Sync With SMPTE

Electronic MUSICIAN

AUGUST 1988 A MIX PUBLICATION U.S. $2.95/CANADA $3.95

40 MIDI SEQUENCER ESSENTIALS:

Know Before You Buy

FREE SOFTWARE!

Guitar Voicings for Keyboards

REVIEWS:

- Technics SL-P1200 Pro CD Player
- Digitech DSP-128 Signal Processor
- Alesis MMT-8 Sequencer
- IBM PC: Bacchus TX802 Editor
- Mirage: Triton Soundprocess Software
- Books. Casio FZ-1/FZ-10 The MIDI Home Studio

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The Power To Ful

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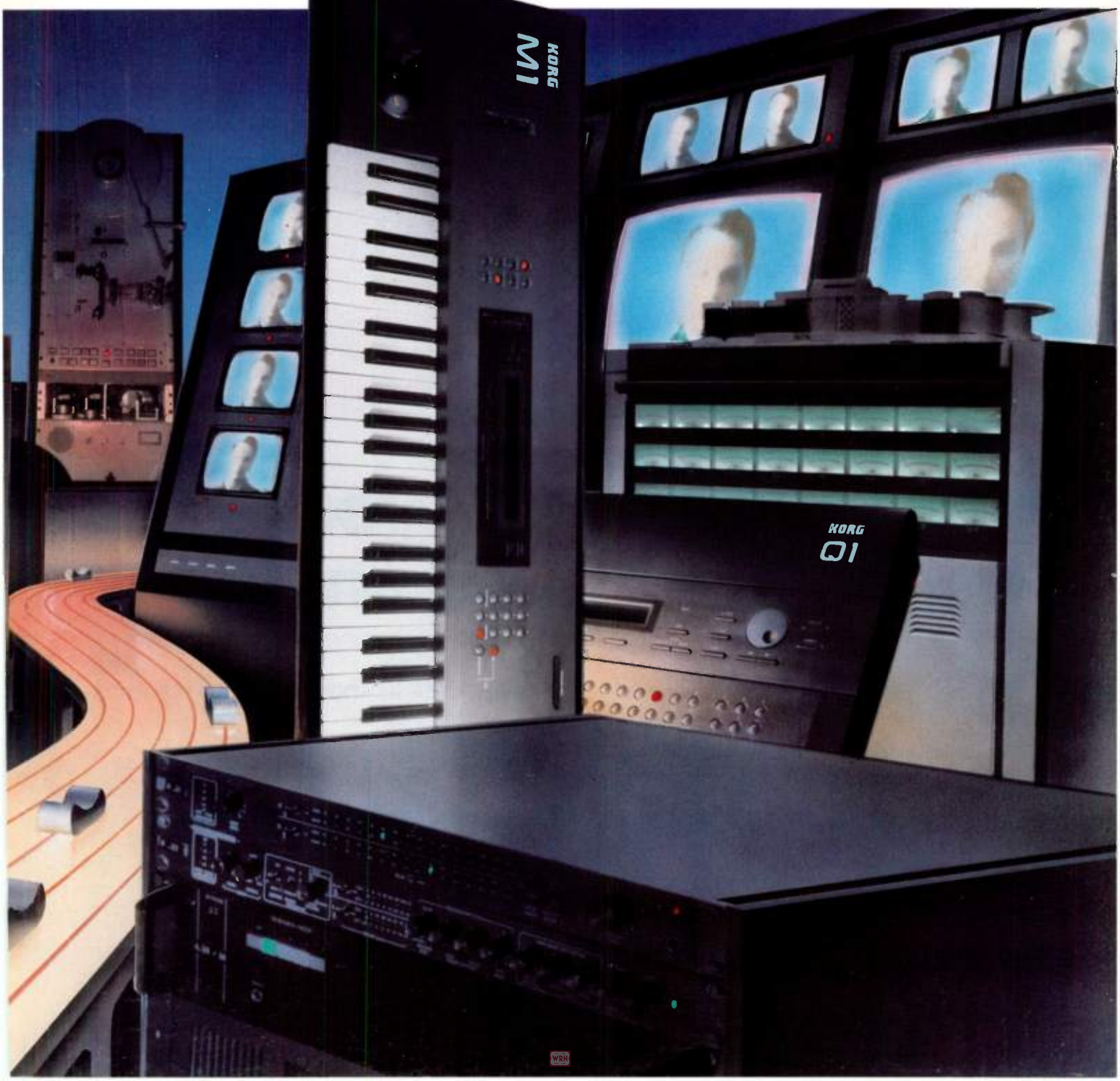

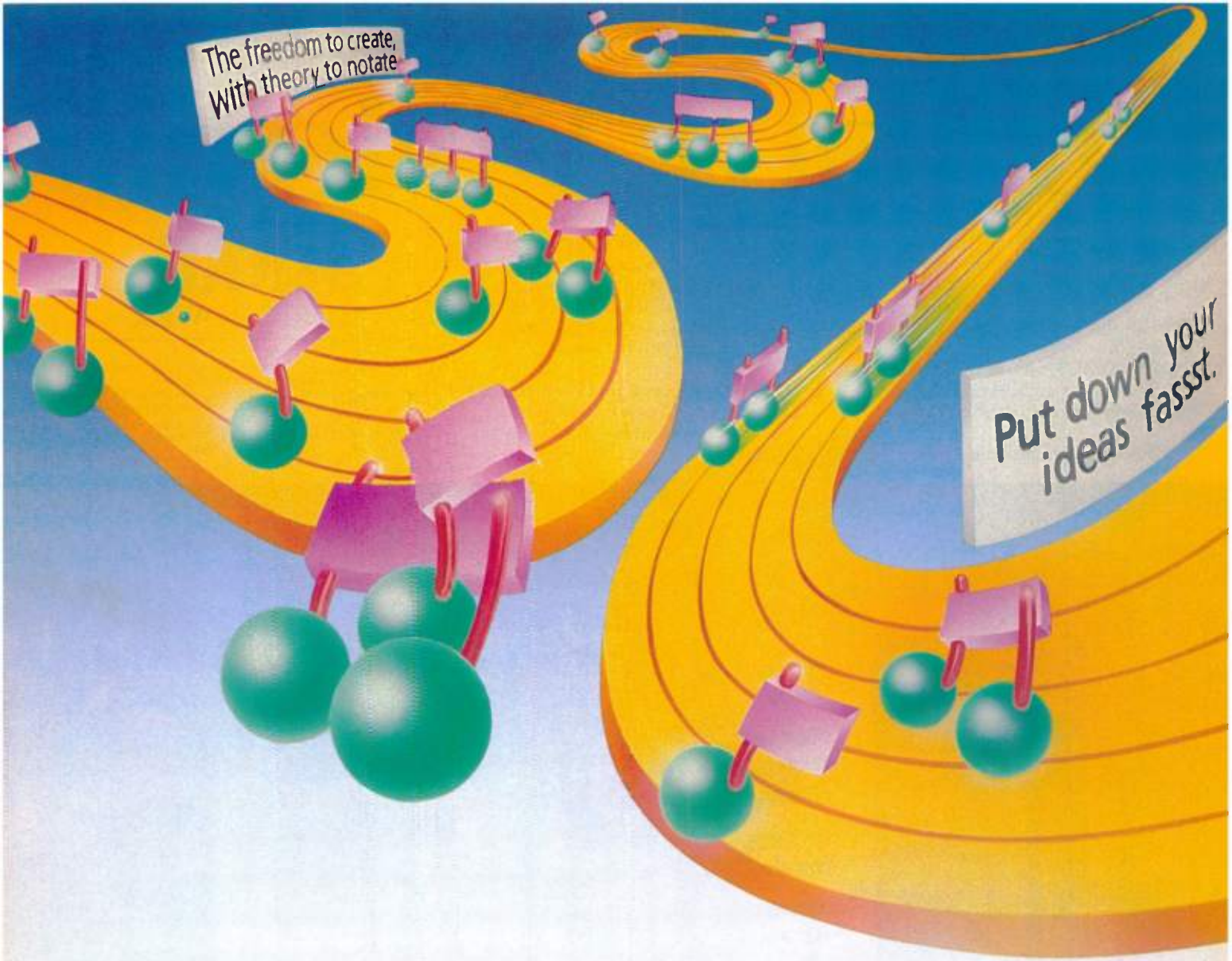

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Electronic MUSICIAN
A MIX PUBLICATION

DEPARTMENTS

Note: Re:Views will return in September. Robert Carlberg is on vacation.

COVER

Our cover depicts sequencing options available to the electronic musician: the Alesis MMT-8, C-Lab Creator, Dr. T's KCS, Passport's Master Tracks Pro, Steinberg Pro-24, Voyetra Sequencer Plus Mk III, and the Yamaha QX3 (the latter courtesy of G. Leuenberger & Co., San Francisco). Photo by David Bishop.

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We are interested in receiving unsolicited manuscripts but cannot be responsible for them and cannot return them unless they are accompanied by a stamped, self-addressed envelope. We urge you to send for our "How to Write for EM" guidelines.

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

ARTICLES

FEATURES


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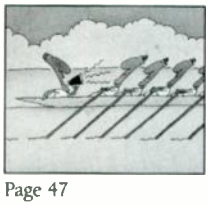
APPLICATIONS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DO-IT-YOURSELF

REVIEWS

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Editor's Note

When we came up with the concept of a magazine devoted to the new breed of electronic musician, we expected it to be successful. What we didn't realize, though, is just how successful it would become. Three years ago, our total circulation was just over 2,000; last month, I just about fell out of my chair when I found out that the print order for the July issue was over 90,000 copies!

This growth parallels the growth enjoyed by many segments of the music industry over the past few years, and we're not the only ones who benefit. The world of musical electronics has exploded into a multi-billion dollar market and is starting to penetrate the world of the consumer. These days, it's not just professional musicians who speak MIDI and musical computers; anyone who wants to play music can now get into the act.

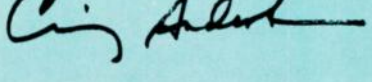
One way this has helped us all is the increased number of pages in the magazine due to increased circulation and advertiser support. Because of this, we've been able to retain the do-it-yourself projects and technical articles appealing to our core readership, and still have space to expand into other areas of interest to both professional electronic musicians *and* consumers (for one example, see next month's article on integrating MIDI and CDs). Another result of that greater support is the availability of more resources for improving the magazine, and starting next month, you'll see a complete redesign in **EM**'s logo and overall look. Many readers have commented that **EM** is looking better and better, so we figured that since you noticed, we might as well go all-out and produce a magazine that can visually hold its own with any other publication out there.

But a redesign is more than just a change in cosmetics and a new logo: our primary objective is to use graphics effectively, making articles easier to scan and read. In that respect, the redesign team of David Armario and Kathy Marty has succeeded beyond our expectations. We think you'll find features as well as technical articles to be more readable, and extracting the information you need will be simpler and faster.

Another purpose of the redesign is to make our entry-level articles easier to assimilate. We run quite a few tutorial-type pieces designed for the beginner, but these sometimes get lost among the schematics, software listings, and reviews. By using a more accessible layout for entry-level articles, we hope to encourage all the "potential musicians" who need a little help in overcoming their fear of technology.

If you're wondering whether changes in editorial direction will go along with the new graphics, you can rest easy. Our editorial direction has remained unchanged since day one: covering anything of interest in the world of musical electronics, from beginner to advanced. We'll continue to have the same provocative mix of reviews, features, technical writing, and tutorials that we've had for the past few years, as well as introduce a new genre of article tailored specifically for those of you who are just starting to get involved in musical electronics.

We also have some other goodies to spring on you, but we'll talk about those next month. See you then!



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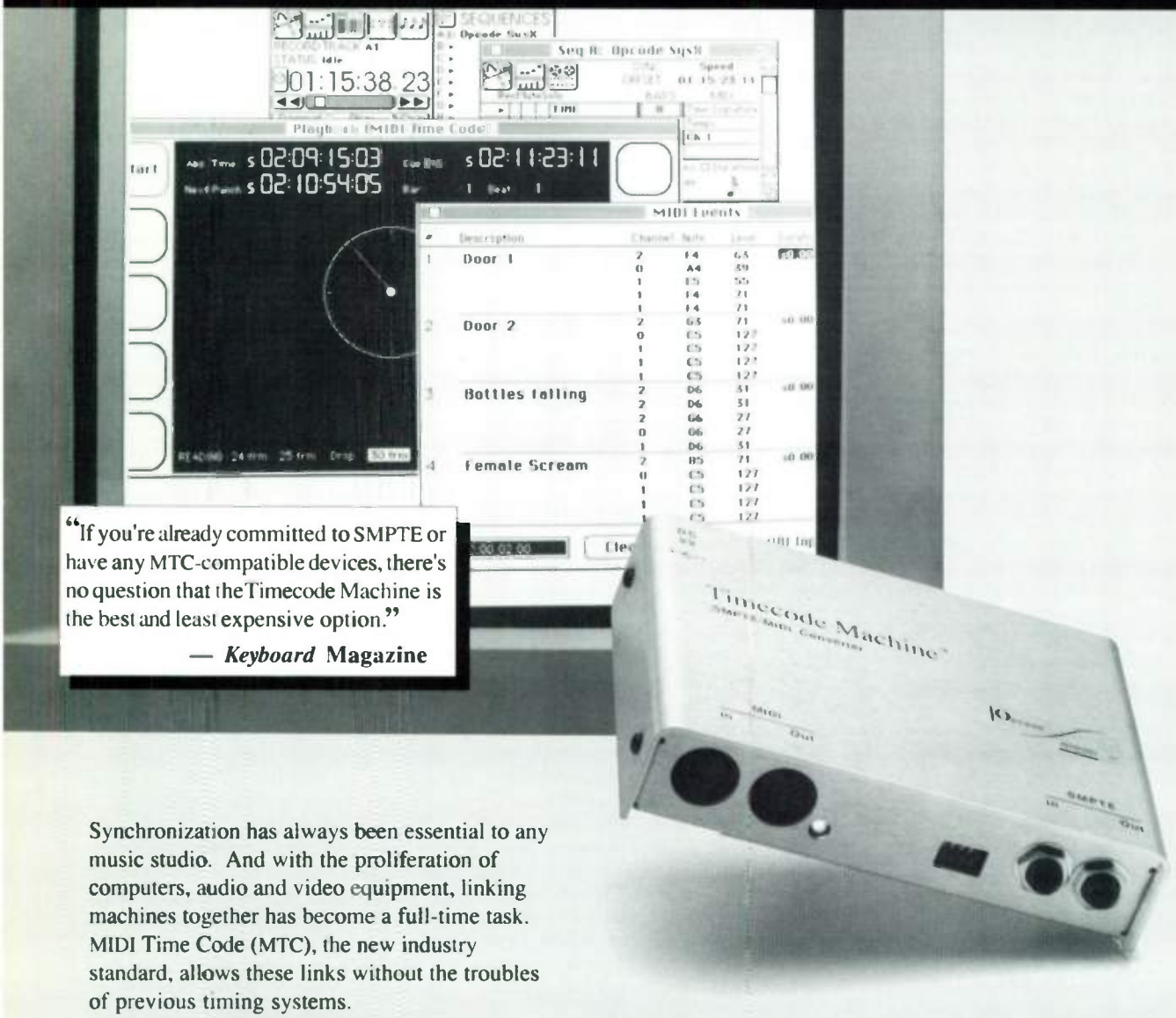

"If you're already committed to SMPTE or have any MTC-compatible devices, there's no question that the Timecode Machine is the best and least expensive option."

— ***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.

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(415) 321-8977

Copy Protection—the Debate Continues

Since 1980, I've managed a consulting firm that specializes in PC-based computer systems. From my perspective, it's kind of depressing at this late date to see so much debate about an issue—software copy protection—that has really been resolved for some time.

In most circles, copy protection has been thoroughly discredited. It's expensive, insulting to users, reduces ease of use and reliability, and simply doesn't do what it's supposed to do: protect sales revenues. Every major vendor of PC software has discarded copy protection.

Yet in the music industry, the debate rages on. The last straw for me was that unsigned advertisement in the March '88 EM—the one that said "If you don't want copy protection, don't let your friends steal programs." Where did that come from? This time, I had to write.

I frequently have the opportunity to configure music software for clients, and in doing so, I've been exposed to quite a mixed bag. Sometimes, music software seems to be years behind the rest of the industry. Many manuals are a disgrace, user-friendliness often seems an afterthought, and support is usually just plain lousy. But I find that if a program works well, I can usually live with these problems. At least there's no malicious intent involved. Copy protection, though, is another matter. It assumes the worst of the people who buy your product (the customer-is-always-wrong mentality). It shows that you're so sure they want to rip you off that you're willing to bet money and precious resources on it.

Copy protection makes software harder to use and less reliable. I've seen off-the-shelf copy-protection products fall apart, leaving dismayed users with dead programs. Copy protection is expensive to develop or buy and, of course, it's the end user who winds up paying for it. In any case, sophisticated users can break most protection schemes without a lot of trouble (rumors have it that Lotus delayed their *1-2-3* program by six months to complete its snazzy protection scheme—one that was broken the day the product was released).

Furthermore, Borland (and others) has unequivocally shown that copy protection is not necessary to shelter revenues—they sell high-quality, well-documented, unprotected software at reasonable prices and have no problem. People are more willing to buy good software than they are to photocopy a 300-page manual. And these days, the giants like Microsoft, Ashton-Tate, and Lotus all seem to agree. Don't argue with me, argue with them. Maybe certain music developers should think about following their examples.

In my own experience (often dealing with unsophisticated end-users on tight budgets and schedules), I have seen copy protection actually *decrease* sales. I have never given a client an unauthorized copy, but I routinely return software that has been compromised by misguided protection efforts. I have had so many problems over the years that I now refuse to configure any product unavailable in an unprotected format. I strongly encourage others to do the same. There are plenty of excellent programs out there sold by people who respect their customers' integrity.

Protection was an idea that was tried and found wanting, and besides, it's just plain rude. So please, let's put this dead horse to rest.

Donald J. Labriola
New York

Donald—The unsigned ad was paid for by EM *(and done with my support and approval—Ed.) in a spirit of helping the many small software manufacturers who continue to be victimized by piracy, as well as the honest musicians who end up shouldering the cost of these pirates. We don't like copy protection either, and decided the best way to eliminate it would be to try to attack the source of the problem—the stealing of copyrighted programs. After all, if stealing programs stops, then copy protection becomes superfluous. We hope that the ad to which you allude will encourage people to compensate manufacturers for their software, rather than copy a version from a friend or pull an illegal version from a BBS.*

While I agree with the facts as presented in your letter, I'm convinced, after talks with many software manufacturers, that piracy is indeed alive and well in the music biz. Whether musicians are more prone to steal software than white-collar types is a question that cannot be explored adequately here, and certainly, many (if not most) musicians recognize that stealing is wrong. However, piracy is a problem that is not going away. One vendor of synth patches, who produces high-quality, non-copy-protected products at extremely competitive prices, estimates that for every patch tape or disk sold, three are copied. A company cannot survive very long with those kinds of odds, and his experience is not unusual.

Most companies seem to regard copy protection not as a solution to piracy, but as a tactic that simply delays *the inevitable day when the copy protection scheme is broken, and all of a sudden, orders come to an abrupt halt. As long as companies see their work posted on public bulletin boards, and find pirated copies in circulation, their natural impulse will be to copy protect. Companies don't like copy protection; users don't like copy protection; the editors at* EM *don't like copy protection. We all look forward to the day when, as in the world of business software, copy protection will be deemed unnecessary.*

FZ-1 Velocity Tips

The sidebar that accompanied Jim Fiore's article, "Meet Zelda: An Altered Octapad" (May '88 EM) offered some great insights on using the Casio FZ-1. Fiore stated, however, that the FZ-1 does not feature velocity control of the sample start point or velocity control of the DCA release time. Fortunately, both of these parameters can be velocity-controlled through velocity switching to simulate the desired effect. Here's how:

1. Make several copies of the sample. This *will not* use up additional memory.

2. In VOICE EDIT mode: a. To control the sample start point, set different values for TRUNCATE START in each copy. b. To control the DCA release time, set different release times in each copy.

3. In BANK EDIT mode, use the velocity switch function (discussed in Fiore's sidebar) to switch between the different copies.

Although velocity switching is not identical to typical velocity control functions and is more time-consuming to program, it can simulate those functions and offers more flexibility.

Patrick Houlihan
Mississippi

The PCM Chorus Unit

I had my Sony PCM-501 digital processor for over two years before I realized an alternate use for this unit.

Of course, the main use for this two track digital recorder is to record high-fidelity final mono or stereo mixes on to a VCR (Beta video cassette in my case). Usually the 501 was not even turned on until all tracks were completed.

Late one night, I decided to redo a guitar part in the middle of a mixdown session, and while trying to match the EQ of the pre-recorded guitar part, the guitar signal was mistakenly fed into the 501 and the 501's output was appearing in the monitor mix.

The resulting combination of the direct guitar and the delayed signal through the 501 sounded pretty interesting. I then realized that the 501 could be used as a digital stereo delay (with fixed delay time) for doubling and thickening parts while recording tracks.

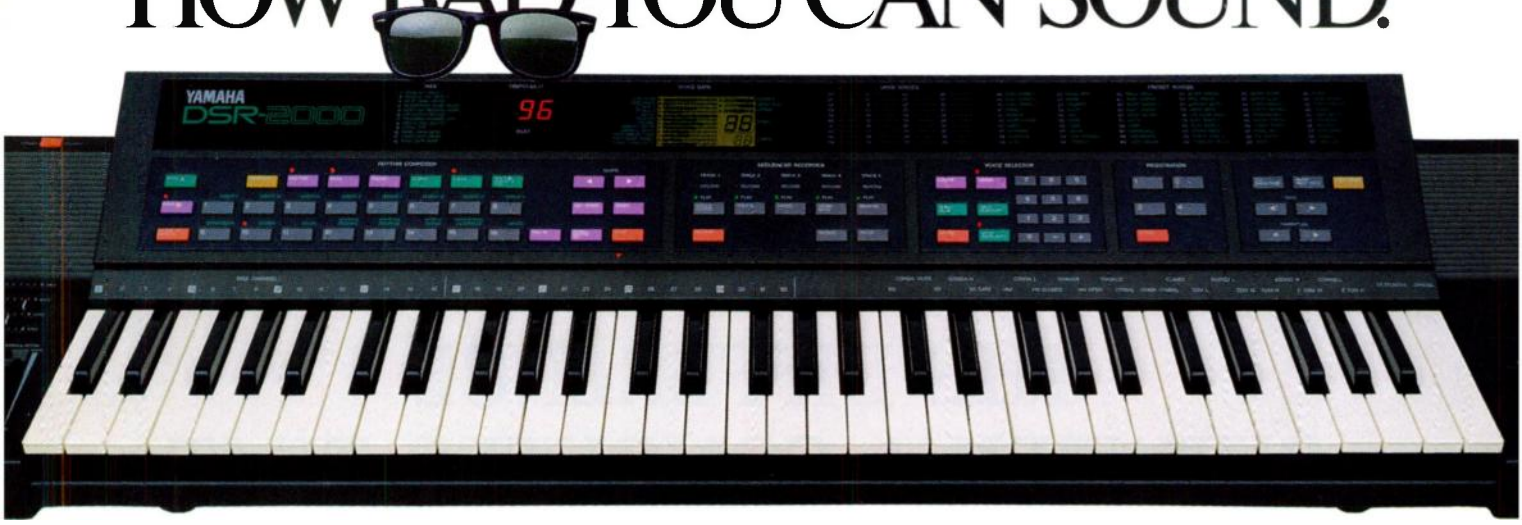
The fidelity of the delayed signal was impressive; I also think something must be happening in the phase relationship, as the result sounded cleaner than the DDLs I use at roughly equivalent delay times.

