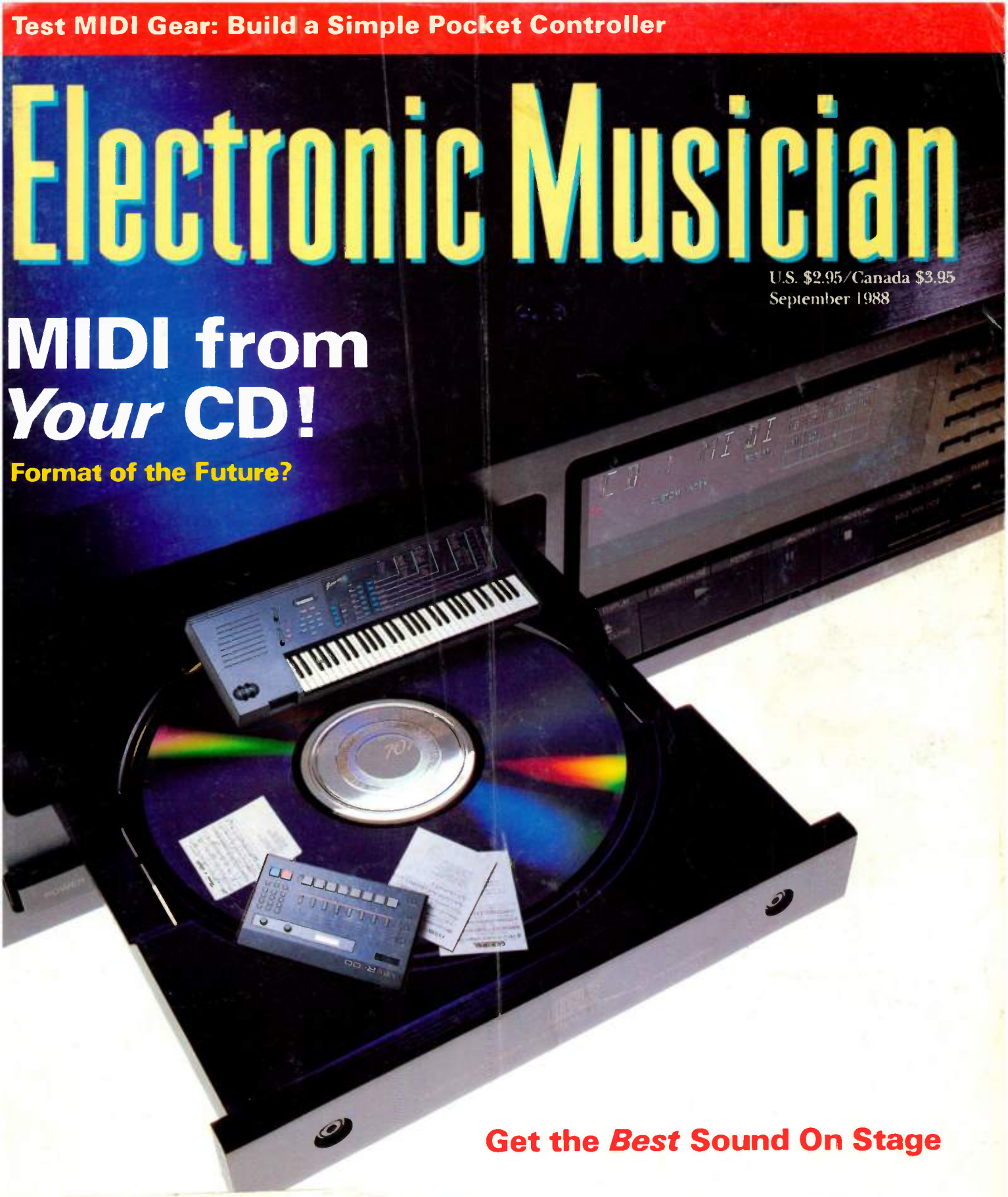
Test MIDI Gear: Build a Simple Pocket Controller

Electronic Musician

U.S. $2.95/Canada $3.95
September 1988

MIDI from *Your* CD!

Format of the Future?



Get the *Best* Sound On Stage

REVIEWS: Dr. T's KCS (ATARI) • Passport Score (IBM) • Jim Miller's Personal Composer (IBM) • Altech MIDI Interfaces (MAC) • Magnetic Music Pyramid TX/DX Editor (IBM) • Valhala Studio Series D-50 Patches

A Mix Publication

Vision Becomes Reality. The M1 Digital Music Workstation

Every once in a while someone comes up with a better product. Less often, a company creates a better product that changes the entire nature of the music industry. The M1, a digital synthesizer/rhythm programmer/sequencer/multi-effects workstation, was conceived as a powerful tool that not only helps creative musicians express their ideas in the most complete form, but also becomes one of the most expressive and versatile performance instruments ever built.

Power To Perform

The M1 brings a new level of power to live performance with 2 megawords of ROM. Every one of the Programs and Combinations (up to 100 of each) is ready to play *instantly*. There's no loading time, because there's no loading. Nothing else gives you sounds this good, this fast.

The 61 note velocity and aftertouch-sensitive keyboard includes extensive parameter voicing that puts literally unlimited performance power in your hands with features like layers, splits and eight way zones across the keyboard.

Power To Produce

The heart of M1's power is 4 megabytes of 16 bit PCM ROM with multisamples of pianos, strings, brass, voices, guitars, attack transients, waveforms and much more.

M1's full-function drum machine has over 42 internal drum and percussion sounds that can be grouped into four user-defined drum kits.

Give extra dimension to your sounds with M1's 33 digital multi-effects including reverbs, stereo delays, panning chorusing, a digital exciter, distortion and more with a choice of four effects per program or combination independently routable to the four polyphonic outs.

Put an entire musical composition or arrangement together with M1's comprehensive 8-track sequencer with song position pointer, phrase and linear based recording, dynamic voice allocation, as well as single event editing.

And M1 power is designed to grow with you: RAM card memory stores extra sequences or programs. And there's an expanding sound library on ROM cards.

Let M1 power turn your ideas into realities. See your authorized Korg Dealer to find out more about the M1 Musical Workstation.

KORG®

MUSIC POWER

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.

Exclusively distributed in Canada by: Erikson Music, 378 Isabey Street, St. Laurent, Quebec H4T 1W1

Why should a sampled piano respond like a grand?

Expressiveness.

"The piano is my main instrument for writing and arranging, so I need sound and a good action. I'm impressed with the Korg SG-1 sampling piano: the action and touch sensitivity is very good. The tone is sharp and clear and will carry a lot better than a conventional piano miked up."

Keith Emerson, Keyboardist/Composer

For years, musicians have been looking for an electronic piano which offered the same expressive capabilities and sounds as the classic acoustic grand piano. They needed the convenience of sonic versatility, portability and reliability, but the basic criteria for sound and expressiveness had to remain true to the original. The Korg SG-1 and SG-1D easily fulfill those criteria while offering a more versatile and practical alternative for the modern pianist.

Realism To begin with, Korg's new SG-1 Sampling Grand uses the most refined 12 bit sampling technology to reproduce the sound of the legendary acoustic Concert Grand piano with uncanny realism. The SG-1's highly accurate acoustic and electronic piano ROM-based sounds are characterized by exceptional clarity, depth and textural richness. Sophisticated digital technology lets Korg eliminate the historical design compromises of electro-mechanical pianos. The SG-1 finally translates the acoustic essence of the Concert Grand into the realm of modern amplified music.

Response Equally important, the SG-1 responds to the touch exactly like a grand piano. Full-sized piano keys (76 for the SG-1, 88 for the SG-1D) combine with a true weighted action for the firm yet supple feel of the concert instrument. Differentiated touch-response adjustable in eight steps gives the modern pianist total expressive control over dynamics and the most subtle nuances of tone and timbre.

Range The sonic versatility of the SG-1 starts with four built-in sounds: acoustic grand, acoustic upright, classic "suitcase" Rhodes™ and electronic piano with a bright tine sound. Additional sounds including other acoustic and electric pianos, clavinet, harpsichords, marimbas, acoustic or electric guitars and more can be instantly loaded into the SG-1 with Korg's inexpensive and easily interchangeable ROM "credit" cards. Unlike other sampling instruments, the SG-1 doesn't limit your choices to factory presets.

The full expressive potential of MIDI can be exploited using the SG-1's responsive keyboard as system controller. It can send Velocity, Pitch Bend, Modulation and Sustain, receive MIDI data, select among 64 programs, send Aftertouch (SG-1D) and transpose within an octave (SG-1). A programmable split point with selectable Local Control On/Off offers the added flexibility of playing piano with one hand and controlling other synthesizers or expander modules via MIDI with the other.

Roadability Designed for today's stages, the SG-1 travels well and truly comes to life when amplified. Rugged and transportable, it eliminates longstanding touring piano problems like tuning instability, microphone feedback, fragility, excessive weight and size. And the SG-1 reduces the price of the acoustic grand to realistic proportions.

Combining all of the modern conveniences of an electronic piano, Korg's SG-1 and SG-1D benefit from the latest in sampling technology to express the true acoustic nature of the classic grand piano and more.

To find out more about the expressive possibilities of the Korg Sampling Grands, see your Authorized Korg Sampling Products Dealer.

KORG® Sampling Products Division

SAMPLING IS ONLY THE BEGINNING

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MAXIMUM CREATIVE ADVANTAGE.

D-20

The Ultimate
Multi-Timbral
Linear Synthesizer

L/A SYNTHESIS

Roland's highly acclaimed digital sound technology can now be yours in the advanced all-in-one D-20 Multi-Timbral Linear Synthesizer featuring a built-in 8-track MIDI Sequencer plus Disk Drive, Rhythm Composer, and Digital Reverb—the only complete MIDI music system designed for both performance and composition in a single affordable unit. Offering extensive 32-note polyphony, you can easily create distinctive new sounds using 128 programmable Patches, 128 programmable Timbres, plus 128 preset and 64 programmable Tones. In addition, the rhythm section provides 64 preset PCM Rhythm Sounds and 32 preset plus 32 Programmable Rhythm Patterns which can be combined to form a separate Rhythm Track. (Optional IC Memory Card doubles complete internal memory.) In Performance Mode, you can play along with your rhythms live using two individual synthesizer sounds, or activate the Sequencer (approximately 16,000 note capacity, excluding Rhythm Track) to control any external MIDI instruments as well. In Multi-Timbral Mode this amazing unit provides performance capabilities equal to 8 independent polyphonic synthesizers. A virtual self-contained instrumental ensemble, the D-20 provides everything you need to compose, record, and perform complete songs, with all MIDI data conveniently stored on a single disk (76,000 note capacity). Used as a professional Music Workstation, the D-20 offers an ideal creative environment for any musician who works at home, in the studio, or needs a compact songwriting tool to take on the road. Featuring a wide variety of musical styles, an exciting Autodemo has been specially created and built right into the D-20 to make it easy for you to directly hear its unparalleled capabilities at the touch of a button. The best way to discover what the new D-20 can do for your music is to audition it at a local Roland dealer today!

For more information call or write Roland Corporation US, 7200 Dominion Circle, Los Angeles, CA 90040. Telephone: 213-685-5141.

PG-10 Optional Programmer

PG-10 Optional Programmer enables you to edit tones quickly and easily—a powerful tool for creating exciting new sounds.

Roland
WE DESIGN THE FUTURE

Electronic Musician

A MIX PUBLICATION
SEPTEMBER 1988 VOL 4, NO 9

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Cover: Photo by David Bishop. Sony CDP-707ESD CD player courtesy Sony Corp. of America; Kawai R-100 courtesy Leo's Audio, Oakland, CA; Emax HD courtesy E-mu Systems.

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FOR YOUR INFORMATION

WHAT'S NEW THIS MONTH:

EM has a new look, thanks to designer David Armario, art director Kathy Marty, and the Mix Publications staff.

This is part of our commitment to unify the electronic musician universe by making information more readable and accessible to the public. We want more people to find enjoyment, creative release, and harmony through music-making, and we are trying to help—so look to this page each month to see what's new at **EM**.

ABOUT EM (*Electronic Musician*):

Since its inception in 1975 under the name *Polyphony*, **EM** has been a communications medium for sharing ideas, circuits, tips, and other information, and is dedicated to improving the state of the musical art.

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Send applications, inquiries, and address changes to: Electronic Musician, PO Box 3747, Escondido, CA 92025. Tel. (800) 334-8152 (outside CA) or (800) 255-3302 (CA). One year (12 issues) is $22; outside the U.S., $37 (accelerated delivery). Visa and MasterCard accepted (only Visa, MasterCard, or international money orders on foreign payments). You will receive a renewal notice before your subscription expires. To insure uninterrupted delivery, please renew as soon as you get your reminder, and we will extend your subscription beginning at the expiration of your current subscription. (Note: We need to process all renewal orders at least two months before current subscription expires.) Postmaster: Send address changes to **Electronic Musician**, PO Box 3747, Escondido, CA 92025-3747.

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This mail-order distribution service (a.k.a. Mix Bookshelf) offers products (books, instructional tapes, music and video software, etc.) oriented toward our readership. For a free catalog, contact: EM Bookshelf, 6400 Hollis St. #12, Emeryville, CA 94608; tel. (415) 653-3307 or (800) 233-9604.

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ERROR LOG:

Occasional errors are unavoidable. We list known errors in "Letters." Make corrections in your magazines so your archives are accurate. We compile corrections annually for those who order back issues; to receive a copy, send a SASE to "Error Log Listing" c/o **EM**.

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To have events (seminars, concerts, contests, etc.) listed, send dates and times *three months* prior to the event deadline.

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Readers: Unless otherwise noted, **EM** reviews production versions of hardware/software (there are no "reviews" written from press releases). We ask reviewers to really work with gear, so sometimes reviews appear later than some other publications. Therefore, we encourage readers to scan "What's New" for new product announcements, and contact the manufacturer for more info. Note: Manufacturers constantly update products, and prices and specifications stated in **EM** are subject to change. **EM** does not make product recommendations. Educate yourself, visit local stores, solicit opinions, and make your own decisions based on *your* needs. Reviews represent only the opinion of the author.

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We welcome opposing viewpoints, compliments and constructive criticism, and will consider these for publication unless requested otherwise (we reserve the right to edit them for space or clarity). All letters become the property of **EM**. Neither the staff nor authors have the time to respond to *all* letters, but all are read. If you have problems with your gear, please call the manufacturer, *not us*.

WRITING FOR EM:

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While most mail-order companies are competent, sometimes there are problems. Mail-order operations operate under strict federal guidelines; if you have any problems, contact the U.S. Postal Service for information. Order COD if possible. Sometimes **EM** authors offer circuit boards, software, etc. as a service to readers—allow 6-8 weeks for delivery; if there is a problem, contact the author.

DO-IT-YOURSELF (DIY) PROJECTS:

We do not have space to explain electronic construction in each issue. Read *Electronic Projects for Musicians* (available from EM Bookshelf) for the necessary background. If you cannot get a DIY project functioning, please check your work. Most problems are user mistakes; however, sometimes typos occur. If you detect an error in a schematic or listing, *let us know*. If a project doesn't work for you, contact us to see if anyone has reported any errors (wait at least a month for the magazine to be in circulation).

INTERNATIONAL PARTS SPEC:

EM specifies parts values following international protocol, thus minimizing decimal points and zeroes. A nanofarad (nF) = 1,000 pF or 0.001 μF. Examples: 2.2k (U.S. nomenclature) = 2k2 (Intl. nomenclature); 4.7 μF (U.S.) = 4μ7F (Intl.); 0.0056 μF (U.S.) = 5n6 (Intl.).

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Technology that improves with age.

To introduce a new product is one thing. To have it universally accepted is something else.

That's why we're so excited by the response we've had to the FZ-1 Digital Sampler.

In the year since we introduced the FZ-1, over 150 sound disks have been created for it.

And we're still creating new sounds and optional software. As are a lot of other people. Companies like Digi Design, Sampleware and Livewire Audio to name a few.

But there's even better news. The FZ-1 is now available in a rack-mount, the FZ-10M.

Not only do the FZs have an impressive sound library, they have a very impressive sound. Their 16-bit linear sampling resolution is the cleanest in its class.

Add to all this MIDI, 64-voice memory, flexible multi-timbral bank arrangements and up to 29 seconds of sampling time, and the FZ-1 and FZ-10M sound even better.

The FZ-1 and the FZ-10M. In this age of modern technology, it's nice to have technology that improves with age.

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Home of Nile Rodgers Productions.

Introducing Kawai's Maximum music.

You'll be amazed at the natural sound, expressive power and easy-to-use functions of Kawai's remarkable K1 keyboard and K1m tone module.

The Kawai K1 is an exciting new class of digital synthesizer giving you an inspiring range of dynamic sound at an unbelievable low price.

Amazing sound that inspires the imagination.

Kawai's new Sampled Digital Waveform technology results in a rich multi-timbral sound that you've got to hear to believe!

The K1 features 32 sound sources that generate 256 different digital waveforms. Kawai's advanced digital circuitry creates a clean, well-defined sound which resonates with surprising depth and character.

From the crisp snap of an electric bass or snare to smooth sustaining strings and voices, the K1's advanced waveform samples let you master the musical possibilities.

Imagine, up to four waves combined into a single sound. The strike of a piano hammer mixed with a violin sustain. Or the breath of a flute matched with a vocal choir. Each source has independent enveloping and modulation controls to give you total control.

Become an expert at sophisticated color tone mixing.

Unlock the creative genius in you with the K1's programming versatility.

With a single patch, you can program up to 8 sounds into a combination that includes splits, layers, multiple MIDI channels and independent keyboard control.

The K1m low-profile design is ideal for desktop use.

new K1 synthesizer. Minimum moola.

Dynamic note assignment and velocity zone functions further enhance the K1's multi-timbral capability. Strike a key softly and one note will play. Hit it a little harder and you'll hear another sound—a tonal variation or a completely different timbre. Create a simple duet, complex orchestral passage or monster solo unison, then save it for instant recall.

Touch response, easy access and full editing for a superb performance.

The 61-note K1 keyboard features Velocity, After-touch and weighted keys for excellent responsiveness. The LCD display and direct access buttons easily summon any of the K1's 64 internal single sounds or 32 multi-combinations. Optional memory cards expand the library of sounds available.

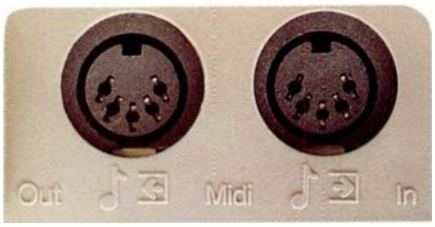
You'll also appreciate the easy, intelligent editing capabilities. Complete sound editing functions are available from the front panel without any additional equipment. Existing sounds can be modified and new ones created easily. Sound programs can be stored in any of the 96 internal memory locations or externally on the optional memory card.

The bottom line: You need to hear this synthesizer.

The K1 is the epitome of intelligent engineering at a very affordable price. But don't take our word for it. Visit your nearest Kawai dealer today and find out how you can achieve maximum music for minimum moola.

KAWAI

Kawai America Corp., 2055 E. University Dr., P.O. Box 9045, Compton, CA 90224
Kawai Canada Music Ltd., 6400 Shawson Dr., Unit #1, Mississauga, Ontario, Canada L5T1L8



THE DIFFERENCE BETWEEN A COMPUTER THAT MAKES MUSIC, AND ONE THAT MAKES TROUBLE.

Of all the personal computers you can buy to make music, none makes it easier than Atari computers.

That's because, unlike the others, the Atari 512-kilobyte 520ST™, 1-megabyte 1040ST™, and 2- and 4-megabyte MEGA™ computers have more of what you need already built-in.

Here's what we mean.

MIDI. The Key to Electronic Music.

As you may already know, the MIDI interface is the key to electronic music.

If you're unfortunate enough to not be working with an Atari, you'll have to buy an interface separately.

And make sure it's compatible with the rest of your equipment, not to mention your software.

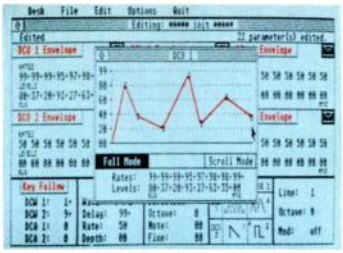
And then you'll have to make sure everything is installed correctly.

What's that like?

You know the song, "What are you doing for the rest of your life?"

Atari ST™ and MEGA computers, on the other hand, have a MIDI port built right into the back of the computer.

So you can connect all kinds of equipment—synthesizers, samplers, drum machines, SMPTE controllers, pitch-to-MIDI converters—as easily as plugging into an amp.



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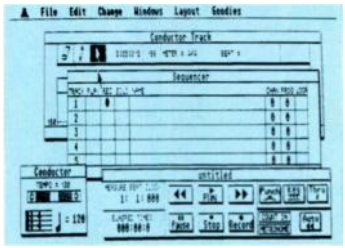

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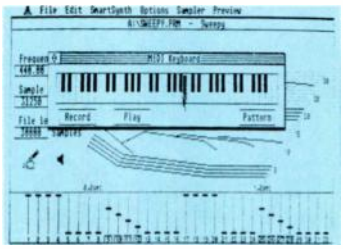
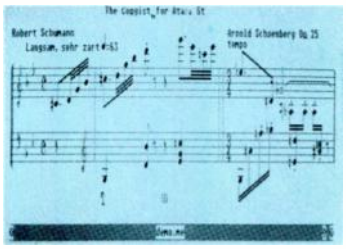


SOFTSYNTH™ Digidesign



THE COPYIST™ Dr. T's™ Music Software

A Musician's Music Box.

No other computer company has made the commitment to music and musicians the way Atari has.

That commitment, by the way, doesn't end with our hardware.

We're working in harmony with all the major music software houses to produce the software you want to make music with.

And building a distribution network of music dealers—not computer dealers—who know electronic music well enough to help you, no matter how much you know.

This Should be Music to Your Ears.

The Atari ST and MEGA computers are just parts of a full system. So there are lots of things you can add when you're ready.

Like our MEGA File 20™ 20-megabyte hard disk for storing your magnum opus.

And our SLM804™ laser printer for publishing it.

Plus one of the largest libraries of music software in the industry.

But perhaps the nicest thing about an Atari is how little it costs.

With what you save on an Atari, you could buy yourself a synthesizer. And some software.

Want to learn more? Write or call for the name of the Atari music dealer nearest you.

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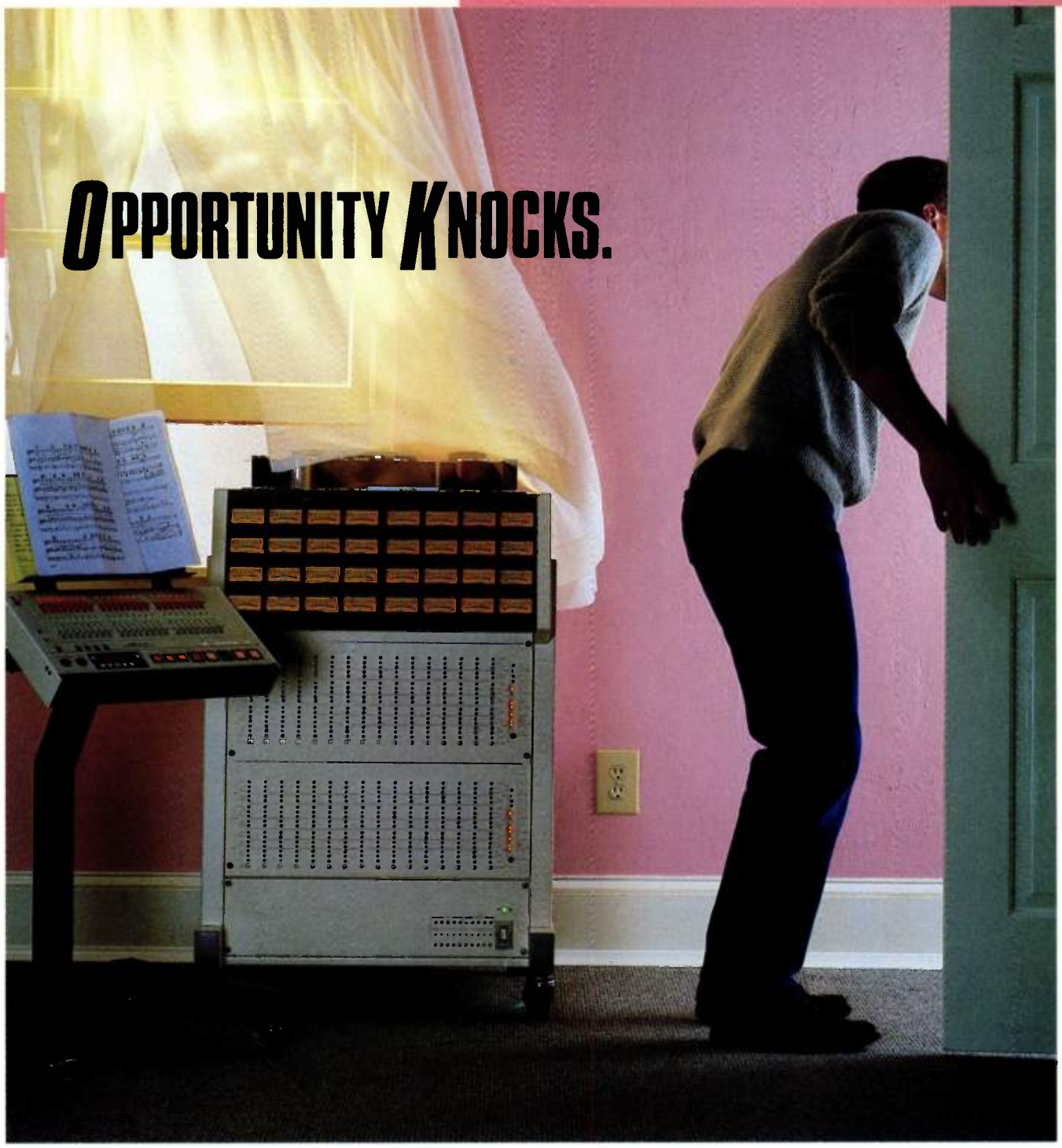
MX-80 32-CHANNEL TAPE RECORDER



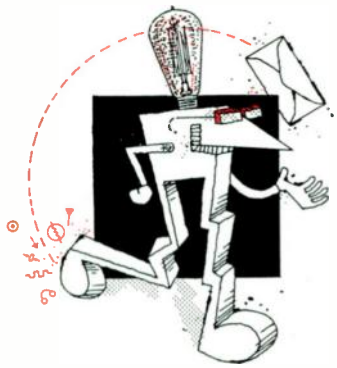
32 Tracks; ■ constant tension tape transport; ■ built-in autolocator; ■ noiseless and gapless punch-in/punch-out, and HX-Pro—at a price you can afford. ■ We call it "opportunity". You'll call it "a killer".

We know getting started in the music business can't mean an MTR-90 in the first month, even when your talent warrants it. ■ So we've given you the next best thing—the MX-80. ■ Now you have room for the band, the back-ups, the strings and the horns—with some bucks left over for that new console you've been looking at. ■ And there's a 24 channel version too! ■ From Otari: Technology You Can Trust.

Contact your nearest Otari dealer, or call Otari (415) 341-5900.
■ Otari Corporation, 378 Vintage Park Drive, FosterCity, CA 94404

OTARI

The Amiga controversy continues, a fan of dinosaurs writes in, and Kawai explains how to upgrade the R-100.



DAVID POWLAITIS

THE CASE OF THE $50 FREE UPGRADE

I bought an early Kawai R-100 drum machine and had problems with the machine crashing when it was in record mode and set for external sync. When I called Kawai, they said they had heard of this, and that they were having trouble duplicating the problem. Also, the sync to tape did not work. Eventually they did find the problem, so Kawai issued an upgrade. I can get the new upgrade "free" at my authorized Kawai repair center, but they'll charge me $47.50 for labor. My feeling is that these were malfunctions on the machine right out of production; they shouldn't sell it with a button called "sync" if there is no such thing.

Maybe people who purchase new products within the first three to six months of release should be paid a fee for debugging! Meanwhile, my back's against the wall. I have to fork out $47.50 to get the drum machine I thought I was getting when I plopped down $650. Am I being overly sensitive? Is my shrinking bank account getting the best of my reasoning ability? What do you think?

Deb E. Danger
Illinois

Deb E.—The issue of upgrades is a complex one, and each upgrade needs to be considered on a case-by-case basis. We contacted Chuck Roberts, technical manager at Kawai America, and he offered the following comments:

"It is Kawai's policy to help the customer in any way we can. All software updates are available on a no-charge exchange basis and may be ordered by the customer, dealer, or service center. Most can be installed by the customer, so we do not support labor, especially because many service centers will charge their minimum rate (as Ms. Danger discovered). If the customer is unable to install the update chip and does not want to pay a service center to do it, someone associated with their dealer can usually handle the job.

"Kawai has in the past offered the best possible support for its products and will continue to do so in the future."

I think Chuck's point is well-taken; something like a simple chip upgrade can indeed be handled by the end user (refer to "Service Clinic" in the July '87 issue for the proper procedure). Although it is unfortunate that equipment is sometimes released with bugs, in my experience Kawai does make a sincere effort to rectify any problems as soon as possible, which certainly puts them several steps ahead of the companies that release products with bugs that are never corrected.

WILL THE REAL TONY LEVIN PLEASE STAND UP?

Barry F. Chabala's letter (February '88) describes Tony Levin using the Chapman Stick only as a bass instrument. This statement is inaccurate; see the concert video by King Crimson entitled *The Noise—Frejus 1982* (EGV2 on EG Video, marketed by JEM Records). Levin typically uses the melody strings to play an involved part (interwoven with the guitar parts of Robert Fripp and Adrian Belew), while using the bass strings mostly for chords. In all the songs of the video in which he plays Stick, Levin uses both melody and bass strings.

Besides, Chabala's comparison of Tony Levin to Emmett Chapman is like comparing apples to oranges. Chapman plays in a solo format in which he is responsible for all parts; Levin plays with groups in which he is part of a team, and his use of the instrument increases the musical interaction between the artists.

There is another King Crimson video of a concert filmed in Japan on the *Three of a Perfect Pair* tour. I once saw it on MTV of all places! If anyone knows how to find either video, please drop me a line c/o **EM**.

Walter Daniel
Maryland

ANOTHER SATISFIED CUSTOMER

I would like to comment on why I subscribed to your publication (the first to snag my subscription dollar). I purchased the January **EM** because of the article "25 MIDI Products Under $500." Since I was at the beginning of a studio "update" phase, such an article appealed to me. Never before have I seen a publication address *quality budget deals*. Reviews of the latest Synclavier are useless to me. The article was refreshing and useful, so I read on. "Update the Dinosaur" surprised me. A publication not devoted to the popular notion of automatic obsolescence?!? Then I read "New Jobs for Old Dinosaurs" and was amazed by such statements as "even the most ancient synths have creative potential far beyond their perceived limitations." Reading on, dumbfounded, I came to the last straw: "If you think your old gear is dead, you probably are just suffering brain atrophy due to spending too much time around dollar-to-MIDI converters." When I came to, I tore out the subscription card and mailed it in.

I have a pretty fair equipment array (everything from the latest MIDI "wonderboxes" to an old ARP Axxe) and have played professionally for a number of years. I may be tempted toward tomorrow's equipment, but I know the potential

of what I have has barely been tapped. Why buy more when I'm still discovering mind-blowing Prophet 5 potential or Drumulator technique? Those who buy, trade in, buy, trade in, etc., are missing the boat. I want a publication that will share secrets that help me access the potential of what I already have. I would encourge you to continue in such a direction. As long as you do, I'll be reading (and subscribing).

William Maxwell
California

William—Thanks for the compliments; you can expect to see more articles tailored to those with more creativity than bucks. But don't necessarily ignore the stuff you can't afford. Eventually those high-end features drift down to us mere mortals (today's high-end is tomorrow's dinosaur), and it helps to be prepared. Besides, studying the expensive systems can give you lots of new ideas. When I saw a Fairlight for the first time, I wanted one but couldn't afford it. So, over the course of a few years I put together a bunch of budget stuff that did more or less the same thing—but having that big-bucks blueprint to follow in the first place sure pointed me in the right direction.

THIRD OPINION ON THE AMIGA

In reply to issues raised by Hugh Falk and Kenneth Rogers in your July '88 "Letters":

KickStart: The original Amiga required a KickStart disk and then a WorkBench disk in order to boot. The Amiga 500 and the Amiga 2000 both contain KickStart in ROM, and hardware upgrades provide this for the Amiga 1000. Commodore's soon-to-be-released WorkBench 1.3 allows auto-booting from virtually any device—a hard disk or even a recoverable RAM disk.

Intelligent MIDI interfaces: The only Amiga program that requires an "intelligent" MIDI interface is *Texture*. All other Amiga music software uses the Amiga's serial port for MIDI; an Amiga MIDI interface simply contains opto-isolators for decoupling, and requires no intelligence. Since this serial port communicates at the MIDI baud rate, Hugh's comment that "the ST's internal port can relay MIDI data quicker than an external port" is erroneous. While a built-in MIDI interface is nice, the Macintosh does well without one. This is not an important issue.

Timing accuracy: There is enough quality music software out there to prove that the Amiga can hold its own in terms of timing accuracy. (*See Dean Friedman's April '88* **EM** *article, "Music on the Amiga" for a detailed discussion of this. —Ed.*)

Multi-tasking: This is the core issue of the Amiga wars and the source of the greatest confusion. Scheduling a processor's time and arbitrating resources among multiple applications must be addressed by a multi-tasking operating system (OS) and understood by any programmer developing in such an environment. Kenneth suggests the usefulness of multi-tasking is invalidated since, with the Amiga's single processor, its applications only "appear" to run concurrently. The Amiga's OS is truly multi-tasking in every sense: it allows more efficient use of the CPU, to the benefit of the user. What Kenneth calls "true" multi-tasking is actually *multi-processing* and irrelevent to this discussion. Sequencing and loading from disk simultaneously is not multi-tasking; it is asynchronous disk I/O. (By the way, I don't know where Kenneth gets his Hollywood statistics, but to suggest that the Atari ST can hold a candle to the Amiga in video production is, in my opinion, ludicrous.)

