for Atari STs) give you the filing capabilities you need to rearrange your sounds in useful categories.

The PCM 70 lets you design sonic spaces and make them an interactive part of your music. The new graphic editors and librarians give you even greater freedom to explore the potential of this unique instrument. The window to new dimensions is wider now: step through it at your Lexicon dealer.

Graphic Editor/Librarians
Digidesign *FX Designer*
Dr. T's *PCM 70 Editor/Librarian*

Patch Librarians
Voyetra Technologies *Patch Master Plus*
Club MIDI *Prolib*
Hybrid Arts *GenPatch ST*
Opcode Systems *PCM Librarian with Patch Factory*



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—from page 91, FIRST TAKE

probably will. Some games that don't show as files in a GEM window may not work at all, and with the slowed down mouse and graphic response, some games may not be as playable. The company says it has compiled a large list of programs that will work with OmniRes, and they say they will continue to add patches for popular titles, with a "nominal charge" for updates.

I love my monochrome monitor, but I do have a few programs that won't run in high resolution. Thanks to HyperTek/Silicon Springs, I can use them. By the way, an updated version is said to allow color monitor owners to run high-resolution software.

—Jamie Krutz

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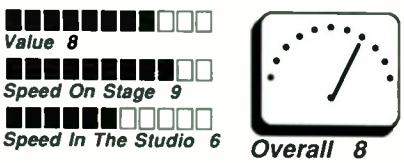
MIDImouse Music Atari ST Fast Tracks ST 1.0 ($130)



If this sequencing software were a car, it would be an old Dodge Dart—not too flashy-looking on the outside, but it'll get you there. I have a friend who used to drag race with a dumpy-looking little Dart. He had a 440 GTX engine hidden under that plain jane hood. He cleaned up.

Like the Dart, *Fast Tracks* looks pretty pedestrian at first. The packaging is generic, the manual is a stapled-together dot-matrix printout, and the program runs entirely off of menu selections chosen from the keyboard. There is no mouse support at all.

If you check under the hood, however, a little secret awaits you: Fast Tracks ST is designed for the fast-paced world of live performance. On a 1040ST the program claims over 100,000 "notes" in memory at one time, and on a 520ST, over 49,000 "notes." (The number of each machine equals its Kbyte memory capacity, and either can theoretically be expanded to a maximum of 4 megabytes). According to the manual, a "note" is two MIDI events; each note my DX7 sounded used up two Fast Tracks ST "notes," though. Additionally, controller information can spit out lots of MIDI events per note, so take that into account.

Up to 16 *sequence sets* can be in memory at once. They each contain 16 *sequences* which can be chained very flexibly into up to 16 *songs*. Each sequence contains 16 *tracks*. The number of compositions available in memory depends on how you record them. If each sequence set is one composition, you can have up to 16 compositions available in memory. If each sequence or song is a composition, you can have up to 256 compositions available. If each track is a composition you can have up to 4,096 compositions available in RAM.

Realistically, memory limitations would limit the latter example to slightly over ten notes per composition on a 1040ST, but the real strength here for live use is the ability to have a set's worth of music in the computer, ready for speedy recall and performance. (Recall could be even speedier if fewer keystrokes were needed to launch each new composition.) In the studio, Fast Tracks is not as fast and flexible as other ST sequencers on the market. Here, mouse support and the niceties of the GEM user interface (drop-down menus, requester boxes, and interactive graphic displays of data) would be useful.

The track level is where recording is done. The length of a sequence is determined by the length of its longest track. Tracks can be quantized and transposed by range, shifted in time, copied and combined. The program forces you to enter both a patch number and MIDI channel before recording, though they can be edited later. It can take nine keystrokes to start a track recording, which doesn't make for fast operation in the studio. There is a punch-in/punch-out feature, but no list or graphic note editing (although Version 2.0 does provide step editing; see below). A handy looping feature makes it easy to experiment with additional parts before recording them, and the variable countdown feature is also a nice touch.

If you want the most comfortable ride, air conditioning and a five-way power seat, other sequencers may be for you, especially in the studio. But if you want a very affordable sequencer designed for speed in a live performance situation, this is one stripped-down, souped-up contender. *—Jamie Krutz*

(Ed. note: As we went to press, MIDImouse started shipping Version 2.0, which features an enhanced step-editing mode, some additional new features, and an updated manual. The list price remains at $130, and free updates are available to owners of version 1.0.)