How about some information on delay time and phase charcteristics of the 501 and other PCM processors? Note that the unit must be connected to and from a video deck for operation, or the REC MUTE button must be held or taped depressed. Otherwise no signal appears at the output.

Of course I like EM very much, and alternate use of equipment (or fine-tuning tips) are widely appreciated. I liked the article on using one PCM processor and *two* video decks for overdubbing new material with minimum generation loss. Why this is not mentioned in the (Japanese) Sony manual is baffling.

Finally, for maximum fidelity in mixing to the 501, connect the 501 outputs directly to the power amp inputs. Although you lose your console's solo function this way, you hear a

YOU WON'T BELIEVE HOW BAD YOU CAN SOUND.



You're looking at one bad portable keyboard.

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Your portable studio. The five-track digital recorder that lets you cut a demo whenever you like.

For good measure, we threw in an amazing rhythm section. With 16 preset rhythms and room for 16 more you can compose yourself.

Besides enabling you to carry a tune better than you ever dreamed possible, each DSR-2000 comes equipped with your very own personal recording studio.

In technical circles it might best be described as a sequencer recorder.

In the real world, you might say you have a five-track recorder that lets you lay down tracks whenever and wherever the mood strikes.

There's also MIDI in. MIDI out. MIDI thru. Stereo input. Stereo output.

Even a headphone jack, so you can jam, compose and record all night without disturbing anyone who'd actually prefer to sleep.

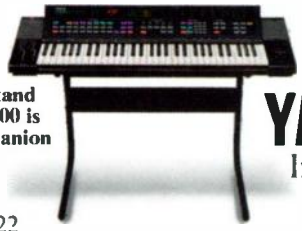
DSR-2000 stores 60 preset and 40 user voices. All selected by the keypad you see here.

In short, there are plenty of decent portable keyboards to choose from. Some can actually make you sound pretty good.

But then why should you settle for just sounding good?

When you can buy a DSR-2000 and sound as bad as you like.

The on-board drum machine features 16 presets with 16 more you can build from scratch.



The optional stand for the DSR-2000 is a perfect companion onstage or off.

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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.

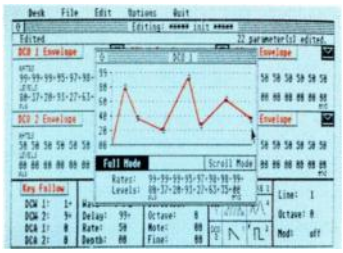
And then you'll have to make sure everything is installed correctly.

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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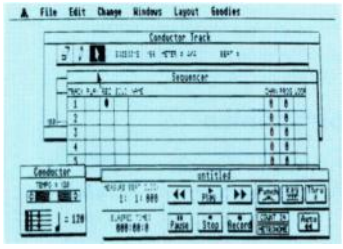

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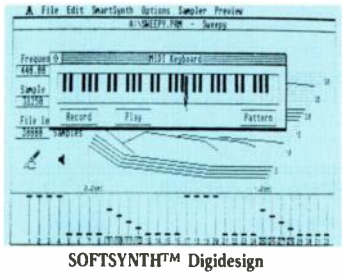

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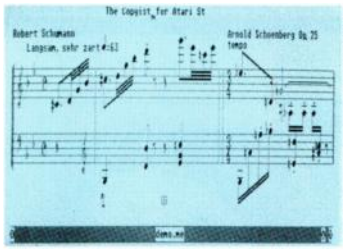

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No other computer company has made the commitment to music and musicians the way Atari has.

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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.

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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.

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more accurate representation by bypassing the op amps in the two track playback console circuits and hearing the result of the A/D-D/A conversion.

Matthew Zalewski
Kamakura, Japan

Multi-tasking in the UK

I have been a subscriber to your excellent magazine for over one year now and for the first time feel moved to write to you.

The reason for this is a statement in the "Music on the Amiga" article (April '88), which is not correct, and I feel is an inadvertent case of "U.S. micro-imperialism"!

The statement in question is "... no other mainstream personal computer at any price includes (multi-tasking)." The Sinclair QL, introduced in 1984 but now out of production because of being taken over by Amstrad, has QDOS, an excellently structured multi-tasking operating system. Up to 120 programs can be multi-tasked concurrently, memory permitting, although things start getting a little slow with this many tasks (although jobs can be given a priority of 1-127).

The QL comes with 128 or 640K of RAM, has twin "microdrives," twin serial ports, real-time clock, multimode video outs, TV out, and full bus expansion for the likes of disk interfaces or whatever. It uses a 68008 processor, which has 32-bit internals *a la* 68000, but only an 8-bit data bus (why waste half of your 16-bit memory if only storing 8-bit values?). There is only one MIDI interface available that I know of, which comes with a 64-track sequencer called *Score* (not to be confused with the Passport program of the same name). There is also a host of very high-quality software continually appearing.

I continue to look forward to **EM** every month and bid you to keep up the good work.

W.G. Wood
Mexico

A Better Single-Board MIDI Computer?

I subscribe to your magazine and noticed that there were several letters over the past few months about building single-board MIDI computers. I have been working on one and would like to share a tip with other developers.

Instead of using a 6802 or Z-80, consider developing around the Motorola 6803 processor. This processor has built-in Input/Output ports for a keyboard, internal RAM (an EPROM version is available), and a MIDI-compatible internal UART. This UART sends and receives data in MIDI protocol 8/N/1 and, using a 2 MHz crystal, gives the MIDI data rate of 31.25 kHz. The software for this chip is upwardly compatible with the popular Motorola 6800 microprocessor; there is even an internal timer, which is very useful if you decide to store an internal sequencer program in the on-chip EPROM. The 6803 is available for about $4, and the 68701 EPROM is about $10. CMOS

versions for battery operation are available, as is a single-chip video interface. The video generator is the Motorola 6847 and costs $5.

Alan Probandt
Oregon

More Single-Board Computer Advice

Concerning the need for a small, portable computer to take to gigs for simple MIDI software applications, I feel that such a computer already exists. It's the PSION Organizer and is available from PSION, Inc., 320 Sylvan Lake Road, Watertown, CT 06795; tel. (203) 274-7521. Unfortunately, the computer does not currently have a MIDI interface (although I am trying to push the British manufacturer in that direction). However, the computer has a very general interface port (so far used for RS-232, bar-code reader, and magnetic stripe reader).

The PSION Organizer is extremely lightweight (8.8 ounces without 9V battery), rugged, and allows the attachment of up to two EPROM datapacks, storing from 16K to 128K. Furthermore, development software is available for the IBM PC, as well as software for very easy upload and download. I've used the PSION unit to drive (via RS-232) a lighting system for a gig.

I hope this information proves of some use.

Peter J. Woodrow
New Jersey

Sampling to the Rescue!

I recently performed a Beta test on the Emulator III at my studio. I was about to write a commercial for the Boardwalk at Santa Cruz, and E-mu and I both felt that it would be a good opportunity to see how the machine would operate in this real-life situation. The idea behind the commercial was to rearrange "Under the Boardwalk," and to mix various sound effects from the Boardwalk into the music.

We hired a group of excellent (and expensive) vocalists, who made the new rendition of the tune come to life. Once we had just about all the music and vocals recorded on the 24-track, we started to lay in the effects. All of a sudden, as we began to punch into track 7, the 24-track went "nuts." It behaved as though it were in chase mode, shuttling back and forth, while clamping all the mute switches down. It finally stopped shuttling, and we all stared at it silently. At first everything seemed okay, but then I began to notice some dropouts. Apparently, during one ten-second section, the 24-track had sent out a series of spikes all the way across the record stack, leaving little points of dropout on each track, including our seemingly irretrievable vocals. Because all the instruments had been performed on computer, driven by a SMPTE sync track, the other parts could be regained with all their original glory. But what to do with the vocal parts?

Earlier that day, my partner and I had sampled the best of the vocals in the E-III, at a 35k sampling rate. I was therefore able to play the vocals back in the damaged sections, and repair the jingle completely. The E-III is so clean and quiet that I wouldn't expect anyone to be able to hear the difference between original and sampled vocal lines (the only difference is that the sampled vocals are slightly crisper and less warm than the originals).

Had we not used the E-III, we might have been stuck with a rather large bill for redoing the vocals, and it would not have been our fault as producers. But this also raises some interesting legal questions. Is the studio required to pay for musician expenses when tracks need to be rebuilt due to machine error? Would their insurance cover the costs? Of course, the studio owners graciously gave us many hours of free studio time to finish mixing and tracking the jingles, but many "what ifs" still remain in my mind about the relationship between studio and producer in this type of situation. One thing I do know is that it would have been a hopeless situation had the E-III not been around.

Andy Newell
California

More IBM Hardware and Software

Kudos for your series of articles on "The Musical Computer" (April '88). We are, however, surprised to find no mention in your listing of the IBM MIDI interfaces and Software of one of the earliest interfaces (1983), the $295 Noteworthy Systems PC to MIDI card, which among other features includes: two independent 16-bit timers/counters with software selectable timer resolution, full interrupt-driven capability for both timer and MIDI events, sync to tape or to external clock (drum machine), and TTL clock output to control external devices.

Available software includes a $79 TX-DX Librarian and a $79 MIDI MACRO Library, a collection of Assembly language programming subroutines which include interrupt handlers with software buffering of incoming and outgoing MIDI info, simple "get MIDI byte" and "send MIDI byte" routines, timing routines, card initialization, and more.

Compliments, again, for a state-of-the-art series.

Ed Horton
Colorado

A few things to add to Carter Scholz's PC survey (April '88 EM):

1. Lyre's *FDSoft* should be added to the "miscellaneous" list: it's an additive and resynthesis program akin to Digidesign's *SoftSynth*.

2. Club MIDI's *ProLib*, easily one of the finest "universal" patch librarians around.

3. *PatchMaster* is now *PatchMaster Plus*, a very full-featured librarian which supports a much larger number of instruments than the original version, includes three MIDI data analysis screens, and creates patch libraries compatible with *Sequencer Plus Mark III, ver. 1.1*. This new version of SP3 is required in order to use the patches created by PM+.

4. Other editor/librarians worth mentioning in addition to the Bacchus line (*see the First Take review in this issue of their TX802 editor/librarian—Ed.*) are available from Poshek Productions (no frills editor/librarians for the FB-01, TX81Z, and the Roland GM-70 and D-50) and Imagine Computers' software (FB-01 and TX81Z, perhaps others).

5. What the PC/AT world really lacks is a good algorithmic composition program a la Dr.T's Algorithmic Composer. Such a program is in the works for SDA's *Pro MIDI*, but it will require that program. Allen Strange's *MASC* can be suited for the PC, but the user must write the interface drivers. Other such programs are in various stages of development, and we may yet see an *M*-type program for the PC.

6. An amazing amount of MIDI stuff for the PC is up on bulletin boards all over the country: sequencers, editor/librarians, synth patches, samples, demo programs, MIDI tools and utilities, etc. Some bulletin boards are incredibly cheap too, and even offer catalogs of their files to cut down unnecessary time on-line.

Dave Phillips
Ohio

Regarding the IBM story, I have some additions. In reference to speed, the most widely sold XT model runs at 10 MHz. While I agree the ST-225 20 Meg drive is a bargain, I don't think it is reliable. Regarding mouse usage with PCs, most software supports it such as *Cakewalk, Visions II, Copyist, Bacchus* and many more! Under "MIDI interfaces," the CMS-401 is omitted. Finally, *Cakewalk Conversion* to the Copyist is built into Cakewalk and is not $49 as stated.

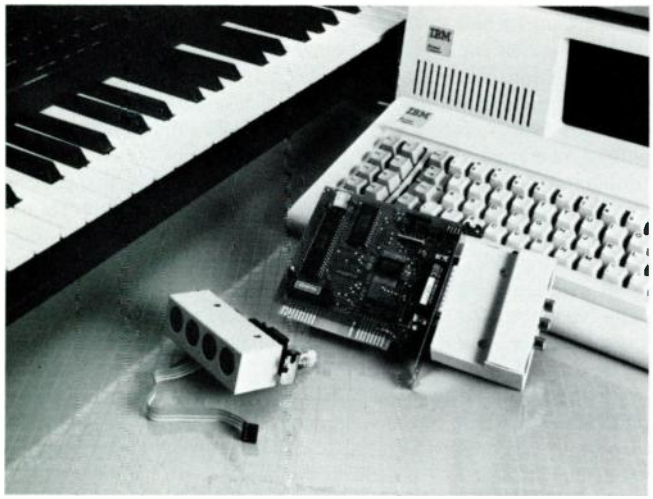
Port Barlow
California

Operation Help Works!

This is just a note to say thank you to everyone who responded to my GR-700 MIDI In retrofit question that was recently published in Operation Help (*a semi-regular feature in which readers can request assistance with technical problems*). I also want to express my sincere thanks to **EM** for publishing my request in the first place; I got letters from all over the country and chose a company in New York to do the work. The unit is back in my studio now, and it sounds great.

Tom Cormier
New Hampshire

EM



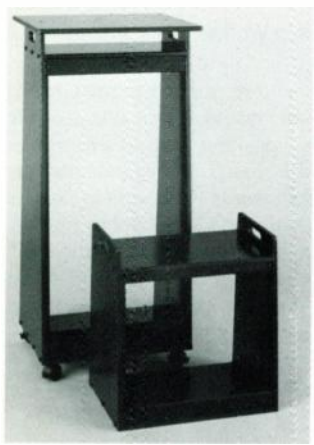
Voyetra V-4001

Accessories

The **Voyetra Technologies V-4001** ($199) MPU-401-compatible MIDI interface for the IBM PC has been released, along with an **expansion kit** ($59.95) that adds four additional MIDI Thru ports to the interface. To provide a more economical interface, the V-4001 is built without the 5V clock sync and FSK/5V/MIDI clock sync conversion circuitry found in the company's top-of-the-line OP-4001 interface.
Voyetra Technologies
333 Fifth Avenue
Pelham, NY 10803
tel. (914) 738-4500

Enclosures

OmniRax™ ($59.95 to $139.95, depending on size and finish selected) by Sausalito Craftworks are attractive, yet inexpensive enclosures for 19-inch rack-mount equipment. Two sizes are available: a tall 45-inch version holding up to 18 rack-spaces and mounted on lockable casters, and an eight rack-space version measuring 21 inches high. Either model comes in a choice of natural oak, birch ply, or gloss black finishes; all include a slanted front panel and top-mounted hand grips for easy mobility. Mounting rails are hard-rock maple, and black mounting screws and washers are included with each OmniRax. Options include casters for the 21-inch model and an accessory top shelf ($25) that mounts above the OmniRax hand grips, providing additional storage space for a drum machine, sequencer, multi-track, or other non-rack-mount items.



Sausalito Craftworks OmniRax™

Sausalito Craftworks
PO Box 1792
Sausalito, CA 94966
tel. (415) 332-3392
or (800) 332-3393

Rack Bags ($50-$150) from Hybrid Cases are easy-to-carry, lightweight rack cases made of a ¼-inch plywood innershell covered with shock absorbent foam and 1000 denier, rip-proof black cordura nylon. The Rack Bags are available in 1, 2, 3, or 4 space units, and depths of 11, 14, and 18 inches. According to the manufacturer, the bags are competitively priced and feature front and back zippered covers, a shoulder strap and outside storage pocket.
Hybrid Cases
1121-20 Lincoln Ave.
Holbrook, NY 11741
tel. (516) 563-1181

Publications

The **Musician's Music Software Catalog** ($3 for a two-year subscription, refundable with first order) contains over 80 pages of music software for all major computers, including education software, patch and waveform editors, librarians, sequencers, transcribers, MIDI interfaces and Thru boxes, SMPTE devices, and more. Free telephone consultation and worldwide distribution are also offered, along with toll-free telephone order service.
Digital Arts and Technologies
PO Box 11
Milford, CT 06460
tel. (203) 874-9080
or (800) 332-2251

Dynacord ADS Sampler

ART MultiVerb

Samplers

The **Advanced Digital Sampler** ($5,895) 16-bit, 16-voice comes with two megabytes of memory, allowing 24 seconds of sound at a 44.1 kHz sample rate. Memory is expandable to eight megs for nearly 100 seconds of sampling, and the unit features a SCSI port for connection to an external hard disk. The ADS claims better-than-CD quality circuitry, with true 16-bit phase locked stereo sampling, 24-bit internal processing, and 20-bit, double oversampled digital filters (88.2 kHz sample rate) on all eight outputs for dynamic range and clarity. The ADS supports the MIDI sample dump standard, and a *sound fusion* feature lets the user stack, chorus, flange, and digitally fuse eight sounds to create highly complex sounds. Sample pitch can be shifted up or down three octaves. Each sample can have two loops, use the smoothing feature, and have its start point altered by key velocity. Voice assignments to the eight polyphonic outputs are extensively programmable, and a modulations matrix provides three envelope generators, two LFOs, tracking, and ramp generators for modifying the original samples.
Dynacord
Drum Workshop, Inc.
(distributor)
2697 Lavery Court, Unit 16
Newbury Park, CA 91320
tel. (805) 499-6863

Signal Processing

The **MultiVerb** (about $550) from ART is a digital multi-effects processor allowing up to four simultaneous effects from a single-space rack unit. Reverb, arpeggio effects, reverse gates, pitch shift, doubling, digital delay, chorusing, digital equalization, and other effects can be programmed into the unit's 200 memory locations or selected from 100 on-board presets, and stacked in groups of four, if

AFTERTOUCH™

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MIDI for guitarists: the promise is finally fulfilled.

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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.

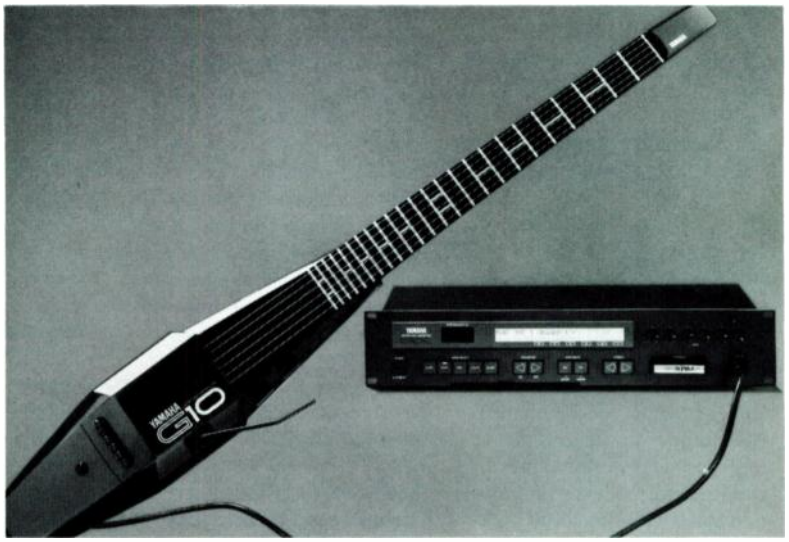
The G10 responds to different techniques because it utilizes three different technologies. In one pickup, ultrasonic sound sensors determine pitch—instantly—by measuring the distance from the sensor to the fret. An electromagnetic divided pickup calculates string velocity. And a third pickup uses optical 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.

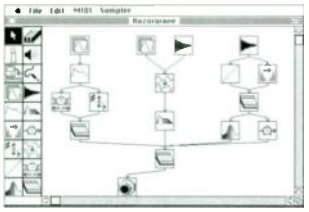
AFTERTOUCH is a monthly newsletter filled with the latest on Yamaha products. Get a year's subscription free by writing to: AFTERTOUCH P.O. Box 7938, Northridge, CA 91327-7938.

YAMAHA.

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

desired. Standard features include battery backup of memory, remote footswitch jack for preset select, 16-bit digital processing, 32-character LCD display, random access keypad, and full MIDI compatibility.

Applied Research & Technology
215 Tremont Street
Rochester, NY 14608
tel. (716) 436-2720



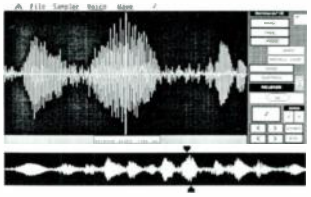
Digidesign Turbosynth

Software

Music Studio™ 88 ($59.95) from Audio Light, Inc., is a new version of the original Music Studio program for the Atari ST. New features for the composing/scoring/performing program include: a "jukebox" function allowing song files to be played continuously from the disk directory, song file merging, measure bar numbering, real-time MIDI input with chord and note duration recording, and MIDI clock in/out for synching to external MIDI sources.

Audio Light, Inc.
PO Box 893
Los Gatos, CA 95031
tel. (408) 395-0838

Digidesign's **Turbosynth** ($349) is a program that performs a wide range of digital synthesis and processing functions from a graphically oriented user interface. Using a palette of sound modules, Turbosynth allows the user to create noise-free, 16-bit sounds on the Mac that can be transferred to virtually any popular sampler. Any number of modules are placed on the screen and linked together using the mouse and the "patch cord" tool. Both sampled and



Drumware GenWave/12

synthesized waveforms are available for applying a variety of synthesis techniques, including waveshaping, additive and FM synthesis. Ten digital processing modules—from digital delay to spectral inversion—process samples and synthesized sounds in many ways. The software will work with the Digidesign Sound Accelerator card for the Mac SE and Mac II, making it possible to preview Turbosynth sounds from the Mac in 16-bit fidelity, perform all synthesis and signal processing functions in real time, and play sounds from the card with an external MIDI keyboard.