Let's take a brief look at the history of multi-tasking. Early computers consisted of a single processor, which executed a list of instructions in memory. Efficient use of the CPU demanded it be busy as much as possible. The first solution—batch jobs, where many users submit jobs and get the results later—lacked real-time interaction, and while there was always a queue of jobs to keep the CPU occupied, this was not a satisfying way to work. Scheme number two—multi-tasking—divides the processor's time among many tasks. Up to a certain point, each user has interactive use of the CPU, and response times are fast. The average task spends most of its time asleep anyway, waiting for user input, disk I/O, etc.

Enter the microcomputer—cheap enough to dedicate a single CPU to just one user and let it sit idly by while he types his commands. This was the premise behind the Apple II, Commodore 64, IBM PC, Macintosh, Atari ST, etc. As microcomputers got more powerful, it became apparent that they could handle multi-tasking. Xenix, a version of UNIX, allowed a single IBM PC to service multiple users in a business setting, but what could multi-tasking do for the individual? Though UNIX can run multiple applications, the context is usually that of one interactive foreground job and one or more background jobs with minimal interaction. The Amiga was designed from the ground up with powerful graphics and audio, an open architecture, a user interface designed specifically for simultaneous interaction among one user and multiple tasks, and an operating system designed for communication among the tasks themselves. (*SoundScape*, by Todor Faye, runs as a group of programs communicating with each other and with the user.) This is what makes the Amiga a unique and revolutionary microcomputer that charted a possible path into the future of personal computing, inspired some, challenged others, and had a pretty difficult time finding its own identity.

There is now an open Macintosh with color graphics and improved sampled audio. Atari has a new blitter chip; Apple, Atari, and IBM are developing some form of multi-tasking. Considering the time needed to bring new hardware and supporting software to market, remember that the Commodore Amiga has offered all this and more at a remarkable price for about two and a half years, Amiga sales are quite healthy to say the least, and serious software support for the Amiga is now a reality. Why is anyone still arguing about this?

David Silver
New York

(*David Silver is a programmer/musician with an M.S. degree in computer science. He has worked professionally with the Amiga, Atari ST, Macintosh, and IBM PC.*)

PATCH BAY TIPS

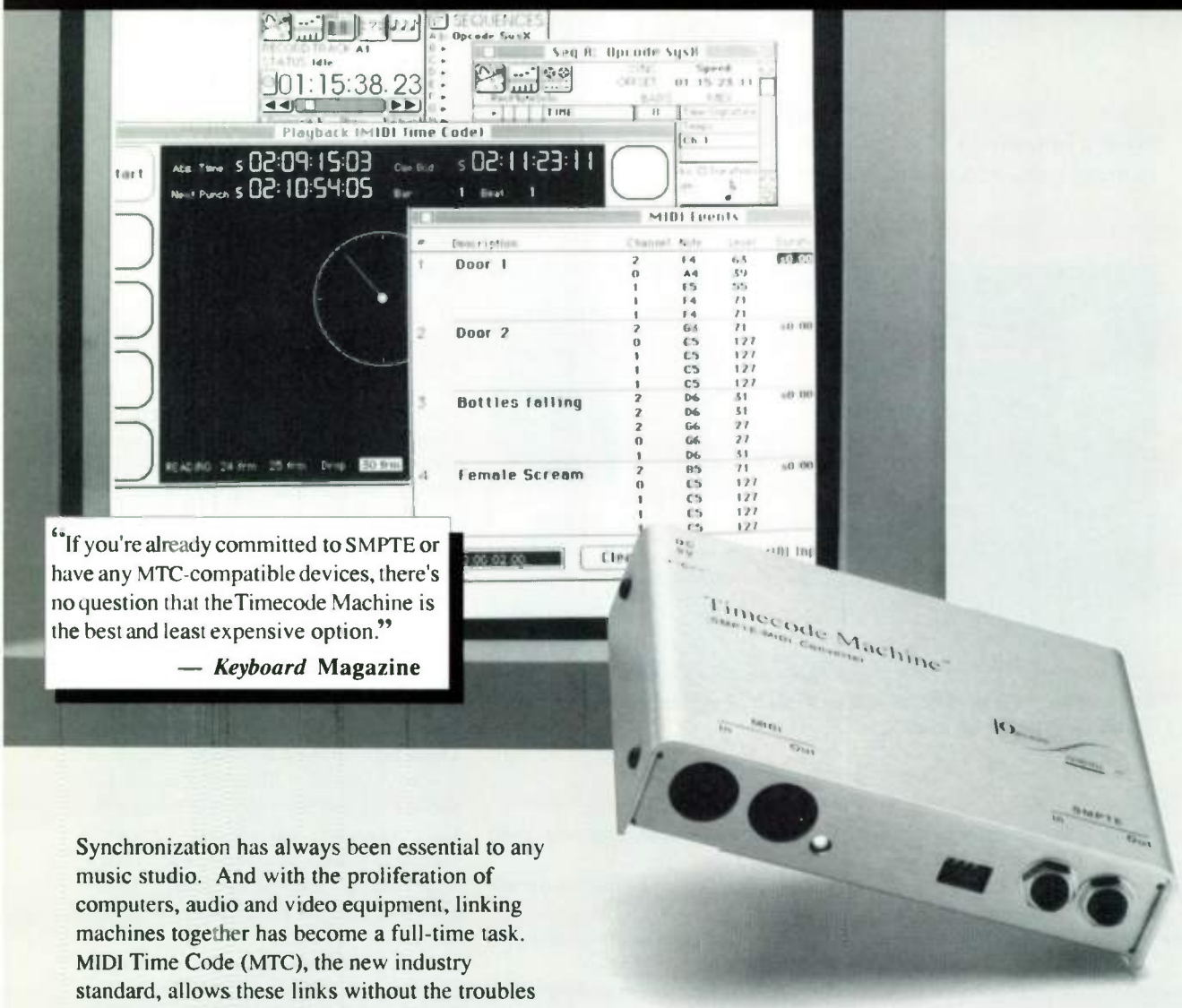
Concerning the article "Audio Aspirin for Studio Headache #1" (June '88), here are some additional tips I had to learn the hard way:

First, masking tape is one of the *worst* materials for cable marking. The tape turns brittle, brown, and nearly impossible to read after less than a year. "Press-a-ply" file folder labels work much better. For extended life, wrap clear plastic adhesive (Scotch™) tape around the label.

Second, for optimum flexibility, label every cable with a number. Then whenever you make changes to your patching scheme, even temporary ones, the cable labels remain accurate and useful. There are booklets available with small adhesive numbers designed specifically for cable labeling.

continued on page 101

Timing is Everything.



"If you're already committed to SMPTE or have any MTC-compatible devices, there's no question that the Timecode Machine is the best and least expensive option."

— ***Keyboard*** **Magazine**

Synchronization has always been essential to any music studio. And with the proliferation of computers, audio and video equipment, linking machines together has become a full-time task. MIDI Time Code (MTC), the new industry standard, allows these links without the troubles of previous timing systems.

And now, Opcode Systems' Timecode Machine™, a SMPTE-to-MTC converter, brings MTC within anyone's budget. It stripes your tape with any format of SMPTE. And when used with Opcode's *Sequencer 3.0* you can sync virtual tracks to tape simply by entering a beginning SMPTE time and rolling your tape. All tempo and meter changes happen where they belong - in the sequencer - and not on your tape or in some expensive box with a lot of buttons.

You can also use it to sync audio to film or videotape, which is why composers are using the Timecode Machine to lock Opcode's *Cue™-The Film Music System* to picture. The Timecode Machine is also the perfect companion for studio automation when used with Digidesign's *Q-Sheet™*.

And we've included one more feature — "direct time lock," currently used by Mark of the Unicorn's *Performer™*. So whether you're using our sequencer or theirs, you can see the SMPTE numbers right on the screen.

Whatever your use of SMPTE, and whatever computer or program you're using, the Timecode Machine is the best option at the lowest price, with the quality you've come to expect from Opcode.

It's about time.

Opcode Systems
1024 Hamilton Court
Menlo Park, CA 94025
(415) 321-8977

Opcode systems

SPECIAL REPORT: THE 1988 SUMMER NAMM SHOW

What's hot, what's not, and a sneak preview of the sizzling new music products coming soon to a music store near you.

By Craig Anderton and the EM Staff

Our unanimous choice for "Best Booth" at the NAMM Show went to Blank Software for their creative use of bubbles and neon.

The National Association of Music Merchants (**NAMM**) has seen their winter show in Anaheim, CA, slowly but surely eclipse what used to be the main trade show, the summer Expo. As a result, several companies—large and small—decided to skip the summer show (held this year in Atlanta) altogether. With dealer and manufacturer attendance down, for the first time in years a little bit of the pressure was off, and manufacturers could spend some time talking to each other instead of merely doing their sales pitches to various dealers. The degree of camaraderie was refreshing and welcome, and many people felt that this **NAMM** show was more fun than any show in recent memory, even if attendance was a little slow.

As with the last two shows we've covered, we'll talk about what's hot, and what's not, and award some of our semi-serious **EM**-mies to recognize that which might otherwise not be recognized. For those of a more serious bent, next month's **What's New** will bring a broader and more detailed picture of the "greatest hits" of this summer's NAMM show.

WHAT'S HOT

Real-time control. The Feel Factory (distributed by Filmsonix) puts the Feel Factor theory (see October '86 **EM**) into practice. Musically Intelligent Devices had an eight-fader real-time controller for their MegaMix automated mixing system, and Blue Sky Logic showed MIXI, a real-time MIDI mixer for varying MIDI parameters. CMS showed a footswitch controller for their IBM PC system "so guitarists can change parameters too."

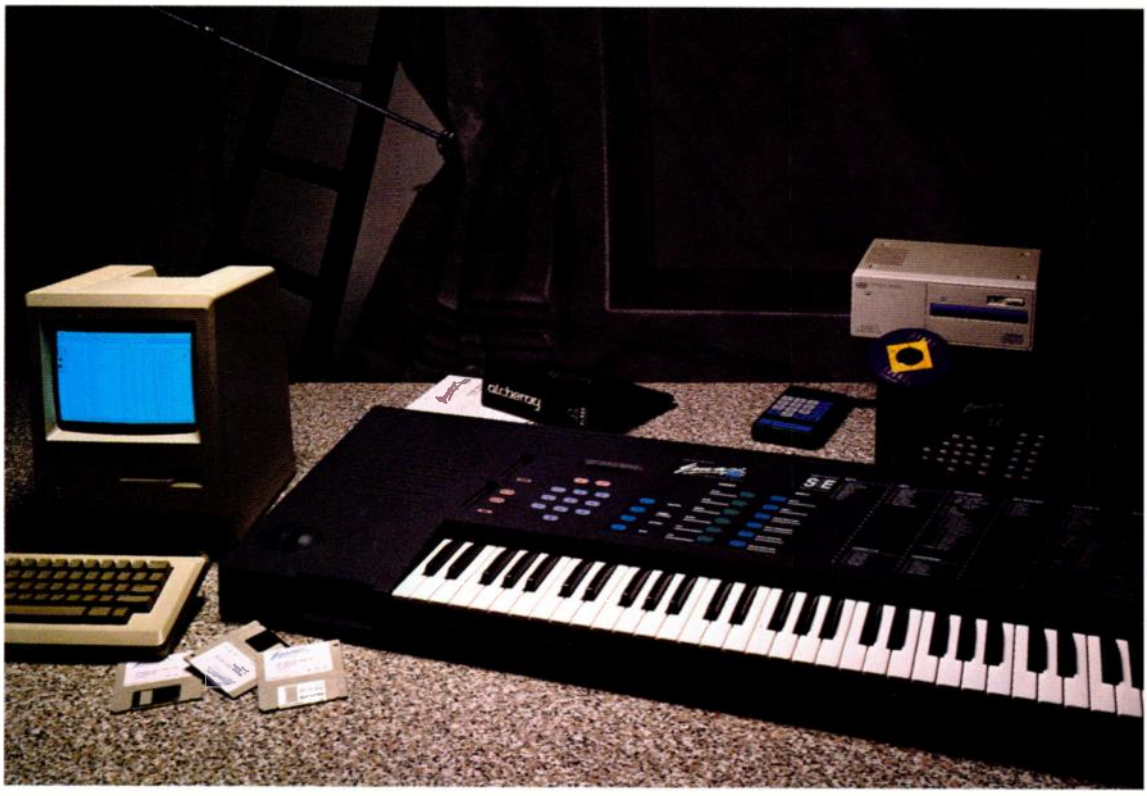
Digital signal processing. The Alesis Quadraverb (still in development) and the ART MultiVerb, both multi-effects units, followed the path blazed by the Yamaha SPX90 and DigiTech DSP-128. Digidesign showed the latest version of Sound Accelerator, their DSP board for the Mac II and SE, which will bring software waveform editing into near-real time; and more and more manufacturers were talking about incorporating Motorola's 56000 digital signal processing chip into future products.

Invisible stands. We're not talking about the company that makes Invisible Stands, but about all the companies that decided to skip the show and whose stands were nowhere to be seen. The dropouts could have made a decent mini-convention by themselves: the list included ADA, Akai, Beetle, E-mu, Ensoniq, Fender, Ibanez, J.L. Cooper, Korg, Kramer, Lexicon, Roland, Zeta, and several others.

The press. With the slow attendance and not as many dealers pounding the floor, I couldn't walk five feet without someone pulling me into their booth for a demo. But did they really love the magazine that much, or did they just need someone to talk to?

Computers. Apple, Atari, and Commodore all had substantial booths housing representatives of a number of music software companies. Commodore's

Emax SE. The creativity of synthesis. The realism of sampling. The power of intelligent design.



The Synthesis Enhanced Emax SE.™ An instrument that combines the realism of sampling with the creative flexibility of advanced digital synthesis. An instrument that invites you to explore a new realm of sonic possibilities.

The Emax SE starts with all the features that have made the Emax the most powerful sampler in its class. Superb sound. Versatile processing and editing functions. And a sound library renowned for its size and quality. Then it adds **Spectrum Interpolation Digital Synthesis,**™ a unique form of additive synthesis that takes advantage of the Emax's computing power and flexible voice architecture to give you the sound creation capabilities of sampled wave synthesizers. Without confining you to a limited selection of factory supplied waves or sampled attacks.

Using Spectrum Synthesis, you can quickly and intuitively create your own library of dynamic wave timbres. Once synthesized, a timbre can be combined with a sampled attack or another timbre to create a voice which you can further shape with the Emax SE's complement of analog and digital processors. The results are sounds of extraordinary richness and complexity. Sounds that you can *only* create with the sampling and synthesis power of the Emax SE.

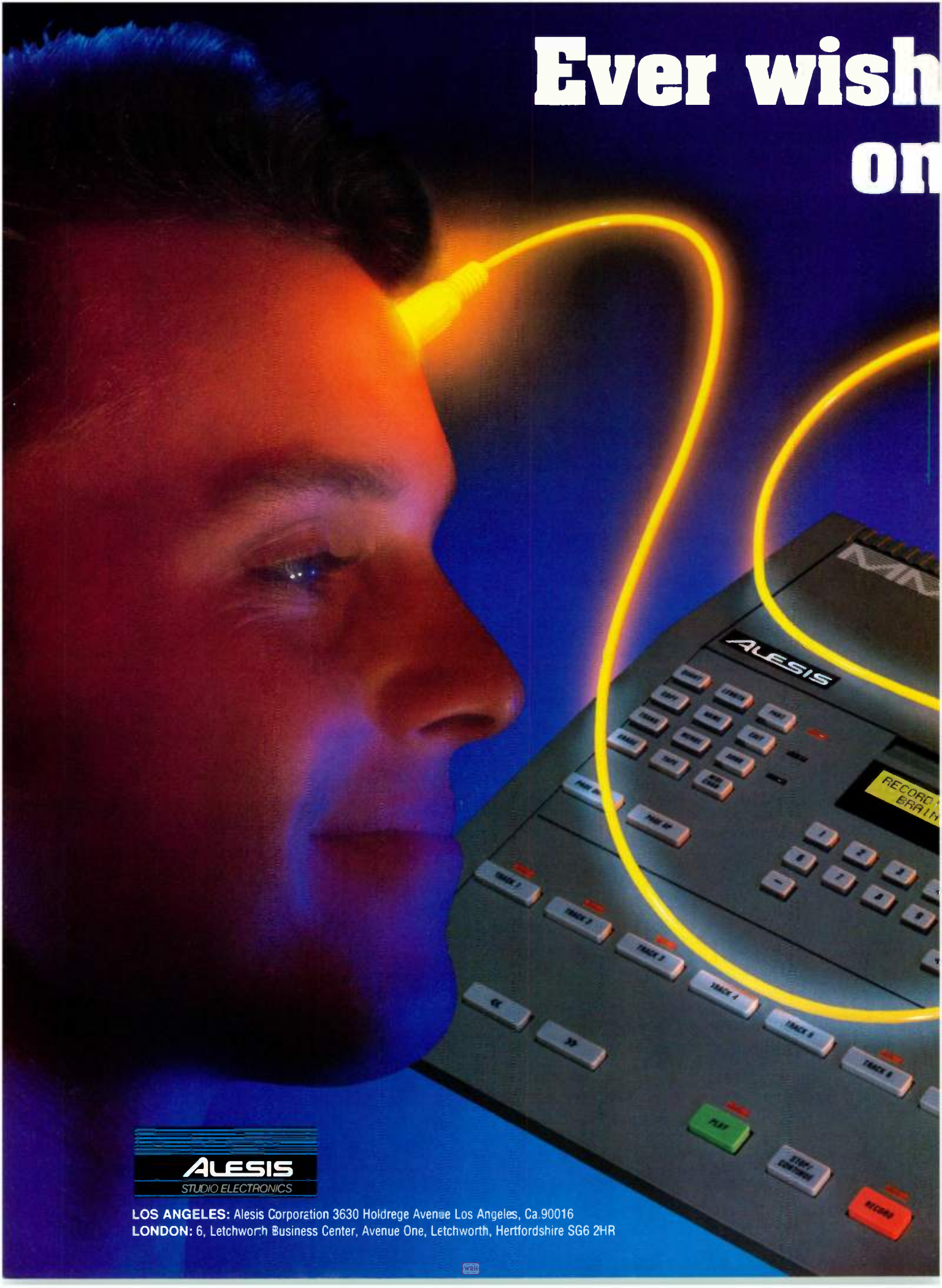
The Emax SE also provides a selection of true Digital Signal Processing (DSP) functions. With **Transform Multiplication,**™ you can digitally combine the harmonic spectra of two samples to create a new class of sounds. Or use **Digital Sample Rate Conversion** and **Digital Pitch Conversion** to manipulate sample data and optimize memory usage.

The Emax SE, like the standard Emax, is available in keyboard and rack versions and with an optional internal 20 megabyte hard drive for virtually instant access to the equivalent of 36 sound disks. It includes an RS-422 interface for high speed communication with graphic editing programs like **Sound Designer**™ and **Alchemy**™ and compatibility with **Optical Media's CD-ROM** system, offering an incredible 4000 presets on a single optical disc. And since the Emax system was designed for expansion, not obsolescence, current Emax owners may easily upgrade their instruments to HD and/or SE capabilities.

Ask your E-mu Systems dealer for a demonstration of the new Emax SE and hear the power of intelligent design at work.

E-mu Systems, Inc. Applied Magic for the Arts. 1600 Green Hills Road, Scotts Valley, CA 95066. (408) 438-1921.

E-mu Systems, Inc.


Ever wish
on
ALESIS
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ALESIS
STUDIO ELECTRONICS
LOS ANGELES: Alesis Corporation 3630 Holdrege Avenue Los Angeles, Ca.90016
LONDON: 6, Letchworth Business Center, Avenue One, Letchworth, Hertfordshire SG6 2HR

you had a "MIDI Out" your forehead?

With the Alesis MMT-8 Multi Track MIDI Recorder it's almost that easy. Just think. A direct line from your mind to a multi track recorder.

The Alesis MMT-8 is surely the next best thing. Tapeless recording has never been so easy or spontaneous. Like thought itself.

Featuring eight tracks tied to the power of 16 MIDI channels, you can punch in, punch out, fast forward and rewind. Just like a tape recorder. But most important, just hit Play and Record and fly.

Bass lines, keyboard parts, horn punches or just grooves. You'll swear there's a MIDI cable connected to your head. The MMT-8 stores your music as perfectly as you hear it in your imagination, with no noise or loss of fidelity. And editing's as easy as changing your mind. With all the advantages and power of tapeless recording. Like changing sounds or changing key. Or finely adjusting the rhythmic feel to sound...well... *human*. Plus, you can store your ideas forever and bring them back out when you land a record deal or when you just want to impress somebody with instant musical recall.

The MMT-8 is only half the story though. Combined with the stunning 16 Bit realism of the Alesis HR-16 Digital Drum Machine, you'll have the ultimate creative tool for songwriters and musicians: The Alesis Music Production System. With the MMT-8 as the melodic brain and the HR-16 as the rhythmic heartbeat, you'll have a musical notepad directly connected to your inspiration. This is exactly what everyone needs. Whether your goal is Grammys or goofin' off. And the price? Forget about it.

Go see your Alesis dealer now. Because the only thing more ridiculous than a "MIDI Out" on your forehead is letting a good musical idea slip away.

And if you buy the MMT-8 and HR-16 at the same time, we'll give you a free carrying bag worth $59.95. Ask your Alesis dealer for details.

DSP is on the front panel.
It's got the features. It's got the price,
and it's got the sound. Everybody
who's looking for more bang for their
buck should be blown away by this
box.
Look for it to be quit
ows. In a year

—David Leytze *Keyboard*[1] Report
May, 1988

several important parameter
of each effect.
On a punch-per-dollar basis,
this was a top contender for best
new product at Anaheim.
The DSP-128 also has the abil-
ity to chain three of those

—Jock Baird *Musician*[2]
April, 1988

The DSP-128 is playing to rave reviews.

The reviewers can't seem to say enough good about the DSP-128 digital multi-effect signal processor. There are plenty of reasons why.

Fully programmable.

The DSP-128 gives you 128 user-programmable memory slots, that offer virtually endless creative possibilities. Change your mind? A master reset function easily restores the 128 factory presets to memory.

MIDI continuous control.

You can assign MIDI continuous controllers to instantly change operating parameters, giving you virtually unlimited real-time programming power over your machine.

The powerful DSP 128 offers comprehensive MIDI control, compatibility with MIDI software, plus the ability to download user programs to a MIDI recorder.

3 effects at once.

It offers 17 different algorithms: reverbs, chorusing, flanging, delays, E.Q. and special effects. And you can produce up to three of those effects at the same time.

90 dB S/N ratio.

The custom 20-bit VLSI engine produces unbelievable dynamic range and computer power for smooth stereo effects, along with a greater than 90 dB signal-to-noise ratio.

Because it's MIDI-controllable, the DSP 128 is compatible with other MIDI devices, like the PDS 3500 MIDI Controller Pedal.

Check out the DSP-128 at your DigiTech dealer.

DigiTech
Start at the top.

For a full-color product sheet, write DigiTech, Dept. R, 5639 South Riley Lane, Salt Lake City, Utah 84107. Or call (801) 268-8400.

presence, something new for NAMM shows, helped convince the industry that Commodore is indeed serious about pushing the Amiga in the music market. Meanwhile, Yamaha introduced a classy, costly, capable, PC-compatible computer designed specifically for musical applications.

Sampling to hard disk. A pick to click in previous NAMM show reports, hard disk recording is here. Lynex had an interesting recorder (demonstrated by British writer Paul Wiffen) for the Atari ST that doesn't use the ST's internal RAM, and Hybrid Arts was, of course, pushing their ADAP hard disk system. Even samplers are getting to the point where they can record a decent amount of sound and transfer it via SCSI to a computer for editing.

SCSI. Speaking of SCSI, Blank Software used a prototype SCSI port on the Ensoniq EPS to rapidly transfer data between the EPS and a modified copy of *Alchemy* (the process worked most of the time). I'm impatiently waiting for all parties to get the bugs out. Optical Media also jumped on the SCSI bandwagon (as did a zillion others), with their latest SCSI-compatible CD-ROM product. Expect SCSI to be the next big buzzword.

Multiple MIDI "cables." We all know 16 channels isn't enough when your sequencer is trying to drive a bunch of multi-timbral devices. Throw MIDI mixing into the equation, and you have *a lot* of data floating around in the MIDI data stream. The solution? Have multiple outputs, and be able to send 16 channels over each output. CMS had five ports on their IBM computer system, Yamaha's computer had eight, Passport's *Master Tracks Pro 3.0* for the Mac sends data out over both the Modem and Printer ports, and, of course, Sonus and Southworth use this technique as well. And you thought it was hard to keep track of which instrument was on which channel in a 16-channel system...

WHAT'S COLD

The summer show. This gets a "What's Cold" designation two years in a row. Preliminary, non-official guesstimates from attendees put dealer attendance at a little better than half the number that showed up at Anaheim last January.

Patch software. Another repeat from previous shows. With the exception of Optical Media's family of CD-ROM products, I didn't see one booth devoted solely to patch software for synthesizers or samplers.

Music demos. Four years ago, it seemed you couldn't go past a booth without hearing someone boot up a synthesized version of something off the *Thriller* album to show off their gear. This year, no song captured the public fancy, and music demos seemed minimal—the emphasis was on letting people play gear themselves, usually through headphones.

Digital workstations. Not one manufacturer used that word during a demo, probably because most of the companies putting out these types of devices didn't come to the show.

THE TOP 10 PRODUCTS PEOPLE SAID I HAD TO SEE

1. Yamaha G-10 MIDI guitar ($2,495). Has a MIDI guitar with excellent tracking finally arrived? With Beetle not at the show, Yamaha had the spotlight to themselves. This sonar-based MIDI controller offers excellent tracking; the ac-

companying G10C Guitar MIDI converter stores 64 performances and can access 64 more cartridge memories. Review units should be available soon, and I can hardly wait. Stay tuned. **Yamaha Digital Musical Instruments Division**, Box 6600, Buena Park, CA 90622-6600, tel. (714) 522-9011.

2. DigiTech IPS-33 Smart Shift pitch transposer ($799.95). At this price, having excellent sound quality would be sufficient, but throw in intelligent harmonization (with two user-definable scales if you don't like the plentiful selection of scale modes), and you have what's bound to be a very hot product. It looks like the harmony synthesizer for the rest of us has arrived. **DigiTech**, 5639 South Riley Lane, Salt Lake City, UT 84107, tel. (801) 268-8400.

3. Hughes & Kettner MIDI guitar amp (distributed by Gibson). A beautiful user interface (LED meters for all adjustable parameters) and good sound quality made this MIDI-controlled guitar amp a must-see. However, the price (around $3,000) put a bit of a damper on things. **Gibson**, 641 Massman Dr., Nashville, TN 37210, tel. (615) 366-2400.

4. Yamaha C1 computer ($2,995 for base unit with dual 720K floppies, $3,995 with 20 MB hard disk and single 720K floppy). After the CX5M failed to,

The eight faders on the Feel Factory allow users to change the "feel" of sequenced music.

shall we say, capture the public imagination, Yamaha did what they always do when a product doesn't go over: head back to the lab and do it right. This AT-compatible computer already has software support from Voyetra, Passport, Turtle Beach, Bacchus, etc., and it's clear that Yamaha did their homework this time around. The C1 is an MS-DOS, portable 286-based machine with two MIDI inputs, eight MIDI outputs, SMPTE in and out, ROM-based music fonts, high-resolution backlit display, 1 MB RAM (expandable), DMA controller, and a whole lot more. Such capability doesn't come cheap, but it's quite a machine. **Yamaha DMI** division, Box 6600, Buena Park, CA 90622-6600, tel. (714) 522-9011.

Yamaha's C1, an IBM-compatible, laptop computer, features two MIDI inputs, eight MIDI outs, SMPTE in/out, dual 3.5-inch drives, and much more.

5. Steinberg Big Band. This algorithmic composition program makes real music that sounds as if it was played by real musicians. It's impressive enough to have earned major compliments from a competitor. **Steinberg-Jones**, 17700 Raymer St., Suite 1001, Northridge, CA 91325, tel. (818) 993-4091.

6. Digidesign TurboSynth ($349). The days of modular synthesis are back—see the **EM**-mies, below. **Digidesign**, 1360 Willow Rd., Suite 101, Menlo Park, CA 94025, tel. (415) 327-8811.

7. MICO Ultrasonic Reference Series Pickups. Someone finally did it: created guitar pickups with a virtually flat response. Throw on the right kind of EQ, and you can emulate almost any kind of guitar sound. **MICO**, Box 956, Arleta, CA 91331, tel. (818) 785-2841.

8. The Feel Factory ($650). It's not often that a magazine article ("The Feel Factor," October '87 **EM**) mutates into a product, but that's exactly what happened. The Feel Factory lets you put theory into practice in real time, without tedious track delay/advance techniques based on clock pulse shifting. Eight faders vary timing of MIDI data to alter the "feel" of sequenced music. Vary timing in real time, or use eight programmable algorithms or 48 algorithmic assignments. Includes SMPTE reader/generator and Mac/MIDI interface. Distributed by **Filmsonix**, 1032 N. Sycamore, Hollywood, CA 90038, tel. (213) 653-0240.

9. Oberheim Matrix-1000 ($595). Subtractive synthesis ends its period of dormancy with a bang—this six-voice, 1U rack-mount unit sounds great and is amazingly cost-effective. Of its 1,000 analog sounds, 800 are ROM presets and 200 are user-programmable. This may be Oberheim's first "Top 40" hit. **Oberheim**, 2015 Davie Ave., City of Commerce, CA 90040-1704, tel. (213) 725-7870.

10. ART MultiVerb ($575). Up to four simultaneous effects (including pitch transposing), 16-bit conversion, 20-bit internal processing, 200 memory locations and 100 factory presets, stereo in/out, and program change mapping garnered a lot of attention for this digital signal processor. **ART**, 215 Tremont St., Rochester, NY 14608, tel. (716) 436-2720.

Oberheim is now shipping their Matrix-1000, offering 800 preset and 200 user-programmable analog synth sounds in a compact, $595 unit.

AFTERTOUCH™

OFFICIAL NEWS FROM THE YAMAHA USERS GROUP

MIDI for guitarists: the promise is finally fulfilled.

YOU'LL BE HEARING a lot of comments about the new Yamaha® MIDI system for guitarists. But none more important than this one: "it works."

Thanks to advanced Yamaha technology, there are no frustrating delays. You don't have to sacrifice your individual technique.

In fact, it's designed so professional guitarists can use every expressive trick in the book.

The system has two separate components. The G10 Guitar MIDI Controller is the actual stringed instrument, while the G10C Guitar MIDI Converter is the brain of the system.

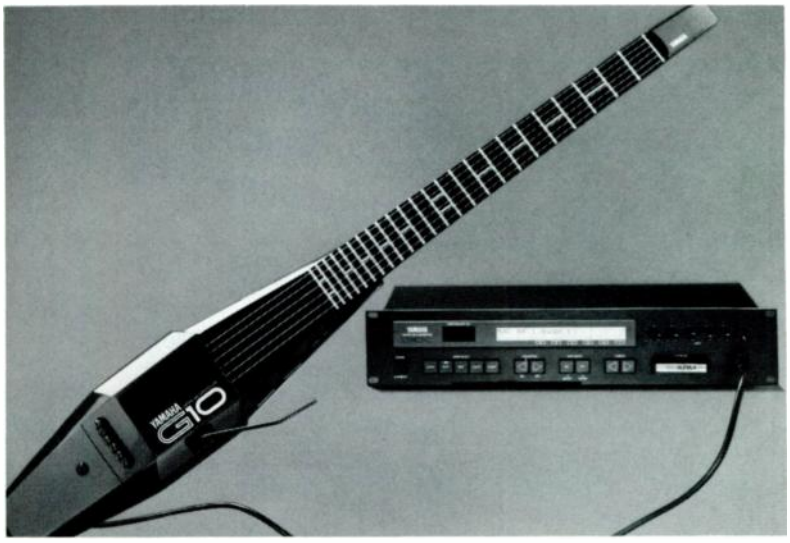
The G10 responds to different techniques because it utilizes three different technologies. In one pickup, ultrasonic sound sensors determine pitch—instantly—by measuring the distance from the sensor to the fret. An electromagnetic divided pickup calculates string velocity. And a third pickup uses optical technology to sense string bending. It's a combination that lets you bend or damp notes, and even play pull-off and hammer-on notes.

Other features provide even greater control. The G10 has a tremolo arm that can control pitch, modulation, portamento time, volume or pan. As well as an assignable control wheel, buttons for changing programs and an input for Breath Control.

The G10C Converter has 64 internal performance memories, and can access 64 cartridge memories. Each stores a complete setup of such parameters as individual string volume, tuning, capo position, velocity curve, mute level and controller assignments—letting you play different styles at the touch of a button. It also has a built-in library of specially prepared voices for TX802 and TX81Z Tone Generators, all easily down-loaded. So you can start playing the G10 without first locking yourself away with a pile of manuals.

Of course, the G10 Guitar MIDI system can also be used to control the whole world of Yamaha MIDI synthesizers, tone generators, samplers and drum machines.

And nobody is better equipped to give you a full demonstration than your authorized Yamaha Digital Musical Instrument dealer.



YAMAHA G10 GUITAR MIDI CONTROLLER AND G10C GUITAR MIDI CONVERTER.

Hot Tips

Adding a human feel to MIDI drum tracks recorded on a QX3 Sequencer.

If you use a QX3 to sequence MIDI drums, you might want to experiment with that sequencer's "Clock Move" feature to give your tracks a more human feel. Here's how to do it:

Record your kick drum line on one track. Quantize that track to a 1/16th note, and then choose Edit Job 19 Clock Move. What this job will do is move your kick drum just slightly ahead of the beat. Exactly how much you move it is a matter of taste, but a good starting point is a clock move value of +3. This will help make your drum part "push" just a bit, and add to the realism of your MIDI drum recording.

Using an RX17 as a drum tone generator.

You can play the RX17 from a MIDI keyboard and record your drum parts to an external sequencer (like a QX21 or QX5). Just connect your RX17 into your system as you would a tone generator, choosing an individual channel for the RX17 to receive on. Then clear one of the RX17's preset songs and leave it in song mode, so the preset patterns don't play along with patterns you create on your external sequencer.

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

THE EM-MIES

The **Best Booth** award goes, by unanimous decision, to Blank Software. Their neon-and-bubbles motif (see photo, p. 16) was an appropriately artistic home for a highly artistic program.