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Amiga fans, take heart—music software is coming out of the lab and into your MIDI setup. And judging from entries such as this, it was worth the wait.

DXII Master Editor/Librarian

BY DEAN FRIEDMAN

Sound Quest Inc., based in Toronto, Canada, is a new software developer with some very progressive music software geared (at present) exclusively for the Commodore Amiga. One of their impressive offerings is *DXII Master*, an editor/librarian for that Cadillac of synthesizers, the DX7II—both the FD and the D as well as the DX7S and the TX802. (It also edits voice and voice bank data on the DX7, DX9, TX7 and TF1.) DXII Master has the same degree of power as the DX7II. The screen is full without being cluttered, and getting around on it is a breeze. The beauty of the program, though, is that it doesn't just provide you with displays and menus that correspond to the many parameters of the synthesizer. Rather, it introduces some amazing new features of its own that serve to enhance the programming of an already potent machine. Ideally, this is what every editor is supposed to do; this one succeeds. But before I get started on the extras, let's cover the kinds of basics this program does so well.

THE BASICS

Most data management—dumping data between synth and disk, and normal librarian routines—happens from the main window. It's also the place from which you open the six main editing windows, which correspond to the six types of data the DX7II uses: Voice, Performance, System Setup, Fractional Scaling, Microtuning, and Additional Voice Parameters (controller settings and so forth).

The edit window most familiar to DX users is the Voice Edit window. This screen clearly displays the six operator algorithms along with all of their rates, levels, frequencies and other values. Written for the Amiga's enhanced graphic ability, DXII Master makes excellent use of the computer's custom graphics chips to update complex color graphics continually, in real time. It not only looks great, it's fun.

You design envelopes either by changing the numeric values of the rates and levels, or by using the mouse to click and drag a graphic display of an envelope. Drag one of the four points of the envelope vertically to change the level, drag it horizontally to change the rate, or drag it diagonally to change both. All numeric values change in real time as you redraw the envelope, and vice versa; there's no more staring at mind-numbing rows of rate and level numbers. The screen even includes miniature envelope graphs for each of the inactive operators, depicting their current shapes. The global editing feature makes it possible to lock the pa-

PRODUCT SUMMARY

Product:
DXII Master
Type:
Voice editor/librarian software
Retail price:
$175
Features:
Edits all DX7II system exclusive parameters; random voice generator; envelope and scaling editing; multitasking data management features.
Manufacturer:
Sound Quest
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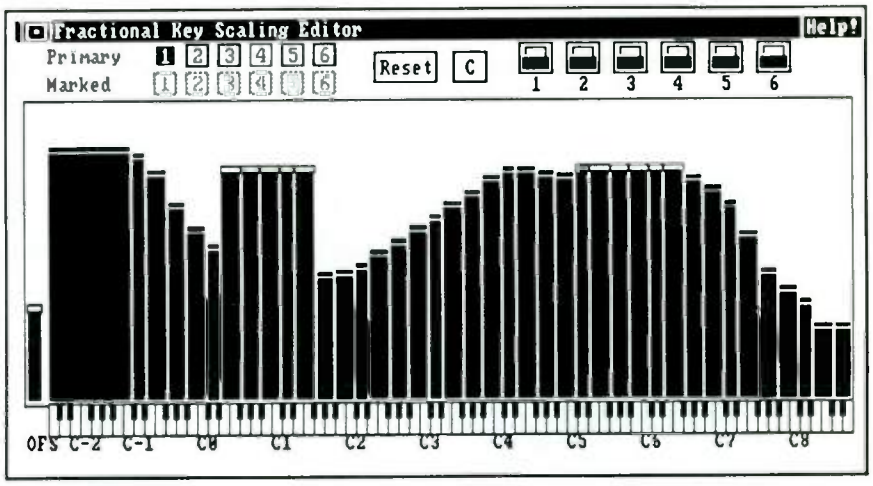

Sound Quest DXII Master

rameters of any or all of the six operators together, so that, for instance, if you were to lock operators 1, 2, and 3 together, changing the envelope of any one of the three would simultaneously change the other two envelopes' graphs.

Normal keyboard level scaling is edited in much the same way, either numerically or graphically. Change right and left depths by moving a drag bar vertically, change the center point by doing the same horizontally. As with the envelopes, the program lets you see graphs for the other five inactive operators as well, which again are updated in real time.