Digidesign Inc.
1360 Willow Road, Suite 101
Menlo Park, CA 94025
tel. (415) 327-8811

GenWave/12 ($299) from Drumware is a generic waveform editor for the Atari 1040ST/Mega computers and many popular 12-bit samplers. Sound samples can be transferred via MIDI from the sampler to the ST's internal MIDI port for high-resolution waveform display, editing, and digital signal processing such as digital EQ, digital enveloping, and FFT analysis. Features include a visual looping editor, variable crossfade looping, and freehand waveform drawing, and samples can be transferred from one sampler to another while keeping loop points intact. Version 1.2 supports E-mu's EMAX and SP-1200, Sequential P-2000/2, Akai S900, Oberheim DPX/Prommer, and other instruments conforming to the MIDI sample dump standard. Drivers for Korg and Roland samplers are planned for release next.

Drumware
12077 Wilshire Blvd., Suite 515
Los Angeles, CA 90025
tel. (213) 478-3956

MusicPrinter Plus ($395) from Temporal Acuity Products is a second generation desktop composing program designed to be used with any IBM PC, PS/2, and compatible computers with at least 640K RAM. The program allows users to create and edit scores of up to 42 staves per system, and print the results on 9- or 24-pin dot matrix printers. Data can be entered via the standard computer keyboard, optional mouse, or external MIDI controller such as a synthesizer keyboard. MusicPrinter Plus also allows the performance of scores using up to 128 voices on 16 MIDI channels. Other hardware requirements include a MIDI interface (IBM Music Feature, Roland MPU-401, Music Quest MIDI Coprocessor, Voyetra OP-4001, etc.); and CGA, EGA, Hercules, PS/2 color or monochrome screen displays.

Temporal Acuity Products
300 120th Ave. N.E., Bldg. 1
Bellevue, WA 98005
tel. (206) 462-1007
or (800) 426-2673

Vaccine ($79.95) is a three-program, antivirus toolkit for the IBM PC, XT, AT, PS/2, and compatibles. It is a resident program that automatically and transparently checks potential virus activity. It warns the user of any program trying to alter the system, performing an absolute write to any device or modifying another executable program in any way, or if a program name is not legal. It scans disks for known viruses and keeps a record of all executable files changed since the last scan. Vaccine does not void your programs by altering them. New features and methods of detecting new viruses will be offered to registered owners as they are developed.

WorldWide Data Corp.
17 Battery Place
New York, NY 10004
tel. (212) 422-4100
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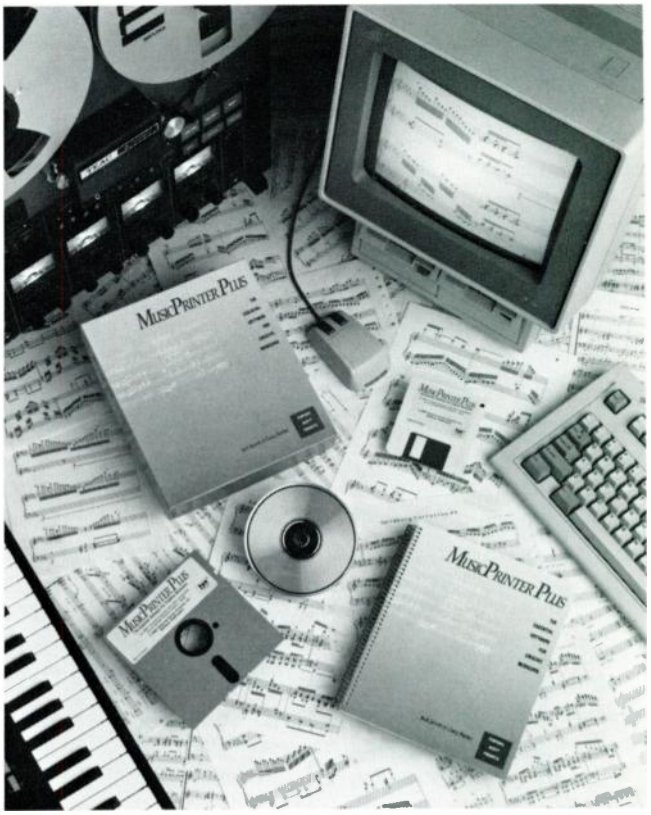

Temporal Acuity Products MusicPrinter Plus

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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.

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WE DESIGN THE FUTURE

WHAT'S IN A SEQUENCER?

BY CRAIG ANDERTON

With the complexity of today's sequencers, choosing the right system can be a difficult decision. If you're in the market for a sequencer, read this guide and find out the facts before making the jump into hyperspace.

One sequencer cannot be all things to all musicians, so different sequencers include different features. Unfortunately, the sheer number and complexity of these features can be confusing—how many tracks do you really need? What type of synchronization works best? How important are different types of quantization and "humanization?"

This article describes the most common sequencer functions to help you evaluate which sequencer most closely meets your specific needs. To further de-mystify the subject, we'll mention typical applications for some of these functions.

No sequencer contains all the features mentioned below, and of course, more features usually translate to a higher purchase price. But don't automatically assume a low-cost sequencer can't do the job—there are many "budget" sequencers that do almost as much as the "big guys." There is one important caution, though: as with synthesizers, not all manufacturers refer to the same feature by the same name. Where possible, alternate names for features are given in parentheses. Ready? Let's go.

ILLUSTRATION BY ANDREW SHACHAT

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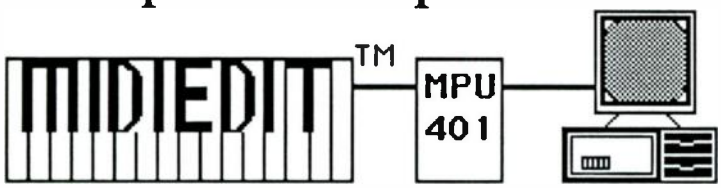

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*Minimum Hardware requirements: 256K RAM, one floppy disk drive, and a Roland MPU-401 MIDI interface. **MidiEdit** is easily installed on a hard disk.

**Prolib is a Registered Trademark of Club Midi Software.Patch Master Plus is a trademark of Voyetra Technologies

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Number of tracks. Nowadays sequencers seldom have fewer than eight tracks, and software packages offering 64, 200, or even an *unlimited* number of tracks are available. For very basic applications eight tracks might be adequate, but with the proliferation of multi-timbral instruments, 16 tracks (corresponding to one for each MIDI channel—see sidebar, "Tracks and Channels") is a virtual necessity.

With only 16 MIDI channels available, having more than 16 tracks may sound like overkill—but there are some valid reasons for such things as 64-track sequencers. Even though you probably won't want to play back data to 64 different synths, extra tracks can be used for organizing sounds. You could record each section of a part on its own track, which makes it easier to modify, say, just the first verse, while leaving the rest of the part untouched (editing can also be done with punch-in and punch-out, but separate tracks are often easier to manipulate). Separate tracks can also store MIDI controller data; you might want to punch in a difficult bend without disturbing the notes themselves, which would be recorded on a different track. The controller and note tracks could then be bounced (merged) together to create a single, composite track containing the pitch bend *and* note data.

But what happens when 16 MIDI channels are not enough? Clever software manufacturers have come up with a variety of ways to circumvent that problem. The most common approach is to have two (or more) completely independent MIDI outputs, and route some track data to one output and other track data to the other output. Thus, data from one track could be assigned to MIDI channel 1 and routed to output A, while data from another track could also be assigned to MIDI channel 1, yet be routed to output B. This essentially doubles the number of available MIDI channels.

FOR THE BEGINNER

Tracks and Channels

Many people mistakenly think that the words "track" and "channel" are interchangeable, but this is not the case. MIDI provides 16 *channels* over which data can be transmitted, but sequencers often include more than 16 *tracks*. Although some sequencers have a one-to-one correspondance between tracks and channels—16 tracks for 16 channels—tracks are not limited to this type of arrangement. Often tracks can record more than one MIDI channel's worth of information, just as a tape track can record a symphony orchestra consisting of many parts as easily as a solo guitar. Tracks can also record less than a full channel's worth of information, which is the case if a track is dedicated to storing, say, just Pitch Bend data or Program Changes for a particular channel. (For more information, see *MIDI For Musicians* by Craig Anderton. Available from your local music dealer or EM/Mix Bookshelf; call 1-800-233-9604 for a free catalog.)

The Southworth JamBox interface, used in conjunction with their *MIDIPaint* sequencer, provides four completely independent outputs and yields the equivalent of 64 MIDI channels—1A-16A, 1B-16B, 1C-16C, and 1D-16D.

Another way to double the number of channels is simply to synchronize two sequencers: one sequencer provides one set of 16 outputs, and the other sequencer provides another. Since data are divided between the two sequencers, there is less of a tendency for the "data clogging" that can occur when a single sequencer is forced to handle every single piece of MIDI data.

One simple way to "double" the number of MIDI channels is to synchronize two sequencers.

The ability to record any type of MIDI data. It's frustrating to have MIDI functions on your synthesizers that you can't access with your sequencer, so the ability to record pitch wheel changes, Aftertouch, Program Changes, and continuous controller data is vital. Being able to record System Exclusive data, while not possible on many sequencers, offers several advantages: specifically, the opportunity to reconfigure an instrument's status (including loading in a new set of patches, if need be) in the middle of a tune. One enterprising EM author, Jim Johnson, even uses Dr. T's *Keyboard Controlled Sequencer*, which can record Sys Ex data, to transmit messages and prompts to the display of his Oberheim Xpander.

Anything that can be recorded should also be editable. Suppose, for example, that you play a part perfectly but mess up on some of the pitch bending. If you can't edit controller information, you would need to play the entire part over again. With controller editing, you could change just the pitch bending itself.

Programmable quantization (auto correct). Quantization rounds off timing errors in your playing to the nearest note value you specify—quarter notes, eighth notes, triplets, etc. (See "Making Quantization Work for You," July '87 EM.) Some sequencers correct only during playback, which is a useful feature since you can correct an already recorded track and change quantization at will. Generally, a *high resolution* or *real time* mode will also be available that turns off auto-correct (see next section).

Resolution. Typically, a sequencer's high resolution mode gives a resolution of 96 pulses-per-quarter note (in other words, your parts will still be quantized, but to such a fine degree of quantization—1/96th of a quarter note—that it will appear to not be quantized). However, musicians who are very sensitive to subtle time shifts feel that 96 ppqn resolution is not sufficient, so some sequencers offer 240 ppqn, 384 ppqn, or even higher resolution (C-Lab *Creator*

runs on 768 ppqn) to insure that notes are recorded exactly where you've played them. Another advantage of high-resolution sequencers occurs with track time-shifting (described later).

Advanced programs will offer different types of quantization, such as quantizing only those notes that fall outside an acceptable range (for example, if you specify a 10-clock pulse "window" around a particular beat, events that occur more than 10 clock pulses away from that beat will be quantized, but events within 10 clock pulses of the beat will be recorded as played). This helps you keep a good "feel" and still trap the most significant timing errors. Some programs let you quantize only notes within certain pitch ranges. Adjusting these parameters can really add a new dimension to a part.

Humanizing options can add subtle timing variations to make a track sound more "human."

There are several kinds of auto-correct. Some quantize Note On information but not Note Off, which can distort the note duration; others quantize both equally, but arguably the most natural approach is to quantize Note Ons and adjust Note Offs to maintain the same duration. (Note that *Personal Composer* provides several variables for adjusting quantization to taste.)

Humanize. Sometimes quantization leaves a track sounding overly mechanical, which is where humanizing options come in. These let you add subtle timing variations to note attacks or durations, or small level changes to velocity, to make a track sound more "human."

Non-contiguous editing. With primitive sequencers, editing is often on a track basis—e.g., if you want to quantize, you quantize the entire track. More advanced sequencers let you define a region of the sequence for editing so that, for example, you can quantize two measures out of a track, but leave the rest of

the sequence alone. In many cases, the defined region can include multiple tracks as well as multiple measures, but the catch is that these must generally be contiguous—in other words, you can't pick a measure, skip two measures, then select the next few measures to be part of the region including the first measure selected. The same goes for tracks; you would be able to define, say, tracks 1-6 as a region, but not tracks 1-3, 6, and 8. With non-contiguous editing, you can, in fact, specify isolated sections of the sequence as being part of the same region for editing purposes. As of this writing, *Performer* 2.3 is the only sequencer I know of that allows for non-contiguous editing.

Disk storage option. This is mostly a concern with stand-alone, non-computer-based sequencers; in fact, many stand-alone sequencers include a built-in disk drive. Saving to disk is more reliable and a lot faster than saving data on cassettes.

With computer-based sequencers, the speed of disk operations depends very much on the machine being used. The Commodore 64 is notorious for its incredibly slow floppy disk operations; Macintosh, Atari, IBM, and Amiga disk drives work far faster. The best option for data storage, though, is the hard disk. Compared to floppy disk drives, hard disks use a different type of technology that offers fast access and the ability to store lots of data (typically 20 to 80 megabytes, although 160 and 320 megabyte models are getting affordable). Few stand-alone sequencers include hard disks, but the Emulator III and Emax HD can store sequences on their built-in hard disks, and most computers can be outfitted with an external (or sometimes internal) hard disk. While hard disks used to be quite costly, prices are declining rapidly; concerning the future, IBM recently announced a process that could increase hard disk densities 50 fold! However, it's important to remember that hard disks can (and will) fail someday, so in any event, hard disk data must be backed up on some other medium—usually floppy disks.

Being able to load and save individual tracks (not just songs) to disk is also a useful feature.

Availability of real-time, modular, and step time recording. *Real-time recording* works like a tape recorder—put the sequencer into record, and play away. *Step-time* lets you delete or add notes, one step at a time, through the entire sequence. Some sequencers let you do only one or the other. *Modular recording* lets you create individual patterns, either in step or real time, that are then linked into songs (like drum machine programming). Step-time, while useful, can often be simulated on real-time-only sequencers by simply slowing the tempo way down. Some sequencers allow all three types of recording.

Graphic and event list editing. There are two major thoughts on how to edit MIDI data: graphic editing and MIDI event lists. Fig. 1 shows a screen from *Master Tracks Pro*, which uses mostly graphic editing. It is even possible to access a window so you can see, and modify, controller and tempo data graph-

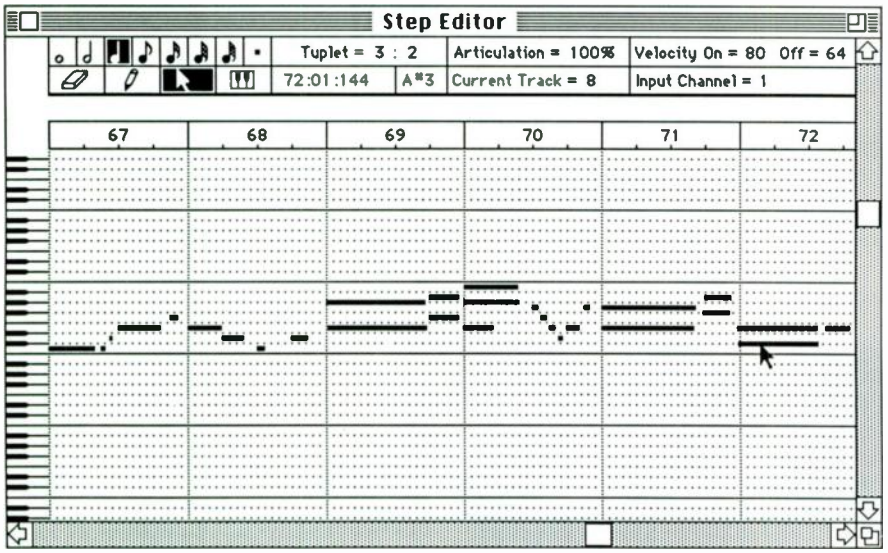


FIG. 1: The main window shows the Step Edit screen from *Master Tracks Pro;* notes are indicated graphically.

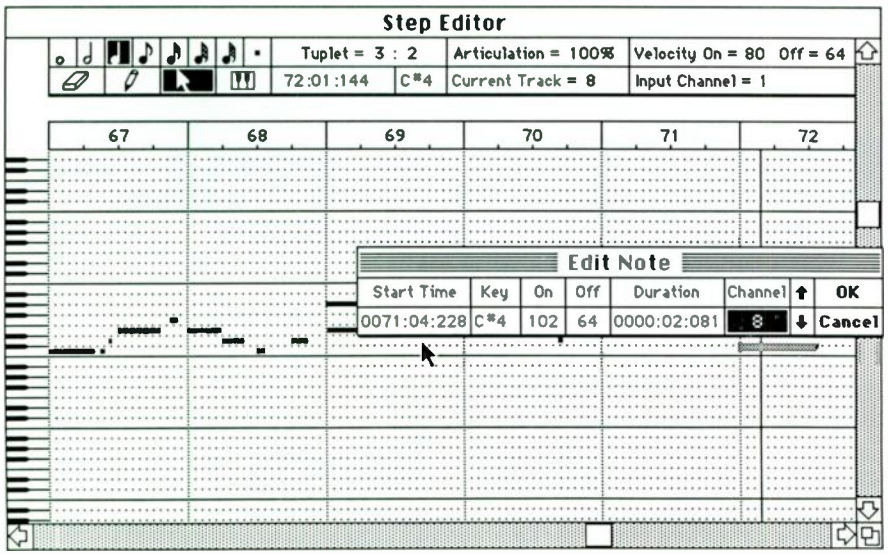


FIG. 2: This is the same screen as above, but double-click on a note, and information on the note appears in a separate pop-up window.

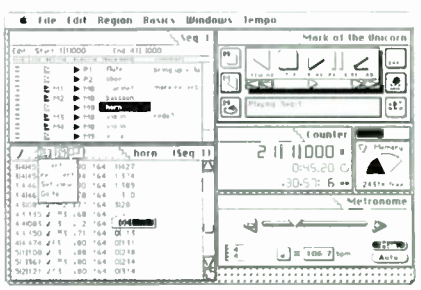


FIG. 3: Mark of the Unicorn's *Performer* lists all events as a continuous roll of text.

ically. Each note is represented by a solid block, with height indicating pitch, and length indicating duration. This is a great way to see your music "at a glance," but is not extremely precise—does that note start right on the beat, or a few clock pulses later? And does it include Aftertouch or other controller data?

With this particular program, double-clicking on a note calls up a mini-screen that contains more precise information on the note—starting time, duration in clocks, channel number, velocity, and so on (**Fig. 2**).

Fig. 3 shows a screen from Mark of the Unicorn's *Performer*. As you can see, each and every event—notes, Pitch Bend, Program Changes, etc.—are individually listed with a great deal of detail. This is a lot of data to wade through, but this particular program lets you remove types of data from the display only (not from the track!) so that you can look at, say, note values without having to see Aftertouch information on screen. Some people feel event lists are less "user-friendly," but do

Step time can often be simulated on real-time sequencers by slowing the tempo way down.

offer the advantage of a great degree of precision.

Graphic editing and event lists offer both advantages and disadvantages unique to each type of note representation. Nonetheless, many people claim that one particular method is the "only way to go." My theory is that right-brain oriented people, who supposedly think more graphically and abstractly, probably gravitate towards the graphic displays; left-brain people, who are reputed to think more analytically and linearly, are most likely those who prefer the event lists. I like having both available—graphic editing for doing broad edits, and event lists for detailed editing. And I might add that graphic editing of controller data is exceptionally helpful, particularly when using MIDI guitar or wind controllers since they generate huge amounts of data.

Punch-in and punch-out. This is similar to punching with a standard tape recorder, but there are some subtleties when applying this technique to MIDI data. If you punch right after a Note On command and don't program anything to turn that note off, the note will stay stuck on indefinitely. A *pre-roll* feature is also handy, where you can program a section to start playing a couple of measures before the punch occurs.

Automated punch-in, punch-out, and other functions. This is even better than regular punching. You simply program the measure and beat in the song where the punch-in and punch-out

should occur, and the sequencer takes care of the rest. No more missed punches! Other features may also be automated: with automatic "rewind," upon reaching the end of the punch, the sequence will return to the beginning of the section to be punched.

Programmable tempo changes. You can radically change the feel of a song by, say, pushing the verse by one extra beat per minute or laying back the chorus by one less beat per minute. Being able to change the tempo for a song is very useful: unlike tape, speeding up and slowing down a MIDI sequencer doesn't affect the timbre of the instruments. Even better, some sequencers let you specify a beginning tempo, ending tempo, and the number of measures over which the time will increase or decrease. There is one caution, though. If you have a densely recorded track that is on the verge of clogging the MIDI data stream, increasing the tempo may send the program over the edge (or at least into a nervous breakdown).

You want to do the least amount of typing or mouse clicking necessary.

Tempo tap option. Some sequencers let you set the tempo by simply tapping a button; the computer reads the time between taps, takes an average (or just gives you the time for the last two taps), and converts this time period into a beats-per-measure reading that sets the sequencer's tempo.

Track (channel) reassignment. Maybe you want to drive your D-50 instead of your DX7 from track five without having to do any repatching; this option will let you do it. Simply assign the track to send its data over the appropriate MIDI channel for the chosen instrument, and you're ready to go. Almost all modern sequencers have this feature.

Program change. This message can be recorded at any point on a track. It changes the program of any devices tuned to that track's assigned channel. Optimally, you should be able to edit and insert Program Changes manually if desired.

Ease of use. Probably more than any other single factor, this affects how much you will enjoy using a sequencer (or any other piece of software, for that matter). You want to do the least amount of typing or mouse clicking necessary. A program that requires only single-letter commands or mouse clicks, and lets you move a cursor around to make selections, is better than one that makes you type in stuff like "SAVE: COMPOSITION #1 IN B-MINOR: DISK A." The types of "help" messages built into the program (if any) are also important. Some products aim to

be so "user-friendly" that help messages are sprinkled throughout the program. Handy while learning, this adds unnecessary clutter once you know your way around the sequencer.

Following the example set by the Macintosh (and prior to that, Xerox), many computers have a standardized "user interface" where various operations (save to disk, load from disk, edit, etc.) are done in exactly the same way for different programs. This drastically reduces the learning time for a program, since you need learn only the differences between programs, not the similarities. The down side is that these standard user interfaces make extensive use of mouse operations, and you might get a little tired of all that pointing and clicking. As a result, many programs that rely on the mouse also include keyboard equivalents. For example, to start a sequence using a mouse, you would need to move the mouse and point to the record option, then click on record; some programs will let you start the record or playback process by simply pressing the computer keyboard's space bar (which provides a large, convenient target). Some accessory computer programs even let you define your own keyboard equivalents. For example, if you often find yourself quantizing parts to sixteenth notes, you might want to define a keyboard equivalent that, when pressed, quantizes all tracks to sixteenth notes.

Another important aspect is the clarity and appropriateness of the display screens: is related information grouped together? Do you have to switch constantly between screens? Is it easy to erase tracks, or worse yet an entire song, inadvertently?