The **Weirdest Product of the Show** award will be sent via carrier pigeon to Rustar Electronics for the Pulstron, a microswitch mounted in a guitar cord. Push on the switch lever, and the signal goes away; this is good for making your guitar sound like it's stuttering, or for imitating stuff off the Who's first album.

Roland's MT-32 sound module was a common sight at the show. Computer Music Supply (of Walnut, CA) unveiled their $39.95 rack-mount accessory for the unit.

The **Most Utilitarian** award goes to Get Organized, whose cable holders and tie-downs can really help clean up cable clutter on a keyboard rack—and cut down on setup time.

Thanks to its presence at a lot of demos, the Roland MT-32 walked off with the **Most Visible Piece of Gear** award. It seems everyone who wanted to show off their MIDI doodad had an MT-32 sitting around somewhere in the booth.

Digidesign won the **Modular Synthesis is not Dead, Just Waiting for the Right Computer** award for creating TurboSynth. This ultra-cool program for the Mac lets you create samples by patching various tone generators (based on synthesized or sampled waveforms), and ten digital signal processing modules (filters, envelopes, time stretchers, etc.). The results can be sent to any of the 21 samplers supported by the program or via the MIDI Sample Dump specification. Very clever.

In the **Niftiest Paraphernalia** category, Coda won the **Best Free Clothing** award for their Finale T-shirt, and Opcode garnered the highly coveted **Most Worn Button of the Show** award. How did they do it? By simply putting a picture of founder Dave Oppenheim's smiling face, bushy beard and all, on a plain white background. Or maybe it was the hidden message: if you turned the button upside down, it looked like Don King.

The music on the show floor just wasn't happening, so the **Best Music Demo** award goes to Stanley Jordan for the rendition of "Stairway to Heaven" he performed at a Casio dealer dinner. The audience's first impulse was to treat it as a hip joke; by the time the song was over, no one was laughing—Jordan's sheer virtuosity and expressiveness turned this AOR workhorse into something totally new and fresh. Ed Alstrom, also of Casio, received runner-up for his inspired drum and string bass solo—played entirely on keyboards.

That's all we have space for this month. Be sure to catch October's **What's New** for a more detailed and comprehensive look at the stuff that made the summer NAMM show simmer.

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Add to that the advantages of full-function remote control, auto punch in/out, shuttling capability and dbx II noise reduction, and you've got a machine that just about does it all.

If this all seems a little too good to be true, talk to your Tascam dealer. To understand how good the 238 Syncaset really is, you'll just have to try your hand at it.

TASCAM

PEAK PERFORMANCE TIPS FOR ONSTAGE SOUND

The vital link between your music and your audience is the P.A. system. Here's how to make that link as strong as possible—from booming bass to tintinabulating treble.

By Craig O'Donnell

Many small P.A. systems suffer from inadequate bass reproduction, and adding one or more low-frequency bins, such as the Electro-Voice TL606 (designed for use with the EVM15L woofer and shown here in a cutaway construction view), may provide a remedy.

Mike Sokol's series in the July and October '87 issues of **EM** on building a compact full-range sound system was interesting and informative *(the readers thought so too—Ed)*. Having put over nine years into live P.A. concert and club sound work, I'd like to add some comments that might be helpful to someone just starting out.

THE BOTTOM LINE

As an electric bassist/drum machine programmer and kick drum fanatic, I'm especially picky about solid lows.

The Electro-Voice SRO speakers Mike suggested for bass units are good (I used two for my bass in the mid-'70s) but obsolete. The E-V EVM 15B drivers I subsequently used as bassist in my band, "Scientific Americans," are a better bet. They are efficient, tough, and handle several hundred watts, as opposed to the SRO's nominal 60-watt rating.

Going one step further, E-V offers plans and designs for Thiele-aligned enclosures for EVM speakers. (*Note: For a free copy, write to: TL Enclosure Plans, c/o Electro-Voice, 600 Cecil Street, Buchanan, MI 49107. Please specify whether you want enclosure plans for 12-, 15-, or 18-inch speakers—Ed.*) I use two of these cabinets as my bass rig. They are simple to build, amazingly compact—about 17 inches wide, 17 inches deep and 22 inches high—and one of them can easily be carried by one person. By adding the "port cover" provided for in the plans, the low end can be extended smoothly by about another half octave. A little low-end EQ can extend this even further if you have sufficient amplifier power available to move the air.

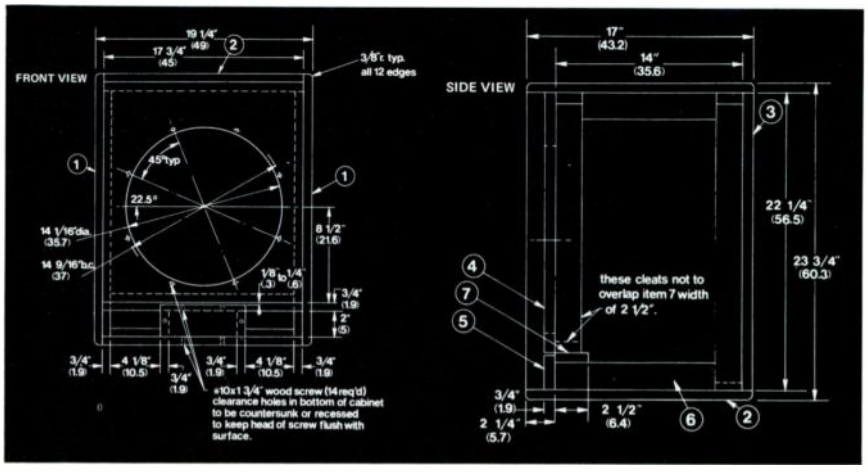
If bin design defeats you, try the EVM cabinets. They're optimized for the 15B/15L speakers, which eliminates the guesswork concerning the very tricky subject of designing a properly loaded bass enclosure.

If buying bass is more your style, check out two sources: PAS (Professional Audio Systems, Harbor City, California) single 15-inch or single 18-inch bins are compact and a good bargain. My band's 4-way club/concert sound system uses PAS double 18-inch bass bins, which are efficient, relatively small, and really pump out the bass.

If you need even *more* bass, Toa Electronics (South San Francisco, California) makes a full line of compact subwoofer systems. I've used their Model SLB (equipped with a 15-inch speaker) and can vouch for it. There are two larger models that give out even lower bass: SDB and SEB. A subwoofer is the right choice when you need "fat" low end. As a bonus, the subs can be placed practically anywhere, since low frequencies are essentially non-directional, and the audience cannot locate their source.

AMPLIFIER POWER

Buy the biggest amplifier you can afford (or lug) to drive your bass system; some suitable choices are made by Crown, QSC, Rickenbacker/Sony, Carver, Crest, or BGW. The 200-watt figure specified in Mike Sokol's article should be regarded as a minimum. It's good to have plenty of



Front and side views of the Electro-Voice TL606, a "typical" ported bass box for a single 15-inch speaker. The enclosure can be constructed of either ¾-inch plywood or particle board, depending on user requirements.

extra power available for headroom and punch. Remember that raw power alone rarely ruins a driver. Too *little* amplifier power (leading to clipping and the resultant voice coil overheating) is often the cause of speaker failure.

The science of amplifier design has made significant strides in the last four years, and buying a new-generation power amp can yield better specs, with improved clarity and generally more punch-for-the-penny than you'd get by purchasing a used unit. Another point to consider is the variety of built-in protection features offered by today's professional power amps: many models now are virtually immune from damage caused by thermal overload, dead shorts, highly reactive loads, DC faults, and other hazards inherent in the sound reinforcement environment.

EQ AND "PLASTIC PEOPLE"

When fine tuning a room, acousticians sometimes use "plastic people": foam blocks that absorb sound in a manner similar to the human form. The acoustics of a room are dramatically altered when that room is filled with people, and it can be difficult to determine when equalization is the answer. Here are a few "quick and dirty" rules of thumb:

- People absorb a great deal of audio energy. The first impulse— to kick up the high end for "clarity"—may leave your system sounding like a nine-transistor radio. Strive for balance between the low bass (which helps the subjective sense of rock-out volume), the midrange (where the important frequencies of vocals and instruments lie), and the very high end (where things like PCM-sample cymbals and FM synths will "shimmer"). If you can't imagine this, put your favorite tune on the stereo at moderate volume and play with the tone controls while switching the "loudness" button in and out until you get a happy medium. Shoot for a similar feel live.
- Not only is a *little* extra high-end EQ helpful, but some bass boost can help. If there is a room problem that needs a touch of equalization, resist the urge to make a major boost, but rather, try to "notch" out the offending frequency by cutting (attenuating) it.
- If the room sound is a little "porky"—tubby—experiment with cutting in the region from 80 to 250 Hz. That cardboard-like bass sound is usually caused by too much energy somewhere in this area (often because of room resonances). A parametric or semi-parametric EQ is the best choice to zero in on offending tones. You should be able to retain full-bodied sound, with good low bass, without people feeling overwhelmed. It depends a great deal on the room itself and the number of people present. Experiment.
- Play a CD or chrome cassette of a well-engineered record you really like and know well at the volume you expect to play. Walk around the room. Adjust EQ as Mike suggests. For example, I'd probably use a Peter Gabriel record, something from Big Audio Dynamite, or even one of the too-well-known tracks from *Thriller*. If you begin your tweaking process by getting prerecorded material to sound decent, then you'll know that any bad sound is due to you, rather than your setup.

Craig O'Donnell, *a widely published musical/electronics/computer author and technical editor for* OPtion *magazine, plans "to become the T. Boone Pickens of synthesizers: exercise well-financed hostile takeovers of Yamaha, Roland, and E-mu; form MIDI (Monopoly In Digital Instruments) Corporation; then raise prices."*

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OUTBOARD GOES INBOARD. Each PM-175 and PM-350 has an internal circuit card bay which accepts Carver's new plug-in signal processing modules. Soon to be available is an electronic, programmable 2-way stereo crossover, with 24 dB per octave Linkwitz-Reilly phase -aligned circuitry, a built-in adjustable high-end limiter and balanced outputs. And more modules will be available in the near future to further help you streamline your system.

PRO FROM CONCEPTION. The PM-175 and PM-350 inherited their father's best features. Including slow startup and input muting to eliminate turn-on current surge, 11-detent level controls, phone jacks, power, signal, clipping and protection indicators as well as balanced XLR input connectors. In a bridged mode, both amplifiers will drive 70-volt lines without the need for external transformers.

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SPECIFICATIONS: CARVER PM-350 Power: 8 ohms, 350 w/channel 20-20kHz both channels driven with no more than 0.5% THD. 4 ohms, 450 w/channel 20-20kHz both channels driven with no more than 0.5% THD. 2 ohms 450 w/channel 20-20kHz both channels driven with no more than 0.5% THD. Bridging: 900 watts into 8 ohms; 750 watts into 16 ohms. THD-less than 0.5% at any power level from 20 mW to clipping. IM Distortion less than 0.1% SMPTE. Frequency Bandwidth: 5Hz-80kHz. Gain: 31 dB. Input Sensitivity: 1.5 V rms. Damping: 200 at 1kHz. Slew rate: 25V/micro second. Noise: Better than 115 dB below 350 watts, A-weighted. Inputs: Balanced to ground, XLR or TRS phone jacks. Input Impedance: 15k ohm each leg. Compatible with 25V and 70V systems. 19"Wx3.5"Hx11.56"D

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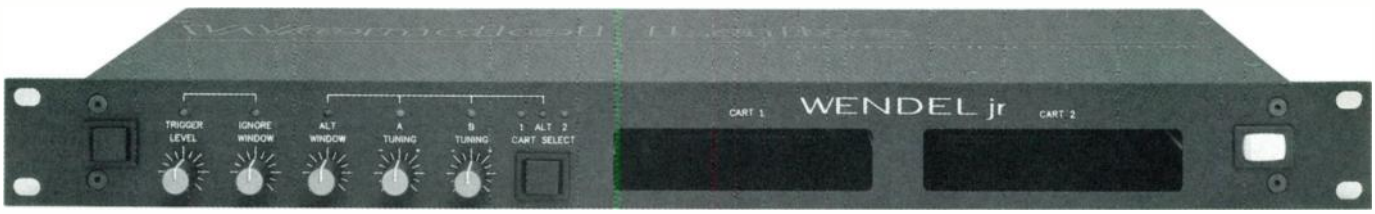

Three reasons why Wendel Jr. sounds better:

1) A 50 kHz sampling rate, unsurpassed in this industry, gives you a real **25 kHz frequency response!** Beware of units that claim a sampling rate of 30 kHz — the true usable audio frequency range is only half the sample rate.

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3) Incredibly long samples give you unmatched realism and sound quality, superior to any drum machine at any price. Just listen to other ride or crash cymbals and compare them to the Wendel Jr. You'll find that their typical cymbal sounds last only 2-3 seconds, while **the Wendel Jr. Ride cymbal is 8 seconds long!** The most expensive drum machines in the world can't even come close to Wendel Jr.'s long samples.

The world's fastest trigger!

Wendel Jr. does *not* use MIDI triggering because it's too slow (as most of you sophisticated MIDI users have already found out). Instead, Wendel Jr. drum sounds are triggered by an incredibly fast circuit. It is so fast that you can listen to the original drum sound and the triggered Wendel Jr. sound side-by-side and you'll hear **no timing difference!** The trigger input can take virtually any signal (drum machine output, tape signal, shorted footswitch, etc.).

Drum sounds so real, they have that human feel.

The optional "Snare Pair" cartridge gives a "left hand-right hand" feel to the snare rolls. This is a subtle effect, but it makes your drums sound human — as opposed to machine-like. **The Wendel Jr. is the only product that is capable of giving you this incredible "two-hand" feel.** When are other manufacturers going to realize that nobody plays all the drums with just one hand?*

Prevent your drum machine from becoming obsolete:

Wendel Jr. is a percussion replacement device, not a drum machine. As mentioned earlier, you can use your existing drum machine output(s) to drive the Wendel Jr. Or, for example, let's say you wanted to replace the mediocre snare drum sound on track 3 of your recorder. Just take the track 3 tape output to the trigger input of Wendel Jr. and record the new Wendel Jr. snare sound on another track. You don't have to keep buying a new drum machine every year. Perhaps more important-

*Rick Allen notwithstanding

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ly, you can now use the drum machine that's easiest for you to program, and then replace key sounds with the Wendel Jr. as needed.

The ultimate drums for sound reinforcement:

Wendel Jr. is the perfect answer for sound reinforcement problems. Just use "trigger" mics on the real drums to feed a rack of Wendel Jrs. patched directly to your PA mixer. Bingo, you have incredible drum sounds without any feedback loops. All in a matter of minutes, not hours.

How to audition the Wendel Jr.:

Just listen to "Hey Nineteen" on Steely Dan's "Gaucho" album. Or try other albums by Steely Dan, Steve Winwood, Rod Stewart, Starship, Al Jarreau, Stevie Wonder, Kenny Rogers, Diana Ross, Duran Duran, Huey Lewis, Toto, Miles Davis, Pink Floyd, Heart, Supertramp, George Benson, Paul Simon, Christopher Cross, Bruce Hornsby and the Range, David Foster, etc.

Now here's the deal:

Roger used to sell the Wendel Jr. with one cartridge (kick *and* snare) to his dealers for $720 with a suggested retail price of $1000. **But direct from us, the Wendel Jr. is NOW ONLY $600!** And if you decide to buy before September 30, 1988, we'll send you a second cartridge free. So take advantage of this offer now! *Many* optional sound cartridges are available.

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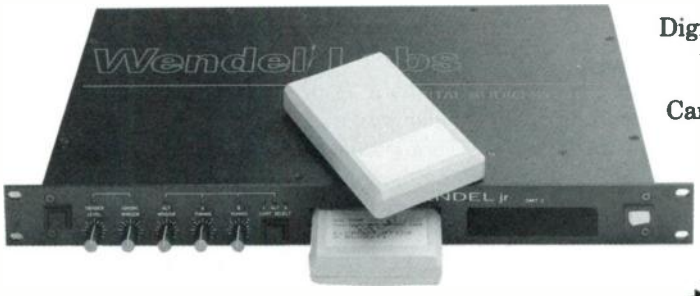
Wendel Jr. Percussion Replacement Device



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Dr. T's KCS Made Easy

Confounded by the complexities of the Keyboard Controlled Sequencer? A dedicated user reveals some secrets...

By Dennis Jablonski

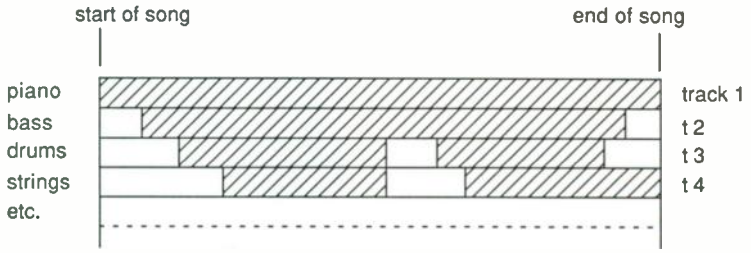


FIG. 1: Linear sequencer structure. The shaded area indicates recorded data. Note that each track theoretically runs the entire length of the song, regardless of how much of that length is actually used for data.

Although some people seem to think that Dr. T's sequencers are mysterious and difficult to understand, I couldn't disagree more. The Atari ST *KCS* is easy to use and, at least for my style of composing, does everything I would want a sequencer to do. KCS includes some pretty fancy data structuring that allows entire MIDI sequences to be "called," much as one would call a computer subroutine, from arbitrary points in other sequences. Since this isn't the usual way of doing things, it may appear confusing at first; but once understood, it becomes intuitive, extremely logical, and versatile.

COMMON SEQUENCER STRUCTURES

Most sequencers use either *linear* or *chain* sequencing. In a linear sequencer, multiple "tracks" play simultaneously, side-by-side so to speak, from the beginning of a song to its end (**Fig. 1**). Each track may contain data for one or more MIDI channels, depending on the particular sequencer. This is fine for free-style jams, subtle ever-changing melody/harmony lines, or any use where exact repetition of MIDI data within the musical piece is minimal; however, cutting and pasting large blocks of data extracted from several linear tracks can be a very cumbersome process.

If you tend to write songs with repetitive elements, chain sequencers (**Fig. 2**) are more applicable, since you can compose several short sequences, each of which comprises a discrete section of a song (Sequence A for the intro, Sequence B for the verse, Sequence C for the chorus, etc.). Each sequence can be several tracks "deep," with one or more MIDI channels assigned to each track. After composing all the required sections, you create a master sequence (constructed under Chain Mode, Song Mode, or some similar designation) that "calls" the song sections sequentially in any desired order. Changing the order can be as simple as altering a single letter or number in the master sequence listing; in addition to "calls," sometimes a bit of real-time performance data (such as tempo changes) can be included.

In my opinion, the main limitation of the chain type approach is the necessity of ending each individual sequence (song section) before the next one starts. This limitation is compounded by the fairly common practice (although not one used by Dr. T) of automatically issuing an All Notes Off message at the end of each sequence, which means you can't make programmed note durations overlap from one sequence to the next. Dr. T's structure overcomes the problems of using linear or chain mode exclusively.

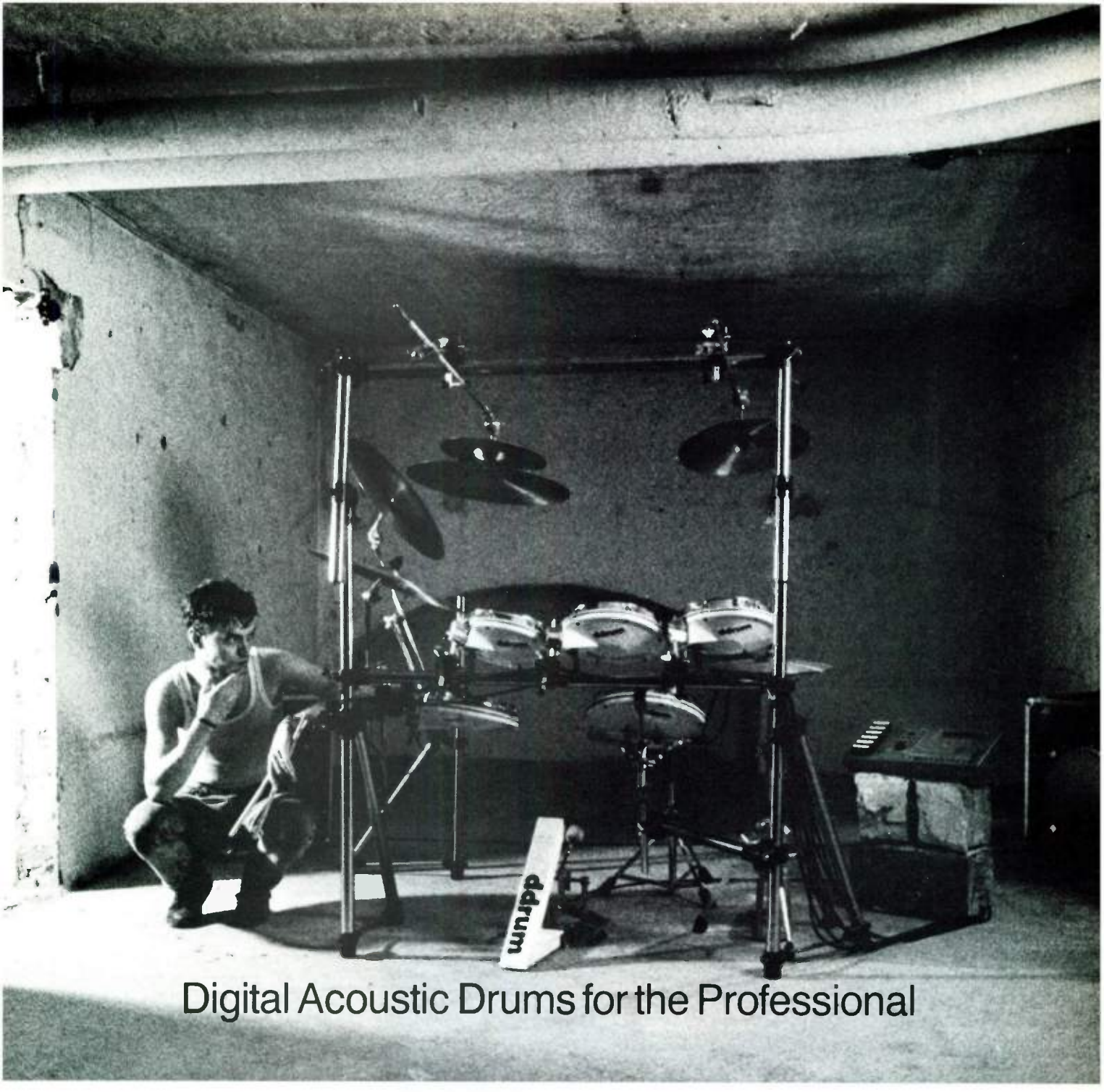
DR. T's SEQUENCING STRUCTURE

Suppose you write a song with a repetitious rhythm section that repeats as a block, a free-form lead synth that runs most of the length of the song, and a chordal string pad that runs the entire length of the song (**Fig. 3**). Dr. T's structure lets you record in blocks or linearly, and assemble any combination of same, overlapping or not, into a song. Therefore, you could compose the elements of a rhythm section and chain them together, then overdub the other two parts alongside the chain in a linear fashion.

The secret to this approach is the ability to treat individual sequences just like notes. As with most sequencers, notes in a Dr. T sequence can overlap by simply specifying appropriate on and off times; however, each *sequence* can also have an "on," or start time, and a duration. Thus, individual note *sequences* can be turned on and off arbitrarily within a master sequence, overlapping wherever they may. And the master sequence, having a defined start time and duration, can be turned on at a specified time in a supermaster sequence, which can in turn be called by another sequencer, which in turn... you get the idea.

A master sequence can contain single notes, other sequences, program change commands, tempo changes, transpositions, and nearly any other MIDI command, all happily arranged in whatever manner suits the material on which you're working. As an extra bonus, it is possible to include notes that continue beyond the designated end of a sequence. This is really handy for smoothing over a sharp transition between song sections.

This method of data structuring is called *Open Mode* on the Atari ST KCS. Open Mode was the only mode available on Dr. T's earlier sequencers and is, by itself, quite sufficient to handle most any style of musical composition; however, the Atari ST version also provides *Track*



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Mode and *Song Mode*, thanks to the greater capacity of the host computer. I usually compose in Open Mode and sometimes bounce a complex sequence to Track Mode for channel-by-channel analysis, then back to Open Mode in finished form.

When you consider all the options at once, KCS may seem overwhelming if you're used to conceptually simpler programs. However, a little experimental mouse-clicking on the screen soon gives a pretty good idea of how the program works. If you prefer, you can start in just Track Mode, or part Track and part Song Mode, as these will provide familiar references if you have worked on linear or chain sequencers before. I recommend learning Open Mode as soon as time permits, though, as this is where the most powerful features reside. Accepting Dr. T's way of doing things in Open Mode soon renders old references to linear and chain approaches obsolete—why not have the best of both worlds?

APPLICATIONS TIPS

Here are four applications that take advantage of some of KCS's features:

1. I like to write a metronome sequence so the click comes from the same speaker set as the rest of the music (timing seems tighter that way). The metronome sequence is "called" from a master sequence, including a count-off of arbitrary length, and is then removed from the master sequence by a single "delete" command when no longer needed.

2. It's easy to write a song that leads up to an endlessly looping "comp" section for jamming. At the end of the jam, a single keystroke can terminate the comp section with one or more stop commands

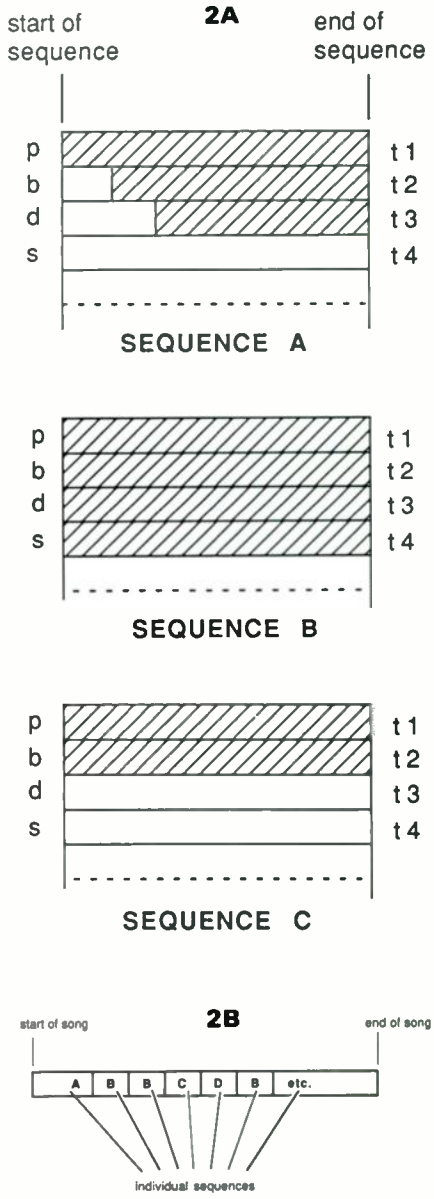


FIG. 2: Chain sequencer structure. 2a shows individual sequences, each part of a song section. 2b shows a master sequence "chain."

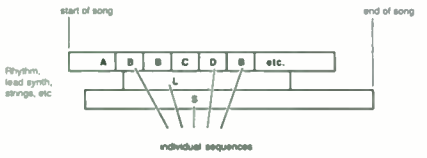


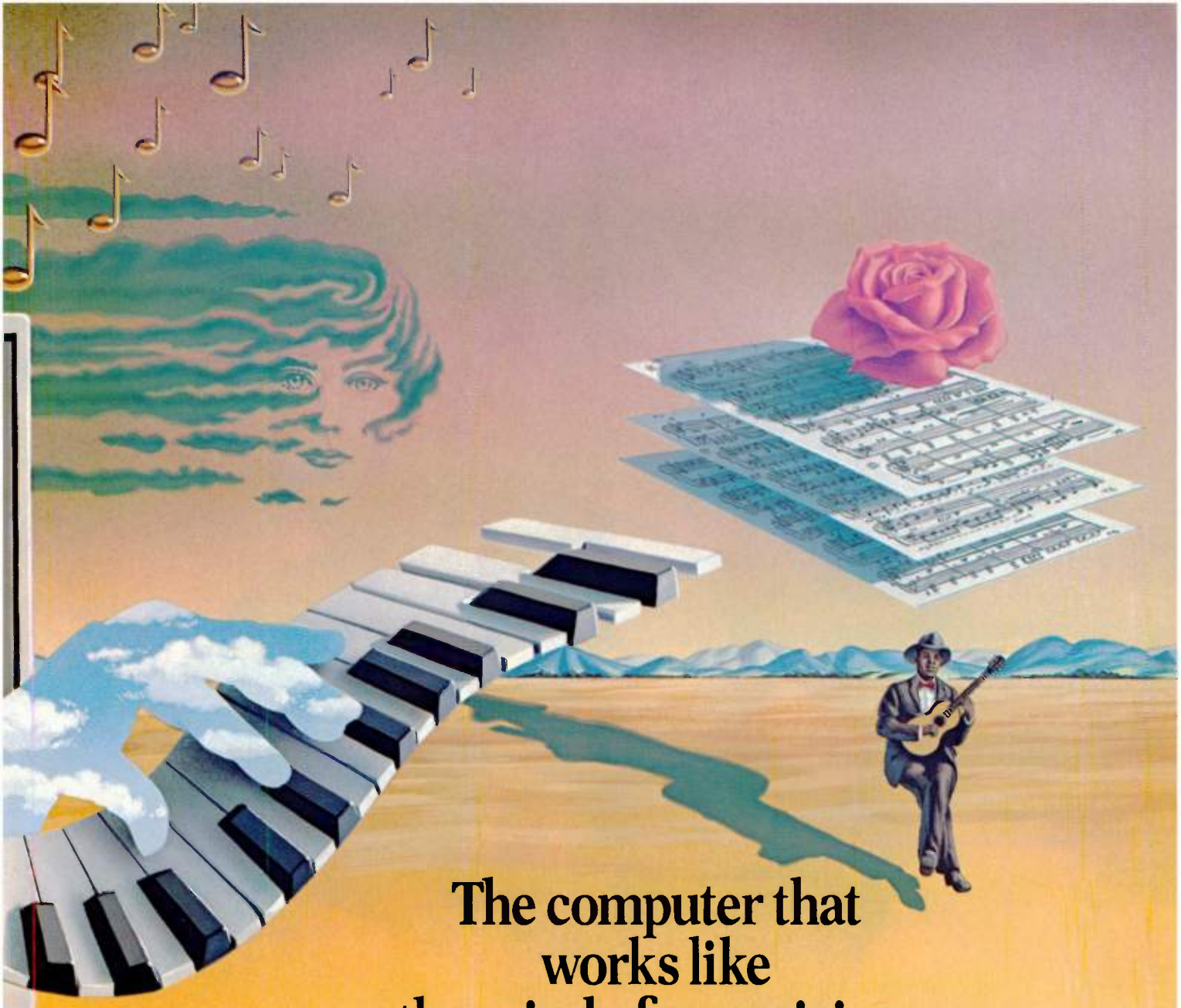
FIG. 3: Dr. T's sequencer structure. Sequences A - C are as in Fig. 2; sequences L & S are linear, with different start and stop times.

and instantly start into another song section. This is great for live performance. You can even program several alternative musical arrangements for coming out of the jam, each assigned to a different keystroke; use whichever one feels right for each particular gig.

3. I once wrote a light, 16th-note arpeggio of four notes, and another like it but with five notes and in a different octave. When both were set to repeat endlessly side by side, with one sequence offset from the other by a couple of MIDI clocks, the result was a very busy, full-sounding background. It had a long, smooth repeat cycle and was as simple to program as the two short sequences. Alternative arpeggio scales are easy to substitute in this kind of structure, either for selective comparison or for variety within a musical piece.

4. When inspiration strikes and you get some of those perfect expressions down (in the form of performance data such as Pitch Bend, Aftertouch, or whatever), remember that it needn't be a one-time event. Your favorite performance data can be saved as a separate sequence and then later added to other compositions whenever appropriate. Various pitch bends, for instance, can be tested by calling them from a master sequence and casually rearranging them until you hear the right combination with the note data of your new composition. The fact that your performance data was recorded weeks or months before the current song in progress is, of course, irrelevant. For those with a little experience in editing, I suggest intentional tailoring of performance data. A pitch bend can be trimmed to perfection if the original overshot slightly, or it can be split into several smaller sequences to provide a step-like effect.

Dennis Jablonski *owns Mixed Modes Productions, where he works primarily on video and sound production/engineering projects. Lately this has included a substantial amount of original MIDI composition. He has also been known to teach audio courses at Lansing Community College.*



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CD+MIDI+GRAPHICS:

Will It Change the Industry?

The CD is one of the audio industry's greatest success stories; MIDI has been equally successful in the music industry. Just think about what happens if you combine the two, then throw in some graphics for good measure . . .

By Craig Anderton

The MIDI connector first appeared on keyboards. Shortly thereafter, signal processors sprouted the now-ubiquitous MIDI jack; then came the flood: guitars, guitar amps, mixing consoles, drums, lighting controllers, and even wind instruments became a part of the ever-advancing MIDI tide. When Atari included MIDI in their ST series of computers, MIDI was on the way to acceptance as a standard computer interface. Now there's talk of someday finding MIDI connectors on everything from tape recorders to home security systems.

But are you ready for a MIDI output connector on your CD player? Warner New Media and the MMA (MIDI Manufacturers Association) think you are; in addition, CD originators Sony/Philips are considering implementing MIDI into the CD digital audio standard. The resulting protocol, CD+MIDI, may signal the widespread acceptance of MIDI into the world of the audio/hi-fi consumer—as well as change the way musicians make recorded music in the years to come.