All other voice parameters are edited by changing either numbers or text using the mouse and a movable window; this window contains icons for incremental (+1 or -1) value changes and a *drag bar* for continuous value changes. This is like having a data entry fader that you can move around to any part of the synthesizer. Yet you don't have to use the computer to change values; the program responds in real time to edits done directly on the synthesizer.

DXII Master uses four colors in its displays. Whenever you change a value from its original setting, its color changes from blue to black. To recall an original setting, either click on the reset icon or, or using the mouse, slide through the values of a parameter until the value flashes back to its original color. In many instances this is more useful than a typical *edit compare* command in that it gives you a point of reference on a continuum within the same patch, as opposed to having to switch over to the original patch and then back again, all the while remembering the original settings. In addition, four instant access edit buffers allow you to jump around among four completely different sounds, or four variations of a single sound.

To hear your edits without reaching over to your synthesizer, simply press the right mouse button to trigger one of three pre-programmed note events: a single note, a chord of up to 16 notes, or a note sequence of up to 16 notes. You define the pitch, key velocity and playback speed. In the single note mode you determine pitch and velocity by the screen position of the mouse icon when you click. You can also disengage the mouse control and have the note or notes retrigger every time you change an edit parameter.

Like most people, I look forward to reading through a thick new software manual about as much as I look forward to getting my teeth cleaned, and I feel a really good program, no matter how complex, should at least get you started without having to get too deep into the documentation. DXII Master is a really good program. Whatever isn't made obvious by the program's presentation is thoroughly explained in one of the full screen *Help* windows, which is one click away from any one of the editor pages.

What we've covered so far is pretty standard DX editor stuff, albeit all done exceedingly well. But now the neat stuff begins. The main features that distinguish the DX7II from the original DX7 (other than superb sound quality) are Fractional Scaling, Microtuning, Stereo Panning and expanded MIDI capabilities. In *each* of these areas, DXII Master shows itself to be a master indeed.

FRACTIONAL SCALING

The most impressive of these features is the Fractional Scaling window.

Anyone who's attempted to design Fractional Scaling for a patch on the DX-7II will delight at the absolute ease with which it's accomplished by DXII Master. When you work with the DX7II alone, the synthesizer only displays a maximum of three, three-note scaling ranges at a time, giving you the numerical values of the active scaling range as well as the values of the ranges to the immediate left and right. This is like painting a landscape one blade of grass at a time, and only being able to see one square inch of the canvas while you're doing it: do-able, but no fun.

DXII Master gives you a representational bar chart of the entire MIDI keyboard (ten octaves) divided up into Fractional Scaling ranges, all of whose values can be instantly changed with a single sweep of the mouse. As easily as you draw a squiggly line with a pencil, the program allows you to draw an entire Fractional Scaling by clicking and dragging. As you drag, the bar values for each Fractional Scaling range update instantly according to the position of the mouse, enabling you to design complex—yet flowing—scalings for every operator in an algorithm.

I can't tell you what a kick it is to use this part of the program. Seeing the entire Fractional Scaling range displayed at once, and being able to change it so dynamically and easily, gives real life to a generally misunderstood and under-utilized DX7II feature.

MICROTUNING

DXII Master handles Microtuning equally well. The Microtuning window displays a full MIDI keyboard with tuning values listed on each key, switchable between note number or cents. A handy addition/multiplication calculator feature allows you to calculate note relationships, useful when designing exotic scales.

All the other edit windows consistently offer exceedingly logical editing, inevitably easing DX7II programming. Even if functions are not immediately clear, the program's intelligent groupings of parameters and simple graphics eventually evoke the reaction: "Well, of course, it had to be that way." Even a process as mundane as Program Change transmission (re-assigning program change numbers to the program buttons) is made enormously easier by being able to see all 64 program numbers and their corresponding changes at once. As with all other parameters, color coding the original settings vs. the changed values gives you a good overall sense of what's happening at a glance.

Of course, no DX editor would be complete without offering some kind of random voice generator, and again DXII Master lives up to its name by offering several different ways of generating random voices. The first is the Random Voice Generator window, which provides a choice of nine different sound parameters corresponding to various portions of the FM voice, and settable for degree of randomness: *Algorithm Select*, *Algorithm Complexity*, *Brightness*, *Sensitivity*, *Bandwidth Dissonance*, *Shape*, *Level*, and *Wood*.