Printout option. Some score/lead sheet printout programs are better than others, but just about all of them beat

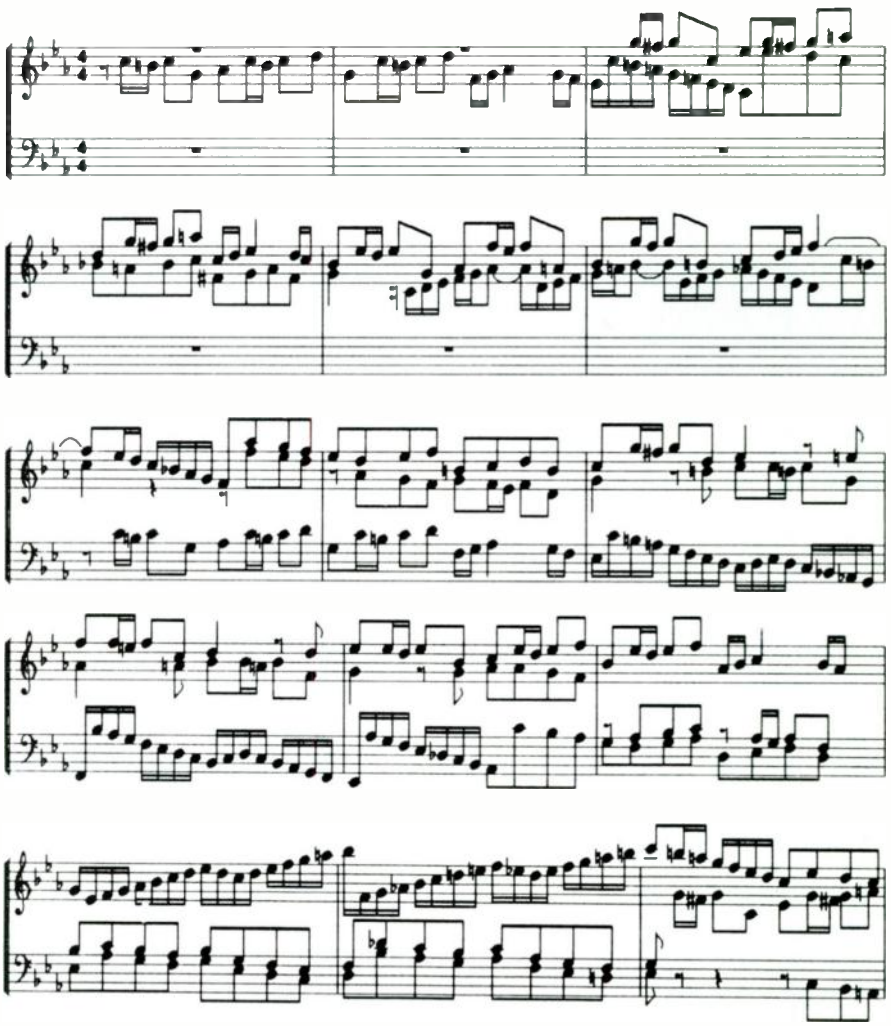


FIG. 4: A music score printout from Dr. T's program *The Copyist*.

doing it by hand. **Fig. 4** shows a printout from Doctor T's *The Copyist* program, which is representative of some of the better music printing programs.

Ability to "import" and "export" sequences. Many sequencers store their files in a common file format so that these files can be transferred among different programs. Probably the most common use of this feature is to "export" a sequence from a program optimized for sequencing to a program optimized for printing transcriptions. The process of turning a sequence into a printed score is difficult and requires very sophisticated software; in general, trying to make a program do everything—from sequencing to scoring to who knows what else—will require more tradeoffs than optimizing a program for a specific application. File transfer protocols are a particular boon to notation programs that do not support real-time recording.

Another example of the usefulness of file transfers involves *M* and *Jam Factory*, composition programs made by Intelligent Music. The compositions created by these programs conform to the standard sequencer file format, so they can be exported to sequencer programs should you want to edit the algorithmically created compositions produced by these programs.

Ability to name individual sequences and tracks. It's much easier to remember a song title than a number. Naming tracks is also handy: that way you know which instrument is supposed to be driven from each track. The more letters the better—"bass" says a lot less than "Bass:DX7 Patch 18."

Programmable countdown. I don't know about you, but I always need a few beats before a song starts in order to prepare myself for the recording process. Being able to start playing or recording from any bar in a song is also useful.

Programmable metronome. Being able to program fast metronome times (i.e. sixteenth notes) means that you'll still have a solid click reference if you slow the sequence way down when overdubbing.

Memory expansion option. Early sequencer programs for the C-64 and Apple II could typically remember somewhere between 5,000 and 10,000 events (with Note On, Note Off, Pitch Bend, and so on being considered as "events"). This isn't as much as it might

appear to be, especially if an instrument generates a lot of Pitch Bend or Aftertouch data. In fact, using any dynamic controllers eats up tons of memory. One of the advantages of computers with a megabyte or more of memory (Mac Plus, Atari 1040ST, etc.) is their ability to store just about as many events as you're likely to produce under normal circumstances. If you get a stand-alone sequencer, check if its memory can be expanded. The more memory, the less you'll have to access a disk drive to shuttle data back and forth between the disk and the sequencer's internal memory.

Memory space status. You should be able to check how much memory is left, as well as how much disk space is left.

Track activity status. It's real helpful to have some kind of indication whether data is contained in a track. For example, with a sequencer whose main screen displays the name and number of each track, a symbol might show up next to the track number whenever data is playing back from that track. This shows at a glance how much general track activity is going on.

Channelization (software MIDI Thru). This takes the signal coming into the MIDI In and retransmits it over the channel of your choice. This feature is vital for owners of the original DX7, which transmitted only on channel 1; with a channelization feature, you can leave your DX7 hooked up and use the computer to change its MIDI signal to any one of the available 16 channels. However, channelization also saves a lot of time in any situation where you're using a single keyboard to control a bunch of expander modules, as you can direct the flow of MIDI data at the sequencer itself, rather than constantly having to reset channels on the master keyboard to access different expander modules.

Track protect. This safety feature lets you protect individual sequencer tracks to prevent accidental erasure.

General-purpose System Exclusive storage. Although few sequencers let you record System Exclusive data as part of a sequence, many let you store this data (typically, patch data from synthesizers) on disk under its own file name, or perhaps as a separate sub-file of the main sequence file. With this feature, if you develop a specific set of patches to go along with a particular sequence, you can store the data for those patches on the same disk as the sequence—very convenient. When you come back to the sequence at a later date, you can reload the patch data back into the synthesizer, and you're ready to go. The System Exclusive storage functions found on most synthesizers work like conventional patch librarian programs, albeit with less sophistication since the sequencer versions will be more "general-purpose."

Many programs now include functions that let you modify music according to some compositional algorithm.

Music generation/modification. How would that piece of music sound played backwards? Or with the lowest notes substituted for the highest notes? How about creating a random two-bar melody line? Some programs (such as Dr. T's Keyboard Controlled Sequencer V. 1.6) now include functions that let you modify music according to some compositional algorithm (created either by the machine or by you).

Sequence calling. This feature lets you call up sequences by typing keys on the computer keyboard and is great when using a sequencer in live performance, where you may want to vary the length of particular sections to allow for improvisation (Opcode's *Midimac Sequencer* is designed with this type of application in mind). A variation of this function calls up a sequence from within another sequence, which opens up all kinds of outrageous possibilities. In fact, you could create a sequence that contains no notes of its own, but simply calls other sequences (this is similar to the modular programming technique described earlier, but more flexible).

Readable manual. Make sure the person writing the manual is trying to instruct you, not impress you. If the first

few pages make good sense, the rest probably will too.

Non-destructive editing. When editing a sequence, some sequencers create a copy that you edit, preserving an unedited version of the original in case you end up not liking the edited sequence as much (don't you wish tape recorders would save a previous track when you did an overdub?). When you get an edited version you prefer, you can then overwrite the original. Even if a sequencer does not offer this feature, you can usually approximate this function by saving a track to disk (program permitting) so that you always have a backup of the original, or by copying to another track and muting the original track as you work on the revised version.

Fast forward/rewind. It's fun to hear the sequence whiz by as you look for a part towards the beginning or end of a song.

Search. Search looks for a particular part of the sequence, or places you a certain number of measures into the sequence.

Bounce (merge). You should be able to bounce data from one track to another and combine tracks together. In many cases, tracks that are bounced together cannot be unbounced; however, there are some exceptions to this (see the section on filtering data).

Typical bouncing applications include playing individual sections of a complex part for one instrument over several tracks, then bouncing them all down to create one composite part on one track. Another option is to play several different solos on multiple tracks, then use punch-in and punch-out to erase those parts of the solo you don't like and bounce the sections that remain into one track, thus freeing up the other tracks for more instruments.

Offset (track shift). Some sequencers let you offset one track from another with respect to time, in single clock pulse increments. As you might expect, sequencers with higher resolution (and therefore more clock pulses per quarter note) let you shift by smaller amounts of time (see "The Feel Formula" in the March '88 EM for details on how to translate numbers of clock pulses into milliseconds). If a sequencer doesn't have the ability to offset tracks, you can often fake it by inserting a short bar (1/32nd note, for example) in front of a copy of a

non-offset track. Some programs have "time-offset filters," which let you change only selected parts of a track, rather than an overall track offset,

Track shifting also lets you "tune out" tiny timing differences between devices to obtain perfect synchronization, as well as create special effects such as doubling, chorusing, echo, and canon harmonies by copying a track to another track, and offsetting the new track by the desired amount compared to the old track. Another application is to create different "feels" with this function; a track that is a little ahead of the beat gives a very different feel compared to one that is a bit behind the beat. (For more information on the subject of creating different "feels" with sequencers, see "The Feel Factor" in the October '87 EM.)

MIDI data stream clogging is a real problem, and filters are about the only good cure.

Transpose. So you can't sing that song in D# after all? So transpose until you hit the right range. Some programs offer both individual track transpose and overall song transpose. Note that if you're driving a drum machine from your sequencer, you probably won't want to transpose the track containing the drum data, since each note corresponds to a specific drum, and transposing the track will trigger entirely different drums. For this reason, some sequencers let you designate one or more tracks as non-transposable.

Filter (strip data). The filtering function eliminates selected data from the MIDI data stream—for example, all notes within a certain range, or all notes associated with a particular MIDI channel (assuming that a track can hold data from several MIDI channels at once, which is often the case). In many cases, this filtered (cut) data can be "pasted" to another track.

As one example of how to use filtering, suppose you played left- and right-hand parts on a single keyboard, and wanted to split off the left-hand part to a different keyboard. You could copy the track and filter the low notes from the original, thus sending the right-hand part to one instrument; the next step would be to filter the high notes from the copy and send the low notes (the left-hand part) to a different instrument. (I first saw this particular low note/high note filtering option in Roger Powell's *Texture* program.)

Filtering also lets you "unmerge" merged parts, assuming that those parts have some distinguishing differences (e.g., occupying different note ranges, being assigned different MIDI channels, etc.). For example, assume that you're transferring sequencer parts from one sequencer to another in real time and that one sequencer contains parts recorded on eight different tracks, corresponding to eight different MIDI channels. Playing this data back into another sequencer will often end up sending all this data into a single track. The strip data command can then "strip off" the data by MIDI channel and paste the data associated with a particular MIDI channel into its own sequencer track.

Yet another use for filtering is to conserve memory. Continuous controller and similar real-time data take up a fair amount of sequencer memory. Filtering out data that is not used in a performance makes more memory available for other functions and sequences.

Filters aren't just for conserving memory, however. If you record several tracks full of controller data, you can quickly end up with a song that is not playable through a single MIDI Out. Imagine what happens when four complex tracks are recorded singly, then played back together. . . MIDI data stream clogging is a real problem, and filters are about the only good cure.

There are two main types of filters: one blocks data (all controllers, for example) while recording; another removes data from already recorded tracks. This is similar to record vs. playback auto-correct—record filtering is useful when you *know* you don't want to record a particular type of data, but once filtered, you can't get it back again. Note that playback-only track filters can take a lot of time to remove data (if you're going to filter out 300 bars chock full of Aftertouch data, it might be time for a coffee break). Many sequencers implement both types of filtering.

Mute/solo function. *Mute* lets you selectively silence tracks while recording or playing back. *Solo* selects one track but silences all others. Some programs let you mute/unmute/solo during playback, while others let you make these changes only while the sequence is stopped. (Note: The more features available while the record or playback process is in progress, the better.)

One good use for muting and soloing is to record four or five different solos and listen to each one individually before deciding which one to keep. For live use, this means you can play different solos at different performances so you don't get bored with hearing the same sequenced part over and over and over again.

Low-cost software updates. According to Anderton's Law of High-Tech Equipment Purchasing, never buy

anything that says "Version 1.0" unless the company will upgrade you to the next software revision for a reasonably low fee. Initial software offerings often have bugs; by the time you get a few versions into the program, the bugs are pretty much all gone. Note that software upgrades are generally much more common, less expensive, and easier to install if you have a computer-based sequencer as opposed to a built-in or stand-alone type.

Copy protection. Copy protection is designed to prevent people from making unauthorized copies of programs, but it also prevents legitimate users from making backup copies to guard against damage to a master disk. Also, you sometimes can't use a hard disk with copy-protected software because the software can't be copied over to the hard disk. Although copy protection is a pain, remember that writing software takes a tremendous amount of time and money, and people who rip off a program are no better than shoplifters or car thieves.

Copy protection takes several forms. Sometimes, a hardware "key" (called a "dongle") is provided that you plug into one of the computer's ports. Unlimited backup copies can be made, but they won't run without the dongle inserted in the computer. Don't lose the dongle, though, or you're in trouble. Another method uses the "key disk" principle. Again, you can make unlimited backups; but upon booting the backup version of the program, you will be asked to insert the original master disk—the key disk—into a drive so that the computer can verify your ownership of the backup. Yet another form of copy protection (happily on the wane) is to disallow copying of any kind, forcing you always to run the program from the master disk, and of course, the more you use the master disk, the greater the media wear and the greater the odds of damaging the disk. This highlights one of the advantages of the key disk approach: since you need insert the key only for a few moments on booting, it should last a very long time.

Check the manufacturer's policies towards providing backup copies in case your master gets trashed. You shouldn't have to pay list price twice for the same program, although the level of manufacturer paranoia varies widely.

Hard disk installation. Recognizing that most pros rely on hard disks in order to save time, some sequencers provide utilities that let you install the program on hard disk. Different programs implement this process in different ways; check with the manufacturer about the hard disk installation procedure *before* you lay down your hard-earned cash, and also investigate how easy it is to de-install the software should you need to reformat your hard disk.

Synchronization. A sequencer should have at least two synchronization options: *internal* and *external*. With internal synchronization, the sequencer has its own tempo reference, and this timing data will also appear at the sequencer's MIDI Out connector so that other devices can synchronize to the sequencer. When set to external, the sequencer will expect to receive MIDI timing data at its MIDI In connector, possibly from a drum machine or other sequencer.

The situation described above assumes that in external mode, some source

of MIDI timing data is available. If you need to sync to tape, this implies that you have a device capable of storing MIDI timing data on tape, which can then be read by the sequencer. Devices such as the Harmony Systems MTS-1, J.L. Cooper PPS-1, Tascam MTS-30, etc. can provide this function. If SMPTE Time Code is the master timing reference recorded on tape, then a SMPTE-to-MIDI converter can convert the SMPTE data into MIDI timing signals suitable for driving the sequencer. However, not all sequencers require an external device to do tape sync, and instead include a sync-to-tape option (usually some proprietary system that is not necessarily compatible with other sequencers) similar to the systems used with drum machines. This will usually be in addition to the two main sync options mentioned above.

If you are planning to drive the sequencer from MIDI data, make sure that the sequencer recognizes MIDI Song Pointer data, as this will allow the sequencer to autolocate to devices that produce Song Pointer data.

Finally, some sequencers can read SMPTE directly, thus obviating the need for a SMPTE-to-MIDI converter for synchronization to tape. Most professional audio/video facilities are SMPTE-based, and having a sequencer that can read SMPTE directly is considered the best way to go. Of course, you pay extra for the privilege. In any event, a reliable form of synchronization to tape and other devices is a necessity if you want to get the most out of a MIDI sequencer in a studio context.

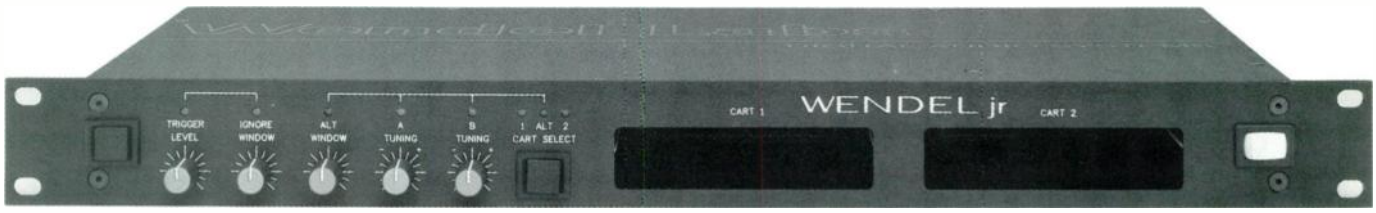
That concludes our tour of sequencer features; good luck in choosing the software that's right for you. Take comfort from the fact that sequencers have reached a very high level of sophistication these days, so all but the most basic models should provide you with a great deal of sonic experimentation and amusement.

(Portions of the above article are excerpted from the book MIDI for Musicians *with permission of the publisher.)* **EM**

Craig Anderton is the author of several books on musical electronics, including The Electronic Musician's Dictionary. *He is currently working on a book about choosing, using, and occasionally abusing samplers, and plans to release his next solo album sometime prior to the turn of the century.*

THE BEST SOUNDING WILL ALSO PREVENT FROM BECOMI

Announcing the Wendel Jr. from Roger Nichols' Wendel Labs.



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.

2) These samples weren't recorded by some second engineer, but by **Roger Nichols, one of the best engineers in the world.** They were recorded direct to the 3M Digital Mastering System and then transferred directly to the EPROMs used in the Wendel Jr. So Wendel Jr. samples have *always been in the digital domain!* (Many drum machines' samples are from analog tapes.)

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

DRUMS YOU CAN BUY YOUR DRUM MACHINE NG OBSOLETE!

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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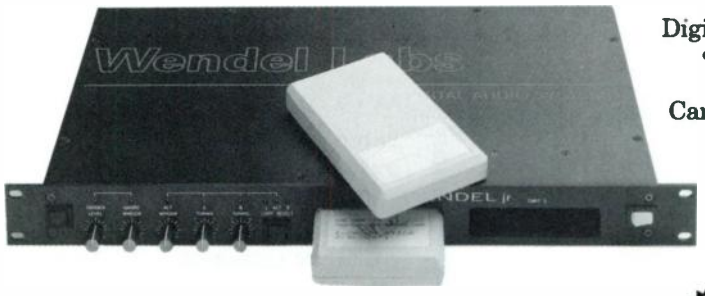

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Beyond Notes

Percussion/ Sequence Calls

A little-known feature on some sequencers allows a single note event to trigger riffs that only an octopus could play and brings a dazzling array of special effects to the creative electronic drummer.

BY DAVID G. SMITH

The concept of electronically triggering sound events has opened new horizons for the creative percussionist, in both studio recording and live performance. In fact, the field of "percussion" has broadened as technology continues to blur the traditional boundaries of instrumentation. For example, the marriage of the velocity-sensitive keyboard with digital sampling devices initially implied the development of new percussive styles of keyboard play, and brought more subtle and chordlike control capabilities over percussion sounds. The development of piezo-electric drum pads returned MIDI control to the drumstick, offering the full universe of sound events to drummers. The techniques presented in this text show how using high-resolution sequencing programs to create and trigger "micro-sequences" can expand the definition of percussive "events."

As more performers become aware of the power of sequencing tools, computers are frequently seen onstage—typically used as auto-accompaniment devices. The development of the "sequence call" function provides a considerable refinement in the control of auto-accompaniment, in that a performer can trigger accompaniment selectively, rather than just having the sequencer run robotically through the full duration of the song.

A sequence call is a cue informing the program to begin playing a requested sequence, consisting of anything from an entire symphony of notes to a mere single note or other piece of MIDI information. The utility of live sequence calls holds a

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powerful implication for the percussionist.

Drum triggering, whether from a drum pad configuration or from a keyboard, is ultimately a matter of converting a mechanical action into a MIDI message which tells the (drum machine/sampler/synth) what sound to release. The assignment of any pad or key to a particular sound, (snare for example) is called "mapping" and is accomplished by parameter

FIG. 1: Three micro-sequences of less than a quarter-note duration, as they might look in a bar graph representation from a sequencing program. Bars represent the duration and velocity of the MIDI notes mapped to different sounds within a drum machine or sampler. Note that these simple figures are not from any actual sequencing program.

FIG. 2: Bar graph representations of stacked percussion events.

settings on the voicing machine. So a pad or key strike can result in very big and complex "notes," chromatic work and layered sound events.

The addition of a computer/sequencer into the above setup opens possibilities beyond the simple triggering of individual or multiple sound sources. This potential is unleased through mapping not merely notes, but sequence calls, triggered by various pads or keys. In other words, instead of playing notes you would be playing sequence calls. Because a sequence can release any combination of MIDI notes over the entire spectrum, in any temporal relationship, a micro-sequence can be used as a complex percussion event.

APPLICATIONS

An example of this would be a micro-sequence consisting of a 32nd triplet group, triggerable in one stroke to achieve a simple three-slap delay effect on a snare. Additionally, the dynamics of the last two notes could be scaled to simulate echo decay. The advantage over normal signal processing is that each drum sound (as triggered by a sequence call) could have its own custom delay pattern in terms of the number of repeats, dynamics, length of decay, etc. And this offers many more options than would ever be possible with a regular delay, such as chromatically scaled or arpeggiated delay patterns, reverse and non-linear decay dynamics, and an infinite number of other combinations, limited only by your own imagination and the resolution of the sequencer. (**Fig. 1** shows three examples of delay-effect micro-sequences.)

Another example would be achieving multi-mallet and complex chord effects by stacking single notes. An added dimension of control over instrument chains is also possible because sequences can address all 16 MIDI channels. Single note or chord micro-sequences (or octave clusters of them) could voice various combinations of instruments. (**Fig. 2** shows examples of this.)

Micro-sequences can be used to release brief melodic runs, percussive arpeggiation runs or sampled concrete elements to track with the drum strokes. Single stroke triggers could release runs of any designated duration, from any instrument in the MIDI chain. Of course, these could be expanded to the point of becoming multi-measure auto-accompaniments, within which the drummer could add density and fills.