The main booster behind CD+MIDI is Warner New Media, an independent company that operates with the support of Warner Communications. Headed by industry veteran Stan Cornyn, WNM is dedicated to

PHOTOGRAPH BY DAVID BISHOP

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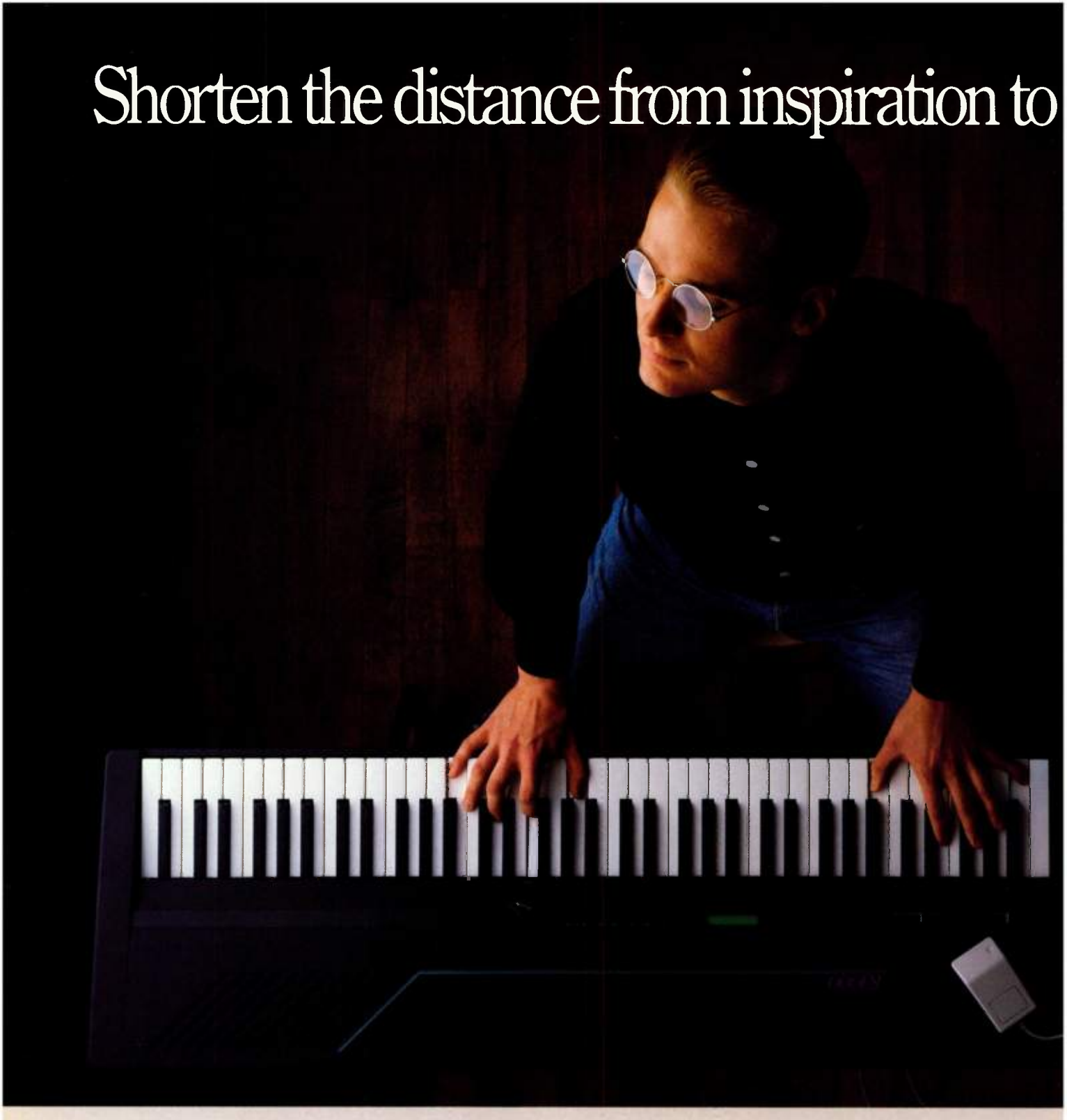

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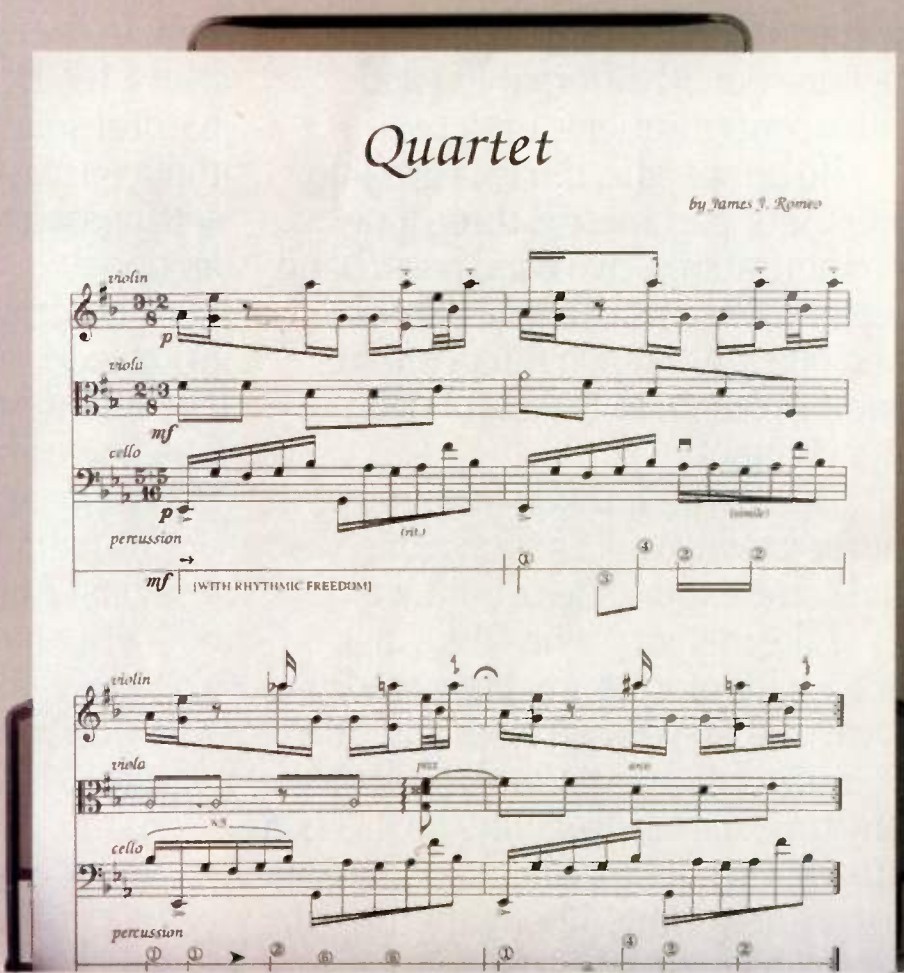

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COURTESY OF WARNER NEW MEDIA

Simply Red's "Picture Book" CD includes graphics and song lyrics.

exploring new ways to use music and video technology. WNM first proposed CD+MIDI to the MMA in January '88; since that time, all parties involved have worked together to insure a worldwide standard with the same sort of consistency and acceptance as MIDI itself.

CD+MIDI is possible because CDs have a significant amount of storage space (about 5% out of the CD's total of 600 megabytes, or approximately 30 megabytes) reserved for future use. This storage space is referred to generically as *subcode* (the P and Q codes that keep track of CD timing and similar "housekeeping" are examples of subcodes at work). Fortunately, subcode memory does not compete for space with audio. Over 70 minutes of audio can be recorded on CD along with the 30 megabytes of subcode data.

CD+GRAPHICS: GET THE PICTURE?

Subcode space is already being used to hold graphics data (CD+Graphics, or CD+G, as defined in the original CD spec from Philips/Sony). Since CD+G is part of the CD+MIDI equation (both compete for the same subcode memory space), let's look into what this graphics data can do.

Graphics capabilities are medium resolution (300 × 200), and it takes about seven seconds to draw a new image on screen. There's also a 16-color limit; however, these 16 colors can be different for each picture (e.g., 16 different gray scales for one image, 16 different colors for another, 16 variations on a few colors, etc.). The image does not appear all at once, but is "painted" to the screen in small vertical rectangles.

There are provisions for 16 channels of graphic information. Generally, channel 0 provides the graphic backdrop against which other information from channels 1 through 15 appears. For example, adding in channel 1 might give you lyrics in the language of the original performance, while channels 2 through 15 would provide translations into other languages. Since using multiple channels simultaneously slows down the screen painting time, generally only two or three channels are available.

Naked, the new Talking Heads CD, already contains CD+G data, and if you have the $400 CD-Graphics Decoder that JVC showed at the summer '88 Consumer Electronics Show, you can see them. (Once the required graphics decoding circuitry is integrated into custom chips, the price of a CD player *with* graphics output is expected to be around $400.) The graphics on the Talking Heads CD are fairly conservative but nonetheless interesting—lyrics, chord changes to some of the songs, and even a "track sheet" that's regularly updated to show which instruments are playing during specific parts of the tune.

In this application, CD+Graphics essentially provides glorified liner notes. But the opportunity exists to present images that become an integral part of the listening experience. For example, many people think of new age music as "wallpaper music," and CD+Graphics can provide

ADDING CD+GRAPHICS+ MIDI TO YOUR CD

If you're about to put out a CD, stop. Adding graphics and MIDI data is not all that difficult, and if you're planning to sell a reasonable number of CDs over which you can amortize the costs, it's not all that expensive either.

If you have camera-ready artwork and MIDI files ready to go, Warner New Media will work with you to get those onto CD (WNM can also help create graphics, should that be required). Even though WNM is part of the Warner Communications family, CD+G+M's importance transcends corporate borders, and WNM is already working with many labels. The basic cost to integrate graphics into the master CD starts at around $5,000, with turnaround times dependent on the nature of the project. If you're serious about CD graphics and MIDI and want to take advantage of the potential of these new media, contact WNM at (818) 955-9999 or write Warner New Media, 3500 Olive Ave., Burbank, CA 91505.

the actual visual wallpaper to go along with that music. Another use is for a live album to include pictures of the group in concert. While not as sophisticated a format as CD-V (the so far less-than-successful CD format that provides five minutes of high-quality video along with 20 minutes of audio), CD+G does not require a player with a lot of extra video circuitry.

Another obvious use for CD+G involves opera—consider listening to an Italian opera with an English libretto flashing by on the screen, along with biographical information on the main characters, and perhaps some historical background.

If you think that having graphics flash by might detract from the listening experience, remember that you don't *have* to look at the graphics. The "liner note" type of information could be absorbed during the first few times you put on the CD, and later ignored when you wanted to close your eyes and just savor the music.

One problem that could arise concerns the use of the graphics for purely commercial advertising. On the other hand, if Sting is singing a song about Amnesty International, CD+G could list Amnesty offices to which contributions could be sent, as well as information about the work that Amnesty has done to help end the torture of political prisoners. In that sense, CD+G provides the graphic "sidebars" that allow for a more participatory listening experience.

CD+MIDI: THE MIDI CONNECTION

Like MIDI itself, the idea of CD+MIDI may seem limited at first—but once you start thinking about the possibilities, you begin to recognize how unlimited the potential really is. At this point, perhaps the biggest hurdle faced by CD+MIDI proponents is the need to convince manufacturers to spend the extra money required to include a MIDI output jack with CD players. Just like MIDI, though, once the jack is there we can expect it to be used. Here are just some of the possible applications:

Streamlined sheet music distribution. If a CD includes MIDI data for the lead vocal, bass line, chordal accompaniment, and so on, it would be a simple matter to bring the CD to a facility (e.g., music store) equipped with transcription software and a laser printer, and print out sheet music on the spot for a nominal fee. Warner/Chappell, the largest music publisher and copyright holder in the world, has given their support to WNM in this new venture; Coda Software (who recently released their *Finale!* music transcription package) are also eyeing the potential of this aspect of CD+MIDI.

Of course, I would assume that anyone with a personal computer running appropriate software, a laser printer, and a CD+MIDI-compatible CD player could also print out sheet music—but how many people are going to have that complete a home music setup? Besides, from what I understand, going through retail channels for sheet music will give the custom-

Album projects are already being thought of with CD+MIDI in mind.

er various value-added features.

While this is all a very new concept that is still under development, it would appear to offer several advantages to store owners and sheet music publishers. First, the store wouldn't have to stock a lot of paper inventory. Second, it would be easier to get sheet music for more esoteric CDs if the sheet music information was already encoded in the CD (ever try finding sheet music for an old record by an unknown group?). Third, since a computer is involved, it would probably be easier for the store owner to keep track of royalties—for example, there wouldn't be any returns of unsold product; sheet music would be generated only as needed, on a per-customer basis. However, I'm not sure what method is envisioned to make sure these royalties do indeed wind up in the artist's pocket.

Education. Music educators could use MIDI data to spotlight particular aspects of a piece of music. For example, with pop tunes you could send the bass line, trumpet line, or lead to MIDI gear for further analysis. I remember how difficult it was teaching someone to differentiate between the various parts in a piece of music; with CD+M, the task would be greatly simplified. And of course, the CD+Graphics images could tell you which instruments are on which MIDI channels and even mention suggested patches or instrument sounds to go along with each MIDI track.

CDs could also be designed specifically for education. A "How to Program Synthesizers" CD might include: audio narration and sounds of different patches, graphics data showing waveforms and how varying controls affect those waveforms, and for the *coup de grace*, MIDI System Exclusive data for downloading into your synth from the CD—along with sequenced compositions that illustrate how to make the best use of these timbres!

Budget CD-ROM for MIDI data. Thirty megabytes is a lot of data (even CD singles hold a lot of subcode data—around 8 megabytes). If this is used for storing synth patches as Sys Ex (System

Exclusive) data, you wouldn't have to worry about balky tape interfaces or loading disks into computer-based editor/librarian programs (although the latter would, of course, be helpful if you wanted to edit and tweak the System Exclusive data after loading it from the CD). What's more, since the CD+MIDI data doesn't compete for memory space with the audio, there could be over 70 minutes of patch sounds recorded for "browsing"; you could then load the banks with those sounds that interest you the most. Throw CD+Graphics into the equation, and it would be easy to highlight suggested keyboard ranges over which particular patches sound best, or even show patch sheets for especially interesting patches.

Thirty megabytes can also hold a reasonable number of digitized samples. Companies that release audio CDs of instruments to sample (Prosonus, McGill University, Sound Ideas, etc.) could also include some digitized samples in a universal sample file format (perhaps the Audio IFF standard used in the Macintosh, or Digidesign's Sound Designer format). These "universal" samples could be loaded into a program like Blank Software's *Alchemy*, converted within the program for compatibility with a specific sampler, and sent to your sampler of choice via the MIDI sample dump protocol.

Karaoke. Karaoke is a popular pastime in Japan; in the many Karaoke bars that dot that country, people (often happily inebriated businesspeople) sing along with background tracks from which vocals have been deleted. Karaoke has never caught on in the U.S., but CD+G+M is well-positioned to aid the Karaoke market wherever it might develop. While graphics show the lyrics to facilitate singing along, the MIDI data could drive a

DOES CD+G+M = CD-I?

CD+Graphics+MIDI is by no means a substitute for the new CD-I/DV-I formats. CD-I (Compact Disc Interactive, as proposed by Philips/Sony) and DV-I (Digital Video Interactive, an alternative to CD-I proposed by General Electric) use computer power and CD technology to create an interactive blend of audio and video, all stored on CD-like discs. Of the two systems, DV-I offers greater graphics potential for animation and motion; CD-I graphics seem to be most useful with "slide show" images. However, CD-I came out of the starting gate first and has already gathered support from several manufacturers. DV-I had a slower start and will probably require costlier technology, but its enhanced graphic abilities are appealing enough to cause a wait-and-see attitude on the part of some manufacturers about whether to go with CD-I or DV-I (if this sounds like Beta vs. VHS all over again, all I can say is—I hope not!)

Unlike CD-I or DV-I, CD+G+M is interactive in only the most limited sense of the word. CD-I or DV-I can access various parts of a disc according to your needs and interests to create a complete audio-visual interactive experience. (One example of this is the "town guide," where you "drive" through a town on video and, if you see something that strikes your fancy, you have the option of departing from the main tour and doing a subtour of, say, a restaurant or museum).

Rather than offering interactivity, CD+G+M basically squeezes more data out of a standard CD; while this is useful information, it pretty much plays along sequentially with the audio information. With CD+G+M, the graphics and MIDI have more of a supporting role to the audio (although as the main text points out, there are other possibilities), while with CD-I and DV-I, graphics are just as much "the star of the show" as the audio. It's also worth noting that with CD+G+M, the audio remains unchanged—it's not compressed or altered, as is usually the case with CD-I/DV-I.

Another difference is that both CD-I and DV-I require players that will cost considerably more than the average CD player, CD+G and CD+M decoders, whether built into a CD player, or into adapters that tap an existing player's subcode output jack, are inherently fairly low-cost devices. However, as with any consumer device, the eventual cost of *any* CD enhancement system depends mostly on numbers—the more players that are produced, the more prices will tend to drop.

—*CA*

If the consumer electronics industry embraces MIDI, the rewards are likely to be substantial.

small, multi-timbral instrument *a la* Roland MT-32 or Yamaha TX81Z. If you turn down the CD audio, the MIDI instrument(s) can then provide the backing tracks and, unlike the CD audio, the music can be transposed via MIDI to fit a particular singing range. Instrumentation can be changed as well.

Practicing. Most of you are probably familiar with the "Music Minus One" recordings, which consist of an ensemble playing a piece but without one of the main instruments—guitar or sax, for example. The student can then play along with this recording and fill in the missing part. With MIDI sequences stored along with the music on a CD, it would be easy to have your "MIDI band" play a tune from the record (you would first hear what it was supposed to sound like on the CD audio tracks) and simply turn off whichever MIDI track corresponded to the instrument part you wanted to practice.

MIDI color organs. The color organ, popular during the '60s, triggered lights according to variations in the music. Typically, the music would feed multiple filters (usually high, mid, and low audio frequencies), and a light connected to the filter's output would vary in intensity according to the amount of energy present in that part of the frequency spectrum. Color organs never really caught on for a variety of reasons; one problem was that separation between the filters wasn't always that great, so you basically had all the lights pretty much just flashing in time with the music (although you could occasionally see individual cymbal crashes show up in the high frequency lights, or bass notes show up in the low frequency lights). Making lights respond to MIDI, however, opens up a lot of options. Sixteen lights could be assigned to the 16 MIDI channels, and the effect would be far more impressive than traditional color organs—you would be able to "see" each individual instrument, with velocity information controlling the brightness of each lamp.

In-store demos. How about a self-running demo for MIDI instruments, designed specifically for music stores? The audio part of the CD could explain how the instrument works, while CD graphics show important instrument controls, block diagrams of how the instrument fits into a system, and so on. Meanwhile, the CD+MIDI information could send Sys Ex data into the instrument—anything from patches to samples to sequences—and issue MIDI Start, Stop, and Continue commands at the appropriate times to run various sequenced demos (assuming, of course, the instrument had an onboard sequencer; otherwise, the CD itself could generate the MIDI sequences). This kind of demo would be particularly useful for rack-mount devices, since you wouldn't have to hook up a keyboard or other controller in order to check out what the rack mount can do. I'm sure that manufacturers might also avail themselves of this opportunity to get in a sales pitch or two, thus freeing up the store's salespeople to handle specific questions and problems. (I've heard rumors that Ensoniq is already investigating the pos-

sibility of using CD+G+M as a way to provide in-store demo support to dealers.)

Also imagine what this approach could mean when demoing a complex signal processor. The CD's audio could provide audio source material to feed into the signal processor, while CD+MIDI sends a stream of Sys Ex data to the unit to change control settings, and the CD graphics show the theory behind what's happening.

The ultimate bass box. How many audiophiles do you know who love thumping bass sounds? Well, you could feed the MIDI data into the consumer equivalent of a 360 Systems Midi Bass set for the channel carrying bass information, feed the Midi Bass into an amp, and there you have it—as much bass as you want.

Home entertainment. Some hi-fi enthusiasts are born "tweakers" and love playing with their sound (witness the aftermarket in graphic equalizers, spatial expanders, and so on). For these people, CD+MIDI represents a way to pull out lead lines and such, feed them into an inexpensive MIDI sound-generating device, and modify the instrumentation of the music—while leaving the main channel audio completely intact. Artists will also have the opportunity to do such tricks as encode alternate takes of solos as MIDI data; considering the interest in remixes and dance mixes, CD+MIDI could provide an easy, inexpensive way to pull several mixes out of a single tune.

COURTESY OF WARNER NEW MEDIA

"La Bamba" CD+MIDI+Graphics screen.

IS CD+MIDI FOR THE MASS MARKET?

CD+Graphics seems well-suited to consumer applications. If nothing else, dance bars with big-screen video setups could project the CD graphics that go along with an album, and for music buffs in general, the idea of extensive, permanent liner notes would certainly provide the incentive to hook a CD player up to a TV and check out if anything exciting was going on.

CD+MIDI is a little different, however. Warner New Media would like to think that the concept has broad-based consumer appeal, as would manufacturers debating about whether to include a MIDI port with each CD player. Yet Karaoke, one of the media to which CD+G+M is best suited, has never been a factor in the U.S., and I wonder how many hi-fi enthusiasts are going to run out and buy a rack-mount MIDI unit just to analyze the lead or bass line on the latest hit single. In my opinion, CD+MIDI is a promising, clever idea—but one that will not necessarily appeal to consumers *at first*. Many of the applications that seem like an ideal fit for CD+MIDI tend toward industrial, professional, and educational markets; but CD+MIDI will probably follow a similar path to MIDI itself, which gradually filtered down from the monied studio

pros to the consumer.

Fortunately, it doesn't matter to manufacturers of CD players whether the market is one large group or split among several smaller groups, as long as the number of potential customers is significant. If you have schools using CD+G+M for education, synth manufacturers using it for demos, patch developers using it as a way to get products out into the world, students using it for practicing, and home stereo tweakers playing bass lines on Casio synths, each market in itself may not be all that big—but taken as a whole, we're talking about a major new market. As someone who is looking to buy a new CD player, I'm certainly going to check for one with subcode outputs so that I can at least pull out the graphics and MIDI data with suitable adapters as they become available.

THE FUTURE IS NOW

Album projects are already being formulated with CD+MIDI in mind. Film scorer/musician Alan Howarth (profiled in the August '86 **EM**) is working on an album project that will include graphics and MIDI data. While understandably secretive about how he's going to apply this new technology, he promises that there will be some very good reasons to want to hook up graphics and sound. As mentioned previously, the new Talking Heads CD already includes graphics information, and other groups are rapidly following suit. Since it is relatively inexpensive to include graphics and MIDI information on CD (see sidebar, "Adding CD+Graphics+MIDI to Your CD"), we can expect that this data will become available on more and more commercially released CDs.

The benefits for musicians could be as significant as the MIDI specification itself.

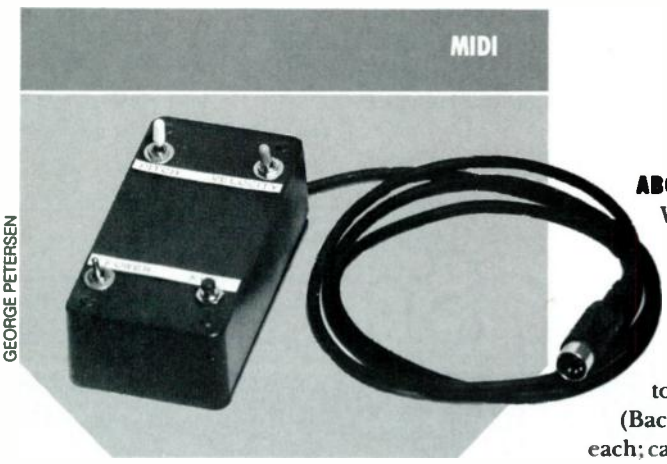
Will CD+G+M change the music industry? It all depends on whether major manufacturers include MIDI and graphics output jacks on their CD players. At the time, it was quite a leap of faith for the keyboard industry to include MIDI jacks on all their gear—but one which has been proven to be both worthwhile (and lucrative) over time. If the consumer electronics industry makes a similar leap of faith and embraces MIDI, the rewards are likely to be substantial as well. MIDI has proven itself to be a coy little critter that eventually delivers a lot *more* than it promises initially (something of note in itself). Mating it with the CD can only make life more interesting and productive for musicians, and considering the increased consumer awareness of MIDI, CD+MIDI might be the critical element that catapults MIDI beyond the music world and into living rooms everywhere. If so, the benefits for musicians could be as significant as the MIDI specification itself.

Among other things, **Craig Anderton** *writes books, plays music, and edits this magazine.*

THE POCKET MIDI CONTROLLER

By Paul Schmidt

Whether you're auditioning an expander module at a music store or troubleshooting an obstinate MIDI system this handy MIDI tester is just the ticket.



GEORGE PETERSEN

It used to be that the word "synthesizer" was synonymous with "keyboard instrument." The synth shopper walked up to a prospective model in the store and played the keyboard to try it out. Likewise, the musician setting up a system, be it on stage or in the studio, could tickle a couple of keys to check quickly the functionality of the various electronic tone generators.

Those days are gone. Because an increasing number of tone generators are MIDI rack-mounted modules, the lack of available keyboards can make the visit to the music store a frustrating experience. What's worse, the troubleshooting of a balky synth setup can lead to near madness—is the controller/sequencer not sending out data, is it the synth, or is the cable bad?

This article describes the construction of, and theory behind, a device intended to solve these problems: the Pocket MIDI Controller. The PMC is a simple, battery-powered, handheld unit that generates basic MIDI codes to play synth patches and run other MIDI equipment while you're shopping or troubleshooting. By plugging the PMC into a MIDI instrument, you can play notes of any duration, with any of several combinations of pitch and velocity. In addition, the circuit can be a building block in more elaborate MIDI code generators you can make that include other types of data.

ABOUT THE CIRCUIT

Whether you intend to build the PMC according to the following suggestions or modify it to suit your needs, it helps to understand its theory of operation. Much of the general MIDI theory required was included in my article "MIDI Switcher Primer" (Aug. '87 **EM**), so I won't duplicate detailed descriptions of MIDI connector hardware and transmitting/receiving theory here. (Back issues are available from EM Bookshelf for $3.50 each; call toll free for credit card orders at 800-233-9604, or write c/o **EM**.)

MIDI data is generated as a serial sequence of on/off pulses, sent at a rate of 31.25 kHz and in groups of eight pulses (called *bytes*). This data is transmitted *asynchronously*, meaning at a constant rate but with arbitrary spacing of the bytes. Since the receiving equipment is not synchronized to the transmitting equipment, it must constantly watch for the start of each of the bytes and ignore the spaces in between. Since any of the pulses (called *bits*) can be either on or off, the receiver has no clue where the start of a byte is.

To solve this problem, two rules have been established to govern the transmission of asynchronous serial data. One is that the signal will be at logic "high" during the space between bytes, and the second is that there will be an additional logic "low" pulse (the *start bit*) immediately before the first bit of every byte (see **Fig. 2**). The receiver uses the start bit to synchronize to the byte and respond to the data it contains.

The PMC consists of a 31.25 kHz clock (that regulates the rate at which the device sends serial data), a long shift register (which produces the serial stream of three bytes required by MIDI messages, along with start bits and intermediate space bits), and a current loop driver circuit. Additionally, a group of three logic circuits responds to the three switches that specify velocity, pitch, and "key" (which, among other functions, sends

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Note On/ Off commands).

Referring to **Fig. 1**, the shift register (which we'll call *register* for short) is a 32-bit parallel input, serial output type, assembled from four 8-bit shift register ICs (IC2-IC5). When the *load* inputs are low (0 volts), parallel inputs 0 through 7 are internally disconnected from the serial registers. In this mode, each low to high transition of the *clock* (CLK) inputs causes serial data to be shifted one bit position in the direction of the *serial out* (SO) output. The on/off data originates at the *serial in* (SI) input of IC2 and finally exits the register at the IC5's SO output. Since the originating SI input is connected to the positive power supply (logic high), a continuous succession of high bits exits at the final SO. The receiver (i.e., whatever the PMC is connected to) interprets this as a space of indefinite length and responds by staying in a holding state. If we stop the clock signals, the register's SO output holds its last value

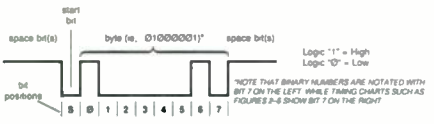


FIG. 2: Example of asynchronous formatting of one byte of data.

(high); from the receiver's point of view, this is equivalent to the moving succession of high bits and, therefore, has the same effect.

When we need to transmit a group of bytes (a MIDI message), the required data is presented in parallel format to register inputs 0-7. Note that each byte to be transmitted includes not only its own group of eight bits, but a space bit and start bit as well. Also note that since each register IC handles only eight bits, the bytes overlap the boundaries between ICs. Next, the clock is stopped to avoid shifting "garbage" bits into the register. Simultaneously, the load inputs are brought high with a

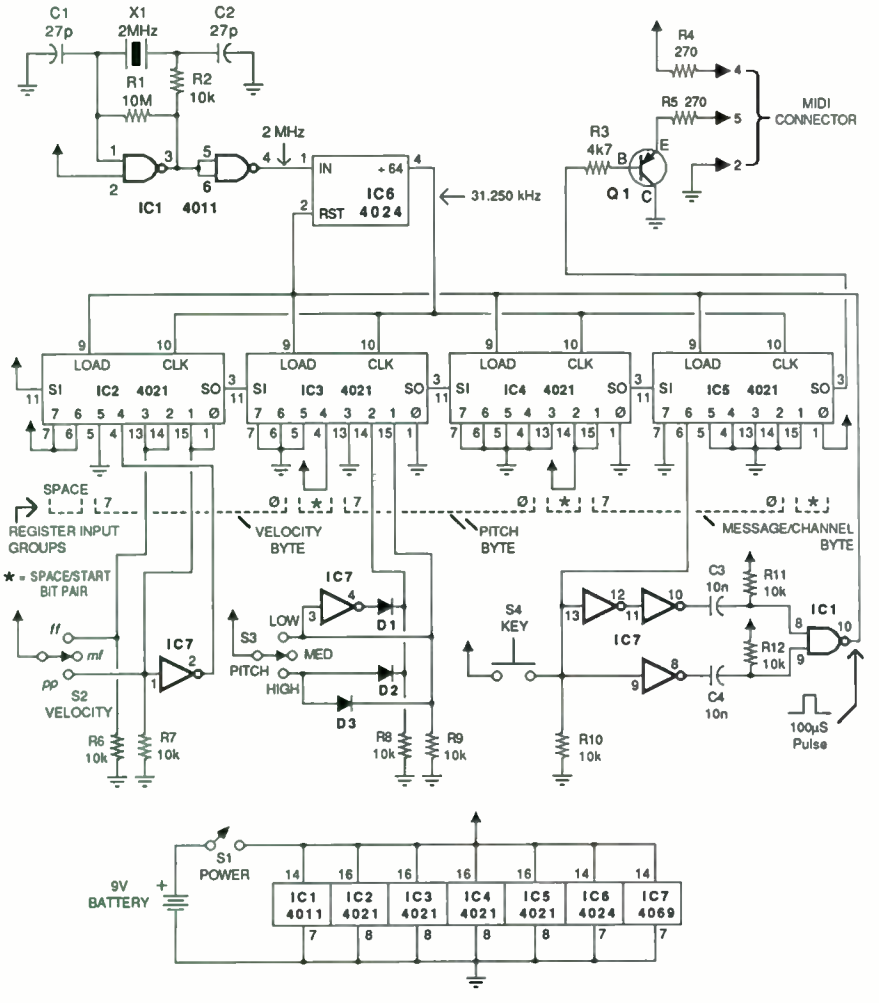


FIG. 1: Schematic for the Pocket MIDI Controller.

PARTS LIST

RESISTORS (¼ W, 5% tolerance)

R1	10M
R2, R6-12	10k
R3	4k7 (4.7k)
R4, R5	270Ω

CAPACITORS

C1, C2	20-30 pF, 50V disc type
C3, C4	10n (0.01 μF), 50V disc type

SEMICONDUCTORS

IC1	4011 CMOS Quad NAND gate
IC2-5	4021 CMOS 8-bit shift register
IC6	4024 CMOS 7-stage binary counter
IC7	4069 CMOS hex inverter (reverses evil spells, ha ha)
X1	2 MHz crystal (any type designed for microprocessor use is okay)
Q1	General purpose PNP transistor (2N3638, 2N2907, or equiv.)
D1-3	General purpose silicon diode (1N4148, 1N914, or equiv.)

OTHER PARTS

S1	SPST toggle (Radio Shack #275-324)
S2, S3	SPDT toggle (On-Off-On; RS #275-325)
S4	Normally open pushbutton (RS #275-1571 or #275-1547)
Misc.	Shielded twisted pair cable (such as RS #278-1276), 180° 5-pin DIN plug (RS #274-003), battery connector (RS #270-325), 9V battery, case, solder, wire, etc.

brief pulse. This causes all data bits currently in the register to be replaced with the parallel data, which includes one space bit followed by a start bit preceding each byte. At the end of the pulses the clock is restarted, and the new data bits are shifted serially out SO, followed by the usual string of space bits that originate at SI. This process is repeated for each Note On and Note Off action. At the receiver, the first start bit alerts the circuitry to start accepting the first byte of data. The following space/start bit pair cause it to accept the second byte, and so on for the third byte. Keep in mind that not all MIDI messages require three bytes; if you modify the PMC to generate messages different from those shown, use only as many register bits as required and connect all unused parallel inputs to the positive power supply. The specifics for Note On/Off messages are outlined later.

The clock signal is generated by two NAND gates from IC1, a crystal (X1) with its support components, and defeatable frequency divider IC6. The crystal oscillator produces a 2 MHz square wave at pin 4 of IC1, which IC6 divides by 64, resulting in the required 31.25 kHz for the register clock inputs. In order to stop the clock during register loading, the same short pulse that drives the load inputs also freezes IC6's output by pulling its *reset* (RST) input high.

The register's SO output must be interfaced to the current-loop MIDI format, so transistor Q1 turns on when SO is low and turns off when SO is high. When Q1 is off, no current can flow into pin 5 of the MIDI connector, and the current loop is off (the on/off status of the current in the loop is the opposite of the logical state it represents). When Q1 is on, current flows from the positive power supply through resistor R4, out pin 4 of the MIDI connector, and to the receiving equipment. There it flows through a resistor, and then an LED (light-emitting diode) in an opto-isolator, turning it on. The current finally flows back to the PMC via MIDI connector pin 5, through R5, and finally through Q1 to ground.