Bandwidth refers to the harmonic content defined by frequency relationship. Brightness is a function of modulator level, and Wood refers to the use of the fixed frequency mode on an operator.

Instead of the actual names of the parameters being controlled, the software uses generic labels such as *Brightness* and *Shape*. This is odd, but I think I understand the programmer's intent. This is after all a random voice generator, and the reality is that even knowing precisely what portions of the operator are being randomized isn't going to help terribly much in predicting what the resulting sound is going to be. So in that sense I suppose it might be more useful to think of the controlling parameters in terms of their sound qualities as opposed to their operational names such as Envelopes, Feedback, Frequency or Mode.

In any case, it works very well. You can either generate a single sound or an entire bank of 32 sounds. A slight change of one parameter and you've just generated 32 more. As with any random generator, the hard part is separating the wheat from the chaff.

NON-RANDOM VOICES

There are two other ways of generating new voices that are somewhat less random: *Voice Slide* and *Voice Mix*. Voice Slide generates 32 voices whose parameters fall along a continuum between any two existing voices that you select. It's a way of merging two similar voices or of using two distinct voices to create a host of unusual related patches. Voice Mix is similar except that each of the 32 new voices will contain some parameters identical to the original two, and instead of the values being gradually merged, they are mixed and sorted.

THE MASTER MANAGER

So what do you do with all of these patches now that you've made them?

If you own a DX7II (FD/D), you already know the pain of data management—storing and swapping patches, performance memories, Fractional Scalings, Microtunings and System Setup information. DXII Master does what it can to make the task a little more painless (though you still have to know what you're trying to send where), such as displaying text names for all the files on a disk.

Beyond that, the *Key* feature allows you to attach key words to files on a disk to call up only files that contain the key word. This is a fast way of calling up a specific set of patches for a specific application or song. DXII Master can also load and send any System Exclusive data saved to disk by any of Sound Quest's other voice editor products. So, for instance, you could load Roland D-50 patches (saved to disk by *D-50 Master*) into a D-50 with DXII Master.

The DXII Master disk also contains a handy utility called Quicksend—a routine you can access without even opening up the DXII Master program—that quickly dumps large chunks of pre-tagged data into your synth. It's a quickie voice/bank dump that avoids a lot of housekeeping by sending voice parameters directly from the disk.

IN GENERAL

In general everything this program does, it does well. A few features—particularly the Fractional Scaling window—are simply terrific.

Of course, owing to the multi-tasking architecture of the Commodore Amiga, this program can run simultaneously (yes, *simultaneously*) with any other Amiga program. Some computers can suspend one program and pull down another without having to reboot, but the Amiga lets you run a sequencing program *and* edit voices with DXII Master *while the sequencer is running*. Imagine playing a sequence, generating random voices, and loading them into your synthesizer while the sequence plays—this is seriously wild stuff.

THE NEGATIVES

As far as I'm concerned there is only one minor drawback to the whole program.

Although the librarian/data management part of the program does what it can to ease the difficult organizing of vast amounts of different types of data, it leaves deleting files up to the main Workbench screen (the Amiga's operating system). This is really no big deal, amounting to an extra few clicks of the mouse, but it would have been nicer to see a delete file option in the main menu.

In context, however, this is insignificant. The program really is great, and it's a pleasure to see developers finally using the full potential of the Amiga. My compliments to Mike Lambie, Sound Quest's programmer, on a truly beautiful piece of work.

EM

Dedicate

Dedicating yourself to your music often means working long hours at your mixer experimenting with effects. But, sometimes this can be frustrating. Like when you get the urge to add reverb to a vocal and you find yourself running around the back of your mixer fumbling with cables. Getting confused. While your concentration and your music suffer.

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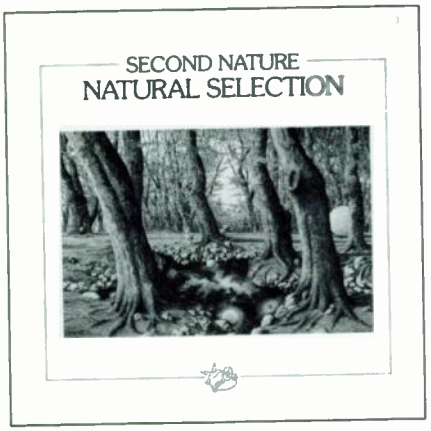
BY ROBERT CARLBERG

I must be out of touch. Why else would most of my favorite albums be out of print? Why else would it be so disappointing to visit a CD store? Why else would the composition of the Top-40 charts seem so unfathomable?