Sequences can contain other than note information, and when triggered can release messages pertaining to patch and tempo changes, various controller information, and multi-channel messages, as well as more exotic messages addressing lighting and other effects. When mapped to an instrument as a sequence call, these messages integrate smoothly into the motions of performance.

Myriad possibilities are open to the percussionist using this type of trigger "event." Once a particular effect has been created as a sequence template, the use of the program's Copy and Transpose functions can quickly and easily replicate the effect for any note in the mapping scheme, for any song. It is also possible to split the keyboard or drum kit so a select set of keys or pads can be used to call sequences while the remainder are used to trigger sounds. Remember that the mapping scheme for the sequence calls is entirely independent of the sound mapping within the drum machine or other MIDI sound source.

Figs. 3 and **4** illustrate a traditional and an alternative mapping scheme for drums in a given song. Note that in this example, the E-mu SP-12 can still be used as the primary sound generator, while triggering note 40 would release a DX7 chord. The advantage of such a mapping

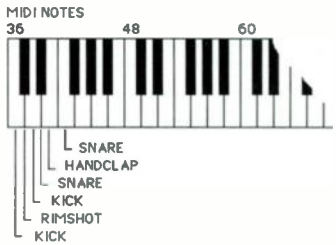

FIG. 3: Partial mapping scheme for E-mu SP-12 percussion sampler.

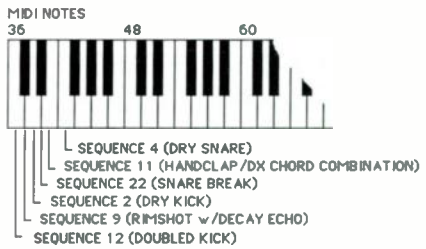

FIG. 4: Equivalent mapping of same six notes as micro-sequences.

scheme is that instruments can be combined in a more controlled manner, rather than having the DX7 always doubling the SP-12. Using sequencing to achieve ambience or delay effects conserves the sampler's memory—something we never seem to have quite enough of—and increases the versatility of the system.

PROGRAMS

Total Music by Bill Southworth for the Macintosh, and *Texture* by Roger Powell for the IBM are but two examples of several sequencing programs that allow the use of live sequence calls. I have had extensive experience with the Southworth program and can say that it offers a very flexible approach to the use of live calls. With this program, you can map as many sequences as there are notes on a keyboard, in any order or configuration, and up to six full maps can be stored in the program after boot-up (but unfortunately not stored to disk with the song, in

Sequence calling provides both power and speed to MIDI percussionists and instrumentalists, whether used live or in the studio.

the current Version 1.14). This lack of disk storage of sequence call maps necessitates that all mapping be done right before a performance or recording session, which can be very tedious with complicated mapping schemes. *(Southworth's* Midi-Paint *program, which has replaced* Total Music, *offers both the ability to run sequence calls* and *store such data on disk—Ed.)*

Of course, the sequence events themselves that you have previously designed can be stored on disk—up to 99 per song. In the Play mode you can call sequences instantaneously, which gives rise to the whole concept of micro-sequence triggering. In the Record mode, such live sequence calling can be recorded and used later as a "conductor track" or in the studio. (You can also record your stage performance this way, and might as well.) Up to eight sequences can be triggered at a time, meaning you have an eight-voice polyphonic capability in terms of calling micro-sequences. Finally, sequences themselves can contain calls to other sequences, leading to all sorts of complex possibilities.

Sequence calling is a tool providing a great deal of power and speed to MIDI percussionists and instrumentalists, whether used in the studio or in live performance. Since sequencing software is a constantly evolving technology, there can be no doubt that future programs will offer even more flexibility, increased resolution and control/ calling features for the creative musician. **EM**

David Smith, age 33, currently lives in Garland, Texas. His occupations include film production and musical performance/ composition.

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Once again, the doctor is in, with answers to the service-related questions that can drive an electronic musician crazy.

Questions and Answers

BY ALAN GARY CAMPBELL

Q. There are persistent rumors that Kurzweil is coming out with a service manual for the K250. When?

Q. How do you access the diagnostics in the K250?

Q. A dealer informed me that there is a separate output mod available for the K250. Is this a factory-authorized retrofit? Do you have to have a service center install it? How much does it cost?

A. Kurzweil plans to release a K250 service manual later this year, available only to Authorized Service Centers, at no charge. It will include troubleshooting guides, circuit descriptions, and schematics for all the boards and accessories. This will be the first time that Kurzweil has published service documentation for their advanced, perhaps underrated, technology.

Unlike some of Kurzweil's later products, the K250 does not have ROM-resident diagnostics. The diagnostic routines are contained in a special two-ROM set, part number 91005801, that replaces the U38 and U54 ROMs on the CPU board during testing. (The ROMs work with K250 Versions 3.0 and later, and with the RMX250; a different set is required for Version 2.0 K250s.) The ROMs and associated documentation—provided to Authorized Service Centers at no charge—allow various tests of the CPU, CGP, and Channel boards, and are virtually a must for troubleshooting the 250.

The *S250 Separate Output Option* provides 12 separate outputs (one per channel), in addition to the normal stereo outputs. Included in the kit are a daughter board that mounts above the Channel board, new operating system software, and a complete backplane with the additional output jacks pre-mounted—which avoids a lot of tedious sheet-metal work. Suggested list for the mod is $1,495 (less installation). Installation is straightforward, but since the kit carries a one-year warranty, it seems prudent to refer the job to an Authorized Service Center.

Q. My Kurzweil K150 rack-mount synth makes a "static" noise when you rotate the volume pot. It's always been a little noisy, but lately it's much worse. Is the pot defective, or is this some other problem?

A. Some of the early K150s have defective volume pots that should be replaced. (If your K150 is out of warranty, Kurzweil will provide the pot, part number 51003101, at no charge, but not the labor.) You'll probably want to refer this job to your service center—a special 15 millimeter collet key (**Fig. 1**), manufactured by Selco Products Company, is required to remove the volume knob. Service centers can purchase the tool from Selco distributors, or direct: Selco Products Company, 7580 Stage Road, Buena Park, CA 90621, tel. (800) 25-SELCO, or tel. (213) 921-0681 (CA). List price for the tool is $6.40, excluding shipping and handling (there's no catalog number for this tool).

BILL KINNAMAN

FIG. 1: The Selco collet knob removal tool.

Q. How do you reset a K1000? The keypress sequence given in the owner's manual doesn't seem to do anything.

A. That's right. The sequence given in the *K1000 Musician's Guide* (power down, press and hold the *YES* and *NO* buttons, then power up) only works with the rack-mount 1000-series modules. To reset the K1000, power down, then press and hold the *A* and *B* buttons, and power up.

By the way, *Appendix 2: K1000 User Interface*, an addendum to the *Musician's Guide*, contains additional K1000 info (but not the Reset sequence). If you didn't receive a copy with your instrument, you can get one from your dealer.

Q. Why do fuses occasionally blow for no apparent reason?

A. A fuse has a finite service life, as does any electromechanical component. If there are no outward signs of trouble with the gear when an equipment fuse blows, just replace it. If the equipment then functions normally, it may be that the fuse was simply fatigued, and failed under normal load conditions.

A line surge will sometimes open a fast-blow fuse and can also scramble data in programmable devices. In such cases, inspect the affected device carefully. If it appears undamaged and powers up after replacing the fuse, but doesn't function normally, try reloading the programs before you take the unit in for service. *Caution: Always replace fuses with the correct type and rating as specified by the equipment manufacturer. Never replace a fuse with one of a higher current rating, or with a fuse case wrapped in foil! Don't replace a fast-blow fuse with a slow-blow type. Refer replacement of internal fuses to a qualified technician.* **EM**

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

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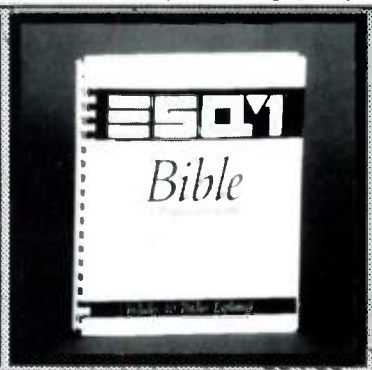

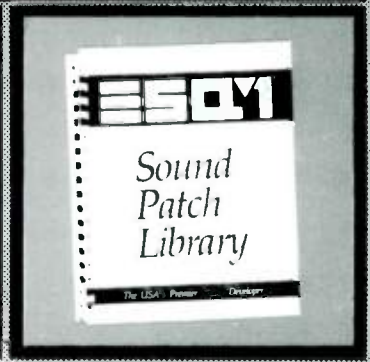

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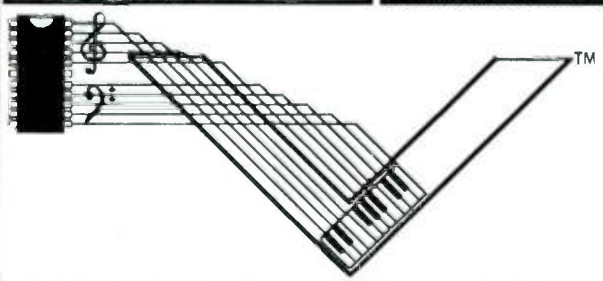

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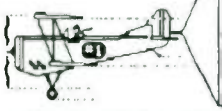

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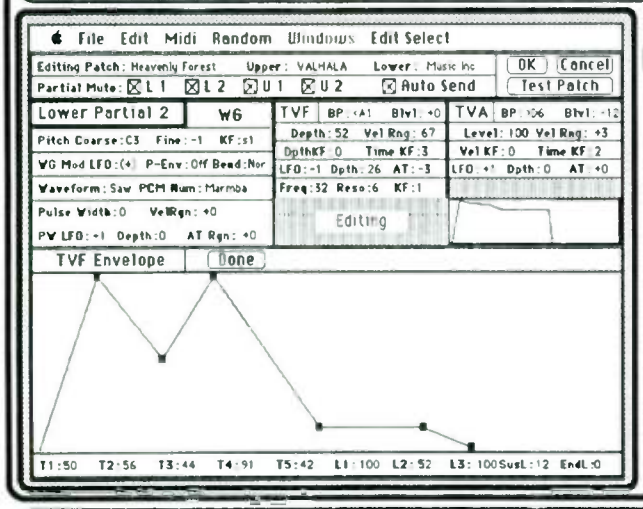

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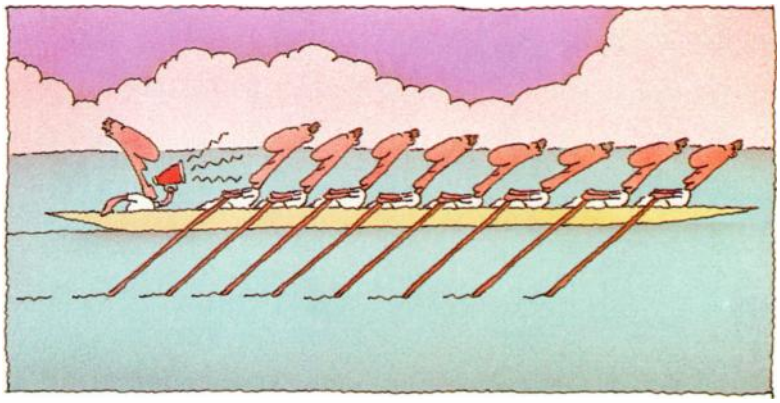
Synchronization in the Home Studio: A Time Code Primer

BY JOHN BARILLA

Multi-tracks, sequencers, video decks—the person at the helm of a MIDI studio uses SMPTE time code to make these elements work together. Scan these simple SMPTE essentials and sync those sessions!

Over the past few years, the use of SMPTE time code in recording studios, both large and small, has greatly increased. With declining price tags on synchronization equipment, what was once strictly the domain of the major studio is now commonly found nestled in the home studio.

SMPTE time code's position as a universal standard makes all kinds of interformat production techniques possible. Projects started in a smaller studio with limited tracking capabilities can be augmented in a more sophisticated studio without additional recording or generation loss. "Off-line" video dubs of TV, or even film productions, can be scored in a comfortable (low cost/low pressure) environment; later on, they can be mixed and combined with video, utilizing the full arsenal of an "on-line" facility. The possibilities open to a studio that can handle time-coded products have greatly expanded—especially at the level of the home studio industry. So let's examine some of the basic concepts of SMPTE time code synchronization, the equipment used for synchronization, and the way this technology is bringing the smaller, off-line studio into a new and productive relationship with the larger, on-line facility.

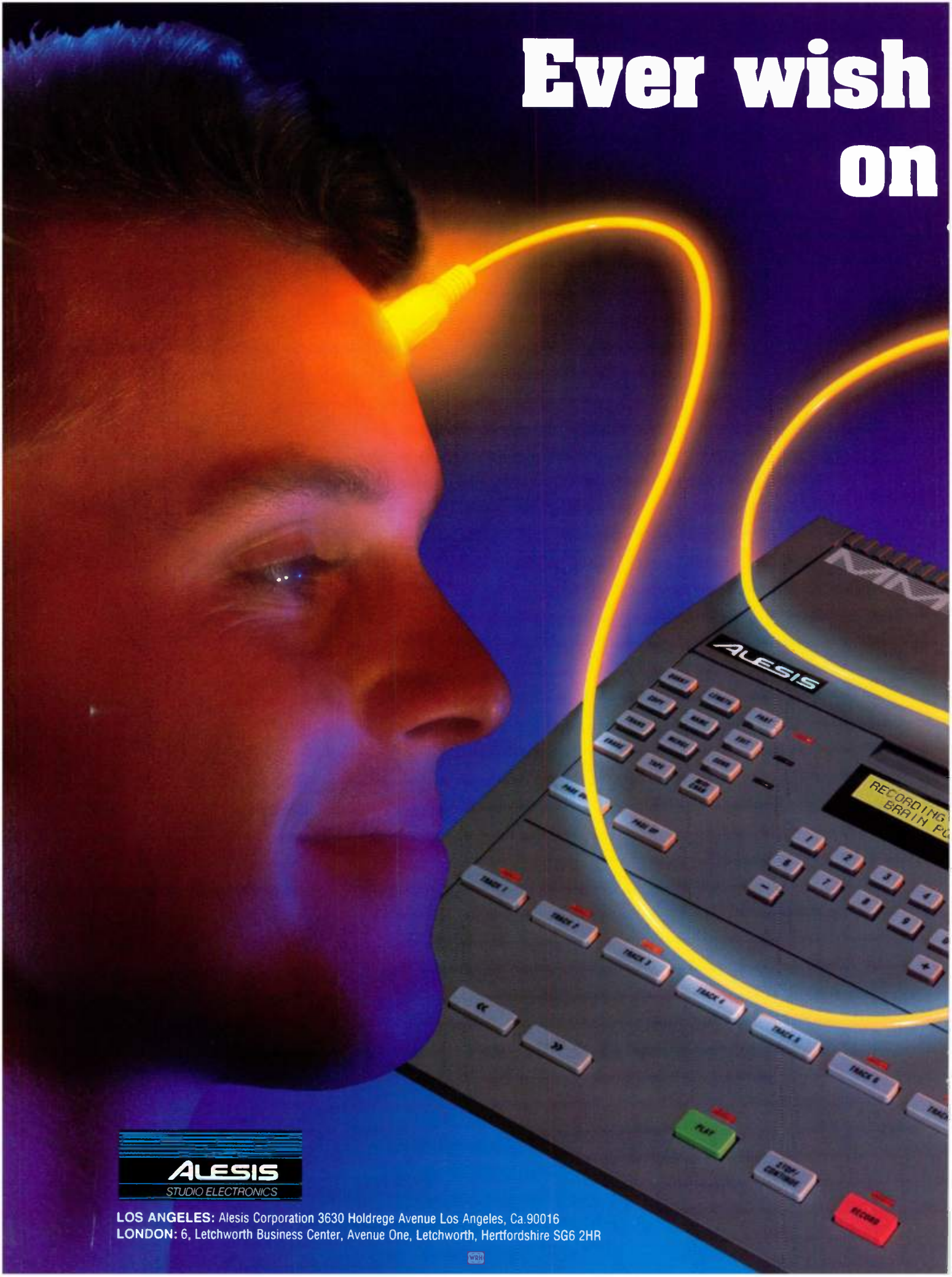


HOW IT ALL BEGAN

The original concept of synchronization was pioneered in the film industry. Since film and dialog are recorded on separate devices, a method was needed to keep them running together (synchronized) on playback. The camera's film transport is inherently frame-locked by the nature of its mechanical sprocket drive. This is not the case, however, with audio tape transports. Without some means of correction, tape slippage alone would spoil all hopes of long-term lip sync.

A master reference was needed so that minor fluctuations in tape speed could be neutralized, or "resolved," on playback. The solution was to record a continuous, precise audio frequency alongside the sound recorded on location. During subsequent stages of the production process, the variations in this frequency would serve as a reference for the speed of the playback deck. Through this "resolver," the capstan motor would receive messages to speed up or slow down—whatever was required to keep this previously recorded tone at its original frequency. *—continued on page 52*

ILLUSTRATION BY JACK DESROCHER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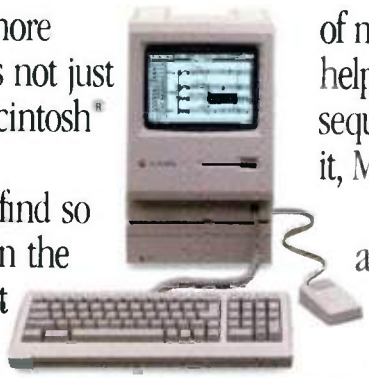

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—*from page 47, SYNCHRONIZATION*

This system of resolver synchronization still works marvelously well for the film industry, where scenes are pieced together from many shorter takes. The sync sound from the location recorder is quickly resolved to magnetic film (where sprockets once again give frame-accurate control), thus rendering a one-to-one correspondence with the visuals. For strictly audio purposes, however, this method of synchronization leaves a lot to be desired.

FOR THE BEGINNER

Terms and Definitions

MULTI-TIMBRAL SYNTHESIZER: A synthesizer that can simultaneously play a unique timbre (bass, violin, trumpet, etc.) for each of its voices, as well as assign each voice an individual MIDI channel. Thus, multi-timbral instruments can play a number of independent melody lines, each with a different timbre, when driven by a multi-track MIDI sequencer putting out different MIDI data on different MIDI channels.

BLEEDTHROUGH: When a recorded signal on a multi-track tape is heard during playback on a channel other than the one on which the signal was recorded, this "spillover" is called bleedthrough.

ON-LINE AND OFF-LINE: In video applications, "off-line editing" is the process of copying sections of one videotape (usually your original footage) directly onto another tape (the edited master). The only possible transitions between the edited sections are "cuts" or fades to or from black.

On-line editing involves two or more video sources (tapes, computer-generated graphics, etc.) being copied to an edited master, where all these elements are synchronized via SMPTE time code. The sources are usually sent to the master through a switching device that allows any sort of transition between shots (cuts, dissolves, wipes, etc.) as well as superimpositions and split screen effects.

The major drawback is that unless you start at the beginning of the tape, the resolver has no idea where you are. This can be pretty frustrating if you are trying to dub in a single instrumental hit three minutes into a song.

Fortunately for us in the world of audio, the video industry had its own share of frustrations trying to uniquely label each frame of video for identification and synchronization purposes. This led directly to the development of SMPTE time code technology. (SMPTE, pronounced simp'-tee, stands for Society of Motion Picture and Television Engineers, the organization responsible for setting the technological standards for the film, video, and television industries.) As an example of these frustrations, consider the situation up until the late '60s, when all that could be done to identify sections of video was to count tachometer or control track pulses generated by the video machine. This provided some incremental numbers to go by from a given fixed point on tape—a decent rule of thumb, but hardly accurate. Drop-outs and tape slippage resulted in accumulated inaccuracies, and no one was yet able to give the video frame an "address" to which a machine could go twice in a row. The best that could be expected with this type of video editing system—even today—is a consistency of two or three frames between the preview and the actual edit. This is hit or miss at best and would never be adequate for any kind of audio purposes where differences of fractions of a single frame can be significant. (If we consider, for example, the black and white video standard of 30 frames per second as related to an audio tape run-

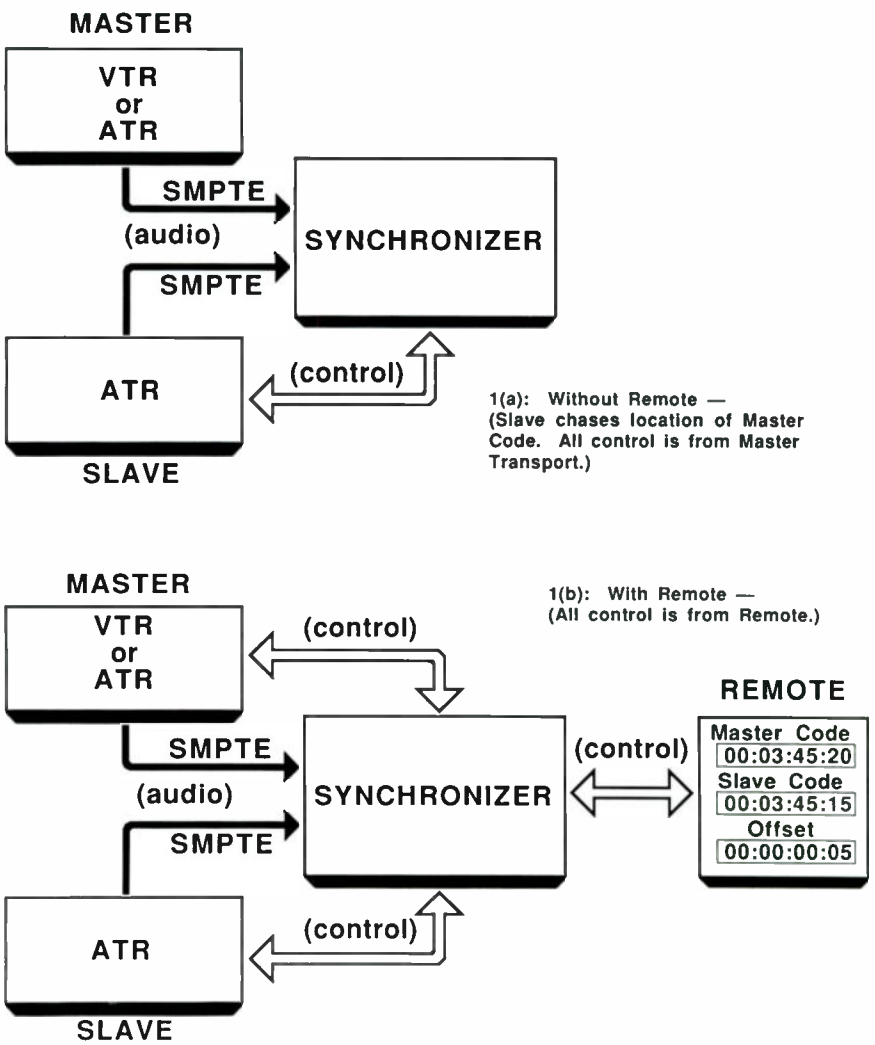


FIG. 1: A Two-Machine Lock-Up.

ning at 15 inches per second, then each frame equals about ½-inch of audio and lasts for about 33 milliseconds. If the sound of a door closing occurs 33 milliseconds before or after the visual cue of a door closing, you'll recognize that the two events are off.)