Normally the values for R4 and R5 would be 220Ω, but since the PMC power supply is 9 volts, the resistor values have been increased to 270Ω to keep the loop current under 10 mA. Also note that an NPN transistor would be a more conventional choice for Q1, but using a PNP transistor gives us the required inverter function for "free." To avoid biasing the PNP into its linear response region, where it would act like an amplifier instead of a switch, the single base resistor R3 is used. You might think that there should be another resistor from the base to V+, but the circuit works just fine as is.

The three switch control circuits are for Velocity, Pitch, and Key (not as in musical key, but as in "to key on and off"). Each is controlled by a simple switch input and produces a more complex output, which is in turn used as input by the register. The MIDI messages the PMC sends are Note On when Key is pressed, and Note Off when Key is released. The actual message requires three bytes, one each for message number/channel number, pitch value, and velocity value. In addition, the Key circuit provides the load pulse each time it is pressed and again when it is released.

Referring to **Fig. 1** and **Fig. 3**, pressing Key sets bit 4 of the message/channel

byte high (pin 6 of IC5). With bits 5 and 6 grounded (low), and bit 7 tied to V+ (high), the message part of the byte is binary 1001 (Note On). Since bits 0-3 are grounded, the channel part of the byte is 0000 (channel 1). Note that the actual channel number is always the binary value plus 1. Pressing Key also pulls pin 9 of IC7 high, causing its output (pin 8) to go low. Capacitor C4 and resistor R12 convert this low-going output into a brief negative pulse of about 100 μS duration. IC1 sees this pulse on its input (pin 9) and produces a corresponding positive pulse on its output (pin 10), resulting in the load operation. When Key is released, R10 pulls bit 4 low, changing the message number to 1000 (Note Off). This time, the combination of two inverters from IC7, along with C3 and R11, produce the negative pulse for IC1, with the same resulting load pulse.

Now refer to **Fig. 1** and **Fig. 4**. The Pitch circuit generates the pitch byte of the Note On event. The byte data consists of a 0 in the bit 7 position, with bits 0-6 being the binary pitch value (0 to 127). In order to keep the number of components in the PMC to a minimum, the three pitches were selected to have the widest keyboard spread while being simple to generate in binary. The resulting codes are Low = 0100000 (A-2 flat), Med = 1000000 (E1), and High = 1100000 (C4). Some simple diode logic sets bits 5 and 6 (pins 14 and 15 of IC3) according to the switch position, while bits 0-4 (pins 3-7 of IC4) are tied low. Resistors R8 and R9 pull bits 5 and 6 low when they are not being pulled high through diodes.

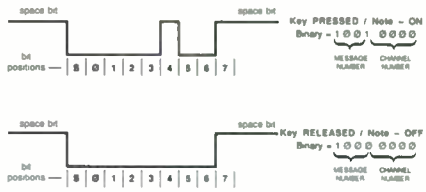


FIG. 3: MIDI message byte (top) and MIDI channel byte (bottom).

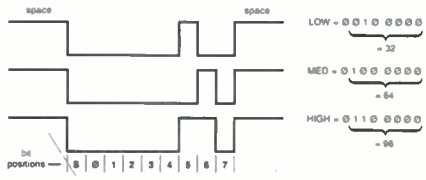


FIG. 4: MIDI Pitch bytes.

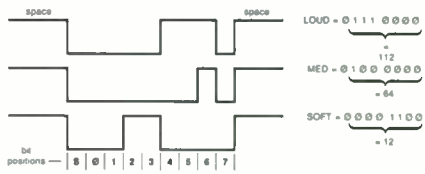


FIG. 5: MIDI Velocity byte.

Referring to **Fig. 1** and **Fig. 5**, the Velocity circuit works similarly to the Pitch circuit, with bits 0-6 determining the value and bit 7 tied low. The binary codes are Loud = 1110000 (ff), Med = 1000000 (mf), and Soft = 0001100 (pp). Different and/or more elaborate circuitry for these switches can be used to generate different values as required. I recommend Craig Anderton's book *MIDI for Musicians* (AMSCO Publications; available at your

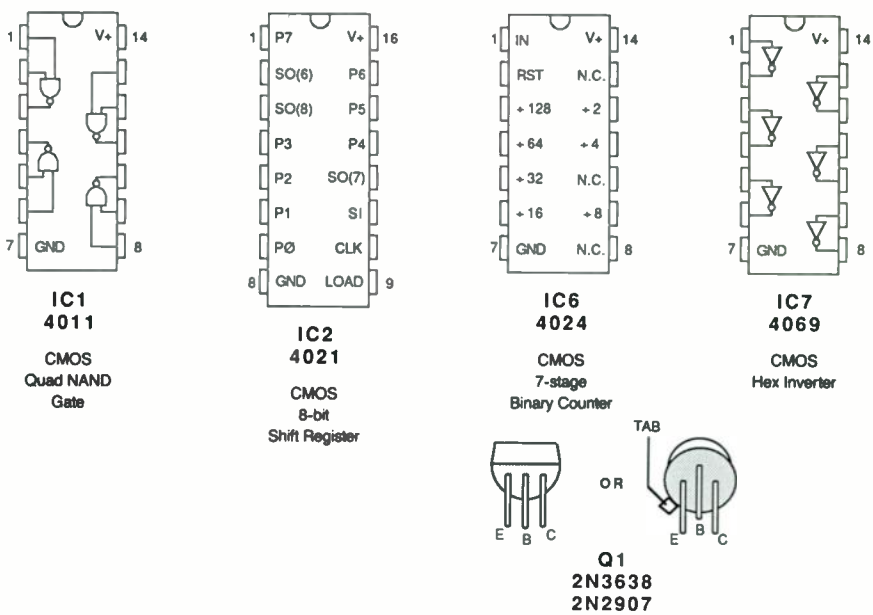
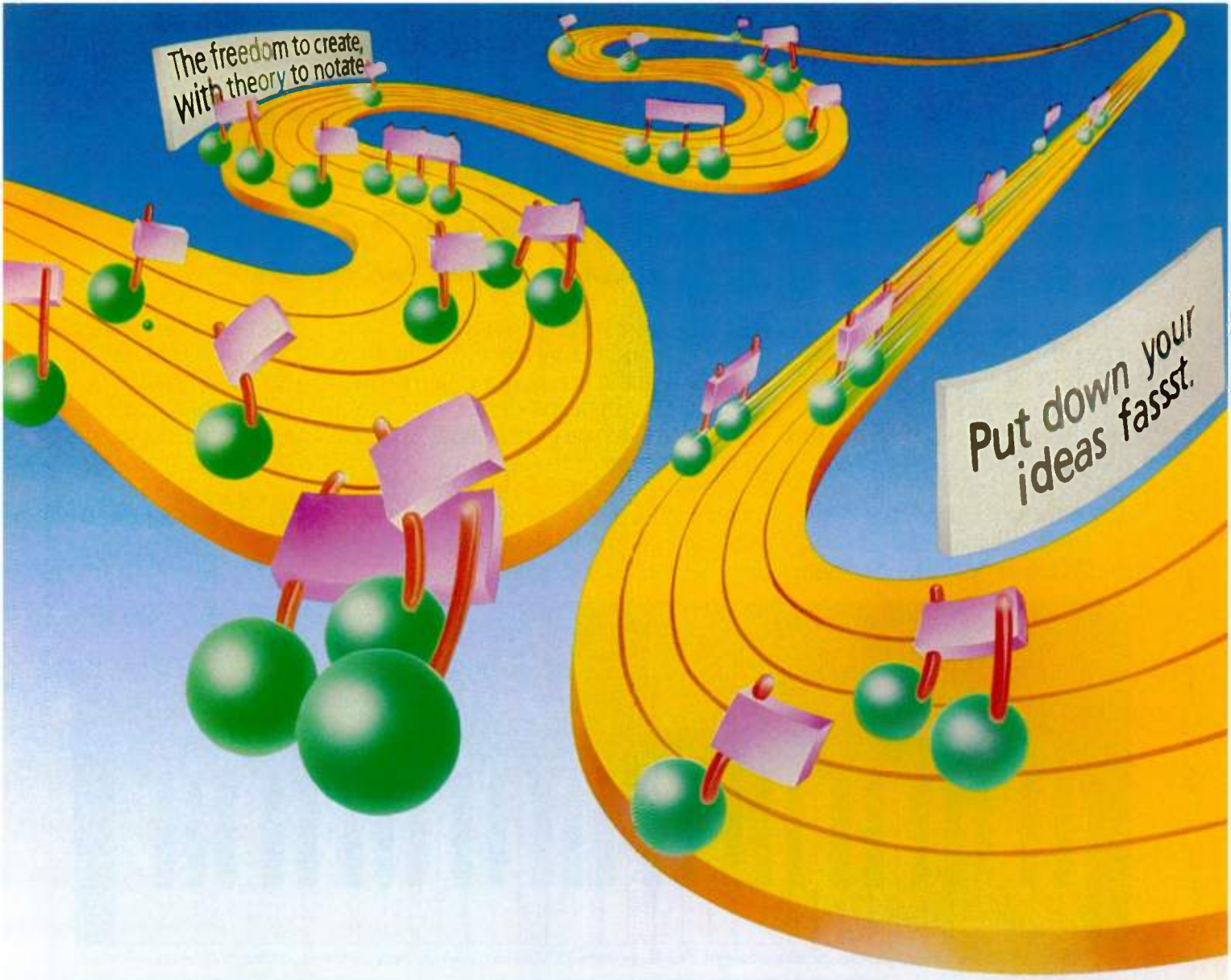


FIG. 6: Device pinouts for Pocket MIDI Controller.



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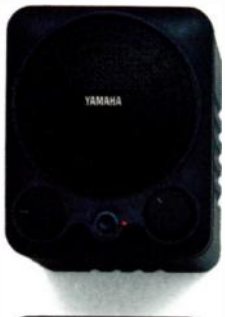

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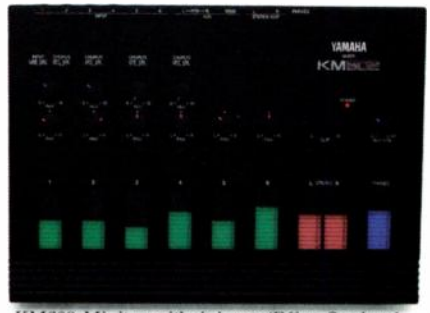

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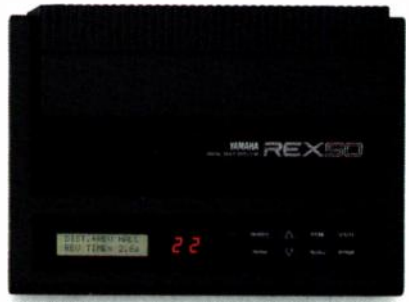

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local dealer and through EM Bookshelf) as a source for understanding how to construct MIDI messages to suit your purposes.

CONSTRUCTION

Since this is intended as a *pocket* controller, and should therefore be as small as possible, I have some suggestions concerning construction. My PMC was constructed to fit (along with its battery) inside Radio Shack's 4¾-inch × 2½-inch × 1 1/16-inch, plastic project box (part #270-222). This, with its three-foot-long MIDI cable wrapped around it, fits neatly into a jacket pocket. I used a circuit board for neater construction and mounted the ICs without sockets in order to provide enough depth for the battery and switches. If you want to use a similar packaging scheme, one row of four shift register chips alongside a row of the other chips and crystal fits well in a box this size; the resistors and capacitors fit between the rows, and the ICs touch end to end. The 2 MHz crystal is a rather large device, typically as long as a 14-pin IC and twice as wide, and laying it flat on the board may be required. Keep in mind that the pinouts for IC1 and IC7 shown in the schematic are suggestions only. Since there are more gates in IC1 and inverters in IC7 than needed, you can use any of the available gates and inverters as long as your arrangement conforms with the device pinout chart (**Fig. 6**). The only caution is to make sure you connect the inputs of any unused gates or inverters to V^+, as this promotes more reliable operation.

Incidentally, although I've provided Radio Shack part numbers in the parts list, most of the components so designated are non-critical, and equivalent parts can be used.

CIRCUIT MODIFICATIONS

A circuit like this allows for numerous possible modifications. Instead of tying the four channel bits of the message byte low, try connecting them to a DIP switch (or better yet, a 16-position rotary DIP switch with binary encoded pinout—see industrial/commercial electronics suppliers for this) so the PMC can transmit on any of the 16 MIDI channels. Control the seven valid bits of the velocity and pitch bytes with similar DIP switch circuits, and the PMC will be able to send *any* MIDI message of any length (to the maximum of three bytes). Just remember to set the bits of any unused byte to logic high, so

continued on page 101

QUESTIONS AND ANSWERS: Moogs, Mirages, MIDI Cables, and More.

This month, the **EM** tech talks repairs, modifications, and upgrades, and solves your most exasperating equipment enquiries.

By Alan Gary Campbell

RICK BISACCIA

Q. I have a Yamaha KX5 strap-on controller, which is great, but I keep wearing out MIDI cables—the leads break when I jump around on stage. I've opened a couple of them up, and even the expensive ones don't have any strain relief, though the plug provides a strain-relief clamp. What gives?

A. Most quality MIDI plugs, like the Switchcraft 05BL5M, provide a strain-relief clamping mechanism; but for this to work properly, the cable jacket has to extend slightly beyond the clamp, which leaves very little free lead-space in which to solder the connections and makes cable construction difficult. So when it comes to strain relief, many manufacturers just don't bother. Molded cables might appear to be an improvement in this respect, but in my experience they are not reliable for truly heavy-duty use.

So what's a stage-struck strap-on-synth strutter to do? If you make your own cables you can afford to do it *right*. The procedure is tedious, but sturdy. Just make the lead length behind the pin-block short, solder the connections, then crimp the strain-relief onto the cable jacket properly. If you're into overkill, get a small tube of silicon sealer and, using the nozzle that comes with it, squeeze a glob into the rear of the plug shell before you reassemble it (be sure to wipe off any excess that squirts out before it sets). This provides strain relief to the max, but don't plan on taking the plug apart again!

Of the MIDI cables I've tested so far, in my opinion those manufactured by Conquest U.S.A. (see sidebar) are the best overall, but even they don't provide any strain relief. I'd like to know about any that do. Write me care of **EM**, and I'll pass the information along.

Q. Is it important to deflux circuit boards after soldering?

A. In general, only high-impedance, low-frequency sample-hold circuits and timing circuits (e.g., analog envelope generators or time-delay switch circuits) are adversely affected by the leakage currents that can result from flux residue. When servicing such circuits, problems can occur if the flux is not removed after sample-hold/timing capacitors or ancillary components are replaced. For best results, the affected PC board area should be defluxed within one hour after soldering.

Most common flux removers are aerosol types (e.g., Radio Shack *Rosin Flux Remover*, catalog #64-2324), which are fast-acting, but contain methylene chloride, a carcinogen, and chlorofluorocarbons, which are suspected of damaging the earth's ozone layer. Furthermore, methylene chloride will, even when dry, *melt* most plastics on contact.

Once, I was installing a Memorymoog "Autotune Update Kit" (which involves replacing all the sample-hold caps) on a tight schedule and didn't want to remove the PC board from the synth to deflux (it was *2 a.m.*). So I constructed a little "pan" from aluminum foil to catch the overspray, opened all the windows, and let 'er rip. The pan must have leaked, because

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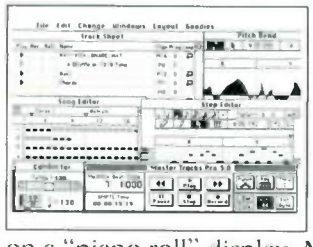

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the next day, as I was finishing up, I set my favorite screwdriver down in a "clear" spot on the Memorymoog's bottom panel. When I came back later, it was oozing all over like chewing gum on a hot sidewalk! I peeled it off, took a file to it, and it lives again; but methylene chloride is *potent* stuff. (Believe it or not, they use it as a solvent to decaffeinate coffee. "Waiter! I'll have the *orange juice*, please.")

For safety's sake, aerosol flux remover should only be used outdoors, or in a *very* well-ventilated area, and should be kept away from anything that even *looks* like it might be plastic.

The convenience of aerosols is seductive, but you can effectively remove flux residue with common denatured alcohol and a toothbrush; it just takes a little longer. Of course, alcohol is flammable, and smoking materials, soldering equipment, electric heaters, motors, and the like must be kept away while it's in use. But it won't harm the ecosphere, the equipment, or *you* if you follow the right precautions.

For more on electronics chemicals and safety, refer to "Better Music Through Chemistry" (January '88 **EM**) and "Service Clinic: Safety in the Electronic Music Workplace" (June '87).

Q. Can the Moog Liberation be MIDIfied? I've grown to love my Lib, and I'd like to use it as a controller.

Q. I have a Moog Liberation that has developed a tuning problem. The poly section is pretty stable, but oscillators 1 and 2 drift almost a semitone sharp as the unit warms up, say over a period of an hour or two. I've had the instrument calibrated at a service center, with no results. Any suggestions?

A. Adding a *polyphonic* MIDI retrofit to the Liberation would be a rather involved job, as the instrument really wasn't designed with that sort of thing in mind. Though it might be possible to add the necessary contacts to the keyboard, there isn't much room inside the instrument for the required electronics; and creating a velocity-sensing version would be difficult indeed! A simpler scheme would use the control voltage output on the Lib's Power Supply/Interface to drive a J.L. Cooper MIDI CV In box, or similar device, to provide a *monophonic* MIDI output. Most such boxes quantize the input voltage, however, so the Lib's pitch bend and modulation control-voltage transmission capabilities won't work as intended.

The Liberation can be difficult to calibrate. The oscillator Range and Scale adjustments are accessible through holes in the back cover, but the High Frequency Tracking adjustments are not. A good technician, desiring to do a thorough job, will remove the cover to access all the trims; but the instrument's heat-transfer characteristics are different with the cover off, which can affect the tuning. Quite often it's necessary to readjust the Range and Scale trims with the cover on.

Nonetheless, significant tuning drift implies a problem other than routine calibration. Test for power supply drift or a thermally dependent offset voltage in the performance-control or keyboard-control circuits. If these check out, perform the "Chip Temperature Adjustment" described in the "Technical Service Information" packet (stored *inside* the Power Supply/Interface). Note that this adjustment is *critical* and involves a calculation based on an *accurate* measurement of the ambient temperature, which requires a lab-grade thermometer. Furthermore, the environmental temperature must remain constant during the procedure, and the instrument should be shielded from drafts—surround it with a cardboard "air dam," if necessary.

Service tip for all Libs: Dismount the top panel and check the XLR connector for the presence of a jumper between the two green wires, at pin 5 and ground, respectively. If it's not present, add it. This mod connects the chassis ground and safety ground together, preventing cata-

ARE YOU READY FOR 100-FOOT MIDI CABLES?

In the May '87 "Hints and Tips," I performed some capacitance measurements on several popular MIDI cables. Yamaha cables measured 39 picoFarads per foot, pin to pin; Roland cables, 49 picoFarads; and the high-end/high-tech Conquest cables, 16 picoFarads. The lower the cable capacitance (and resistance), the longer the cable can be without significant data distortion, assuming the cable's shield can go the distance.

The MIDI Spec sets a maximum cable length of 50 feet, but was this tendered with cables like the **Conquest** in mind? Recently, Conquest changed suppliers for their cable material. To push the spec, I tested a special 100-foot Conquest MIDI cable, and it worked perfectly. I even added a cable extender and another 15-foot cable, and subjected the combination to all the artificially generated electromagnetic interference I could conjure. Just for fun, I ran the cable to my next-door neighbor's, and drove his CZ-230s from my CZ-101. Talk about acoustical delay lines! I was a little surprised the modest 74LS00 in the CZ's MIDI output circuit could drive a 115-foot run—from battery power, no less.

Conquest MIDI cables have all five pins connected—so you can use them with remote MIDI controllers that employ the extra pins for DC transmission, etc.—and carry a limited lifetime warranty.

The new material is low-capacitance Belden Brilliance™ cable (model #1192A), electrically quite similar to the Canare StarQuad™ cable used previously. Yes, it comes in colors. My only complaint is that it kinks at the slightest provocation—so use cable spools. Nonetheless, 100-foot or even longer MIDI cables are not only possible but practical with such material.

On the road, high-quality MIDI cables are just about mandatory, but I've been looking for a less-expensive, quality alternative for home studio use. Recently, I tested some Hosa-brand 5-foot cables (available from EM Bookshelf, tel. 800-233-9604 or 415-653-3307). They use a sturdy-looking, molded construction and carry a 5-year limited warranty; average measured capacitance, pin to pin, is 67 picoFarads per foot. True, these things are not in the **Conquest** league; but they're a lot cheaper, and some discount dealers sell them as loss-leaders. I think I'll forget about "rolling my own." —*AGC*

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Ensoniq ESQ-1 Ed/Lib.
Yamaha FB01 Ed/Lib.
Roland D-50 Ed/Lib.
Yamaha TX81Z Ed/Lib.
Ensoniq SQ80 Ed/Lib.
Macpatch General
Yamaha DX27/21 Ed/Lib.
Yamaha TX81Z Desk Acc.
Ensoniq ESQ-1 Desk Acc.
Yamaha DX7 Desk Acc.
Yamaha DX21 Desk Acc.

BLANK SOFTWARE
Alchemy Sample Editor

DIGIDESIGN
Emulator III Sound Designer
Seq Prophet Sound Designer
Ensoniq Mirage Sound Des.
Korg DSSI Sound Designer
Akai S900 Sound Designer
EMAX Sound Designer
Universal Sound Designer
SoftSynth
Q-Sheet
Lexicon PCM70 Ed/Lib.
Turbosynth

DR. T
KCS Sequencer
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Fender Polaris Lib.
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Kawai K3 Lib.
Korg DW8000 Lib.
Lexicon PCM70 Lib.
Linn Linndrum Lib.
MidiPack Lib.
Music Mouse
Oberheim Matrix 6/6R Lib.
Oberheim Matrix 6 Ed/Lib.
Oberheim OB8 Lib.
Professional Plus Int
Roland Super Jupiter Lib.
Roland D-50 Ed/Lib.
Roland D-50 Lib.
Roland Juno 1/2 Lib.
Roland Juno 106 Lib.
Roland JX8P Lib.
Sequencer 2.5
Sequential Prophet VS Lib.
Sonata Font
Studio Plus 2
Yamaha TX81Z/DX21 Ed/Lib.
Timecode Machine
Yamaha DX7/TX Lib.
Yamaha DX7II/TX802 Ed/Lib.
Yamaha FB01
Yamaha SPX-90 Ed/Lib.
Yamaha TX81Z Ed/Lib.

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The Copyist
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Kawai K3
KCS 1.6 with P.V.G.
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Korg DS-8 Ed/Lib.
Lexicon PCM-70 Ed/Lib.
Matrix 6 Ed/Lib.
Midi Recording Studio
Roland MT-32 Ed/Lib.

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Ensoniq Mirage Oasis
SMPTE Track
SYNC Track

INTELLIGENT MUSIC
M

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Master Tracks Jr.

SONUS
Roland D-50 Design
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Masterpiece Sequencer
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SST Sequencer
SMX-2000
Super Score

STEINBERG
Yamaha DX/TX Synthworks
Ensoniq ESQ-1 Synthworks
Yamaha FB-01 Synthworks
Roland D-50 Synthworks
Roland MT Synthworks
Ensoniq Mirage Soundworks
Akai S900 Ed/Lib.
MasterScore
PRO-24 Sequencer
SMP-24 Synchox

C-LAB
Creator Sequencer
Notator

COMMAND DEVELOPMENT
D-50 Command

IBM

BACCHUS
Yamaha TX81Z Voice Man.
Yamaha TX802 Voice Man.
Yamaha DX/TX Voice Man.

CLUB MIDI
Prolib Librarian

DIGIDESIGN
Sample Vision

DR. T
Casio CZ-Patch
Ensoniq ESQ-Apade Ed/Lib.
Kawai K3 Ed/Lib.
Roland D-50 Ed/Lib.
Roland MT-32 Ed/Lib.
Ensoniq Mirage Waveform

IMAGINE
FB Master Ed/Lib.
TZ Master Ed/Lib.
MF Master Ed/Lib.
MT Master Ed/Lib.

MAGNETIC MUSIC
Yamaha DX/TX Pyramid
Texture 2.5R/K
Texture Live

MELLOTRON
MuArt Sequencer

PASSPORT DESIGNS
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Yamaha Music Feature Studio
Master Tracks PC
Roland JX8P Ed/Lib.
Yamaha FB01 Ed/Lib.
IBM Music Feature Ed/Lib.
Midi Lib.

ROLAND
Desktop Music Studio
Ease Sequencer
MPU IPC
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SONUS
CakeWalk Live
CakeWalk Sequencer
Yamaha DX-TX Design
Ensoniq ESQ-1 Design
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OP4000 Interface
OP4001 Interface
Patchmaster Plus
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DR. T
KCS Sequencer
Yamaha DX

PASSPORT
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Master Tracks
Polywriter

SONUS
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DX Design
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strophic circuit failure if the instrument cable becomes intermittent.

Q. I've heard there is a modification for the Ensoniq Sampled Digital Piano that reduces the noise in the chorus circuit. What does this involve? Is it a do-it-yourself project?

Q. How can I obtain the software upgrade that allows the Ensoniq Sampled Piano to resond to all the notes on 88-key controllers?

A. For SDP-1s serial numbers 10,000 to 10,500, there is a simple mod, described in the Ensoniq *SDP-1 Service Bulletin #1*, to reduce the chorus circuit noise; it involves removing a capacitor or two and adding two others. This is a non-warranty upgrade, so you might want to do it yourself if you have the skill; however, if your SDP is under warranty, it's wise to refer the job to an authorized service center. Ensoniq will supply the mod parts to service centers at no charge, but the labor charge is extra.

SDP-1 Operating System ROMs from Version 1.5 and later will respond to all notes on 88-key controllers. The current ROM, Version 1.7 (part number 135550-0145), is available at no charge from Ensoniq service centers; for in-warranty SDPs, installation is at no charge.

Q. How do the poly aftertouch mechanisms of the Ensoniq EPS and SQ-80 work? Do they use piezoelectric film?

A. Contrary to popular opinion, not *every* new sensor mechanism uses piezoelectric film. The EPS and SQ-80 keyboards use electromagnetic sensors (see **Fig. 1**). Beneath each key, a copper-foil spiral, etched on a PC board, serves as a miniature coil. This "coil" connects to a capacitor, forming a tuned RC circuit. As the key is pressed, a steel plate mounted on the underside moves closer to the coil, altering its magnetic permeability and, hence, its inductance. The keyboard decoding circuit measures the resulting change in "tuning" and derives from this not only Note On/Off and velocity data, but poly aftertouch. The instruments even perform automatic velocity/aftertouch calibration for each key on boot up.

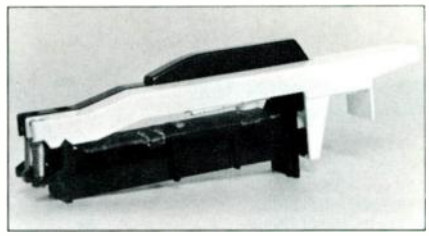

FIG. 1: Cross section of the keyboard used in the Ensoniq SQ-80 and EPS models.

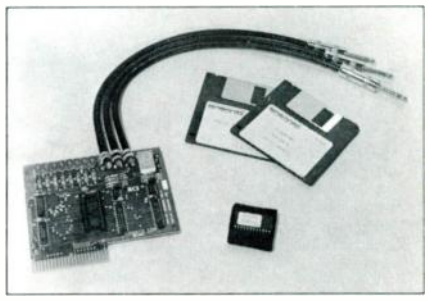

FIG. 2: The Ensoniq Mirage Diagnostics Kit includes a hardware PC board that plugs into the expansion slot, software EPROM, and two test disks.

Q. The salesman at the local Ensoniq dealer says the latest Mirage operating system allows the instrument to respond to poly aftertouch information over MIDI. Is this correct?

Q. I bought one of the first Ensoniq Mirage samplers, before the top panel redesign, weighted keyboard, and so on. It's always played fine when slaved via MIDI, but when I play it from its own keyboard, the next-to-lowest octave plays noise instead of the appropriate sound, and other notes respond erratically. A more recent problem: the Mirage occasionally refuses to access its disk drive, showing "nD" (no Disk) even with a disk inserted. My authorized dealer/service center is stumped. Any ideas?

Q. I've heard there is a test kit for the Mirage. How can I get one?

Q. My Mirage keeps blowing fuses. This only happens on the gig at a local club; it works fine in my home studio. I've tried surge suppressors, but they don't help. Since the fuses are inside the instrument, replacing them is a real pain. How do I stop this?

A. The Version 3.0 disk operating system (on current factory disks) allows the Mirage to respond to poly aftertouch by translating the most recently received poly data into *Channel* Aftertouch, which is global or monophonic—even *with* Version 3.0, the Mirage still provides only one level of LFO and/or mix modulation for all eight voices, simultaneously. Nonetheless, this is handy when controlling the Mirage from an EPS, SQ-80, Prophet-T8, Kurzweil MIDIboard, or the like.

Regarding bizarre keyboard symptoms, several possible problems on the Mirage mainboard could cause them, but so can a much simpler condition: a mounting screw accidentally driven through the keyboard ribbon cable. In fact, **EM** author Jim Chandler's Mirage came this way from the factory. (Of course, this was a fluke. In general, Ensoniq products are *very* reliable, and their customer service is excellent.)

Otherwise, you should simply have the Mirage mainboard replaced. Ensoniq services units by "module exchange" (board swap) and does not provide expansive service manuals or schematics to service centers, so trying to service the Mirage at the component level is not only inefficient but unadvisable. Even if your Mirage is out of warranty, if you reported the problem during the warranty period, they should do the work at no charge. Otherwise, the exchange rate for mainboards is $150 (suggested list). Swapping the mainboard may cure the drive problems. If not, swap the drive as well. The exchange rate for drives is also $150.

The Mirage Diagnostics Kit, intended

for use with the DSK-8 and DMS-8, includes two diskettes and one EPROM of diagnostic software, and a "Burn-in Test Cartridge" (a PC board with cables and lights; see **Fig. 2**) that plugs into the Expansion Port. The test cartridge, with one of the disks, autotests the power supply, mainboard, inputs, outputs, and disk drive read/write functions. With the EPROM, it allows manual testing of the keypad. The second disk allows pitch/mod wheel tests—the LED provides a bar graph display of the wheels' output voltage. The only thing missing is some sort of field alignment routine for the drive.

Mirage diagnostics are explained in the *Mirage Service Bulletin No. 6* (which until recently was included with the basic Mirage service documentation), but now the kit is only given to authorized service centers, and only as required. Similar diagnostic kits are available for the ESQ-1 and SQ-80.

Regarding blown supply fuses, the Mirage is sensitive to line-voltage levels and transients in excess of 130 volts AC RMS. Ensoniq revised the Mirage power supply fuse specification: F1 and F2 (analog supplies) are still 1.5 amp fast-acting 5 × 20 mm fuses (Radio Shack catalog number 270-1243A), but F3 and F4 (+5 volt supplies) have been changed to *2-amp* fast-acting fuses (Radio Shack catalog number 270-1244A). This change applies to the DSK-8 and DMS-8 (rack-mount) models; the newer DSK-1 has incorporated 2-amp fuses for F3 and F4 throughout its production.

CAUTION: DISCONNECT THE POWER CORD BEFORE OPENING THE MIRAGE TO REPLACE FUSES.

Opening the unit may void the warranty; the top panel is secured by hex-key screws to discourage disassembly. If you go ahead, the rack-mount units and older Mirage keyboards (model DSK-8 only) require a 2.0 mm hex key, and the newer keyboards, a 2.5 mm hex key. Use a fuse puller (Radio Shack catalog number 270-1199, or similar) to remove blown fuses.

If the unit still blows fuses, it's likely some nearby refrigeration, HVAC, or other equipment is dumping "spikes" on the AC line. Often, such transients are of sufficient amplitude to blow fuses or scramble RAM, but not large enough to activate the surge supressors' MOVs.

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

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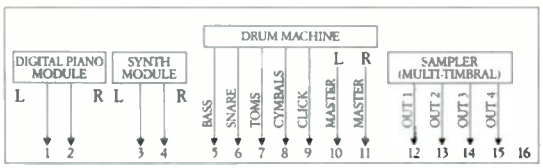

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Each mixer has pro line level (+4 dBm) inputs and outputs, balanced XLR outputs and each yields exceptionally high S/N ratio, low distortion and outstanding frequency response. Each channel has input gain, peak indicators, panning control, smooth faders, three (count-em) stereo effect sends/returns plus 1 aux-send which can be positioned either pre or post master faders. There's also a Phone Mix In jack to facilitate headphone monitoring of the mix or a sequencer click, as well as master level meters, peak indicators, and mic level compatibility on channels one and two.

You might think with all of these features that we didn't leave a thing out. But we did—on purpose. There's no equalization. Why? Because MIDI keyboards and modules already offer much more tonal contour than the shelving equalization found on conventional mixers. Most importantly, adding EQ to a mixer inevitably adds noise—and the M-160 and M-240 were created with low noise as a design requirement, not an afterthought.

Nicest of all, you'll find the price tags on these mixers amazingly low for the features packed inside them. So, if your current mixer is starting to look like a wimp in the face of all your new MIDI equipment, it's time you checked out the new mixers that were designed specifically to handle the load. Today. At your Roland dealer.

ACTUAL DIMENSIONS: 26"W x 11⁹/₁₆"D x 3⁵/₁₆"H

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As circuits become more sophisticated, power supplies need to follow suit. Here's one power supply that's ready for the digital/analog world of the late '80s.

By Thomas Figueiredo

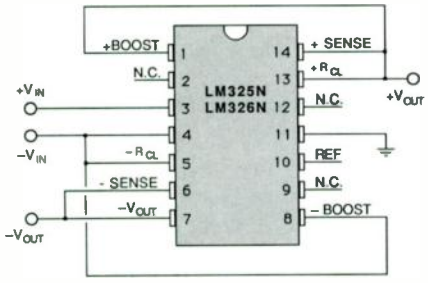

FIG. 1: Unboosted regulator configuration; 100 mA or less.

Op amps get better every year, as do transistors and FETs. Improved analog components, combined with the multitude of digital signal processors, cheap memory, microprocessors, and digital synthesis software now available, have worked together to make digital technology increasingly accessible to the experimenter.