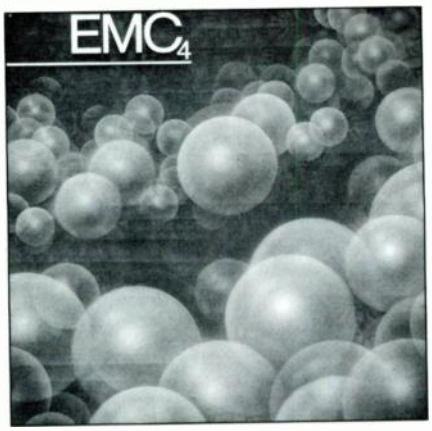
I read the trades. I listen to college radio stations. I tune in MTV and VH-1. I visit record stores. I subscribe to *Eurock*. Does this keep me up with what's happening?

Hardly. It only serves to remind me of the incredible volume of music out there that I will never hear. There are five billion people on earth, and sometimes it seems they're all musicians.

There is some logic to being out of touch with the farther reaches. Music in other lands would be unlikely to cross paths with me unless it appeared on the radio or TV or in the local record stores, which it seldom does. For the same reason, private releases put out by individuals probably wouldn't catch my attention without some media exposure. Here at **Electronic Musician** (one of the smaller players) we get about a hundred tapes and records per month, and that's just a tiny, tiny fraction of what's released every day. There wouldn't be enough time in one life to hear them all anyway.

You can follow a name, or a style, or a label known to be consistent. You can buy new music when you feel like experimenting, or when something catches your ear on the radio, or maybe even based on a review. But you can't hope to be comprehensive, even within the smallest of specialties.

That's not why I feel out of touch though. In my years of collecting music I have developed some favorites, and almost without exception they're out of favor now, out of style and out of print. For the purposes of argument let's talk about recent rock bands, but the same is true of jazz, classical, or any other style. Some are innovative foreign bands that just never really caught on in the U.S.: Gentle Giant, Gryphon, Ekseption, Agitation Free, Ragnarok. Some are musicians' holidays that never were intended to cash in: Brand X,



Bruford, Penguin Cafe Orchestra, Hatfield & The North, Gilgamesh, Oregon, Nucleus, Isotope, Soft Machine. Some were earlier, more progressive incarnations of bands who, though they still exist in name, bear little resemblance to their origins: Jethro Tull, Pink Floyd, Genesis, Yes, Tangerine Dream.

Reading the list, you may understand my disorientation: if my favorites have already done so poorly in the "test of time," what hope is there for the future?

Today's hitmakers are cookie-cutter bands with interchangeable songs who look alike, sound alike and think alike. That goes even for the aforementioned "progressives" who have joined the corporate ranks and now sound like everybody else. We used to call that "selling out," but these days there's nothing to sell out *from*.

Reportedly, the revamped "progressives" are selling more albums now than they ever did before. A few years ago, "progressive" was an adjective of praise and "commercial" an adjective of scorn. Today these positions are reversed.

Am I out of touch or what?

All this was brought home by the arrival of a new cassette, ***Life Cycle*** by guitar synthesist Bill Berends. Berends was behind another tape, ***Mastermind Vol. 1***, with his group Mastermind, consisting of himself, his brother Rich Berends on drums, and his friend Phil Antolino on bass guitar. The tape had been startlingly exceptional, brimming with exciting ideas and powerful musicianship. The fact that it owed much to the progressive rock movement of the early '70s in no way diminished its effect, as I tried to convey in my review last August.

Well, in the letter accompanying ***Life Cycle***, Bill thanked me for the complimentary review, and then went on to lament that "Shrapnel Records loves our tape but said they can't sell it, and Derek Schulman at PolyGram thought it was good but didn't have hit potential." Hit potential! Derek Schulman was once the vocalist for Gentle Giant for crying out loud. Is this what the industry's reduced him to, rejecting everything without "hit potential?"

Bill continues, "The new age companies think it's too heavy and dated sounding, and the rest of the music industry hates progressive rock. The Emerson Lake & Palmer comparison has been the kiss of death." Let's ask a small question here: how long do you suppose it will be before new age music is "dated sounding?" Is fashion such a large part of the industry that it's more important than the quality of the music? I guess we know the answer to that one.