Suffice it to say, whether it be for editing purposes or the synchronization of multiple tape transports, a means of positively identifying the location of the tape in a precise and repeatable way is needed. Thanks to the work begun by the people at SMPTE in 1969 and standardized in 1971, that need has been fulfilled and is increasingly implemented by manufacturers with each passing year.

Until the late '60s, all that could be done to identify sections of video was to count tachometer or control track pulses generated by the video machine.

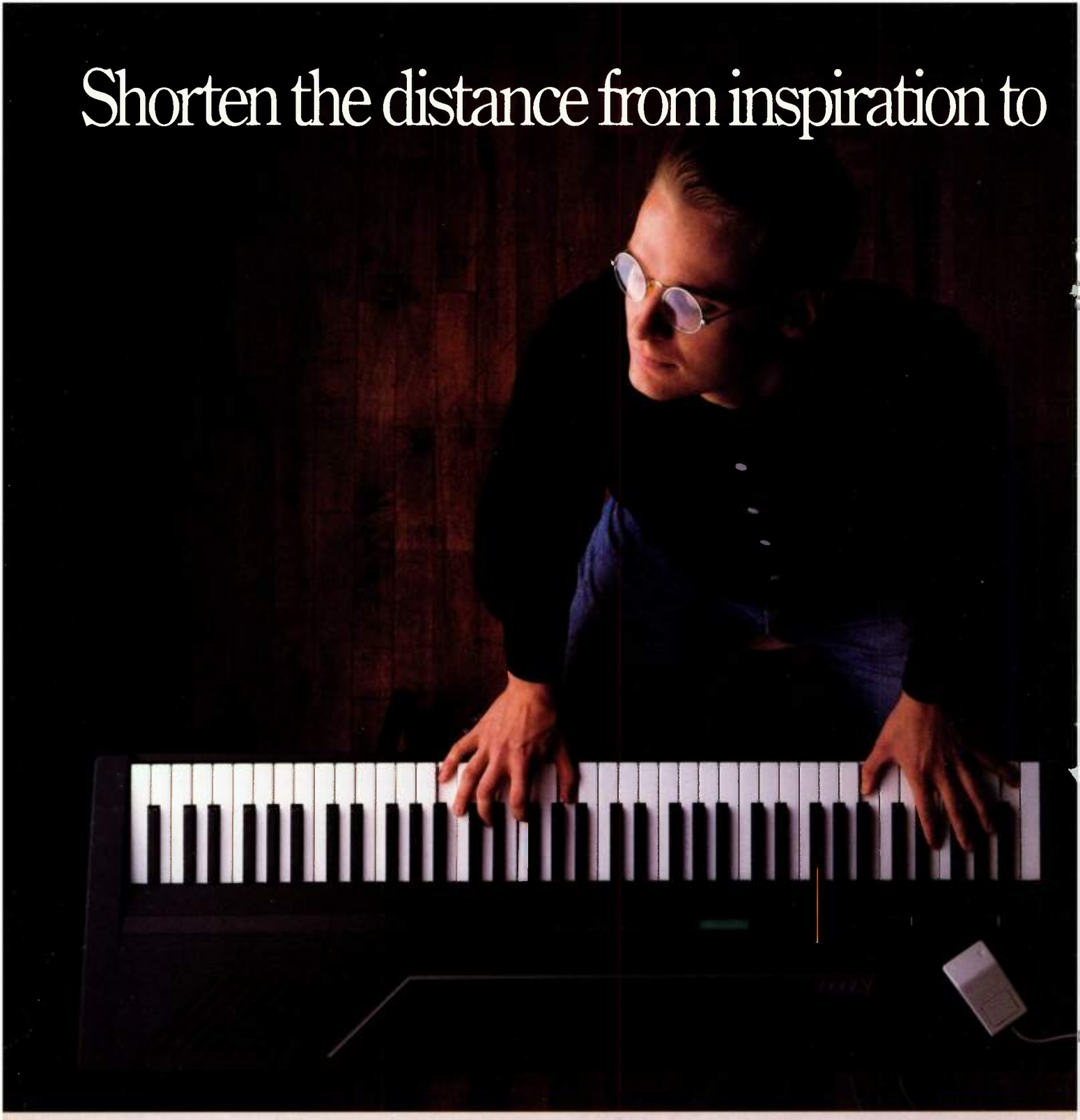
SMPTE TIME CODE ESSENTIALS

Reduced to absolute basics, SMPTE time code is a *frame-accurate digital clock*. The passage of time that it marks need not correspond to actual local time but can be arbitrarily set by the user. When any audio or video event is marked by SMPTE time code, it establishes a permanent identity usually referred to as an "address." Measured in hours, minutes, seconds, and frames, the events become temporally and spatially related to discrete points along the path of the tape.

Actually, there are two principal kinds of SMPTE code. Both are composed of continuous streams of digital words that are created by a SMPTE generator and stored on tape. The most commonly used variety in a small-format audio facility is *longitudinal time code*, or LTC, which is stored as an audio signal along the length of a spare audio track. The second variety, called *vertical interval time code*, or VITC (pronounced vit'-see), is stored as video information on the video track during the blanking interval in each frame of video. (The blanking interval is the time during which there is no video information, in order to allow the CRT electron gun scanner to go from the bottom right corner where it is at the end of a frame to the beginning of a frame in the top left corner.) While VITC has many advantages, LTC is most commonly used in a multi-track audio facility—even one that does audio-for-video work. Hence, for the remainder of this article, when we speak of SMPTE time code we will be referring to the common longitudinal variety.

How does SMPTE tell time? Simply by incrementing a digital counter by one with every passing frame. Technically, SMPTE time code is not really SMPTE time code unless the generator's counter

Shorten the distance from inspiration to



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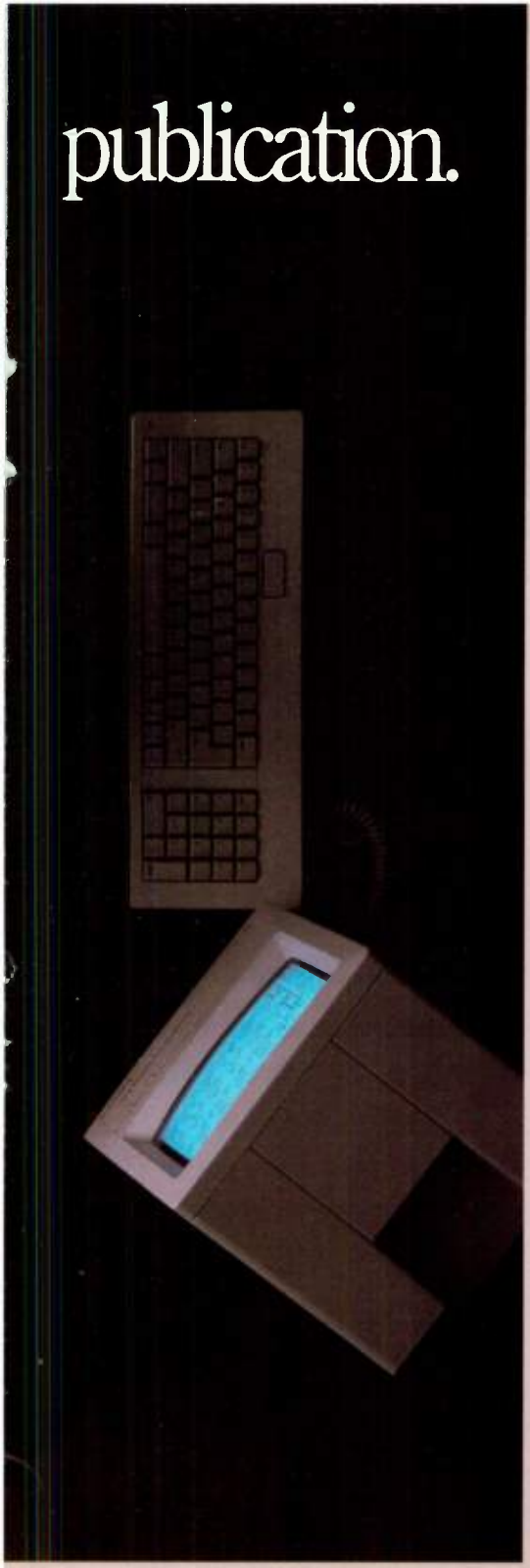

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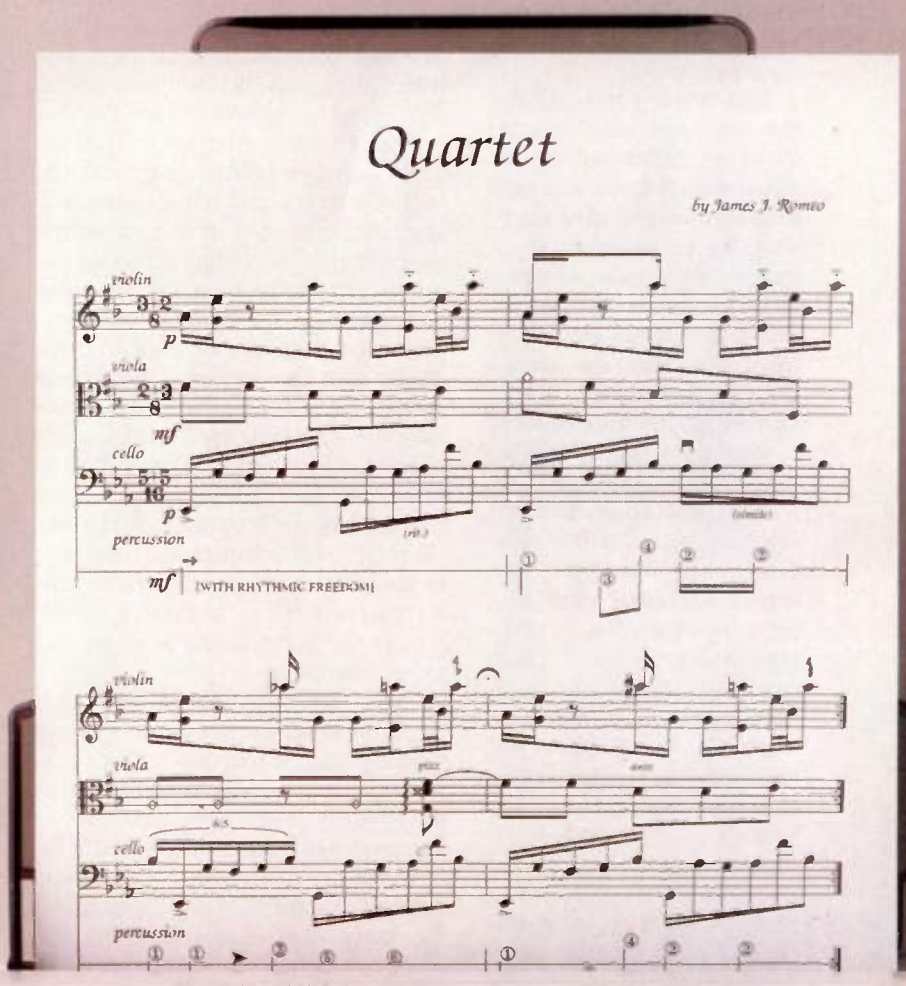

Finale's publisher-quality scores are a sight for sore eyes.

uses video sync as its time reference. In other words, the SMPTE generator ought to agree with the video sync generator on where a frame actually begins. If you are shooting or editing video, this can be of utmost importance. If you operate a smaller audio facility, you don't need to be too concerned about this—for most common audio applications, using a video sync generator is not at all relevant. Locking up two audio machines does not require a video reference; even if you are doing post-production sound to a video dub, usually the tape will have been previously striped with SMPTE at a facility that utilizes a house sync reference. So for most purposes in the smaller studio, you won't need to deal with the added expense of a video sync generator.

Here is what you will need for *basic* synchronization operations: a SMPTE generator, a synchronizer, and the appropriate interface cables. A remote controller is a useful and time-saving option, but if you are on a tight budget, get just the basic gear and you can get to work right away. Granted that the remote will allow you to preprogram a lot of repetitive moves, but the synchronizer itself controls all the essential operations (**Fig. 1**).

Simply stated, the synchronizer is a device that "listens" to the SMPTE time code previously recorded on two or more tape machines (audio/audio or audio/video), compares the code, and adjusts tape speed based on the results of that comparison. One of the time code inputs to the synchronizer is designated the *master* reference and sets the standard. The other time code input is called the *slave* reference. According to how we implement the synchronizer, it will continuously adjust the speed of the slave transport so that the time code numbers of the master and slave maintain the desired relationship. For example, assuming we want the slave to follow the exact time code sequence of the master (which is commonly the case), we would enter a zero offset on the synchronizer. The synchronizer will compare the two time codes and control slave speed so that there is no difference between the numbers. At this point the machines are said to be *frame-locked*.

Note, however, that a zero offset might not always be desirable. If you are working with video, and dialog is on screen, there is always a possibility that the lip sync might need adjusting. As little as two or three frames of lead or lag in the audio can begin to look a little strained. By experimentally determining the exact amount of difference, that number can be programmed in as an offset and insure that the lip movement is in sync with the video. Another possible use is for "signal processing" when doing music on two multi-tracks. Small offsets may, in certain cases, add a spacious dimension to tracks that seem a little sterile when perfectly locked. This is very similar to "chorusing" effects (which result from splitting a signal, delaying one path very slightly, and recombining the two).

ANSWERS TO PRACTICAL QUESTIONS

With this brief overview in mind, let's cover some applications notes about specific areas of concern. For openers, what about record level? It seems as though no two books on the subject of time code ever seem to agree on this. My own experience tells me that it is best to experimentally derive it for the system with which you work. This seems especially important for narrow gauge recorders (e.g., ¼-inch, 8-track decks, or cassette 4-track machines), where headroom is limited and noise reduction often cannot be switched off. Although the conventional wisdom sometimes recommends putting healthy levels on tape and avoiding noise reduction, SMPTE code and its related equipment seem to be more forgiving than people initially thought. I have found that conservative levels (somewhere around -3 VU) seem to work best (*this also reduces the possibility of bleed-through to adjacent audio tracks—Ed.*). If you can switch off noise reduction, so much the better; but if you can't, it's still

—continued on page 63

A zero timing offset may not always be desirable: in certain cases, a small offset can add a spacious dimension to tracks that seem a little sterile when perfectly locked.

The SMPTE/MIDI Connection

There are many SMPTE-to-MIDI converters that can translate a SMPTE time code address into how many "MIDI beats" (sixteenth notes) have elapsed since the beginning of the tape and send this data over the MIDI line as a Song Position Pointer message. This way, if you start a SMPTE-coded tape at, say, beat two of measure 45 of a composition, any MIDI sequencer or drum machine that responds to Song Position Pointer data will align itself with the tape and also start playing from beat two of measure 45.

Note that some currently available SMPTE sync boxes (such as the Roland SBX-80 and Garfield Master Beat) include a *beat map* capability where you can tap exactly where beats should fall (or numerically enter where the beats should fall). This is useful for programming in tempo changes or "fudging" the tempo a bit so that, say, a particular downbeat falls on a particular SMPTE time code point.

In addition to regular SMPTE-to-MIDI conversion, MIDI Time Code is a fairly recent development that communicates SMPTE time code data directly over MIDI. Thus, events can be marked in time independently of the rhythm of a song; this promises to make MIDI gear more useful to those in the film and video industries. For more information on MIDI Time Code, see the article "MIDI Reaches Adolescence" by Lachlan Westfall in the May 1988 EM. —*Craig Anderton*

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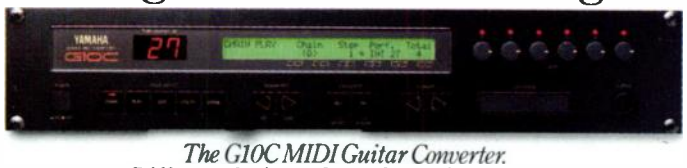

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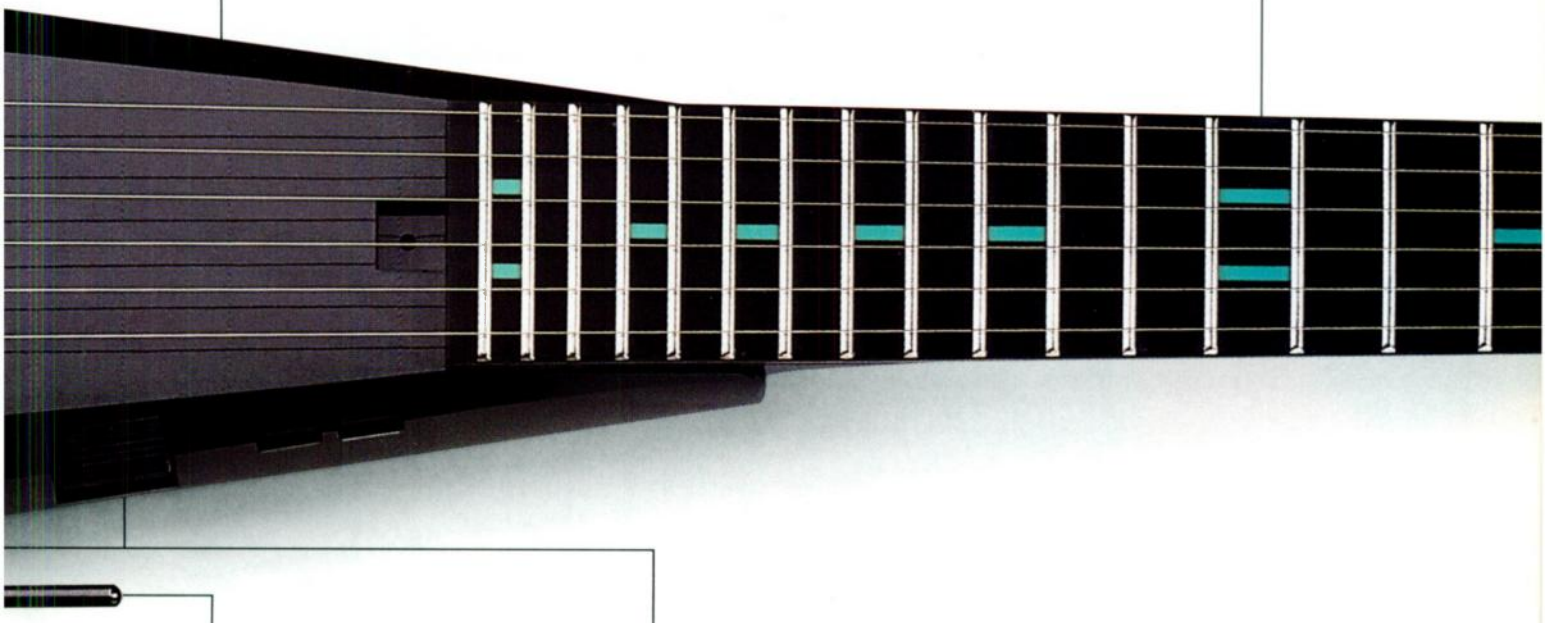

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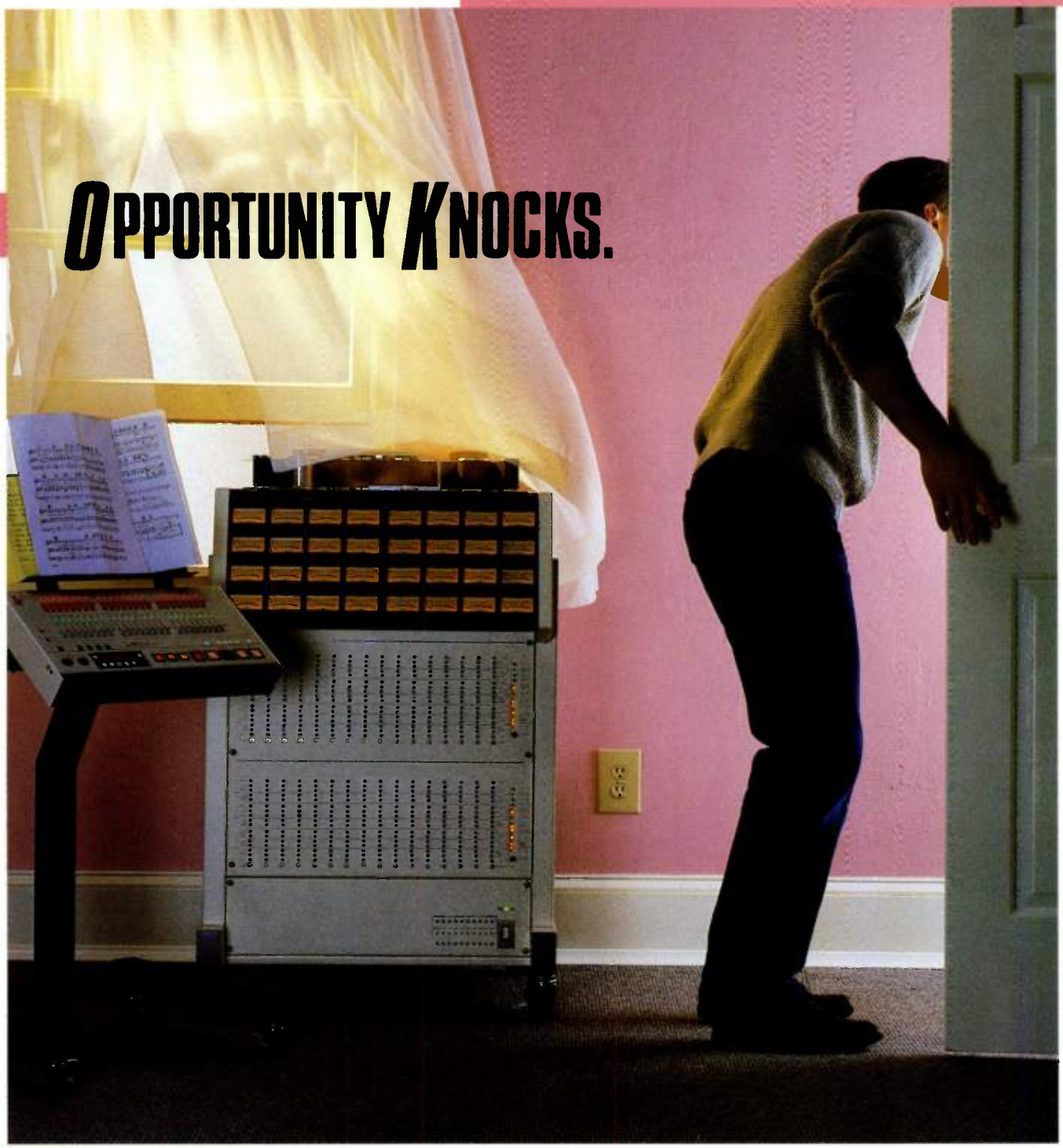

32 Tracks; ■ constant tension tape transport; ■ built-in autolocator; ■ noiseless and gapless punch-in/punch-out, and HX-Pro—at a price you can afford. ■ We call it "opportunity". You'll call it "a killer".