However, high-performance electronic music circuitry requires an equally high-performance power supply. Today's 12- and 16-bit DACs and ADCs (digital-to-analog and analog-to-digital converters), as well as the preamp and filter circuits that accompany them, require highly accurate op amp circuitry with low offset voltages. This in turn requires a very accurate and stable power supply with matched positive and negative voltages.

Common regulators aren't necessarily the answer. According to manufacturers' data sheets, the output of a 7815 15V positive regulator can vary between 14.25 and 15.75 volts, and 7915 15V negative regulators will produce between -14.25 and -15.75 volts. A dual supply constructed of these parts could have a worst case 1.5 volt imbalance between positive and negative supplies. This is not accurate enough to power a 16-bit DAC or a precision op amp circuit requiring a low offset voltage (unless you want to add offset trimpots for every amplifier).

THE SOLUTION

National Semiconductor offers the LM325 and LM326, dual (positive and negative) tracking regulator ICs that deliver ±15 and ±12 volts respectively. Input voltages (which should be well-filtered DC with a sufficiently large capacitor across the rectifier output; see **Fig. 3**) can range from ±18V up to ±30V, and adjustable current limiting is available. These regulators offer output voltages balanced to within 1% for the LM325A premium version and within 2% for the more common LM325N version—a five to tenfold increase in voltage accuracy compared to standard three-terminal regulators. I generally use the LM325N, and usually the outputs match to within 20 mV! This IC is available in a 14-pin DIP (dual, in-line package) and a 10-pin metal can. I prefer the DIP package, as sockets are easier to find (not to mention cheaper).

The basic, unboosted regulator in **Fig. 1**, which requires no external parts, is about as simple as a regulator circuit can be. To improve line ripple rejection and transient response, filter capacitors may be added to the inputs, outputs, or both (connect between V_{in} or V_{out} and ground). This circuit is adequate for total current drains of 100 mA or less and is short-circuit protected.

Handling higher current requirements isn't much more complicated. **Fig. 2** is my favorite circuit for regulation up to 2.0A; the 2N3055 transistors are inexpensive and easy to find, but they may be replaced with RCA SK9234s if a smaller footprint is important. The LM325N has negative and positive sense pins, which should connect to the V_{out} terminal *at the load*. This is important so that the sensing circuitry can detect any voltage drop in long supply lines and adjust the output voltage accordingly. The two resistors set the current limit point; for a current limit of 2.0A use 0.7Ω resistors for the LM325 and 0.9Ω for the LM326. These resistors should be rated at 1W, metal film preferred. The 100n (0.1 μF) capacitor connected between pins 10 and 11 is optional, as it bypasses the internal reference zener for lower output noise.

Fig. 3 shows the standard circuit for converting 110 VAC to filtered positive and negative DC voltages. Don't leave out the fuse; the extra buck or so for a fuseholder is well worth it to prevent fire or electrocution. Any center-tapped transformer between 24 and 34 volts center-

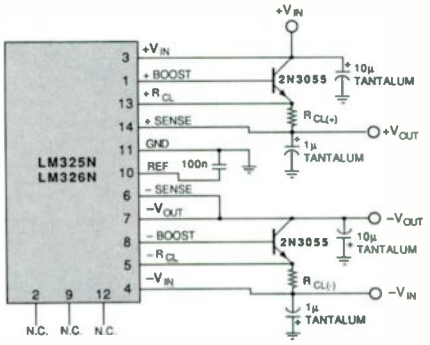

FIG. 2: Regulator configuration for up to 2 amps.

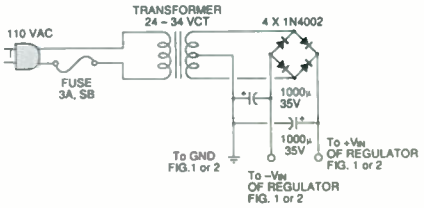

FIG. 3: Standard power supply circuit for converting a 110 VAC signal to filtered positive and negative DC voltages.

FOR THE BEGINNER

Offset Voltages and Regulators

One of the most common op amp applications is amplification. Ideally, with no input voltage there should be no output voltage; however, small voltages inside the chip, when amplified, appear at the output of the op amp as an *offset voltage*. The usual solution is to feed in a minute voltage that cancels out any internally generated voltage, or trim the chip so that its internal elements are perfectly matched and therefore create no offset voltages.

A *regulator* accepts a varying input voltage and produces a rock-steady output voltage. This component works by continuously sensing the output, and if the voltage starts to drop or increase, the regulator circuitry compensates accordingly to maintain a constant output.

tapped is OK, as long as it can handle enough current for your application. The diode rectifier bridge is made of four 1N4002 diodes (make sure the polarities are correct, or you'll blow a fuse or worse!). Also make sure the polarities of the two 1,000 μF 35V electrolytic capacitors are correct.

CONSTRUCTION

The first and most important point is that power supplies hook into AC power, *which can be lethal.* Make sure all AC connections are well-insulated and dressed away from any metal, such as the sides of a chassis. If you have not built circuitry involving AC power, *don't start now.* Begin with some simpler, battery-operated projects, and work up to this level. Should you have any doubts about your ability to successfully complete this project, enlist the help of someone more experienced in electronic construction.

I build my supplies on a piece of 4.5-inch by 1.75-inch perfboard; Vector #TO-42 terminals connect all the input and output wires, as well as anchor capacitor or resistor leads to the perfboard. This method of breadboarding works well when you need only one or two of a certain circuit or when constructing a prototype that may require changes. Photo-etching PC boards is not worth the trouble unless you're making significant quantities, and besides, photo-etching uses chemicals that are not good for the environment.

A lot of my projects require regulated +5 volts as well, and there is enough room for a 7805 or LM317 (voltage regulators well-suited to +5V applications) on the same piece of perfboard. Heat sinks should be used on the 2N3055s if you intend to run the supply close to its limit. All the parts mentioned in this article are available from Digi-Key Corporation, Highway 32 South, Thief River Falls, MN 56701-9988, as well as many other electronics mail-order houses. By the way, Digi-Key carries a "space saver" heat sink (part #HS102) that is perfect for this project.

These circuits, as well as many others, are discussed in more detail in National

FOR THE BEGINNER

Perfboard and PC Boards

Perfboard, short for perforated board, is a flat, thin piece of phenolic or epoxy-glass material pre-punched with rows of holes to allow for the insertion of electronic components; wires, either soldered to or wirewrapped around the component leads, provide the electrical connections between components. A PC (printed circuit) board is usually made of the same material as perfboard, but the positioning of the components is predetermined, and electrical connections are made via metal traces; these metal traces are "etched" by a chemical process that keeps them intact where you want them and eliminates the metal coating where you don't want conductivity.

Semiconductor's *Voltage Regulator Handbook* or in their pamphlet "AN-82 LM125/LM126/LM127 Precision Dual Tracking Regulators." Unfortunately, the *Voltage Regulator Handbook* is no longer available but, according to a spokesperson from National Semiconductor, much of the same information can be found in their *Linear 1, 2, and 3 DataBooks* available from CMC Publications, 565 Sinclair Rd., Milpitas, CA 95035; tel. (408) 945-1557 (call or write for free catalog). Specific datasheets, such as the "AN-82 LM125/LM126/LM127 Precision Dual Tracking Regulators" pamphlet, can be ordered directly from the National Semiconductor's literature distribution division at no charge; call the division's direct line at (408) 721-4932. For additional information write to National Semiconductor Corporation, 2900 Semiconductor Drive, Santa Clara, CA 95051.

I will be offering a pre-etched and drilled circuit board for this project for $10. California residents please add 6% sales tax; all orders please include $1 for shipping and handling. Send orders to: 26 Redwood Road, Fairfax, CA 94930. (*Allow 6-8 weeks for delivery.—Ed.*)

Thomas Figueiredo, *a guitarist/songwriter from Fairfax, California, designs and builds custom guitar electronics for musicians. He has been studying audio electronics for 12 years and enjoys reading* **EM**, Polyphony, *and* Device Magazine.

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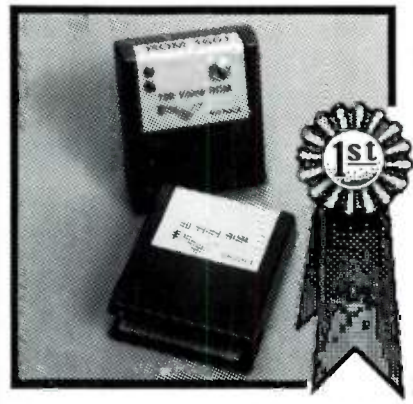

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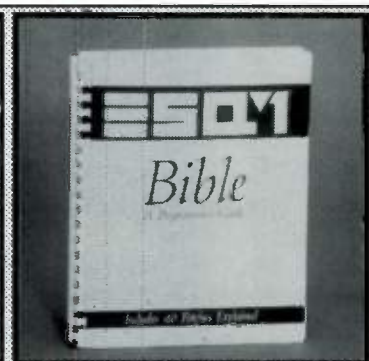

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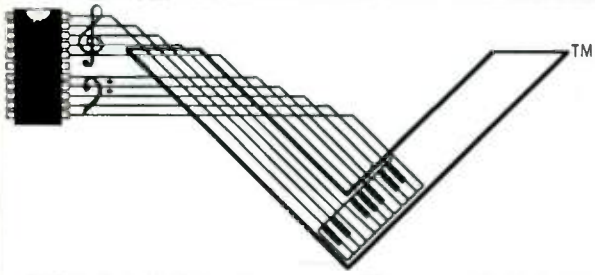

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IN REVIEW

The Valhala cards constitute a hunk of fine synth programming. There's not a dog in the bunch, and each volume has a few absolute killers. Velocity and aftertouch are routed to useful parameters in a very playable fashion.
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P. T. Brooklyn, NY

"Your D-50 'New Age' ROM Card was great, now I'm ordering your other three."
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FIRST TAKE: Capsule Comments

This month we look at two cost-effective Mac interfaces, a new DX/TX editor/librarian for IBM and compatibles, and a series of D-50 "studio" patches on ROM cards.

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

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

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

the EM rating system

Magnetic Music Pyramid Voice Editor/Librarian for the DX/TX ($74.95)

By Carter Scholz

At this stage, voice editor/librarians are pretty much old hat, but Magnetic Music's Pyramid has some nice features that raise it above the pack.

David Bartz, Pyramid's programmer, borrowed Lotus's popular "pull-down" menu idea: hit the slash key to activate a menu from which you select an item, which may in turn bring up a submenu. It's an efficient way of getting around a program, since a novice can plainly see what to do next (when the cursor's resting on an item, a line of text describes its use), and an experienced user can zoom through familiar commands without even looking at the screen. Additionally, the more common commands are tied to function keys.

The voice edit screen is a bit cluttered (for TX7s there's a separate performance editing screen), and though the DX7 *does* have a lot of parameters, it seems more thought could have produced a better design here. I find the algorithm display especially ugly, as it always shows some unused boxes.

Aesthetics aside, the editor is easy to use—just move the cursor to a value and type in a new one. The change is transmitted immediately to your DX/TX if the "autosend" feature is on; otherwise you must send it manually. Certain parameters are adjusted not by typing, but by using increment keys similar to the ± buttons on the DX panel. In the case of keyboard breakpoints this isn't a hardship, but for adjusting operator frequency, it's a pain. In fairness, this is partly Yamaha's fault for designing the "coarse" and "fine" frequency controls in a confusing way; you have exactly the same problem on the DX7's front panel. Bartz was also nailed by another Yamaha "gotcha": it takes Pyramid *two* increments to advance one tick for frequencies under 1.00. Incrementing is done with the Home and PgUp keys (rather a non-intuitive choice, I feel), or by units of ten with Ctrl-Home and Ctrl-PgUp.

DX panel commands "voice init," "edit compare," and "ops on/off" are all supported, but envelope copy is not; instead, there's a command for copying all of one operator's parameters to another operator.

Pyramid has an editable note memory of 16 notes, which can be played as a chord or a sequence from the computer keyboard. This is handy if your DX7 isn't near your computer, but it would be nicer if the sequence played automatically (you have to hit the space bar to play each note in turn).

The random patch generator is the star of the show. As anyone who's played with random patches knows, unless you're aiming for flying saucer sounds, you can't just pump numbers indiscriminately into parameters. Pyramid lets you fix the values of certain parameters during randomizing; further, you can set an upper and lower limit on parameters that do change to keep a carrier from acquiring a bizarre

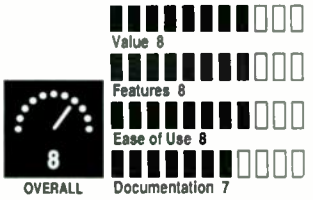
frequency like 37.39 or a level of zero.

Librarian functions are the usual: save, load, clear, and copy banks; swap voices between two banks (Pyramid can have two banks in memory at once); and copy voice. A separate utility program lets you browse or auto-search through bank files and print lists of voices. The auto-search is a good idea crudely implemented: a long list will scroll off the screen without pausing; the search disregards case and position of the search string (so if you typed "str" it would find "Strings," "SlowStrings," "Histrings," and "AstroTurf"); and these functions would be more useful if they were available within the main program.

I have a couple of gripes. Magnetic Music ought to be ashamed of the documentation. The writing is clear and informative, but the format was thrown together with no regard for the user. Near-letter-quality dot matrix printing has been photo-reduced so that two pages fit side by side on a horizontal sheet. The sheets are printed on one side only and stapled in one corner, then folded in half to fit in the box. It's incredibly awkward to read. It would have been no more expensive, and only a bit more trouble, to print the pages on both sides, putting a staple through the fold to make a normal, usable booklet.

And Pyramid is copy-protected. If you want to install it on a hard disk, you pay $10 more to Magnetic Music for an installable (*not* unprotected) diskette. I consider this policy, like copy-protection itself, to be an affront. (*At press time Magnetic Music has informed us they now include a laser-printed, bound user manual, and the installable disk is free upon request.—Ed.*)

Carter Scholz *is a musician, writer, and programmer living in Berkeley, California.*



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Altech Systems 1 × 3 MIDI Interface and 2 × 6 MIDI Interface for the Macintosh. ($79.95 and $119.95, respectively)

By Tim Tully

The spectrum of Macintosh MIDI interfaces ranges from the feature-loaded and pricey to the bare-bones and inexpensive. The deluxe models, produced by the likes of Opcode and Passport, cost from $275 to nearly $500. They offer multiple ports, MIDI merging and Thru functions, tape synching, and other pro-oriented features. Apple's one-in, one-out, one-port wonder sports the fewest features of all and costs a nice, round $99.

However, two Mac interfaces from Altech Systems provide inexpensive and interesting alternatives, in price as well as in features and flexibility.

Both are opto-isolated, 1.0 MHz units that work with the Mac 512 (the 1 × 3 needs a $15 DB-9 adapter for the 512), 512e, Plus, SE, and II. The 1 × 3 model has one

connection that goes to either the Mac's printer or modem port, one MIDI In, three MIDI Outs, and includes cables. It's not only a completely adequate unit for the one-synth, one-computer system, but the multiple MIDI Outs keep you three connectors away from having to spring for a Thru box. This is a genuine bargain.

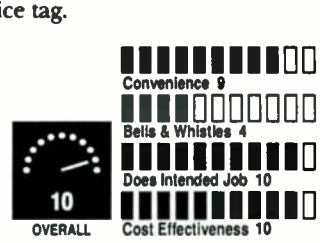
Altech's 2 × 6 interface (also distributed as the MIDIface II by its manufacturer, Austin Development, 227 Marin Street, San Rafael, CA 94901, tel. (415) 454-9620) has twice the hardware and even more functionality. Not only does it have two serial connections—one for the Mac's printer port and one for its modem port—but the 2 × 6 provides two MIDI Ins and six MIDI Outs as well. While this gives you a lot of connectability for the buck all by itself, the implementataion of these various ports is even more impressive.

Two different operating modes (as set by an easily accessible internal switch) are available. In one mode, the unit functions as two, independent, one-MIDI-In, three-MIDI-Out interfaces: one connects to the Mac's modem port, the other to the printer port. When switched to the other mode, all six Outs send data that comes only from the modem port or (with software that has a "patch-thru" feature) its assigned MIDI In; the other MIDI In and the printer port talk only to each other in this mode. This switchability is useful for isolating a time-critical musical part—a drum machine track for example—from the data of a large composition that otherwise could cause congestion and timing problems.

Since the 1 × 3 is self-powered and needs no power cord or batteries, it can be used with any Mac, in any country, regardless of international voltage discrepancies. The 2 × 6 is AC-powered and comes with a standard power cord attached. In both cases, there's no need for a bulky AC adapter.

The 2 × 6 measures about 2 × 3 × 5 inches and has its connections conveniently labeled on top to simplify repatching. Included in its already low list price are two six-foot MIDI cables, one three-foot serial cable, and a Mac disk with a number of public domain MIDI utilities. This is as ready-to-go a unit as I've seen.

The smaller unit is an excellent and inexpensive beginner's interface that allows considerable expansion. Though the 2 × 6 lacks any functions other than interfacing the Mac to MIDI devices, it does that very well, especially considering its low price tag.



Altech Systems
Suite 200 King's Highway
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tel. (318) 226-1702

Studio Series Patch ROMs for the Roland D-50 ($40 each)

By Tim Tully

Taking advantage of the patch-programming flexibility of the Roland D-50 is a learnable but time-consuming chore. Even if one is willing to buy the not-inexpensive programmer Roland offers, or one of the computer-based editor/librarians available, the question of portability still exists.

A series of four credit card-sized ROM cards from Valhala Music offers a sturdy (Valhala says its cards are manufactured by the same company that makes the Roland ROMs) and convenient solution to both problems. Any one of the cards can

easily be slipped into the D-50's ROM slot to add 64 new sounds to the instrument at the touch of a button.

The four cards are labeled "Top 40," "Orchestral," "New Age," and "Analog," and each supplies an appropriately different set of sounds. While none of the sounds on the Orchestral card will ever convince anyone looking for imitations of acoustic instruments, that's the nature of D-50 as much as of the patches, and the patches do maximize the capabilities of the instrument—its potential for rich, complex sound as well as the use of such modulators and controllers as aftertouch and pitch bend.

In addition to a handful of percussion sounds, there are a number of synthy string, oboe, brass, and woodwind sounds; such useful splits as orchestra in the left hand and oboe in the right; and charmingly clever effects patches like "Rain on the Rhode," a four-voice layer of Fender Rhodes and rain sounds.

Flaws exist: a few patches (Baritone Brass, e.g.) have an unacceptable amount of the whine apparent in samples that have been transposed too low, and the clarinet has a lot of the well-known D-50 noise. Nonetheless, these are compensated by the quality and utility of the bulk of the patches.

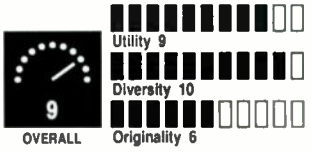
In addition to the expected celestio-twink, breathy-mystical, and made-for-a-movie-soundtrack sounds, the New Age card has a few surprisingly strong leads and bass—check out Alembic Bass—patches.

Top 40 has various piano and electric piano sounds (the former, like the sounds on the orchestral disk, are unconvincing imitations, but useful), synth leads (including my personal favorite—biting and full of subtle character—With-Without You), organs, standard "bell-like" digital stuff, bass patches, guitar cops, and a few brass and string sounds. This is pretty much a can't-go-wrong card with a lot of variety and an ear to the contemporary sound.

The Analog card has a bit of the same noise problems as Orchestral and is probably the least appropriately named of the four. Don't look for real analog-type thickness here (Mean Hollow Lead is really only a little petulant). Neither is there a solid realization of the "warmth" of analog synths, but once again, this is one of the mysteries of the D-50: no one seems ready to admit the synth *can't* get down and analog (those waveforms *are* in there), but at the same time, no one's gotten those sounds out of it yet. But bright and spacey assuredly have their place, and that's what both the D-50 and the Analog card offer in spades.

The few flaws notwithstanding, I can't imagine anyone being disappointed with any of the Valhala cards. They put a bunch of useful and attractive sounds in your pocket, and against the time you'd spend programming your own sounds, $40 is a bargain.

Tim Tully *divides his time between programming his own sounds and writing about other people's.*



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Passport Designs Score, An IBM PC Music Notation Program

Fifteen years in the making, *Score* sets a new standard in music publishing programs. But there's no such thing as a free lunch—you need pro-level dedication to master this pro-level program.

By Carter Scholz

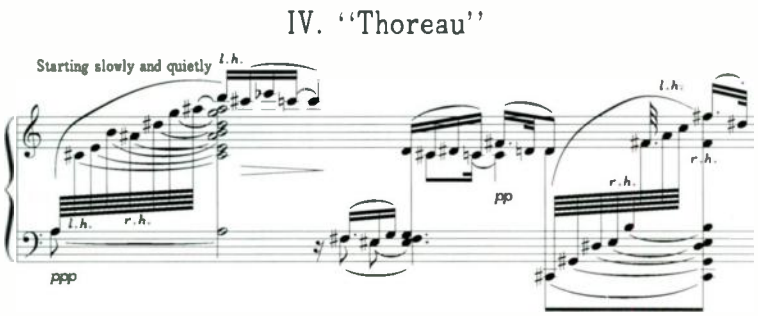

FIG. 1: A line from Ives's *"Concord"* sonata produced by Score.

Computerizing the writing of a musical score is truly a formidable task. Just play with available scoring software for awhile, and you'll quickly run up against restrictions: no sixty-fourths on this one; no grace notes on that one; no quintuplets here; no slanted beams there. If you want to torture-test a scoring program, try getting Ives's *"Concord"* sonata out of it. (See **Fig. 1.**)

One can imagine, with sympathy, the programmers responding helplessly, "You can't do it all. You just have to leave something out."

Score leaves nothing out. It was written over a period of more than 15 years by Leland Smith at Stanford University and shows a level of refinement that only long use by many users with diverse needs can give a program. Score can produce engraving-quality manuscripts for virtually any music, from Gregorian plainchant in traditional neumes, to Romantic symphonic scores, to Ives, even to Cornelius Cardew's *Treatise*. Score ups the ante for all other microcomputer scoring programs by at least an order of magnitude.

However, the potential Score owner will want to study the program—and his or her own needs—very carefully before purchase. Score's Herculean power commands a Herculean price, and it's *not* simple to use. Score is definitely not for the casual musician who has to produce a lead sheet once in a while; it's for serious music publishers willing to make a substantial investment in money and learning time. But if you need the power of Score, there's currently nothing else that comes close. Score rates a vigorous recommendation as a unique, cutting-edge product—with equally strong demands.

A SESSION WITH SCORE

Comparing Score to other scoring programs is like comparing a high-end Mergenthaler typesetting system to MacWrite—the similarity (that both organize words) is vastly overshadowed by the differences. MacWrite can be a notepad: sketch an idea, modify it, move things around. Forget that with Score; you'll want a fair-copy manuscript in front of you before you boot the program. It's a *publishing* tool, not a *writing* tool.

As if to underscore that differentiation, you can work on only one page at a time, and it's best to work on only one staff system or individual measure at a time. Because of Score's complexity and control, you can get into a horrible muddle if you have too much going at once. Keep a full score in many small files, and link them later.

Another consideration is the user interface. Interfaces are a highly subjective issue, and those who flee from Score's in horror may be forgiven, while those who wrestle it to submission may find themselves amply rewarded. Here, the program clearly shows its mainframe heritage. For instance, to produce the example in **Fig. 2**, you type:

```
IN 1 0 0 .9
0
M/TR/K2S/T3 4/OB4/C5/
    AS4/M/D5/C/CN/B4/BF/A/R/M/F5:
    D///G4:A:C5/FN4:A:D5/MD;
2/E//E/S//E./S/E//T///Q/;
F 1 13/C- 4.5:7/S 8/P 9/T
10:12/C 10:12.7/A 14;
2B;
2 3/4 6;
```

The first two entries set up a staff; the next entry is pitch data. The next four lines are rhythmic values, expressive marks, beams, and slurs. As you enter each line, Score adds the information to the score taking shape on your screen (**Fig. 3**).

There *are* other ways to input data—function keys, mouse, MIDI keyboard—but these are add-ons to what is essentially a text-based engine. For all but the simplest scores, you'll have to go to the

FIG. 2: There's more to this simple line than appears here.

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keyboard for something, and in time it became my primary means of entering data. Keeping everything text-based has some real advantages: you can use the word processor of your choice to prepare Score files. Since these files are purely text, they can be painlessly transferred to Score from any conceivable computer.

After you enter the pitches, Score asks for the rhythmic value of each pitch. If you've entered 30 pitches, you have to enter exactly 30 rhythms; Score is unforgiving on this point, and it's another argument for doing only one staff at a time. After that, enter *marks*: staccato, tenuto, crescendo, etc. Score boasts over 60 such marks (see **Fig. 4**). Then enter beams, or let Score do it; the program does an excellent job for conventional meters. Finally, add slurs.

When entry is done, you can save all your text to a file. Then, if you've made any serious mistakes, you can erase the screen and read the text file in again, correcting it as you go. When the score looks right, save it as a graphic file and proceed to the edit screen for fine tuning. An incredible degree of control is possible here. Score keeps the locations of objects as floating point numbers, and produces PostScript output (see sidebar), so its resolution is to the limit of your printer. You can shift a slur by a thousandth of an inch, and that shift will show, if you're using a Linotronic typesetter.

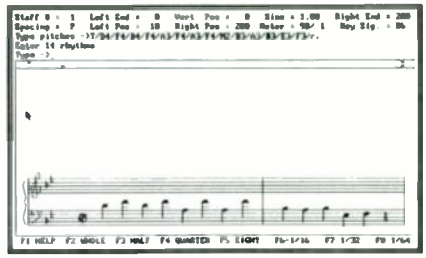


FIG. 3: A score taking place on Score's edit screen; only pitch data has been entered so far.

Some clean up is necessary at this stage —for instance, tuplet brackets must be edited to give them their proper appearance—and you can add text and other special symbols here. If a line seems too crowded, the RIPPLE command moves a measure up or down a line. You can adjust the precise height and curvature of slurs. JUSTIFY does an excellent job of spacing elements across a staff or staff system; this feature alone may make Score worth the investment. Perfectionists will appreciate the zoom feature that magnifies any portion of the screen by any factor for editing details—and what details!

I can only begin the list. Time signa-

```
                    Code 9,  P5
PPP . . . . . .51
PP  . . . . . .52
P   . . . . . .53
MP  . . . . . .54
MF  . . . . . .55
F   . . . . . .56
FF  . . . . . .57
FFF . . . . . .58
FP  . . . . . .60
SF  . . . . . .61
SFZ . . . . . .62
CR  (Cresc.) . . . . . .63
```

```
                                P5
DI  (Dim.) . . . . . .  64
RI  (Rit.) . . . . . .  65
PZ  (Pizzicato). . . . .  66
AO  (Arco) . . . . . .  67
AC  (Accel.) . . . . . .  68
TMT (Tremolo, 32nds)    Code 6
TME (   "      8ths)      "
TMS (   "     16ths)      "
C x y (cresc. x to y)   Code 4
C- x y (decresc. x to y)   "
O x y (Ottava x to y)   Code 7
OB x y (Ottava bassa)      "
```

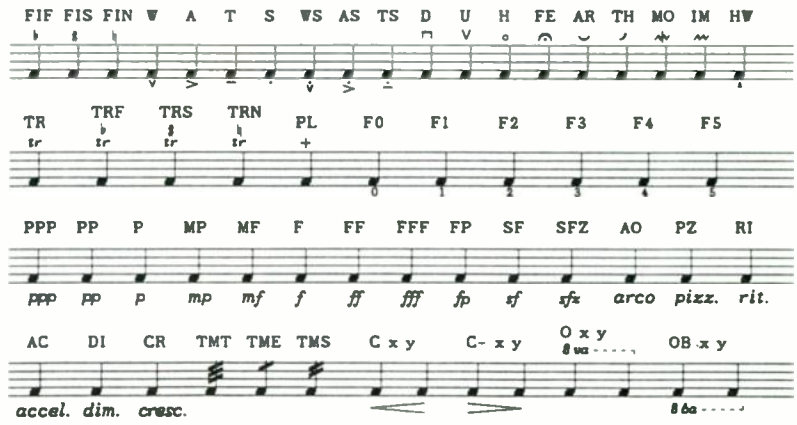


FIG. 4: Articulation marks available in Score.

WHAT IS POSTSCRIPT?

Score is especially powerful because it speaks PostScript, a page description language developed by Adobe Systems for the typesetting industry. PostScript enables a program to exercise fine control over printed output *regardless of the output device*. With PostScript you can send output to a laser printer with 300 dots-per-inch resolution or to a Linotronic typesetter with 2,570 dots-per-inch resolution. The same score can take full advantage of whatever resolution is available—usually vastly more than the 72-or-so dots-per-inch on the average computer screen.

This is important: you can proof a score at home on your dot matrix printer, take it to a copy center, and rent time on their laser printer or Linotronic to produce publication-quality output. PostScript files are easily transferred between various computers as well.

Some programs that support laser printers use installable fonts. This restricts their output to those symbols available in the font. The font must be bought separately and installed on a printer: if you don't own a laser printer, and the local copy center doesn't have the font you need, you're out of luck. On the non-PostScript printers, you're also restricted as to the size of the font: you'll need a separate font for every size. PostScript enables you to scale installed fonts and also lets you add your own symbols at will, on any PostScript printing device.

Score supplies its own music font, which does not need to be installed on a laser printer. Instead, Score writes pure PostScript text files, which can be read to any PostScript printing device by any computer with a driver for that device. Symbols can be added to Score's internal fonts with the Draw program.

Pure PostScript files can take a long time to print, depending on their complexity and on the printer. I've heard of cases where extremely dense graphics took as much as an hour per page on a Linotronic. The Ives example in **Fig. 1** printed in about two minutes on an Apple LaserWriter Plus.

tures are "restricted" to two-digit numbers—feel free to enter 53/11. Key signatures are entered by key name, but should you need something bizarre (say, F-sharp and B-natural and E-flat), you can get it. Staves can have all kinds of brackets and can be invisible if you need notes or other symbols to float in space. There are percussion noteheads and headless notes. Treble, bass, alto, tenor, percussion clefs, and grand staff. All note values (and rests) from breves to 1/8,192nd notes. Beaming across staves. Lines of any thickness, length, and angle. Empty or filled rectangles, polygons, circles, and arcs of any size, shape, or regularity. Text of any size in Roman, bold, or italic. Guitar tablatures. Harp pedals. Slurs of any curvature and thickness. (See **Figs. 5** and **6**.) And if that's not enough, you can add your own symbols or modify Score's existing library with the *Draw* program.

Score ups the ante for all other microcomputer scoring programs by at least an order of magnitude.

You can play back a score over four MIDI channels or with the IBM Music Feature. This is not meant to be a performance tool (all notes have the same velocity, for one thing), but it's handy as a proofreading check.

When it's time to print, three auxiliary programs come into play: *Just*, *Page*, and *Sprint*. Just is for justifying and aligning large scores, necessary because Score itself can only handle 16 staves at a time, and also allows you to read in a series of files and combine them in a single score system. Page is used primarily for part extraction. Sprint talks to printers or produces raw PostScript files. The last is espe-

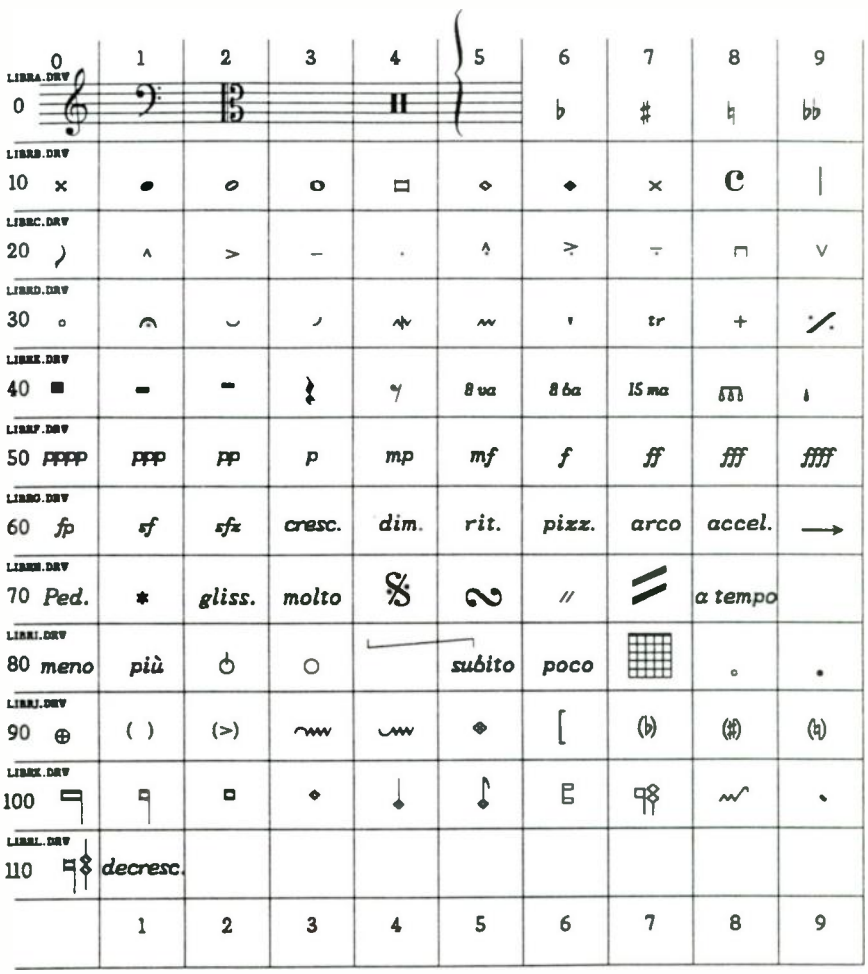


FIG. 5: These are some of the symbols available in Score.

A RATHER UNFRIENDLY DIALOG WITH *PAGE*

I was trying to extract parts, when I got this curious prompt:

```
1=Page Layout,
2=Parts,
3=Old Page Data
("ex"=exit, "-"=backup)
```

Since I wanted Parts, I typed "2" and got:

```
Type name of part
extractor control file
```

At this point I was scratching my head, as I neither had nor knew the nature of a "part extractor file." I hit Return and Score gave me:

```
File name missing or
blank - Please enter
name UNIT 8?
```

My best shot was NONAME. Score responded:

```
**** Error opening file
**** Pause. Please press
<return> to continue.
```

I found this level of communication refreshingly clear and responded as asked. Score added:

```
? Error: File system
error in file... Error
Code 1036, Status 0004
PC = 0B3E: 8344; SS =
7A2B, FP = 04D0, SP =
833A
```

At this point, I went to lunch.

cially useful for transferring files to modem or Linotronic or to another machine, such as a Macintosh, that might be more convenient to use. Without a hitch, I was able to create scores on my IBM and modem the resulting PostScript files to a copy center for printing on their laser printer, via their Mac.