So does Bill Berends. For ***Life Cycle*** he's done some serious woodshedding, "searching for a new direction" in his words. The result is a marvelous distillation of the memorable riffing and driving momentum of the Mastermind material, but couched in an '80s sensibility with a much more new age, heavily synthesized/polished/rounded-off sound (he even slips in some nature recordings!). It still has more vitality than 99.9% of the blissed-out drivel that passes as new age muzak (rhymes with "sewage"), but it sounds contemporary instead of "dated." Here's wishing him success in his search for a record label, because it deserves to be released on CD. Meanwhile, cassettes (***Life Cycle*** or ***Mastermind***) are available for $7 apiece from Trademark Music, PO Box 1259, Browns Mills, NJ 08015.

Of course, new age music isn't all "blissed-out drivel." David Casper (Hummingbird Records, PO Box 30714, Seattle, WA 98103 ☎ 206 / 782-1512) plays a cheng, a sort of Chinese koto-harp, on his seven albums: ***Hear and Be Yonder*** (1981), ***Tantra-La*** (1982), ***Another Kind of Sky*** (1983), ***Crystal Waves*** (1984), ***Earthsight*** (1986; cassette only), ***Let The Earth Be Happy*** (1987) and ***Natural Selection*** (1987, with his group Second Nature). Each of these releases embodies a pan-cultural blending that represents new age at its best, drawing on the "cultural archives of the globe" without plundering them. Utilizing a vast array of instruments (piano, bass, cello, marimba, kalimba, ocarina, ch'in, h'siao, sitar, tablas, jew's harp, glass harmonica, and a dozen others), Casper manages to keep the relatively simple structures of his pieces interesting with sonic variety and frequent changes ($9, cassette or LP).

Another tape that points up just how low our standards have sunk, by providing what we should expect from all of them, is ***The Ritual Continues*** by Diam Karet. This L.A. four-piece rivals the glory days of Pink Floyd or This Heat or any other experimental rock band you care to mention. Unconventional playing techniques, sound effects, non-Western heavily percussive rhythms and a genuine inventiveness are captured in this live recording (no overdubs). Like This Heat or early Floyd, they seem to be forging a fresh new direction, not still experimenting (they had a year of rehearsals) but delivering completed musical statements in a new language all their own. This is another fine effort (and

digital recording!) which I wish I could hear on CD. PO Box 883, Claremont, CA 91711.

One album which is on CD because it was funded by the Canadian Broadcasting Corporation, Imperial Oil Limited, the Laidlaw Foundation, the Ontario Arts Council and the City of Toronto Arts Council is ***Impact*** by percussionist Beverly Johnston and clarinetist James Campbell. The four contemporary classical works range from the percussion extravaganzas "Steal The Thunder" by Jean Piche and "Chronaxie" by Serge Arcuri, to "Angels" by Gary Kulesha, a melancholy meditation for marimba and *musique concrete*. Piche, whose ***Hellograms*** was one of the best albums of 1982, includes what sounds like a string synthesizer (actually a single kettle drum manipulated by a Fairlight), Kulesha uses a Prophet 5, and Arcuri uses a Jupiter 8. Only Alexina Louie's piece, "Cadenzas," is all acoustic. In all, this CD, though supported by grants and sounding unpromising in concept, presents some of the finest contemporary classical/avant garde/*musique concrete* in my experience. It's much stronger than the similar ***Go Between*** by The New Percussion Group of Amsterdam with Bill Bruford (Editions EG), who is now three for three with ***Cloud About Mercury*** and ***Earthworks***. Phooey. He's rapidly becoming not my favorite drummer anymore.

There's better drumming in ***Better Than Nothing*** (cassette) by The Hello. The Hello is a "pretend band" (their term) made up of Miles McManus and Carey Kriger on Mirage and Roland JX-3P driven by an IBM PC. The band may be pretend, but the music is very real. It's synthesizer rock—a term which may make you wince from overuse—but performed so cleverly and tastefully that even jaded old reviewers get excited about it. Their Mirage textures are quite digital (and well-recorded!), and the percussion tracks are among the catchiest I've heard. Miles says they "have been recording with a sort of makeshift home studio for a couple years now to the seemingly endless amusement of friends and relatives." Better than nothing? Hell, these guys are better than almost everything on the radio. It may be too late to become a relative, but new friends can send money to 1512 Corona, Austin, TX 78723 ☎ 512 / 346-7266. Do it soon, to prevent the Mirage of their pretend band from vanishing!