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.

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OTARI.

Some SMPTE/Sequencer Applications

As one example of how to use SMPTE, consider a sequencer driving four eight-voice, multi-timbral instruments, and assume that you want to record all four instruments on four tracks of a multi-track tape recorder for later mixdown. If you assign each voice to a discrete MIDI channel on the sequencer, then you can only play two of the instruments from the sequencer at one time, since you need to use all 16 MIDI channels to drive the 16 available voices (refer to illustration).

To get around this limitation, first record SMPTE time code on the multi-track tape. Choose a specific SMPTE start time point, and start the sequence playing at that point. Mute all sequencer tracks except the ones that drive two of the multi-timbral instruments, and record the instrument outputs on tape.

Now rewind the tape back to just before the SMPTE start point, and start the sequencer again. This time, play the tracks that drive the remaining two multi-timbral instruments, and mute the tracks you played back in the previous pass. Record the instrument outputs on tape, and voila—all four multi-timbral parts are now recorded, in perfect sync with each other.

A variation of this technique can be used to create "virtual tracks." Sync a sequencer to tape, and you can record acoustic parts on tape and electronic tracks on the sequencer. During mixdown, keep the tape and sequencer synchronized together, and run the tape outputs and the outputs from the sequencer-driven instruments into a mixer. Patch the mixer output to a two-track, and you can combine both acoustic and electronic tracks on your master, without having to waste tracks from the multi-track recorder on storing the electronic instruments.

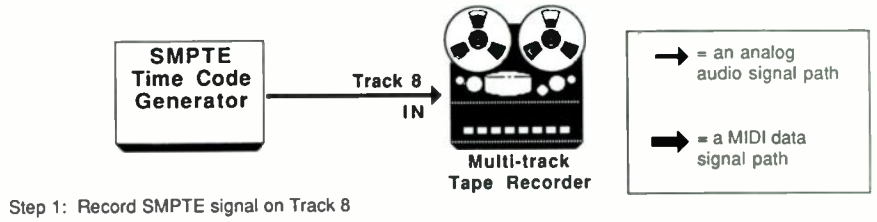
—*Craig Anderton*

—from page 56, SYNCHRONIZATION

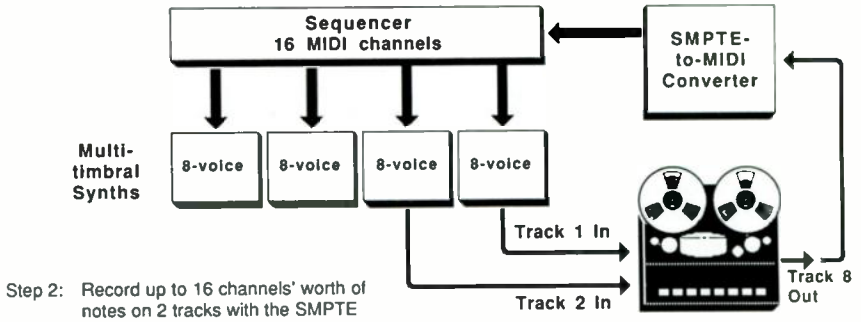
usually possible to find a combination of level settings that will do the job.

As to which track (on a multi-track recorder) is best for holding time code, a common practice is to utilize an outside track (e.g., track eight on an 8-track, or track 16 on a 16-track), leaving the one next to it empty as a *guard band*. However, the outside edges of tape are most likely to be damaged by improper handling and less-than-well-aligned tape transports, so some users are most cautious and record the code one track shy of the outside track (e.g., track 15 on a 16-track machine). The reason for using a guard band is to protect the audio program from the sound of SMPTE (which is truly hideous), protect the SMPTE track from bleedthrough from adjacent audio tracks, and also to protect the SMPTE from nervous punchers (by sticking it on a less-used track).

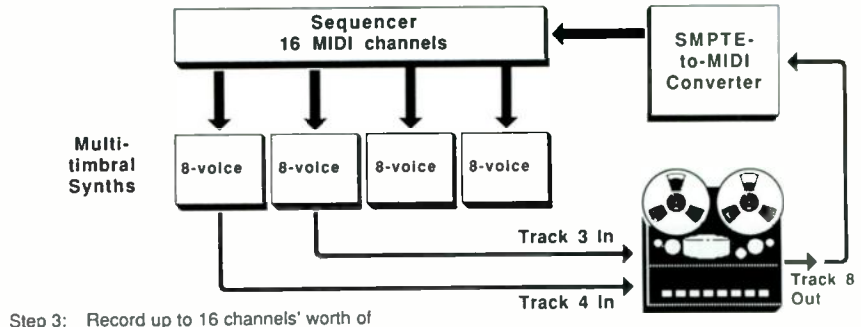
If your multi-track tape is going to remain in-house for an entire project, using track 16 with a single guard band is all you need to do. If the project is going to be shuttled to various studios, it really might be wise to use the inner track for an extra measure of protection against edge damage. While it's never a good policy to record on your guard tracks, if you really, really need to squeak out another track, you can try (carefully) recording some low-end, intermittent program material on those tracks (such as bass or percussion) and gate out any SMPTE crosstalk during mixdown (*also be careful to not record this signal so loud that it throws off the synchronization signal—Ed.*).



Step 1: Record SMPTE signal on Track 8



Step 2: Record up to 16 channels' worth of notes on 2 tracks with the SMPTE signal on Track 8 as master timing reference.



Step 3: Record up to 16 channels' worth of notes on 2 additional tracks with the SMPTE signal on Track 8 as master timing reference.

Above: SMPTE sync can "double" the number of MIDI channels when complex sequences are dumped to multi-track.

How about frame rate? Since SMPTE was designed primarily to meet the needs of the television and film industry, the subdivision for seconds of time is always related to the frame. SMPTE time code generators give us a choice between several frame rates:

30 frames/second (the black and white television standard),

29.97 frames/second (the NTSC color television standard, called "drop frame"),

25 frames/second (the European television standard, PAL), and

24 frames/second (the frame rate for film).

For audio purposes the 30 frames/second will be used almost all the time, but sometimes when a video dub comes in from an outside facility, its time code may be at one of the other rates—particularly if the visuals are not final cuts but are earmarked for further editing after you track the sound. Synchronizers act a little strange when master and slave code have different rates, so don't assume anything when synchronizing a product from another studio. Be sure before laying code on your slave.

Another important point is to record sufficient amounts of extra time code *before and after* the program (around 20 to 30 seconds of SMPTE at the head and tail should suffice). While your synchronizer may usually be able to stop on a dime, occasionally it will mysteriously refuse. If your little buffer of extra code is only five or ten seconds, the machine may careen into the next song, or go totally off the reel, before the synchronizer can regain its poise. Usually this occurs if you instruct the machines to go close to the beginning or end of the program. If the tape runs out of code, the synchronizer will shuttle the tape transport all around trying to find something it can read. So don't be too frugal with your tape, even if you have to crack open another reel in order to insure a sufficient pad of extra time code.

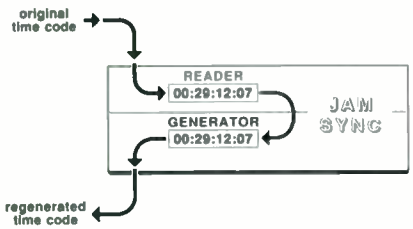
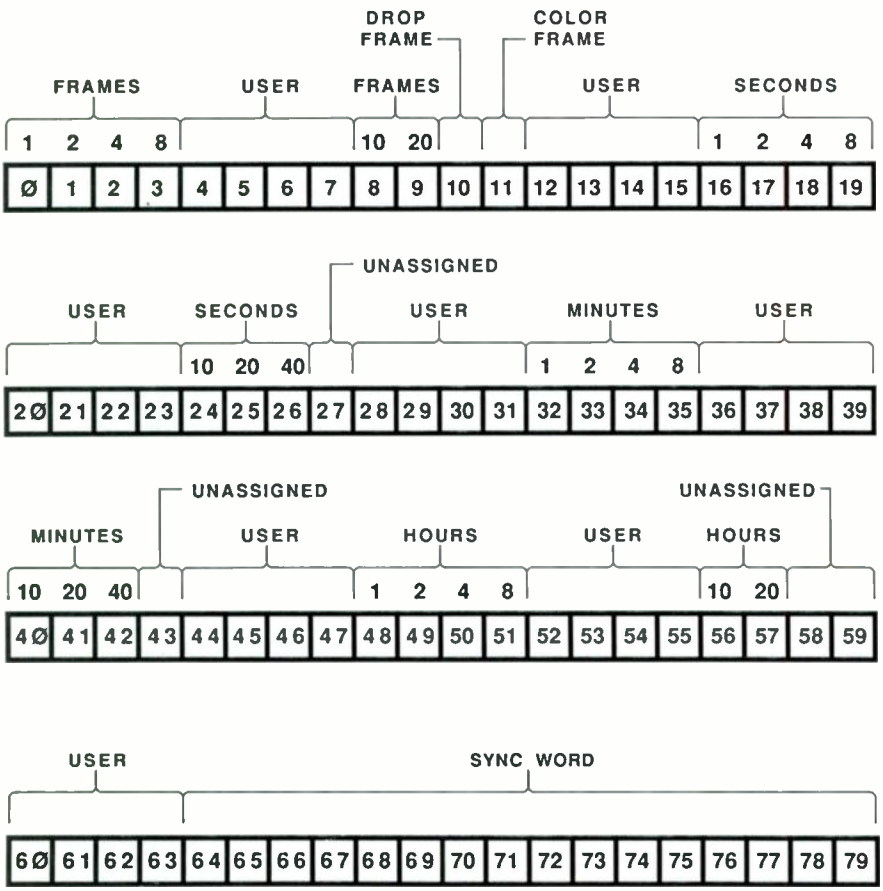


FIG. 2: SMPTE Time Code Reader/Generator.

If your system is locking up quite well for a while, and then things start to go slightly berserk, try some first aid before you panic. First, it may be time to clean the tape heads again. When your track width is narrow, a little dirt can do a lot of damage. If that doesn't do it, the next point to check is that *all* connections are still sound. Jiggle them all around; maybe even apply a little contact cleaner. Usually, a little TLC will take care of it. (TLC is "tender loving care," not some special brand of contact cleaner.)

There *are* worst-case scenarios, though. What if your machines won't lock up because you accidentally erased a big chunk of the time code? And you were almost finished with a week's worth of recording? A nightmare, and embarrassing, too; but fortunately, in most cases this problem is easily solved, assuming you have access to the proper equipment. I didn't mention this equipment in the basic list, because it is not an absolute requirement for the smaller studio. But serious professionals in the large audio-for-video houses would not be without a versatile time code *reader/generator* module as part of their system. (This is not because they accidentally erase time code every day, but rather because of all the other nifty things they can do with it.)

A reader/generator differs from a plain old generator in that it can read existing SMPTE code from tape and spew a refreshed version of the incoming code from its generator output. It will do this even if the code is somewhat degraded or partly missing. This process is generally referred to as *jam sync* (**Fig. 2**) and is properly used in any case where SMPTE time code needs to be copied. Audio always gets somewhat degraded with each generation. While program material



Note that counting proceeds by a hybrid of true binary and some arbitrarily chosen decimal numbers. A digital "one" in a bit cell indicates that quantity has been added to the count.

FIG. 3: SMPTE Time Code Bit Map (Longitudinal Time Code 80 Bits).

may not seem noticeably different, SMPTE code is particularly sensitive to any loss in the integrity of its waveform. (While you probably could get away with one generation of direct copying without losing sync, there would undoubtedly be a noticeable difference in the way the transports handled at high wind speeds, where degradation is more noticeable to the synchronizer.)

In any case, to fix a missing code problem and maintain the original time code numbers, a reader/generator is the only way to go. (To the small studio owner, it is comforting to know that such devices can be rented as needed.) The actual procedure is pretty simple. Find a spare track on which to record the regenerated code. Route the damaged code into the reader and the generator output into the spare track. Switch the reader/generator to the *continuous jam* mode, and start recording. The jamming process will generate fresh time code that takes its numbers directly from those still present on the damaged time code. When the erased section comes up, the generator will just keep on running at the same rate even though there is no code coming into the reader. In this way it will fill in the blanks with the code that theoretically should be there.

There is actually another way to remedy this particular problem without benefit of a reader/generator, but it will take a little longer, and the original numbers will not be precisely intact. Prepare to record another track of SMPTE, and set your no-frills generator to start rolling at the same numbers that were on the original. Cue the tape up to the top, and start the generator at the appropriate time as you go into record. The resulting new code will probably be ten or more frames off, depending on your reflexes. Later, upon synchronization with the other transport, the exact offset can be experimentally determined and stored in the synchronizer. The results will be satisfactory even though the numbers may be a little different.

There are, however, some things that *only* a reader/generator can do. While the smaller, more specialized studios may not use these functions as often, they are really a staple item in the large multi-service facility. These functions are also worth mentioning to illustrate the flexible and farsighted nature of the SMPTE time code specification.

Time Code: Now Playing on a CD Near You . . .

It seems there's never any time code around when you need it: a simple task such as striping a tape track often requires tying up your SMPTE-based instrument or synchronizer for up to an hour at a time. Of course, having a second time code generator can solve this problem, but this usually requires a substantial investment in yet another piece of hardware that you may not use often enough to justify the expense. Software-based SMPTE generators can provide a solution at a lesser price, but in that case, your computer remains busy in that capacity and you "lose" access to your PC while performing the mundane chore of striping tapes.

Prosonus, the maker of high quality sample libraries on compact disc, recently introduced *CodeDisc*, a low-cost answer to many SMPTE generation problems. CodeDisc, priced at $49.95, turns any compact disc player into a SMPTE generator, churning out the audio standard, 30-frame, non-drop time code, resolved at 60 Hz. *(At press time, Prosonus announced a new CodeDisc version set up for European standard EBU 25-frame time code—Ed.)* The guaranteed-drop-out-free disc is encoded with one hour of SMPTE code on one channel, while the other contains spoken audio time cues, so even users without a time code reader can monitor time code status. An approximate display of elapsed time can also be read from the real-time counters found on most CD players.

In operation, CodeDisc provided a handy, reliable, and portable way to sync up my SMPTE-based sampler and drum machine setup for live gigs (by having both instruments slave to the master time code output of my CodeDisc-equipped Technics CD player). For studio applications, CodeDisc could prove to be a real money-saver, as users can pre-stripe their tapes at home rather than utilize expensive recording studio or video edit suite time for that purpose.

CodeDisc is available in North America from Prosonus; European distribution is being handled by Exile Music Distributions of London.

—George Petersen

Prosonus
1616 Vista Del Mar
Hollywood, CA 90028
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or (800) 999-6191

Referring to **Fig. 3**, the longitudinal variety of SMPTE time code is basically a stream of 80-bit digital words that are incremented by one for each passing frame. There is, however, much more information stored in those 80 bits than just a frame count. Actually, only 26 of those 80 bits are occupied with the usual numbers we refer to as SMPTE. Some of them are occupied with "housekeeping" functions (like the 16 bits dedicated to defining the end of each digital word, hence defining the beginning of the next word as well). All this is necessary just so we may unambiguously know in which direction a tape transport is moving. Some bits are "flags" which are mostly useful in editing of NTSC color video, and others remain undefined and reserved for future implementation.

The most helpful of all, though, are the 32 appropriately named *user bits*. These chunks of data, dormant until accessed by the user, can be used to label sequences, trigger remote equipment, and/or run alternative time code sequences (simultaneously with the main reader output). One use is to run time code backwards so that elapsed time can also be displayed. Another common use is to run alternative frame rates so that a choice would always be available to the next user.

In many cases, the smaller recording studio will get most everything they require out of an integrated "turn-key" system like the Fostex 4030 synchronizer

—continued on page 106

Part 3

He gave up his day job for music, sold his house, selected his gear, and cut his demo—only to find that the record industry doesn't exactly greet newcomers with open arms. But he wasn't ready to give up yet...

THE YEAR OF LIVING DANGEROUSLY

By Kofi Busia

THE STORY SO FAR: This three-part series, originally printed in England's *Sound On Sound* magazine, tells how *SOS* reader Kofi Busia—an African living in England—funded, and then released, his own independent LP titled *Oh Africa*. In Part 1, the author faced the insecurities of giving up his job for music, and chose the equipment he thought he needed to make his dreams come true. In Part 2, he came to terms with MIDI, programming, and recording in a professional studio. In this final installment, Kofi still doesn't have the backing of a major label—but learns that there's more than one way to accomplish the goal of getting his music out into the world.

Before we get going this month, I would like to quote from just a couple of the reviews my album, *Oh Africa*, has received since its release.

"...(he) builds rhythm patterns that are unexpected, fascinating, and often inspired. It's heartfelt, and a back-streets triumph, really succeeding in ways that tens of hard-working African club bands have never yet done." *(New Musical Express)*

"...the set mixes African rhythms...with lyrics about missionaries or slavery. It's successful..." *(The Guardian)*

"Kofi Busia adopts an entirely novel and seductive approach ...he creates a unique blend of Western pop and the music and rhythms of West Africa...with his clear, compelling enunciation and gentle personal touch, he has the potential to become a significant stylist." *(The Times)*

I started with these for several reasons. One, of course, is to

KIRSTEN HUGHES

Kofi and the KX88 he used as a master keyboard for all his recording and songwriting work.

Of its 90 digital effects, these three are the most amazing: $525.

You can count the price in hundreds on one hand. Yet you'd need the hands of eight more people to add up all the effects you get with the Yamaha REX50 Digital Multi-Effects Processor.

At about $5.85 per effect, amazing is quite an understatement. Add to that not only the number, but the quality of the effects. Then remember you can have them all in your own home studio. In one compact, sleek unit.

First we borrowed 20 preset effects from the SPX90. Like reverb, early reflections, delay/echo, pitch change and modulation effect.

Then we added the world's first digital distortion. Ten of the hottest distortion effects preset in the REX50. That you can use alone, one right after another, or in combination with another effect.

Any of those preset 30 effects can be changed, modified, customized, perfected and stored in 60 user-programmable slots that you can call your own on an LCD display.

And recall instantly via MIDI, remote or footswitch.

Yamaha's REX50 Digital Multi-Effects Processor. Just think what you could do once you get your ten digits on it. There's one waiting for a nice home at your Yamaha Professional Audio Dealer. See him today.

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try to make you curious enough to go out and buy the album! But there are other reasons, which we will come to in the conclusion.

Last month left off with me sitting with a whole album's worth of material—and a huge pile of rejection letters (Virgin three times, Island twice, EMI twice, CBS twice, WEA twice, and countless others at least once). A familiar story?

I am sure nobody out there needs me to tell them that the music business is a very difficult and soul-destroying arena to try and enter. Yet it's difficult to understand why this should be so. The record charts are always so depressing—reruns, cover versions, re-releases, remixes, rehashes of past hits, and the same old mega-produced, mega-sampled sounds. You would think that the whole scene was just crying out for new talent, creativity, and new directions. Why, then, is it so hard for newcomers to make headway?

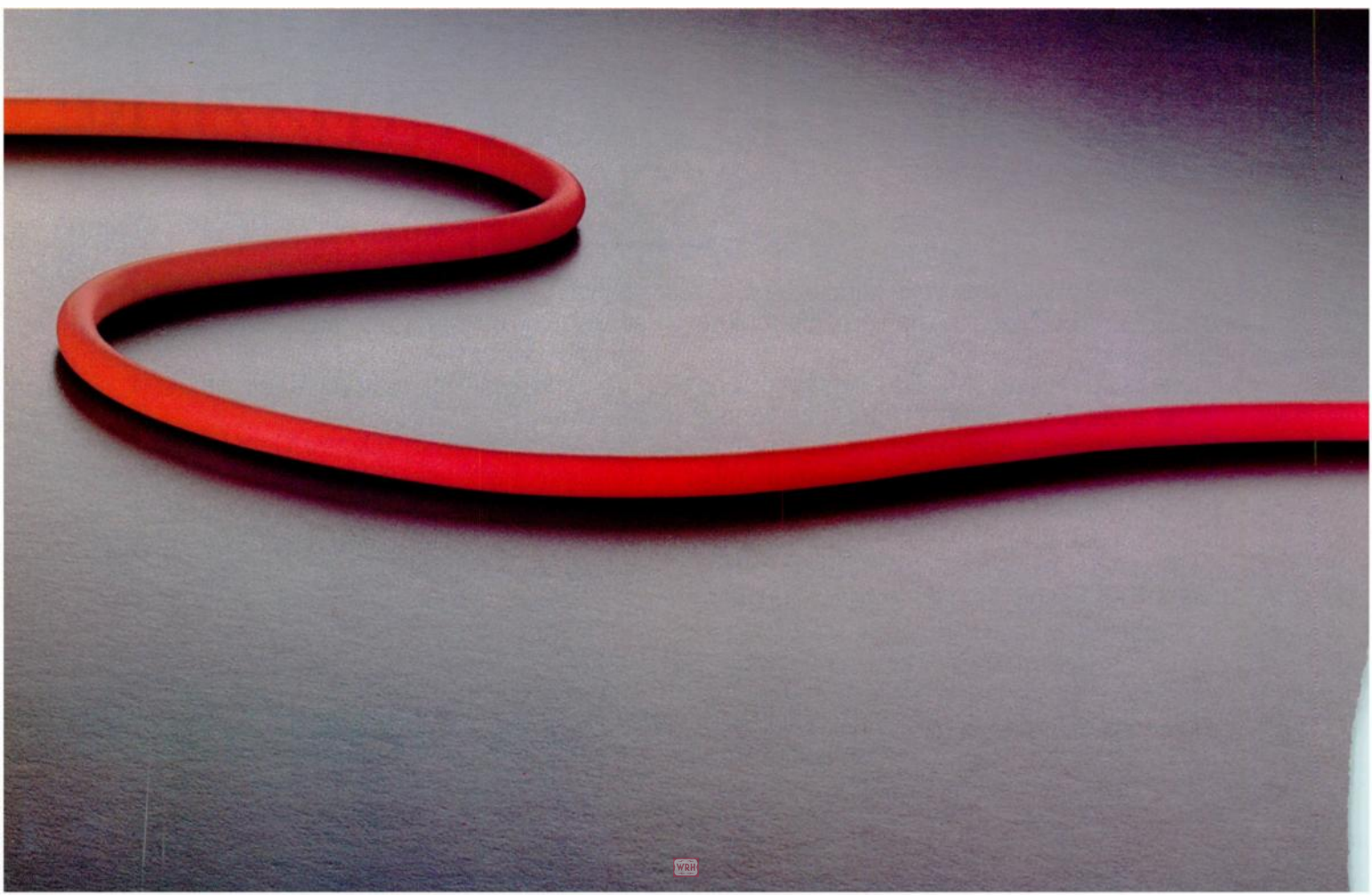
After becoming suitably dispirited at my total lack of progress, I eventually decided not to take any of this lying down. First, I got people whose credibility I respected to listen to the music on my album. The general feeling was that I had done something worthwhile that stood just as good a chance as anything else around. The brutal fact to be faced, though, was that nobody was going to give me a "fair chance."