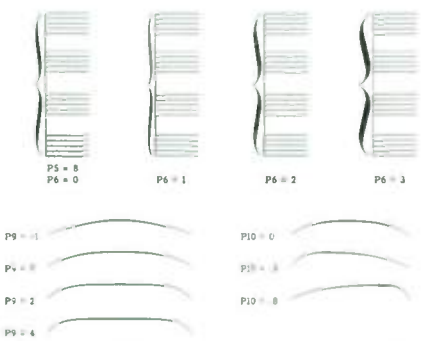


FIG. 6: Score gives the user a wide choice of brackets and slurs.

Score's printing, as you can see, is beautiful. The telltale jaggies of the 300 dot-per-inch laser printer are visible on some beams but would vanish on a higher resolution device. The text quality is a bit iffy. Passport ought to get to work on that. (*Note: According to a Passport representative, the just-released* Score Version 2.0 *allows the use of all PostScript fonts in your printer—Ed.*)

The programs Just, Page, and Sprint are, shall we say, *interesting* to use. Whereas Score has been touched up to make it look like an IBM program, these guys haven't. They run in a terse, unforgiving manner that could only be improved. (See the sidebar on a dialog with Page.) And that brings us to Score's negative points.

Performance Benchmarks for Score

TASK	TIME (in seconds)		
	PC	PC w/8087 coprocessor	AT
load 1-staff file	25	3	13
justify 1 staff	82	4	30
read in 1-staff text data	192	20	45
"ripple" one bar	135	9	68
printer setup for 1 staff	70	12	45
load an 8-staff file	55	10	32
justify 8 staves	325	18	187

Note: The above timing tests were all run with a hard disk installed. Also, the AT system was running without a coprocessor.

THE MOUSE TRAP

The task of making Score run on the IBM, and of designing the user interface, was unenviable. It's not a bad interface, but it just doesn't come together. The difficulty may be that Score *looks* like it should be more intuitive. The score window and the mouse *imply* that it should be easy to grab items and push them around.

In fact, it can be difficult even to select an item on the edit screen; trying to click on one note in a dense chord is just as likely to get you the note above it or the slur or beam trailing away from it. And once you get it, you are back in the text mode, typing numbers to change parameters.

There are other annoyances that often add up to frustration. The cursor keys are divided so that the left and right arrows control horizontal movement within a staff or through menu items, but the up and down arrows scroll the whole display screen. I couldn't get used to this, and Score leaves no room in memory for keyboard redefinition or macro programs. The tiny editing space Score allows above the score window is inadequate on a few counts, starting with size. You can enlarge it, but only by contracting your score window. If you ask for a file directory, hundreds of files can zip past without pausing to let you read their names. If you're reading a text file trying to correct errors, several error messages can flash past illegibly. If Score were less capable overall, this kind of stuff would be fatal.

THE SNAIL ON THE SCREEN

Another besetting vice is Score's lack of speed; this program is greedy for all the processing muscle and memory you can give it. A hard disk is a must. Score occupies almost two megabytes, using three subdirectories and over 250 files. To run it, 640K of RAM is required; I had to remove all my memory-resident programs (like Sidekick) to make room for Score. You must also remove the ANSI.SYS screen driver. You can't treat Score like a mere application—you almost have to dedicate your system to it.

Passport "highly recommends" a math coprocessor chip. I say it's another requirement. Every time Score draws to the screen, which it does often, it does a *lot* of floating-point math, making it unusably slow, even on an AT. The math chip improves matters dramatically—and adds $100-200 to the real cost of the program. (See "Benchmarks" sidebar.)

THE MULTIPLE MANUAL

Finally we come to that *bete noire* of all software reviewers—the manual. Score's is not terrible. The information is all there, but it's in five different places. There's the reference manual; dry and rather daunting, it probably inspired Passport to produce the more accessible but less comprehensive User's Guide. Still (rightly) suspecting users would need more guidance, they added the Quick Reference—helpful in its way, but even quick references ought to be complete, and this one isn't. The on-line help contains not a few items left uncovered in the other manuals, and finally, there are the inevitable updates and errata.

Passport needs one person who knows the program well, who's a musician and who can write gracefully, to go through the current heap of documents and produce one comprehensive, orderly reference with a good index and lots and lots of examples, from the simple to the complex. The examples in the Reference Manual and User's Guide tend to be too simplified. They're fine for illustrating specific points, but when you get into real-life work with Score, you'll have a lot of questions the manuals don't address.

CONCLUSIONS

At this point, it may seem that I've been a bit hard in my criticisms of Score in terms

ACID TESTS

I *have* found music that *Score* can't handle, but I had to work at it. Stockhausen's *Zyklus* is written on a circular staff, and George Crumb's "Spiral Galaxy," in *Makrokosmos Vol. 1*, uses a spiral staff. Score can't do either. Nor is it possible to get the wedge-shaped beams Crumb and some other composers use to represent accelerandi. Score couldn't deal with the seventh canon in Bach's *Musical Offering* because of the inverted key and time signatures (although it handled the inverted clef; see **Fig. 7**). With sufficient labor, using Draw and some tricks, you could do all of these scores, but at that point, hand engraving would be quicker and easier.

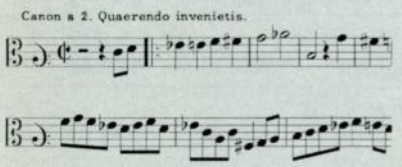


FIG. 7: Score produced these inverted clefs from Bach's *Musical Offering* quite well. It won't invert time signatures, however.

of its speed, price, and ease of use. Passport sees the potental users of the program as professional music publishers rather than a casual user who might be expecting something along the lines of a souped-up Deluxe Music Construction Set. A Passport representative compared Score to Autocad, an IBM drafting program which sells for $2,500, is difficult to learn, and runs very slowly on stock PCs, but nevertheless is considered the best program of its class by professionals. This is a fair comparison, and it brings up the point that the expectations and desires of a specialized professional audience are considerably different from those of the average PC user, to whom ease of use is a high priority. Traditionally (although I maintain, *not* necessarily), an inverse relationship exists between power and ease of use in high-power, specialized programs. In that regard, Score is clearly a power tool.

The efficient use of Score requires a major commitment of time. Although I've worked with the program off and on for over three months, I feel I've barely scratched the surface. It's an extremely powerful package with an extraordinarily opaque, and sometimes maddening, interface. Part of this is Passport's responsibility, for not wholly succeeding at a demanding implementation, but most of the limitations are inherent in the complex nature of Score and the art of music scoring itself. Still and all, the engine at the center of Score is *amazing*, and Passport is to be commended for seeing its potential and committing to it. This is a program that, simply stated, sets a new standard.

That new standard will surely be challenged soon; several companies have announced products that promise to rival Score's power. Most are Macintosh products, so their ease of use is almost certain to surpass Score's, but they are still only promises; Score's 15 years of development will not be matched easily.

This looks to be the year of scoring software. Whether or not other companies can or will match Score's power, or Passport increases Score's user-friendliness, remains to be seen. The race is on, with Score—so far—the only one out of the starting gate.

Carter Scholz *says he will never review a software package this complex again.*

Product Summary

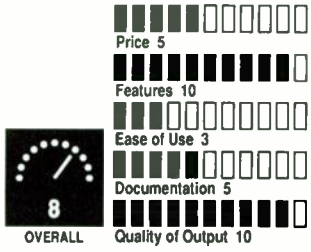
PRODUCT:
Score

TYPE:
Desktop music publishing for IBM PC

HARDWARE REQUIREMENTS:
IBM PC/clone with 640K RAM; MPU-401 interface or IBM Music Feature optional; dot matrix or laser printer; 8087 math coprocessor and hard disk recommended

PRICE:
$995 (For Version 2.0 with all PostScript fonts)

MANUFACTURER:
Passport Designs
625 Miramontes Street
Half Moon Bay, CA 94019
tel. (415) 726-0280



DR. T's KCS Level II With MPE for the Atari ST

KCS was one of the first sequencers for the Commodore 64. The latest version, for 68000 machines, builds on the tradition of power pioneered by the first KCS—but adds some significant new twists.

By Charles Williamson

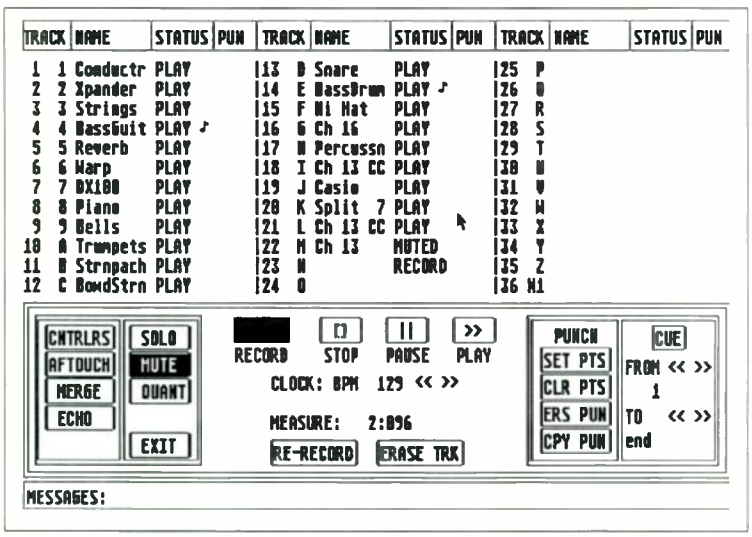


FIG. 1: On the Track Mode record/play screen, tracks are listed on the top half, while features are accessed by clicking on the buttons along the lower half of the screen.

The first Dr. T's sequencer was written for the Commodore 64 and gained a reputation for editing capabilities that were quite extensive, if a little less than intuitive. Users of the Commodore versions will find much that is familiar in its big brother for the Atari ST, but also some very important differences. (*Versions of* KCS *very similar to the one reviewed here are also available for the Amiga and Macintosh computers—Ed.*)

The Atari sequencer has two distinct personalities. In *Track Mode* it is a multitrack tape deck simulator, while *Open Mode* provides the more complex editing and structuring found in other Dr. T's sequencers. (*For comparisons of Dr. T's sequencing structure compared to other sequencers, see Dennis Jablonski's "Dr. T's KCS Made Easy" elsewhere in this issue—Ed.*)

One major difference from older versions is that *KCS Level II* includes a function for generating variations of existing sequences, according to a variety of user-supplied guidelines. This *Programmable Variations Generator* (PVG) is a useful, flexible feature and a whole lot of fun! There will undoubtedly be some who will buy the package for the PVG or Master Editor features alone. Another major difference is MPE, the *Multi-Program Environment*. You can't use this feature if you have a 520ST, but owners of 1040 and Mega machines will appreciate the ability to switch instantly between programs, as well as an opportunity to link Dr. T's composition program, *Fingers*, with KCS. (*The Amiga version takes advantage of the Amiga's multitasking architecture to provide the same sort of operating environment—Ed.*)

TRACK MODE

The program boots up in Track Mode and is ready to record; the screen shows tracks listed toward the top, with pseudo tape transport controls along the bottom (**Fig. 1**). Recording begins when you start to play or when you click on the record and play buttons. A particular track may be designated for recording, or you can record "drum machine style" and keep looping through a particular sequence. Unlike drum machines, though, instead of each loop recording additional data over the *same* track, each pass through the loop records on consecutively numbered tracks. In this mode, track 1 sets the time of the loop or overall composition, as well as overall timing for all tracks, and may be set aside as a "Conductor Track."

Buttons on both sides of the transport controls access various functions. *Echo* duplicates the input data on another MIDI channel in either record or play mode (i.e., a software MIDI Thru); *Merge* mixes incoming MIDI data with the sequencer output without rechannelizing. *Mute*, when lit, lets you mute a track by clicking on that track in the upper portion of the display. When *Solo* is lit, clicking on a track mutes all other tracks so it's easy to isolate a single track. *Cue* lets you start and stop recording at designated points in the middle of a piece, and a variety of live edit features are implemented by *Punch In/Out* buttons.

Punch points for a track can be set while the track is playing, and once set, notes between the punch points are muted. You would typically re-record the part on another track, then merge the new track with the original. If you want, you can record several retakes one right after the other on consecutive tracks and have the program automatically mute each previously recorded track as you go. This way you can perfect a part by recording it over and over again without breaking the mood, then pick your best take when you are done. If you don't like any of the takes, the original track can be restored.

Other controls on this screen select MIDI filtering parameters. A single but-

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• COMPOSITION

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ton controls filtering for program change, pedal, and wheel data; you are limited to turning these on or off as a group. Thankfully, a separate control was provided for filtering Aftertouch.

The track display at the top of the screen shows the number, name, play/record status, and punch status (in/out) for 36 tracks. Tracks are named automatically according to the MIDI channel on which data was first received (e.g., a track whose first note is on channel 3 is named "CH 3" until you rename it). This is useful if, in the heat of creativity, you don't get around to naming tracks as soon as you should. A screen full of unnamed tracks can get confusing in a hurry, and a channel number is probably the most intelligent default for this field. Regrettably, you are only allowed eight characters for a sequence name, and in my experience eight is never quite enough to get you away from names like "brgstngs" or "bass2vrs."

Even though 36 tracks are displayed, the sequencer supports 48. The remaining 12 invisible tracks are of limited use, though, since their status is not displayed; however, solo, mute, or punch operations can still be entered from the numeric keypad. These tracks can be used as storage tracks, or as extra tracks when you loop and record on a different track with each pass of the loop. Once you get a track you like, you can then copy it to a "visible" track.

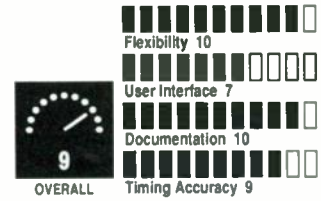
Track Mode contains the same editing features as Open Mode, discussed below.

OPEN MODE

In the Track Mode we just covered, a piece of music is treated as a whole: it begins at the beginning, ends at the end, and no restructuring is permitted. Clicking your way to *Open Mode* presents an entirely different screen (**Fig. 2**). On the right is a double column of commands, and on the left, a box for listing sequence data. A dense grid in the lower right is filled with the numbers and letters representing the sequences in memory. Pointing to one of these and clicking lists the sequence on the left side of the screen in the same MIDI data listing format used in other Dr. T sequencers; graphic editing is not supported. Clicking on a variety of arrows and symbols to the left of the listing scrolls the listing lines up or down,

Product Summary

PRODUCT:
Dr. T's KCS Level II with MPE (Atari version)
TYPE:
48-track software-based MIDI sequencing system for the Atari ST, Apple Macintosh, or Commodore Amiga
HARDWARE REQUIREMENTS:
Atari 1040ST or Mega with at least 1 megabyte of memory; the 0.5 MB Atari 520ST can also use KCS, but cannot access the MPE functions
PRICE:
$325
MANUFACTURER:
Dr. T's Music Software
220 Boylston St., Suite 306
Chestnut Hill, MA 02167
tel. (617) 244-6954



If you know your way around the nuts and bolts of MIDI well enough, you can even use the KCS as a patch librarian!

from one at a time to a screenful at a time.

Point and click the left mouse button to place the cursor on any listing parameter you want to edit; click the right mouse button to play the sequence, starting at the cursor position. Dragging the mouse across a section of the listing highlights that section, and clicking the right mouse will play the highlighted section. Pressing both buttons plays the selected range *and* all currently unmuted tracks so you can hear your edit in context. A combination of dragging and clicking on the commands toward the right of the screen facilitates a host of editing functions, all of which are pleasantly intuitive and very fast. The usual cut-and-paste functions allow you to delete, move, or copy sections within a sequence, or among sequences.

Program change, continuous controller, even System Exclusive data can be recorded and edited in Open Mode sequences. If you know your way around the nuts and bolts of MIDI well enough, you can even use the KCS as a patch librarian!

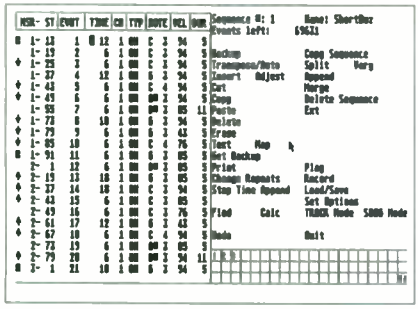


FIG. 2: The Open Mode edit screen; note the edit menu on the right and a typical Dr. T-style sequence listing on the left. The grid at lower right indicates three sequences in memory, which can be selected by clicking on the appropriate square.

● KCS REVIEW

The open structuring is the same as that used by Dr. T in previous sequencers, but with a few more options. Simply stated, the playback of a sequence can be started from within another sequence with sequence start events. The ability to include these start events at any point in any sequence creates a very unconfining environment where almost anything is possible—sequences calling sequences, calling sequences, calling...

The liability to this approach, as you may imagine, is that you are not led by the hand through the process of creating music as you might be with a more rigid structure. Although the concept is not all that complicated, to take advantage of any of the Dr. T sequencers requires many hours of use to become acquainted with this structuring method.

The variety of editing functions provided is excellent. The *Transpose* feature, for instance, treats note timing, duration, pitch, and velocity independently and can change any or all for any specified section of a sequence. Selecting Transpose opens a dialog box on the right side of the main screen; from this screen, a number of mouse clicks and keyboard entries will turn functions on or off and specify transpose amounts. Transpose also allows you to play sequences backwards or inverted. Another convenient Transpose feature takes a polyphonic sequence recorded on one channel and splits it to a number of channels for playback in MIDI mono mode. This is a tough feature to live without once you get used to it.

The Master Editor function (**Fig. 3**), accessible from Track or Open Mode, is six full screens of editing options that allow for a very large number of interesting and useful editing tasks, from "deflamming" chords (lining up all the notes of each chord so they start playing at the same instant) to "thinning" controller data (removing a certain percentage of controller events from a sequence). Thinning can be particularly useful for fixing a sequence that has so much controller data that it pushes MIDI's bandwidth and slows down the output of notes.

The amount of actual music that comes out of this thing is surprising and a little bit scary.

Even though Track Mode and Open Mode exist pretty much independently in this package, they can communicate with each other. Tracks created in Track Mode can be copied to sequences for use in Open Mode and vice versa. There is also a menu item that dumps all tracks into one sequence, or all sequences into one track. This allows you to hop back and forth between Track and Open Mode during the creation of a piece to take best advantage of the features in each. Another function, Sequence to All Tracks, automatically splits merged sequences into their respective MIDI channels.

The Load/Save menu item is your communication link to the disk drive. After clicking on this selection you are presented with a box that asks if the load or save operation involves a single track, sequence, operating environment, or everything. The default here is everything. Then, in the same box, you click on Load or Save. At this point, a familiar GEM item selector box appears with the current disk files you have to choose from. You click on a file, and you're in business.

However, to avoid accidental erasures you have to be very careful when using the Load/Save menu. There are no save-with-replace warnings or undo options for save and load commands, so if you want to save, but accidentally click on load instead, you'll pull data from the disk and overwrite what's in memory. Conversely, if you want to load, but click on save, whatever's in memory will overwrite the file you meant to load from disk. While

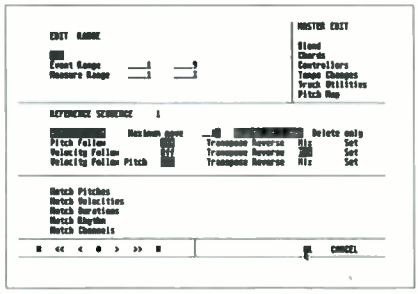


FIG. 3: Using the Master Editor's Blend section, users can select certain elements of a reference sequence to blend with, or otherwise affect, elements of the sequences currently being edited. In this particular case, the velocity of each note in the sequence will be averaged with the corresponding note in Sequence 1.

it's good that the program doesn't overburden you with "Are You Sure?" messages, I do think that for disk operations, double-checking is appropriate. In fairness, there is a line at the bottom of the screen that tells you whether you are loading or saving, and if you are prudent you save your work frequently and make backup copies of your data disks anyway. But in the real world this does not always happen, and it would be nice to have a warning before you make the final click.

TIMING ACCURACY

Lately, timing accuracy has become a hot topic among sequencer users. There are two elements that determine how closely the timing of the output of a sequencer matches that of the original input: resolution (the number of clocks per quarter note) and the ability of the sequencer to output data at a consistent and accurate rate.

Like so many other parameters with the Dr. T sequencers, resolution is user-selectable, up to 384 clocks (steps) per quarter note. This provides up to 999 steps per measure, which I believe is adequate in most situations. Dr. T's recommends setting the resolution to 240 clocks per quarter note, yielding 960 steps per measure.

A word to the wise: first-time users should make it a priority to determine the resolution their ears and music require and stick with it. Since all editing is done numerically, if you work consistently with (for example) 240 steps per quarter note, pretty soon you will start to recognize 60 steps as a sixteenth note, 90 steps as a dotted sixteenth, etc. It is not until these numbers become second nature that editing is anything less than tedious. Changing the resolution setting changes the relationship of these numbers to their corresponding notes, and since relearning these numbers to the point of using them quickly and intuitively is a long process, I don't recommend changing the resolution setting to fit a particular application.

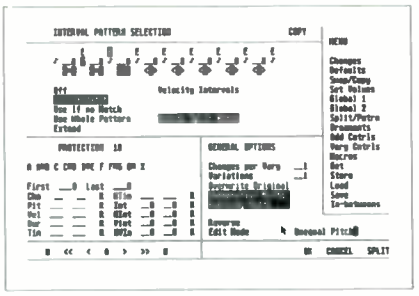


FIG. 4: The PVG's Pattern Selection screen sets up complex, logical tests to determine whether or not the PVG will process a particular note. The way this one is set up, only notes whose pitches are different from the notes preceding and following will be processed.

The timing of the data output sounded fine to me, even during some fairly busy music. In my evaluation I used a lot of autocorrected and step-time entered sequences that would clearly show up timing anomalies in the output rate. From my experience, I feel confident that the accuracy of this sequencer's timing is not an issue.

PROGRAMMABLE VARIATIONS GENERATOR

Clicking on the PVG selection (which, like the Master Editor, is available in

Track or Open Mode) transports you past the world of algorithmic composers into the dimension of the Programmable Variations Generator (**Fig. 4**).

The PVG's main function is to take an existing sequence and copy it with certain changes. Exactly what changes it will make depends on fate and the guidelines you have provided; pitch, velocity, note duration, and timing can all be affected. Further, you may select the degree of change that occurs, and how often these changes occur, for each variable. This is done by giving a weight to each change amount you select. If, for instance, you select pitch changes of three and five semitones, and you assign the three semitone shift a weight of one and the five semitone shift a weight of four, then of all the pitch changes the PVG will make, four times as many will be five semitone shifts. The same system applies to the other parameters you want to alter, with the amounts and weights all under your control. The PVG can also produce evolving multiples of a sequence in which each repetition maintains the changes from the previous cycle, while adding more for the current cycle. These evolving multiples can be made to devolve, so to speak, by playing them backwards (in this case, the feel of the sequence is one of returning to its source). Combinations of evolving and devolving sequences are interesting at the very least, and quite musical at their best.

The PVG is the best cure for composer's block that I have ever seen.

The PVG can also perform a variety of complex editing functions that are completely programmable and predictable. Macros give you the ability to automatically call up and use a series of PVG presets in a particular order, which allows you to change, for instance, all events occurring on a specific beat in each measure.

You may also protect certain notes of the scale from being changed and restrict changes to certain notes. Combining this with non-random transpositions brings up some interesting key modulation possibilities.

There are many, many sides to the PVG, and I am sure no one would claim to know all its potential uses. In fact, this brief tour has only scratched the surface. The ten screens that make up the PVG are all at once thorough, confusing, and fascinating. The PVG is the best cure for composer's block that I have ever seen. Try varying a measure of eighth notes, all at one pitch, into 16 measures with a variety of pitch and velocity changes and occasional 16th-note duration changes to add syncopation. Even this simple type of variation can produce results that are often brilliant and very human-sounding. The amount of actual music that comes out of this thing is surprising and a little bit scary.

MULTI-PROGRAM ENVIRONMENT

The MPE in the title of the program stands for "Multi-Program Environment," which is the Dr. T term for having more than one program in residence in your computer at once. Unlike the Amiga, Atari computers do not have true multitasking capabilities, so if you would like to have one or two patch editors available

ADVENTURES IN MPE: The Multi-Program Environment

As Charles notes, the Multi-Program Environment requires a minimum of 1 MB of RAM, which he didn't have. So we decided to evaluate MPE here at **EM** and borrowed a 1 MB ST along with several of Dr. T's MPE-compatible programs: *KCS*, *Fingers*, *4-Op Deluxe*, and D-50 and MT-32 editors.

MPE runs under KCS, so you begin by loading KCS. Selecting the EXT option on either the Track Edit or Open Mode screen lets you load additional MPE-compatible programs into RAM. I loaded Fingers and 4-Op Deluxe; after loading, there were about 20,000 events left in memory (with KCS Level II alone, there were about 90,000 events).

A three-letter name for each program loaded in RAM appears next to the EXT option mentioned above. Clicking on the program name selects that program, and instantly, you're there. No disk access; no quitting and launching programs. To get back to KCS, simply click on the "back to KCS" option found in MPE programs.

Those into algorithmic fun and games will be delighted to know that Fingers, Dr. T's "intelligent instrument" that generates music and lets you alter it in many different ways, can now link with KCS. Once you start a sequence in Fingers, it automatically records into KCS, starting at sequence 16 and proceeding up to sequence 25 (these will, of course, overwrite any existing sequences in KCS if they have the same number). Since KCS is just a mouse click away, it's easy to edit what comes out of Fingers. You can also copy the first 16 notes of the current sequence, track, or highlighted range in KCS into Fingers if you want to work out some algorithmic variations on something recorded in KCS.

It's also handy to call up a patch editor, tweak a few parameters, then zip back into Fingers or KCS. While in the patch editor, pressing the right mouse button plays the sequence you're working on so that you can hear changes *in context*. This goes well beyond the usual "switcher" approach and pushes the Atari much closer to being a multi-tasking system.

Using MPE was not totally trouble-free; and if there is a crash, you have to reload all the programs you want to use. I experienced a total of two crashes, although both were associated with my fingers slipping on the keyboard when entering values and might, therefore, be more properly considered as operator error. Since these were quite early versions of the programs, any problems may have been fixed by now.

The whole point about Dr. T's software is that your reward for a relatively steep learning curve is a *tremendous* amount of raw sequencing power at your fingertips, as well as a structure that seems more like a compositional environment than merely a way to record events. With MPE, you can add *speed* to Dr. T's MIDI software equation, since zipping back and forth between programs is simplicity itself. Once you've experienced an integrated software system like MPE, the old one-function-at-a-time shuffle seems kind of archaic.

—Craig Anderton

without abandoning your sequencer, you will have to use programs from one company that are designed to work together. Dr. T programs with the MPE label work this way.

Any additional programs to be loaded reside in memory that would otherwise be used for note storage. While the KCS Level II will run on an unexpanded 520ST (with a limited amount of note storage capacity, about 5,000 events), you will need at least 1 MB of RAM if you want room for patch editors at the same time. (See sidebar, "Adventures in MPE.")

THE MANUAL

The program comes with one large 7-inch × 9-inch loose leaf binder, with separate sections for the main sequencer and PVG. The manuals (written by Jim Johnson and Jim Aikin) are well done. The sequencer manual includes a tutorial to help you get started, and both have very thorough indices and logical layouts to keep the inevitable frustration of learning complex software to a minimum. Yes, the age of illegible Dr. T manuals has come to a welcome end.

CONCLUSIONS

KCS Level II with PVG is a comprehensive, professional sequencer. Like any sequencer, it has strengths and weaknesses.

Let's talk about weaknesses first. The program's user interface relies exclusively on numbers and letters; seldom will you find graphics or conventional music notation. When editing you will have to think about music in terms of numbers; thankfully, there's a pop-up calculator in the program to help you along. Also, the program has something of a split personality. The two primary modes of operation do indeed work together to a degree, but not really in a way that you could call organic. Another annoyance, but unfortunately an understandable one, is that the disk is copy-protected. You cannot make copies, or boot the program from a hard disk, without having the original program disk in a floppy drive.

Regarding strengths, in true Dr. T form this program is *extremely* flexible. I would go so far as to say you are unlikely to find yourself frustrated by an inability to do something! The editing section is as thorough as can be and includes many open-ended functions—the kind you will be finding new uses for a year from now. This is the type of software that keeps itself interesting over the long haul.

This is the type of software that keeps itself interesting over the long haul.

Then, after all is said and done, there is the PVG. And the PVG, friends, is worth the price of admission all by itself. It is fitting that this marvelous utility finds itself in the environment of a very capable and interesting sequencer.

Charles Williamson *has been an audio recording hobbyist for 15 years and has been recording electronic music in his home studio for the last ten. His most recent production,* Music by Dead People, *features "electronic music composed on a Ouija board by the spirits of people killed in car accidents."*

Jim Miller's Personal Composer V. 2.0

One of the earliest and most successful scoring/sequencing programs for the IBM has a new set of clothes and is ready to party.

By Carter Scholz

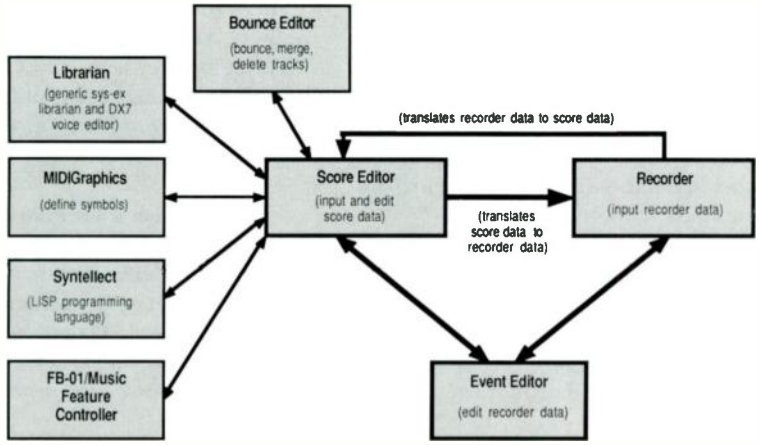


FIG. 1: Personal Composer consists of several interrelated modules.

It was summer 1983 in Chicago—the NAMM show where MIDI was actually introduced. Only a few MIDI products were on display, and one that was causing a stir was Jim Miller's Personal Composer. You could play a MIDI keyboard, and it would record your performance and play it back like a tape recorder. Furthermore, you could type standard musical notation into it, and it would play that, too. Soon after NAMM, Miller added the next feature: it would actually transcribe a recorded performance. Even though you had to play with mechanical precision to get clean output (first takes came out resembling a Boulez score, shotgunned with sixteenths and slashed by ties), it still seemed miraculous. It was the first microcomputer software to do scoring at all and, as of this writing, remains the only package that integrates recording, scoring, and transcription.

Personal Composer has released a major new upgrade, Version 2.0, also called "System/2." In keeping with Jim Miller's exemplary upgrade policy, the new version is free (plus $15 postage/handling) to registered users of any earlier version of the program. Offering numerous enhancements, major and minor, and a definite vision of the future, the program reasserts its commanding position in the IBM world.

OVERVIEW

As a programmer, Jim Miller has never believed that small is beautiful. Five years ago, when both items were exotic and costly, Version 1.0 required both a Hercules graphics board *and* 320K of memory. Today, Personal Composer 2.0 demands a full 640K of memory and a hard disk; theoretically you can run it from a high-density floppy drive, but I wouldn't suggest it. The program comes on four double-sided diskettes; installed, it takes up an unbelievable 1,000K—that's one megabyte, folks—on your hard disk, not counting various support files. The documentation is similarly massive—a 600-page, large-format paperback book. (I thought the Book of the Month Club had sent me *Gravity's Rainbow* by mistake.)

Personal Composer is composed of several separate modules designed to work together. There's the score editor, the recorder, and the event editor; additionally, there's a DX/TX7 (not DX7II) editor/librarian, which doesn't really interact with the other parts of the program, but is nice to have on-line if you have a DX7. Finally, there's "Syntellect," a programming language that gives you access (if you're patient and bold) to many of Personal Composer's low-level functions (see **Fig. 1**).

INTERFACE

The user interface is text-based, relying on two-letter mnemonics typed on a command line. You *can* use a mouse, but the program simply *feels* text-based, and for a variety of reasons I gave up on the mouse. (In early copies of PC 2.0, a bug caused some mice to respond erratically and sluggishly; the folks at PC forthrightly acknowledged that this was a "major embarrassment," and it should be fixed by now.)

Typing the first letter of a command brings up a short list of all commands starting with that letter. (More extensive onscreen help is also available.) While this means of entry seems awkward at first, it improves upon acquaintance and comes to seem natural. But even experienced users will eventually grow tired of the drudgery of keyboarding: drawing a single eighth note requires typing *no* (for note), *e* (for eighth), *s* (for single), and *u* (for stem up). Too much of this could drive you back to oral tradition. Fortunately there is help, and it comes from one of Personal Composer's most powerful features: keystroke macros (see sidebar).

THE SCORE EDITOR

The score editor is the main Personal Composer screen from which you access all the others. It's used to display, enter, and edit standard music notation, using either the keyboard or the mouse. You can place staves of any length at any position (as long as they're not too close together) and on those staves place five kinds of clefs, time and key signatures,

notes, rests, slurs, ties, repeats (including numbered endings), codas, fermatas, dynamics, text, fifteen kinds of articulation marks, and much more.

The score editor is quite capable for most purposes, but it does have limitations. No notes or rests shorter than a 32nd note are available; the grace-note symbol is absent; tuplets come only in threes (triplets) and fives (quintuplets); and beaming across staves is not allowed. Spacing has limited precision—there are either 80 or 90 fixed columns on a page (depending on your display)—so you can't micro-justify elements. One strange restriction is a limit of fifteen "note-

FOR THE BEGINNER

Notation Software

There are many software packages for a number of popular computers on the market that claim to produce professional quality musical scores on paper. Even the best of these have had serious problems, and Personal Composer, though one of the earliest and most durable, has not been unflawed in its early versions.