The more languages you speak, the more likely you may be able to convey your thoughts to a varied audience. Bill Greenawalt (PO Box 215, New Milford, NJ 07646) speaks several musical languages fluently: electronic rock, new age piano solo, meditational electronics, contemporary classical composition. With all of these styles in abundance, Greenawalt's ***Black and White*** solo debut cassette ($8.95, postpaid) should say something to almost everyone. Just to add insult to injury, he's also tied together all the tracks with recurring melodic themes, making the collection a concept album rather than a compilation. I don't think the term *tour de force* would be inappropriate, if you'll pardon my French.

Not that compilation albums are necessarily a bad thing. The fourth such from Edmonds Community College's Electronic Music Club, ***EMC(4)***, is now available for $5 from advisor Jim Guard, 20,000 68th Avenue West, Lynnwood, WA 98036. You won't believe the quality of these student compositions; I've heard official releases from well-known names with less sophistication, fewer ideas and lesser fidelity. These kids (am I getting old enough to call 'em that?) are amazing.

I guess there is hope for the future. How can I lose faith when so much fabulous music is hiding out there, lurking just behind the facade of so-so stuff on the radio? Okay, okay, I take it all back. I'm too young to be a curmudgeon anyway.

Please send as much music as you possibly can as soon as you can to Robert Carlberg, PO Box 16211, Seattle, WA 98116, where it will lay in a pile of dust waiting for a free weekend. Opinions expressed herein are probably not shared by any other living being. EM

—from page 69, PERFORMER

name by choosing *Save As* from the File menu, and start recording.

DYNAMICS

In addition to timing, the feel of a performance also depends upon the placement of accents, or *dynamics*. The quickest way to get dynamics into your sequence is to record in real time from a velocity-sensitive keyboard or drum pad. Unfortunately, you can have occasional problems with uneven accents: certain notes will either be too loud or seem to drop out.

You can easily fix these uneven dynamics by applying a kind of "MIDI compression"; this technique is also applicable to *Master Tracks Pro* and probably other sequencers too. Suppose, for example, that your track has an average velocity of 90, and an unacceptably large range of velocities from 60 to 120. Here's what you do.

Select the region, then go to the Region menu and select *Change Velocity*. In the change velocity menu, select *Change to 50% of current value*. Your velocity now ranges from 30 to 60, and averages 45. Go back to the Change Velocity menu and select *Add 45 to all velocities*. Your average velocity is now back up to 90, but ranges only from 75 to 105.

Of course, you can also change individual accents by editing velocity values directly in the Event List edit window.

CONCLUSION

Performer is a powerful and flexible tool that allows you to capture the subtleties of real-time performance and lets you manipulate and edit the resulting data. There are several powerful commands and options that allow global manipulation of timing and velocity information. To achieve musical results such as swing or velocity compression, you sometimes have to combine several basic operations. If you don't see a command for what you want to do, sit down and analyze exactly what result you want, then look for a combination of commands that will produce this result. Remember, with an open-ended tool like Performer, there are many different ways to accomplish a given result. EM

Kalle Nemvalts is a trumpet player, composer, and consultant on technology in music. He can be reached on PAN as KALLE.

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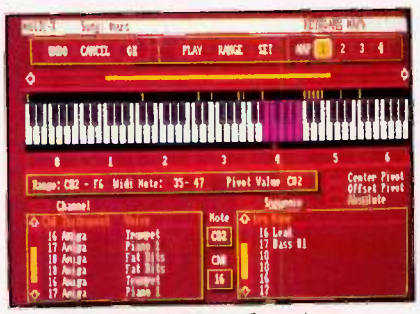

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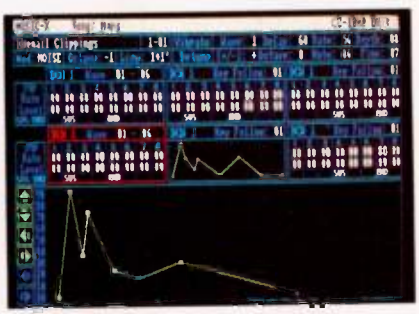

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