Some of the difficulties notation programs face include the ease and accuracy of entering notes, interpreting such subtleties as dynamics, grace notes and so on, and printing the score with the unique kinds of alignment used in traditional notation. Usually, notes are entered by typing commands on the computer QWERTY keyboard, clicking and dragging icons with a mouse, or by actually playing the score on a MIDI instrument.

Personal Composer 2.0 is a "modular" package that, besides a scoring program, includes a "recorder" that records and plays back music performed on a MIDI instrument. This is usually called a "sequencer."

This version of Personal Composer has new features that include more advanced sequencer functions, such as event editing, which allow the user to cut, splice, copy, move, erase, and quantize single notes, rests, or other events. It also has some other very high-level features, such as its use of MIDIgraphics and Syntellect, which the review discusses in detail.

—Tim Tully

groups" per staff. (A note-group is any group of beamed notes.)

Any number of files can be open at once, and data can be moved and copied freely among them. When you've finished a score, you can automatically extract up to 16 parts to separate files.

GRAPHICS FOR MIDI

Some of the scoring restrictions are mitigated by the excellent "MIDIgraphics" feature that allows you to create symbols of your own on a 24 × 24 pixel grid. (A pixel is a single dot on the screen; normal IBM screen characters are 9 by 14 pixels.) Once drawn and named, that symbol can be entered into a score just as if it were a regular Personal Composer symbol. Not only does this let you add non-standard notation to a score (guitar tablature or unusual, non-tonal, avant-garde compositions, for example), but you can also associate the symbol with a MIDI message—Program Change, Pitch Bend, Sys Ex—and Personal Composer will transmit that message whenever you play the score over MIDI. You can embed variables into your MIDI messages so that a MIDIgraphics symbol linked to a raw Program Change message will prompt you for the program number when you add it to a score. Or it can read a number from the staff position of the MIDIgraphic. Imagine creating a symbol for "scale change" and using it to send Sys Ex microtunings to a DX7II as part of a piece.

This is powerful magic, but it needs one addition: invisible staves. Presently, all symbols, including MIDIgraphics, must be placed on a visible five-line staff. Since many of the things you can do with MIDIgraphics make no sense in traditional notation, it would be nice to be able to blank out (or redefine) the staff. (Under consideration for a future version is the option of an n-line staff, where n can be any number from zero to infinity. This would ease percussion scoring as well.)

A bug in MIDIgraphics prevents you from viewing more than the first screenful of user graphics saved in any single file. The best fix is probably to save single screens in separate files, at least until Version 2.1 comes along.

THE RECORDER

The Recorder is a 32-track MIDI data recorder with bounce and merge functions—an analog of an analog tape deck, if you will. Recording is done directly to disk (either hard or floppy), not memory, which has plusses and minuses: you'll never run out of memory, but the slower disk access may result in lost data if your music is very dense (if you have enough memory, as from an expanded/ extended memory card, you can record to a RAM disk). RAM buffers hold the data temporarily during playback and recording, and you can increase their number. With buffers set to their maximum values, my Cecil Taylor imitation still glitched the playback from hard disk once or twice, but normally this is not likely to be a problem.

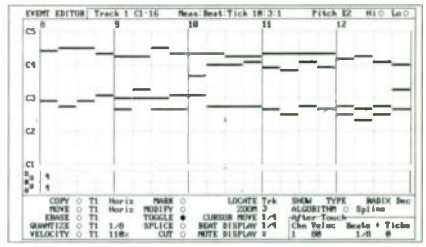


FIG. 2: The Event Editor displays note information in a scrolling screen.

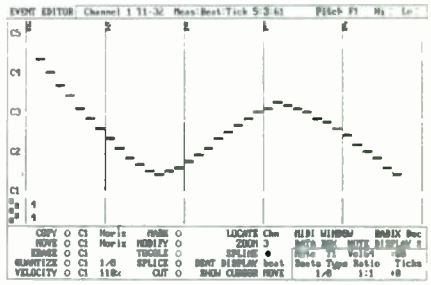


FIG. 3: The mysterious Spline feature.

New to this version, and most welcome, is the Event Editor, which brings many new and badly needed sequencer functions. It permits correction and tweaking of recorder data to a resolution of 1/120 quarter note. The screen is the "player piano roll" type, showing pitch vertically and time horizontally. (See **Fig. 2.**) Velocity and controller data show up in separate windows. The usual editing functions are present: cut, splice, copy, move, erase, and quantize. Quantizing lets you select whether Note Offs are to be quantized, or to "slide" with the Note On to maintain duration. You can scale velocities by a fixed percentage and restrict any function to work within a certain time or pitch range. Though these are nice, the editor still lacks the more complex functions found in some other sequencers, such as harmonic transpose and time scaling.

One unique function is *Spline.* This draws a string of notes along a smooth curve of which you've specified the endpoints and two midpoints (**Fig. 3**). As with

the other edit operations, you can restrict Spline as to pitch class so that it leaves its droppings only on the notes you want, at a specified, even rhythmic density. Pretty weird. I'm not sure how useful this is, but it's a lot of fun to play with.

A small misfeature: not all the two-letter commands from the score editor, "queue cursor," for instance, work from within the event editor.

I find moving around in the event editor to be awkward. You can push the cursor ahead or back by the measure, beat, tick, or by a user-defined number of beats. But when you hit the edge of the event window, that's it—the cursor sticks there, and you have to scroll the window. And the only way to scroll the window is one measure at a time. The window should scroll itself when the cursor reaches its edge. I also want to be able to move among the six levels of zoom in the editor and be able to scroll rapidly through the piece at any level. A macro won't help here, since it would call the "scroll-one-measure" command repeatedly and take four seconds each time to redraw the screen.

PRINTING

Epson-compatible dot matrix printers and PostScript laser printers are supported for printing—the latter requires the Adobe Systems' Sonata font (about $100). Although dot matrix output (see **Fig. 4**) is somewhat crude, it will suffice for many purposes. The laser output (**Fig. 5**) is much better, not just because the higher resolution smooths jagged curves, but also because it's micro-justified—where the dot matrix output pushes everything into one of 90 columns, the laser automatically adjusts the exact placement of elements for a more visually appealing product. You can set many aspects of the page's appearance with a "style" file: paper size, standard headings, footers, margins, scaling, spacing, staves-per-page, and more. But you cannot hand-adjust the exact placement of individual elements—the micro-

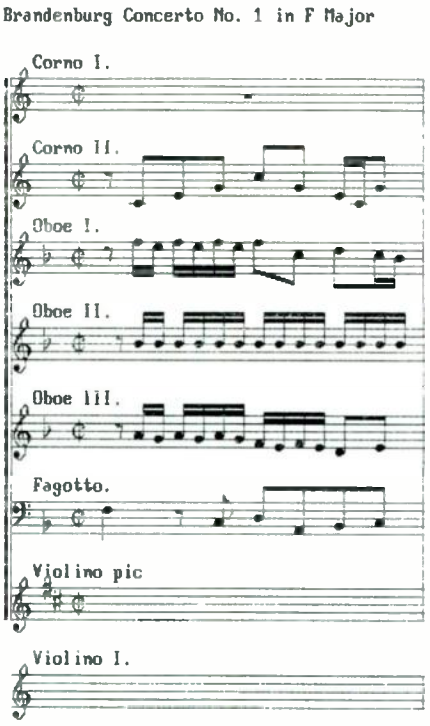


FIG. 4: Score produced by a dot matrix printer.

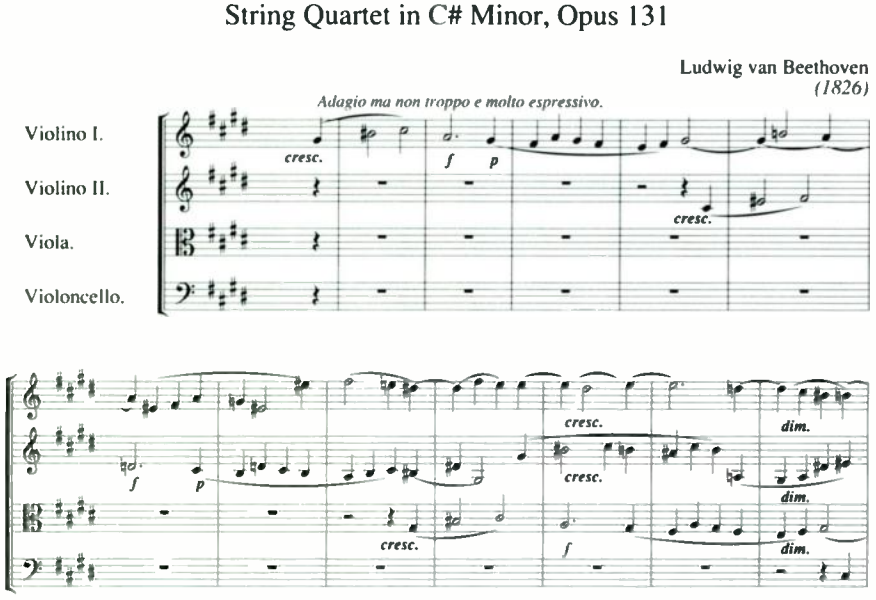


FIG. 5: Laser-printed Personal Composer score.

justification algorithm, for better or worse, is fixed.

INTEGRATION

Personal Composer stores music in two formats simultaneously: score format (graphics) and recorder format (tracks). Score data can be converted to MIDI data in the recorder, and recorded tracks can be converted to orchestral score format, one staff per MIDI channel (so if you record each "instrument" from your MIDI synths on its own channel, each will get its own staff) with clefs (including grand staff), key signature, etc., specified by the user. A recording is quantized to sixteenth notes when read into the score editor (quantizing is non-destructive—the recorded timing values are kept unchanged in the recorder).

It's necessary to keep the two formats separate, because what is optimum for playback won't always be optimum for the appearance of a printed score. Being able to adjust the two data formats independently is the way to optimize playback and appearance for the same piece.

SYNTELLECT

The most significant—and most frustrating—feature of Personal Composer is an implementation of the LISP programming language called *Syntellect*.

We've become accustomed to buying an application, like a sequencer, to perform specific functions decided by its programmers in response to market conditions, user feedback, "standard" features of similar applications, and so forth. But as good as any single application may be, it remains a closed box with fixed limits. The next step in music software design, I believe, will have to be programs designed around a central software engine with external modules that the user can extend or customize. With Syntellect, Personal Composer has declared itself for this future: you can't yet customize the existing parts of the program, but you *can* add to them.

The most significant—and most frustrating—feature of Personal Composer is an implementation of the LISP programming language called Syntellect.

Syntellect gives you well over a hundred commands for accessing the low-level primitives that Personal Composer uses. I can't sufficiently praise the vision and industry of Miller and his resident LISP guru, Joseph Newcomer, for providing users with this sort of power. Even if you never activate Syntellect, others can write applications that you can run in Personal Composer without knowing anything about LISP. Quite a bit of experimental work in music composition and research is done in LISP at universities (check back issues of the *Computer Music Journal* for some details); when and if it becomes possible to port this work to Syntellect, we could see some fascinating applications running with Personal Composer as a front end. On the other hand, using Syntellect here and now is not a casual enterprise. First, of course, you have to learn LISP—not a thing every composer is yearning to do—then deal with this particular implementation and its many quirks.

Syntellect is not yet a stable system. Starting out, I got system crashes every time I tried to use it—it turns out that Syntellect doesn't like memory-resident programs. Fine. I pulled them all. Then I found that Syntellect makes trouble when you "exit"; turns out you have to "exit-with-clear." Then I started getting "function not in this version" messages. (Jim Miller told me the fix for this is a top priority for version 2.1.)

Speed is a problem too. Personal Composer includes a Syntellect application called TX.SYN, which is a voice editor/librarian for Yamaha TX816 modules. On

SAVING STROKES WITH KEYSTROKE MACROS

A keystroke macro is simply a recording of activity at the computer keyboard. Suppose you're scoring a string quartet. Just entering the empty staves and clefs into a "system" takes about 50 keystrokes. Obviously you don't want to do that dozens of times, so you repeatedly use the Copy command, or you record the 50-odd keystrokes it takes to create the system in a macro, save the macro, and use it over and again, just as if it were any other command. Macros can range from the simple (for dropping a stem-up quarter note and advancing the cursor two spaces) to the complex (for creating an entire page of orchestral staves).

Easy Key is a collection of over 600 keystroke macros and MIDIgraphics for Personal Composer. Besides streamlining music entry by automating the placing, spacing, and beaming of clefs and notes, it includes an italics type font, a 24-point font, automated page layouts, a complete library of guitar chord frames showing finger positions, open and unplayed strings, grace notes (including multiple, beamed notes), fingering numerals, and various cut-and-paste macros. The guitar chords alone may make it worth the investment.

A 30-page user's manual walks you through the system with excellent tutorials, and the main Easy Key libraries have help screens. It's quite possible to customize your own library of macros using Easy Key as a starting point.

Quik Edit is a smaller package with 43 macros and four MIDIgraphics (headless eighth-note stems, half-note "diamonds," cut time, alto clef—the last two are now available in Personal Composer itself). Macros, activated from the function keys, automate note placement, spacing, beaming, stem flipping, and the moving of notes up and down on the staff. Users who don't need the multitude of functions provided by Easy Key may prefer Quik's simplicity. (The manual is all of three pages long.)

Easy Key ($65 ppd.)
John Clifton
175 W. 87th St., Apt. 27e
New York, NY 10024
tel. (212) 724-1578

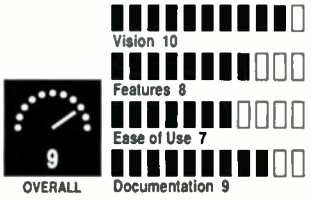
Quik Edit ($99)
Rick Powell
Matterhorn Music, Inc.
PO Box 5177
Cleveland, TN 37320-5177
tel. (615) 472-4700

my 8 MHz XT clone, Syntellect took 40 seconds to load itself, 2½ *minutes* to load the program, and another 3½ minutes to load eight voice banks. Syntellect is slow because it's an interpreted language. The compensatory advantage of interpreted languages is that they're supposed to allow more immediate and interactive testing and debugging than compiled languages.

Although Syntellect has a full-screen debugger, I didn't make it that far because the rest of the environment was so unconducive to interactive work. For one thing, the window for entering Syntellect commands doesn't let you back up, so if you mistyped the first line of an eight-line DEFUN, you have to type all eight lines over. A compiler is in the works, as is a full-screen line editor. In the meantime, owing to its unwieldliness and the unimplemented functions, Syntellect must definitely be regarded as "under construction."

Product Summary

PRODUCT:
Personal Composer System/2
TYPE:
Integrated sequencing, scoring, transcription, DX7 voice editor/librarian, and programming language
FEATURES:
Too numerous to mention
HARDWARE REQUIREMENTS:
IBM PC/clone or IBM PS/2 Model 30, with 640K RAM; Hercules, EGA, or PS/2 monitor; Roland MPU-401 interface, or IBM Music Feature; Epson-compatible dot matrix printer, or PostScript laser printer with Adobe's Sonata Font
PRICE:
$495
MANUFACTURER:
Jim Miller
Box 648
Honaunau, HI 96726
tel. (808) 328-9518



MISCELLANEOUS AND OVERALL

The DX/TX7 voice editor/librarian works well, though it does not support the extended capabilities of the DX7II. The IBM Music Feature editor is a bit of a disappointment, since it only sets certain configuration parameters; it doesn't edit voices.

Version 2.0 runs perceptibly slower than 1.35, the last release. Moving between editors, which used to be instantaneous, takes about eight seconds now; booting the program, which was formerly a matter of five seconds, is now 45 seconds. Because the program is so huge, it can't fit in memory all at once, so it must pause for disk access every so often. As with any program of this size, there are some bugs and some unimplemented features, but most of these will supposedly be addressed in version 2.1, which is in progress.

Though somewhat overwhelming, the manual is complete and comprehensible, a major achievement in itself. Unfortunately, it is, in the deceptive phrase of the printing trades, "perfect bound": the pages are glued end-on to the spine. This is a guarantee that the spine will crack almost at once and, eventually, that pages will fall out. This seems minor only until you start losing pages.

Jim Miller and his company are devoted to their users. The free upgrades, the quality of support, the willingness to acknowledge mistakes, and the responsiveness to suggestions are the finest I've seen.

Overall, Personal Composer is powerful, complex software, not an instant-gratification, don't-need-the-manual kind of program. The user interface is business-like and functional, not full of flash and fun. While not difficult to use, it does require a reasonable commitment of time and attention from a user. Its integration of scoring and sequencing, its keyboard macro features, MIDIgraphics, and—potentially—its Syntellect extensions set it apart from any other sequencing environment.

Carter Scholz *owns several kinds of computers and synthesizers. His favorite software/hardware combination is fingers and a piano.*

LARGE MUSIC

. . . in which Robert loses his records, tapes, and stereo and in finding them, rediscovers his vocation.

By Robert Carlberg

Hello again. I'm back from a little vacation (my first since joining **EM** in 1981) and glad to be back here. During my hiatus I spent some time listening to music that has nothing to do with *Electronic Musician*: Patsy Cline, the late Chet Baker, George Theophilus Walker, some Chinese music my sister brought back from Beijing. I don't think I heard a synthesizer the whole time.

A good portion of the last six weeks I wasn't listening to anything at all, because I moved, and all worldly goods were in boxes. I found I began missing the music almost immediately. Doing anything for eight years without a break can take some of the bloom off it, even something as fun as reviewing; but it quickly became apparent that I need the "new music fix" (probably more than you need to be reviewed!), and I'm glad my stereo is finally set up again.

As long as I'm confessing, let me take a moment to thank those readers who wrote in to express support for the idea of a review column. It was flattering and somewhat embarrassing, coming as it did just before I shut down for two months. Like the rest of you, I'd still listen to new music and form opinions of it, whether or not I had a public forum for those views. The difference, I suppose, is that I wouldn't have to worry about deadlines if I were doing it strictly for myself. That's a small price to pay for the privilege of hearing all the new music sent in to the magazine.

I'd like to make a small addition to the column which, having given it some thought, seems like a good idea. The box at the bottom of this page called "The Best So Far" will contain a cumulative selection of my ten favorite albums for the year, culled from the items in the current and previous columns. In this way you can tell at a glance how the albums each month stack up to those reviewed in previous months, and by December it will be an automatic "Top Ten of the year." Maybe nobody else will care, but it's important to me to be able to fit new works into some sort of perspective. It also gives the opportunity to mention again my favorite albums, just in case anybody out there doesn't read the column each and every month.

Which leads me right into the first review. In the February column I expressed my opinion that **Gregory Alan Taylor**'s fourth tape, *Virtual Terrain*, was musically "less successful than it could be." He wrote back a very nice letter thanking me for the review, and asking, reasonably I thought, for an elaboration. "What did I do wrong?" he asked. "I know you're probably extremely busy, but if you have some time I'd appreciate some concrete feedback on what keeps this stuff from being what it could be."

I intended to give him a full and reasoned reply, replete with specific references to his earlier work that I thought worked better. But I didn't want to approach it haphazardly, because I know Gregory is very serious about his work and does not release a tape without a lot of preparation. Alas, I got about two pages into my reply when this house business came to a head and prevented me from even completing a column (for the first time in eight years). Gregory's letter and tape lay on a corner of my desk in the proverbial "pile of dust" (real).

Luckily, I never finished the reply. Greg's fifth tape, *What The Thunder Wrote* ($8 postpaid from ARTlevel Recordings, 602 Russell Street, Madison WI 53704), arrived shortly after I moved, and in it he's addressed and conquered the concerns I would have expressed. Once again his extensive liner notes illuminate the process and purpose of his music, and I would not have been able to add anything to his own ruminations (ain't that the case!). He states, "Like my earlier recordings, the pieces on this tape owe a tremendous debt to the music of Indonesia,

TEN BEST SO FAR

1. **Richard Burmer** *Bhakti Point* **(April)**
2. **Djam Karet** *The Ritual Continues* **(March)**
3. **Mark Isham** *Castalia* **(Sept)**
4. **Peter Buffett** *The Waiting* **(Sept)**
5. **Kazumi Watanabe** *Spice of Life* **(June)**
6. **Phil Thornton** *Flying* **(April)**
7. **Latitude** *Latitude* **(May)**
8. **David Arkenstone** *Valley in the Clouds* **(April)**
9. **Bill Behrends** *Life Cycle* **(March)**
10. **James Newton Howard** *Promised Land* **(June)**

which I continue to study and enjoy. *What The Thunder Wrote* initially grew out of some little 'research detours' I made. I found myself returning again and again to pursuing sampling and creating FM patches...spending time nearly every evening improvising on the melodic materials I was working with for the 'real' project and using these more non-imitative sounds. In time, this activity became the 'real' project, i.e., *What The Thunder Wrote.*"

It's not the solution I would have suggested, but a better one because it grew

organically out of the process of his composing. I was going to suggest that when working with harmonic materials (Javanese scales and sounds) unfamiliar to the Western ear, he needs to fold in some elements the Western ear can identify with, such as recognizable rhythm or melody. Of course this solution is ridiculous to a serious student of Javanese music, and I'm glad he's found his own solution in combining the influence of the technology he's using (DX7II, TX81Z, Mirage) with the history and tradition of the music he dearly loves. *What The Thunder Wrote* is a testament to the fact that reviewers should review and artists should create, and for goodness sake don't ask my advice!

In the biographies of Chet Baker it is stated that he "found his voice" through his trumpet, creating a recognizable "Chet Baker sound." Gregory Taylor is creating a "Gregory Alan Taylor sound," one which nobody can take away from him or imitate. Taylor states, in the liner notes again, that Wendy Carlos's "Poem for Bali" from *Beauty in the Beast* "is of such quality and vision that any attempts which follow it will be judged according to it—an equivalent situation to that of trying to shoot 2¼-inch square photographic portraits after Diane Arbus." Carlos had this instant-standard effect on classical synthesis with *Switched-On Bach*, and again on environmental synthesis with *Sonic Seasonings*, but neither of these stifled further explorations, and I don't think *Beauty in the Beast* will either. It is important for each artist, when they reach that plateau of being able to create in a style, to find their own voice within that style. As Igor Stravinsky is quoted, "A good composer does not imitate, he steals!"

Taylor's description of *Beauty in the Beast* as a work of "quality and vision" leads me into the next series of reviews. Music is not usually described in terms of size, but I kept coming back to the concept while listening to this latest batch of new releases. Two albums in particular, *Neverland* by **Suzanne Ciani** (Private Music 2036-2) and *Sticks and Stones* by **Dave Grusin** and his brother Don (GRP 1051), strike me as being examples of small music. Both are filled with recent electronic technology, and all three performers are seasoned veterans of the commercial music industry, yet these albums never deviate from simple harmonic progressions and plodding time signatures. For all the experience their credentials supposedly give them, these albums display no more writing sophistication than many first-time efforts. For me at least, that makes them tedious collections of notes rather than music. Their authors seem to have had no other aim in mind than to establish a groove and exercise their chops over it. That, I contend, is a poor reason for doing an album. Music is only a form of communication if it sets itself higher goals.

Compare these, if you will, to what I would call large music, some marvelous examples of which I've found in the last few months. **Mark Isham**'s new album, *Castalia* (Virgin 2-90900), is a good starting point. He has lent his name and horn to some rather lackluster projects in the last year, but *Castalia* finds him returning to strength, in the manner of his Group 87 or Windham Hill solo albums. The album features equal portions of instrumental rock fusion and atmospheric digital synthesis, in a balanced and varied mixture of vision and scope.

The words "vision and scope" kept coming to mind as the album played—many times—in recent weeks. What it shares with Carlos's "quality and vision" is an overall architecture, a journey through a strange and wonderful landscape. It's easier to lapse into such hyperbole than to try to describe everything that's going on in works of this magnitude. Isham performs on synthesizers and trumpet, with guests including Bill

• MUSIC RE:VIEWS

Douglass from his days with Art Lande's group, Rubisa Patrol, Peter Maunu and Patrick O'Hearn from Group 87, and David Torn from Cloud About Mercury. In addition, Terry Bozzio (Zappa, Missing Persons), Paul McCandless (Oregon), Mick Karn (Japan), and Kurt Wortman (Group 87) also appear. Acoustic instruments and percussion are intertwined imperceptibly with electronic, and the music, as I've said, varies from uptempo to very relaxed, sometimes within a single track. Isham is also capable of writing stunningly beautiful melodies. This truly is a work of large music.

Synthesizer and trumpet also appear together in *Music from Siesta*, by **Miles Davis** and **Marcus Miller**. *Siesta* and *Castalia* share many other similarities besides instrumentation and the Spanish theme, although it is a major enough release that I probably shouldn't get into details here. Suffice it to say, Miller plays nearly all the instruments from an Emulator keyboard, and Miles Davis is another artist who has stolen many styles away from other would-be masters during his long career.

Isham, Maunu, and Bozzio also appear on **Patrick O'Hearn**'s new solo album, *Rivers Gonna Rise* (Private Music 2029-2). O'Hearn, who played with Bozzio in Missing Persons and Zappa's band, brings a shade more pop sensibility to his music than Isham, who, aside from a stint with the Sons of Champlin, has mostly jazz in his background. O'Hearn gets in a lot more bass playing than on his previous solos, *Ancient Dreams* (1985) and *Between Two Worlds* (1987), which gives his instrumental, soft rock a human focus. There's still ample gorgeous synthesis (as on *Ancient Dreams*) and a more varied percussion lineup than on *Between Two Worlds*, so in many ways *Rivers Gonna Rise* is the best of both. I don't think O'Hearn's composing is quite as powerful as Isham's, although Isham claimed in his February '86 **EM** interview that Maunu was really responsible for most of the structured pieces in Group 87. Now *there*'s a solo album I'd like to hear...

One last example of large music, and then next month we'll get to the basement cassettes that bowled me over. **Peter Buffett**'s *The Waiting* (Narada/Mystique ND-62002) is another powerful work of "vision and scope." Like Isham and Davis (and to a lesser extent O'Hearn), each track is a suite that moves through several stages on the way to describing a larger goal. Like Isham and Davis, there are elements of world music incorporated,

● MUSIC RE:VIEWS

and the instrumentation is not static track-to-track. Like Davis, every instrument you hear is actually a sample or digital construct, including (like Isham) a glass harmonica sample (my favorite soundsource in the whole world!). Buffett's composing is surprisingly developed for a debut album, although Peter and his wife, Mary, run a thriving recording and music production business. His music is definitely of the large variety; as he himself states, "I want a broad, grand type of sound. I have always tried to go for expansiveness in the music. Most people who hear it think it's very cinematic and visual. I have tried to get the scope of the big screen into the material..." Scope and vision. Scope and vision.

Yes, it's good to be back reviewing.

Robert Carlberg *can still be found sitting in the 4 × 6-inch confines of his post office box: PO Box 16211, in Seattle WA 98116. Due to space restrictions, Robert prefers receiving material for review on compact discs if at all possible.*

● POCKET MIDI *from page 59*

they will create *space* bits.

You might also consider removing or disabling the components that produce a load pulse on release of the Key. This will accommodate single events such as Program Change, MIDI clock, etc. Or, try adapting the circuit to play MIDI drums by replacing the Key switch with a foot pedal. With the load circuit replaced by a variable speed oscillator, the PMC can trigger a synth to produce, among other things, metronomic click track sounds. If you built a MIDI switcher from my aforementioned article, the PMC circuitry might be combined with it to add a test feature.

At any rate, the PMC can, either by itself or as the foundation for something more grandiose, prove to be a useful and versatile tool for the electronic musician.

Paul Schmidt *is a full-time electronics engineer, as well as part-time consultant and college instructor. Musically, he runs a small recording studio and plays tuba in a brass quintet, doubling on euphonium and sax. He also sings and plays recorder with a Chicago area early music group.*

● LETTERS *from page 14*

Third, it's very handy to configure your patch bay with all of the "outs" on top and all of the "ins" on the bottom. (Usually with the "outs" normaled into the "ins" below.) This makes it easier and quicker to visualize the signal flow and find your way around.

M. Freeman
California

COPIED RIGHT, OR COPYRIGHT?

How legal is it to sell sequenced versions of copyrighted songs? I have noticed such ads in yours and other magazines' classifieds. Do these vendors have to work out a deal with the publisher, or is the current copyright law too dated to include sequenced version of songs? I am interested in doing this myself, but I am not sure of the legal implications.

Simon Hamblin
Ontario, Canada

Simon—It is possible to record versions of songs by paying what's called mechanical royalties; however, since I'm not a lawyer I can't be more specific. We are printing your letter in hopes that someone will be able to write in and enlighten us all as to correct procedure for selling sequenced versions of copyrighted songs.

ERROR LOG

In the April '88 Letters column, two words were misspelled in the letter from Craig Paul. The first should be "Alain Danielou," and "Indian Society" should have been "India Society."

In a previous NAMM report (September '87, page 15), we gave a Public Service EMmie to Kurzweil for releasing their MidiScope program to the public domain. Let's also give a big round of applause to Ralph Muha, who wrote the program in the first place and has just completed updating the program to add even more features.

Electronic Musician's mail service burned down on June 27, 1988, and one day's mail was lost. If you mailed something to us that may have arrived on that date, please send it again with a short note explaining that this is a second submission in case the first was lost in the fire.

EM CLASSIFIEDS

EMPLOYMENT OFFERED

New York Technology Sales Inside and outside music technology salespeople needed. Must be experienced with computer MIDI systems, synthesizers, and digital electronic keyboard. Retail and institutional sales. Send resume and salary history to Musication, 1600 Broadway, W. 48th St. #1000A, NY, NY 10019 Attn: Jaimie.

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Commodore SX64 portable computer w/color monitor, drive, printer: $400. Korg tape/MIDI synchronizer: $75. dbx 163 compressor: $75. Korg remote MIDI keyboard w/Anvil case: $275. C-64 Interface/Synchronizer for AHB CMC mixers: $125. Mac, ST, C64 software—call! All excellent condition, guaranteed. Livewire Audio, Dept. EM9, PO Box 561, Oceanport, NJ 07757 (201) 870-3115.

ARP Avatar $150, Roland GR100, G202 w/case $300, Korg Poly-800 $375, shipped collect, call eves. (516) 757-7094.

Roadie Proof AT compatibles with MIDI interface. Rack-mountable ECA, 20MB disk, 3.5" floppy and up to 17 short slots. For more info send SASE to PO Box 2055, Warminster, PA 18974.

Kurzweil 250. With enhanced C.G.P. ROM Blocks A&C. Mac attached, 512K dual 400K drives. $11,500 U.S. Call or write G. Halpern Festival Concert Society 3737 Oak Street, Vancouver, B.C. V6H 2M4. (604) 736-3737.

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IF IT LOOKS LIKE A MUSICIAN AND THINKS LIKE A MUSICIAN. . .

Are electronic instruments destroying virtuosity—or instead educating their users to appreciate what virtuosity is all about?

By Craig Anderton

Lately I've detected a bit of a backlash against the hobbyists and consumers who like to tinker with music, especially those who use computers and MIDI gear. Some self-appointed "real" musicians sneer at those people who laboriously enter music a note at a time in step time, or who slow their sequencers down to a crawl in order to execute a passage. The fear is that these emerging musicians will, due to lack of technique and understanding, somehow degrade the overall quality of music—and, perhaps, even someday release a flood of bad music out on the market.

Yet if "real" musicians want to look out for their own self-interest *and* be really appreciated, they should encourage *anyone* who wants to get into music to do so. Why? First of all, the more that people play with music, the more they'll understand and appreciate the work that goes into creating a composition. Musicians who make uncommercial records are often accused by the industry of making music for musicians, not the public; but if the *public* plays music, then it seems to follow that there would be a more educated appetite for original and technically proficient music. Those who don't know a thing about music are happy with two or three chords. After a while, though, those chords start to get old, and people will tend to look for something a little more interesting. The idea of having a musically literate mass market boggles the mind, and the possibility of that coming to pass should be enough to make any musician jump for joy.

A second consideration is economy of scale. The reason we have great synthesizers for a fraction of what they cost a few years ago is that more and more people are playing synthesizers. A company like Yamaha can go out and integrate custom chips, knowing that they'll most likely be able to recoup the cost if they come up with a product that strikes the public's fancy. Interestingly, modern technology is proving so cost-effective that instruments like Roland's MT-32 or Yamaha's TX81Z, while sporting entry-level price tags, offer enough features to keep even the most seasoned pro entranced.

As to whether all the amateur musicians are going to flood the world with bad music, let's face it—geniuses on the level of a Bach, Coltrane, or Hendrix are always few and far between. A lot of recordings are already junk (maybe junk with a fresher outlook would actually constitute an improvement). But I don't think most people are looking to go through the hassle of putting out a record, tape, or CD anyway, since doing that even halfway right takes a lot of work and money. Hey, I like to swim, but you'll never see me trying out for the Olympics; I get all the satisfaction I need by puttering around in a convenient body of water. A lot of people simply want to putter with music, and there's nothing wrong with that.

Deep down, I suspect that much of the resentment toward the new generation of amateur musicians stems from jealousy. Some musicians have honed their skills on an instrument over decades and don't like the idea of instruments where you can just load in a cello disk and cello sounds pour forth. But again, look at the educational angle. Right now, acoustic musicians claim they're having a hard time finding work because *people don't hear the difference* between acoustic and electronic instruments. However, if you had been raised on sampled violins, and then heard some classical violinist who really knew the instrument, I think you'd be able to detect the difference. When drum machines first came on the scene, a lot of people couldn't tell them apart from real drums. Now, after hearing drum machines on four zillion different recordings, it's pretty easy to tell the difference.

And what if someone *does* use a computer to come up with a drum or cello part that sounds as human and expressive as the "real" thing? Then you can rest assured they've sweated through enough practicing, done enough trial and error, and listened to enough people to become truly accomplished at what is *their* instrument—which means they don't deserve any resentment at all. Sequencers are instruments too; it takes a certain virtuosity to produce a sequence with expressiveness and originality.

The world needs all the musicians it can get. At last winter's music industry trade show in Anaheim, I asked a local cab driver (who spends most of his time on the convention beat) which showgoers were his favorites. Without a moment's hesitation, he replied, "The musicians. They tip well, they have a sense of humor, and they don't give you a hard time." As far as I'm concerned, the more people who play music, the better. I think the cabbie would agree.

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