Getting a record contract is all a matter of gaining someone's favorable opinion and being in the right place at the right time. As long as the instruments and vocals are all in tune, everything is roughly in time, and the material is strong enough, then the rest is down to:

- How the company heard about you. This is *most* important. A demo tape sent through the mail without a solid recommendation from someone with credibility simply will not cut any ice with the A&R (artists and repertoire) staff. Your tape will get sent straight back with, at the very most, a photocopied note saying "This is promising, but..."
- Your track record. It is unfortunate but true—nobody likes to take risks.
- How the company feels at that particular time. (Let me put it this way—some of the *very same people* who initially turned me down are now getting excited about the material I have produced!)

I eventually said to myself: "This is *supposed* to be a democracy—freedom of choice and all that. People have died for that ideal. So get out there on the streets and let the people decide." After a lot of thought and research, I came to the following five conclusions:

1. Record companies are *businesses*. Forget "creativity" and "talent." Record companies have to compete in the marketplace, where success is not measured by artistic integrity but by profits. This comes down to signing artists who can make music that *sells*. And who is most likely to produce a hit? Someone who has already made a couple, not some unknown bozo with a demo tape. Without a hit, a proven live performance record, or a recommendation from a "well-respected source," you have zero credibility; this is a fact of life you *have* to accept. At this



point, your only option is to release *your own* record and *make* it a hit.

2. The technology in/surrounding the music industry has changed drastically over the last few years, thus dramatically shifting the power balance between artist and record company. To gain a better perspective on this, think about the '60s. The Beatles (as a particular example) were creative and adventurous, exploring new sounds and ideas to a degree that has been unmatched since. One legacy left by them was the greater importance of the recording studio, which became acknowledged as a complete musical instrument in its own right. The role of the producer and the engineer—those who operate the studio's gadgetry—became very important, and albums like *Sgt. Pepper's* caused rock music to be judged by different standards on all levels. Record companies and A&R people rejected music that didn't measure up to these new criteria.

3. Because of the above, a band's overall sound and image became very important. The record companies demanded final say over an artist's material, production, and sometimes even appearance. On a musical level, the producer became the record company's representative, and was more important in their eyes than the writer/musician. Ask any new band who just got a contract—final say over the sound and the mix *always* lies with the producer and the company. Forget about artistic control; it just won't happen. If they want to remix your music, they will. (Of course, there are some extremely creative producers around who can really draw out a band's music and make it better than the band could by itself. Still, this doesn't deny who has the last say, and not all bands are lucky enough to hook up with sympathetic producers.)

In this context, one vitally important point about the Beatles is that they not only wrote the songs, they experimented with those songs and were responsible for the final sound. Examine today's Top 100 and see how many musicians have this kind of artistic control—a few superstars in the Prince/Paul Simon/David Bowie league, and that's it.

4. The sheer *expense* of the studio and equipment required to achieve the kinds of sounds and textures desired also added to the growth in influence of record companies. Record companies either paid for or owned all the expensive equipment and called the shots.

5. Back in the early/mid-'60s, pressing records was almost a cottage industry. Practically every major city had a pressing plant nearby. This meant that enterprising bands and their managers could cut a record at very little cost and start selling locally. They went for a few local sales, and if enough excitement was generated, this grew into national sales. But the industry was also reaching a period of expansion. For reasons of cost-effectiveness, the major companies gradually bought up most of the plants; those that were left often went out of business. Nowadays, there are only one or two plants outside London, and less than 20 nation-

In the E-Series E is for Excellence.

Audio professionals everywhere are turning to the Fostex E-Series recorders for their production and post-production needs. So much so, you hear the results of their work nearly every day — in movie soundtracks, commercial and cable television shows, industrial and educational films and videos and, of course, hit records.

The E-Series features gapless "punching" so there's no blank space after the punch-out point. Only recorders which are much more expensive offer this sophisticated function. But since you can't run a fully automated system without it, Fostex includes gapless punch-in/out as standard equipment on the E-Series.

Also standard is a synchronizer port which will interface with all SMPTE time code based systems. When used with the Fostex synchronizer, Model 4030, you can then use our software program to perform sophisticated audio assembly editing.

Models E-8 and E-16 are multitrack recorders with built-in noise reduction.

Models E-2 and E-22 (not shown) are 2-track master recorders with a third, center channel for SMPTE time code control. This is a standard feature, not an option. You will have complete compatibility with existing 2-track tapes, plus the ability to run computer derived edit decision lists and full automation.

Servo control of the reels in the edit mode will help you pin-point cues and spot erase. When the pitch control is engaged, the exact percentage of speed deviation is displayed so that when you need to re-set the control, you can do so precisely, and the real-time counter features search-to-zero even from the negative domain.

The E-2 uses 1/4" tape at 7-1/2 & 15 Ips (15 & 30 Ips speeds are optional); the E-22 uses 1/2" tape at 15 & 30 Ips.

When an E-Series recorder is used with Fostex Model 4050 — autolocator and SMPTE to MIDI controller — you have programmable punch-in/out, 100-point autolocate capability. 10 programmable edits, a SMPTE time code generator / reader (all four formats), plus the ability to locate to the bar and beat.

So if you're looking for a professional recording instrument, there's a Fostex E-Series recorder that can help you wth two important "E" words: Efficiency and Effectiveness. The E-Series can also help you achieve the most important "E" word of all: Excellence.

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wide. The most important result of all these changes was that:

- A few record companies came to dominate the music scene.
- As record companies grew, they became more impersonal, and the profit criterion became paramount.
- Given equal-quality music, sound and image became an important factor in giving a competitive edge to some groups over others.
- The excitement, creativity, and experimentation created by the constant search for new bands disappeared.

Through the '70s and '80s, the technology of studio equipment and musical instruments advanced at a dizzying rate, and there have been two major consequences. First, there are now incredible machines (like Synclaviers and Fairlights) that create sonic opportunities undreamt of only a few years ago. Second, however, entry-level instruments have also appeared with—admittedly—nowhere near that level of sophistication, but which nevertheless offer professional sound quality. You and I can now afford to buy home recording equipment superior to what was considered top-flight professional equipment by our rock and roll forebears. Paul Simon's synthesized strings, so effectively used on "Bridge Over Troubled Water," were at the time way beyond the financial reach of most musicians. Now, they can be had for a few hundred dollars. Many of the studio effects that were so complicated to achieve ten—even *five*—years ago can now come at the touch of a button.

Modern music has gradually returned to a position similar to that of the '60s. Artists and bands with enough faith can once again emulate their predecessors and get their music out on the streets. The only other alternative is to give up, crawl slowly into a hole, and die.

Record companies all have similar structures and act in similar ways. They are all, first and foremost, *businesses*. Selling records is a completely different process from making the music that goes on them. With companies like Virgin acquiring Steve Winwood and Robert Palmer, what realistic chance do you have when faced with this kind of competition? And there is a lot of competition around—artists frequently change labels, split up, regroup, and so on, which means that several established artists can splinter off from one group. If a record company can sign an established act, which involves little or no financial risk, it will. The bottom line is that as an industry, the music biz has an extremely average rate of return. It is only the very few mega-sellers that make it viable. These are, therefore, what everybody wants.

In the light of my thoughts and research, I gradually concluded that (apart from giving up) setting up a new record label was not only my sole remaining option, but also that it was not as crazy or impossible an idea as it might seem. I was lucky enough to have had a little bit of business experience, so expressions like "double-entry bookkeeping," "variable overheads ratio," and "margin on costs" did not throw me into a blind panic. (If you're not willing to pick up a few books on running a business and make at least *some* effort to work through them, then just give up on the idea of doing something similar.) Unless you are

very, very rich, money will have to be borrowed—and if you need money for something as totally lunatic as financing a record company, then you stand *no chance* of getting a bank loan *unless* you can be totally convincing and come up with a proper business plan, budgets, and an overall strategy. (Like the record industry, which wants to sign artists who have hits, banks are happiest lending money to people already running successful businesses.) Not surprisingly, the words "music biz" are a real turn-off to the average bank manager; it took me *months* to talk mine around.

Once you have obtained financing, there are *still* a lot of legal and other procedures and moves to consider. There is an awful lot of organization involved in setting out the basic corporate shell. Nevertheless, undaunted, I struggled slowly and patiently, taking one step at a time. Eventually, I managed to get everything together. I found a small office (read "dingy little room"), shoved a couple of people into it, and was able to get my fledgling record company on the road.

So you go out, do some recording, and make yourself a master tape. You will still have to edit it. Then you have to organize a mastering session and research what is involved in making such things as acetates and lacquers. Compared to this, writing lyrics, working out arrangements, and programming synths gets to seem like child's play—believe me!

If you do get as far as being able to plan out the manufacturing of your record, you then have to organize sleeve artwork, typesetting, printing, invoicing, letterheads, and so forth. All of this takes time, energy, and patience. You have *got* to approach it properly. This is a very competitive business, and you have to *look* totally professional and together. (*A good book for those wanting to start their own record company is* How to Make and Sell Your Own Record *by Diane Sward Rapaport, Headlands Press; it's available through Mix Bookshelf—Ed.*)

Assuming you have survived until now, it's time for the manufacturing and distribution stage—where a whole set of new problems begin. Have you ever tried persuading a record shop to stock an unknown artist on an unknown label? Even on a sale-or-return basis, it's a headache. As you might expect, the larger retail chains won't stock anything unless it, or the artist, is on a viable label or comes through a credible distributor they already deal with (although some stores are more imaginative than others), and the store can see that the record is already charting. This only leaves a far smaller number of independent shops, and arranging a distribution network is a hard and depressing task in itself.

Once the record is finished and ready, you have a beautiful piece of shiny black plastic (or cassette or CD) in your hand. So what? Record companies employ whole departments whose entire purpose is to do nothing else but solicit reviews and airplay, arrange for interviews, and generally get their hot artists seen and heard in all the right places. What is the point in having the world's best album ever if nobody has heard of it? And again, the same rules apply: nobody will show the slightest interest without a hit or some credibility. And of course, without coverage, you won't get much of either. Press agents and professional radio pluggers really do earn their money and are not employed for their looks; they have years of experience and big fat contacts books. You may not like the way the system works, but there is no point in ignoring it. This kind of competition is not to be taken on lightly. Be realistic—what you are up against is over 4,000 releases each year. Every artist dreams of being a winner, yet every week there is only one Top 10.

If you need money for something as totally lunatic as financing a record company, then you stand *no chance* of getting a bank loan.

I have tried to be totally honest and sketch out the odds, but enough of this gloom and depression. I hope that you have followed me this far over the last

three months. The time has come to draw to a close and to elaborate on the two conclusions mentioned in the opening paragraph.

As the review quotes suggest, it was not the music I was making that accounted for my total lack of progress. My first conclusion is this: if you are totally dedicated, totally committed, and really prepared to work *hard*, there is no reason at all—given today's technology—why you should not be able to get your music out on the streets. Changes only happen when enough people make them happen.

I am totally convinced that there are hundreds of creative people out there who are being denied a fair break. I cannot believe that the present record charts are truly representative of the talent that currently exists in the UK; the thought is just too depressing. The 20 or 30 A&R people in those four or five huge corporations do not have God-given infallibility in what is and is not music, what is or is not creative, and what will or will not sell. Don't forget that the Beatles were turned down by *everybody* until Brian Epstein got behind them and they tried EMI. The group Boston was turned down numerous times by numerous companies, and their *very first album* sold over eight million copies. When John Hammond signed Bob Dylan to CBS Records, everyone there thought Hammond had gone mad. After Dylan's first album flopped, the pressure was on to dump him. Hammond refused and hung on; the rest is history.

My second conclusion is this: on the whole, I would not glibly recommend that people do what I did. You have to be willing to lose your shirt, and also need to do a lot of background research and have your wits about you. However, I cannot deny the following:

- It is enormously satisfying to know that there are now several thousand people who have had a chance to hear my music who would never have had the chance otherwise.
- The reviews gained, the sales made, and general reactions to the music have served to totally vindicate the sacrifices and pain.
- I am now fortunate enough to own what is beginning to look like a thriving independent record label with definite prospects (my label is now negotiating to put out another act, and I personally am working on my follow-up album).

I agree that I have not (yet) made the Top 10. But I *have* gained a *lot* of personal pleasure and fulfillment, and still managed to sell a lot more records than none, which seemed like the only other alternative. Anyway, the future is yet to come. U2, after all, didn't exactly shake the world with their first couple of releases either, did they?

To finish, it is my personal conviction that both the music industry and the music in it are soon to undergo a period of great creativity, change and excitement. Why not be part of it?

(The end result of Kofi Busia's efforts is an unusual album entitled Oh Africa, *released by African Records International [44 Cowley Road, Oxford OX4 1HZ, England] and distributed by EMI/Jet Star.)* **EM**

KEYFRETS:

Keyboard to Guitar Voicing Translator

This clever and very slick C-64 program remaps what you play on a keyboard to sound like you played it on a guitar! Don't believe it's possible? Then just check out these wide-open chord voicings . . .

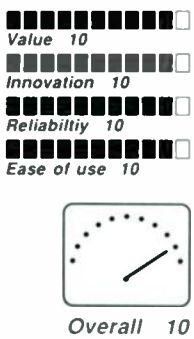
BY JAMES CHANDLER JR.

As a keyboardist who never mastered the fine finger control required for guitar, I have frequently coveted the advantages fretted instruments offer for certain musical techniques.

Plucked timbres are only part of the uniqueness of fretted instruments. Plucks are easily approximated on synthesizer, but guitar techniques are difficult to emulate with a keyboard. A stunningly realistic guitar sample played with ordinary keyboard fingerings invariably ends up sounding like a clavinet or odd piano.

As guitarists sometimes envy keyboardists for the ability to peg pedal tones with the left hand while making close clusters with the right hand, a keyboardist can envy the guitarist's ability to effortlessly make open, wide chord voicings. A guitarist can more or less unconsciously grab lush chords with the left hand while concentrating primarily on the right-hand fingerpicking and strums, thereby creating fat, rhythmic tracks.

The desire to include idiomatic fretted styles in my sequenced music prompted me to write *KeyFrets*. KeyFrets turns a Commodore 64 into a specialized mapper that inserts between a keyboard controller and a synth or sequencer. By using a C-64 to run KeyFrets, your main computer (if you have one) will be left free to run a sequencer and capture your "key-fretted" performances. (In many ways the C-64 is the ideal auxiliary MIDI processor, since it is easy to program and almost free at typical garage-sale prices.)



see Mini-Review page 76

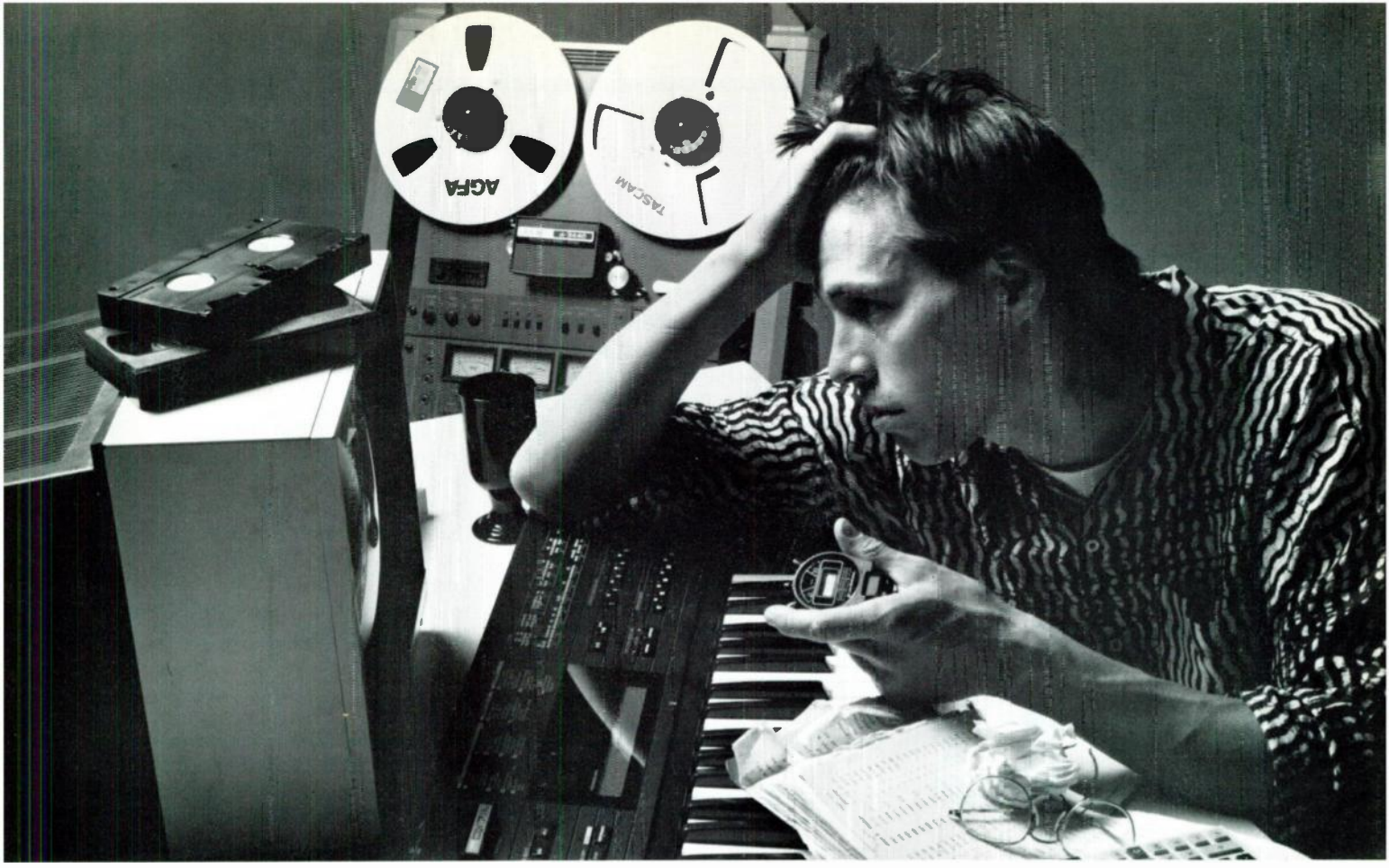
RUNNING KEYFRETS

First, patch the keyboard controller's MIDI Out to the MIDI In jack on your C-64 MIDI interface. Second, patch the MIDI interface's MIDI Out to your sound generator, preferably set up for a guitar-like patch. Enter the code (**Fig. 1**) and save it to disk as KEYFRETGEN—*never* run a program you've typed in until it has been saved! (*If all that typing seems like too tedious a chore, you can buy a disk directly from the author; see sidebar, "KeyFrets Mini-Review"—Ed.*) When run, KEYFRETGEN will write a machine language program to disk called KEYFRETS. This resulting file can be loaded, run, and saved just like a BASIC program.

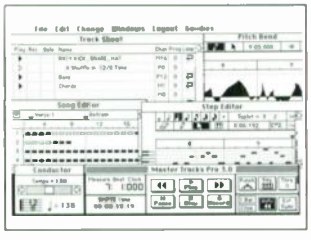
Reset the computer by turning it off and then on, insert the KeyFrets disk into the drive, and type:

LOAD "KEYFRETS",8

Now type RUN, and then press Return. After loading, the first screen asks you to choose between a Sequential- or Passport-style interface. Once you've made your selection, the screen shows the first four frets of a hypothetical ten-string guitar, with string tunings listed on the "nut" towards the top of the screen. If you only want six strings for normal guitar, ignore



Stop Playing Hit and Miss with Audio for Video Production.



If you write music for film or video, you know that writing cues and making last minute changes can be a tiresome game of hit and miss. Until today, your choices have been limited. You could sell the house and buy a monster production system, or you could piece together components from various manufacturers and pray they all work together.

Now, you can toss out your clickbook and calculator and enjoy fast, accurate and *affordable* soundtrack production. Passport offers you a fully integrated music production environment that combines a powerful sequencer, a MIDI interface with SMPTE sync capability, and a program that calculates and prints hit maps for film and video synchronization. With Passport, you're assured a hit every time.

Master Tracks Pro™ Version 3.0 with SMPTE Sync

Your music will never sound better than when you compose, record and edit using this award-winning MIDI sequencer. Master Tracks Pro features 64 Tracks with real-time or step-time recording, and a unique graphic display for easy editing of all MIDI data. Powerful features such as controller chasing, fit time and 32 MIDI channels help speed production. Our version 3.0 even has a built-in cue sheet and syncs directly to MIDI Time Code and SMPTE.

MIDI Transport™ For Perfect Timing

MIDI Transport is a two In, four Out MIDI interface that reads and writes SMPTE in standard formats (24, 25, 30, and 30 drop). It combines the functions of a MIDI interface and a sync box in one package with its own internal AC power supply. It also converts SMPTE to MIDI Time Code and converts FSK to MIDI Song Pointer. This box can drive your entire MIDI setup and lock everything directly to tape.

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ClickTracks software offers you the most affordable means of establishing and printing hit maps for film or video soundtracks. Create a conductor track by entering hits, generating a cue list, and adjusting meter and tempo. Print out your cue as a list or on score paper for live conducting, or save your cue as a MIDI file and load it into Master Tracks Pro. Now, you're ready to produce music perfectly synchronized to film or videotape.

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the four extra strings towards the right of the screen.

USING KEYFRETS

Notes played below middle C on the controlling keyboard do not sound, but are assigned to the appropriate frets on the "guitar." The fingering appears on screen. For example, if in the keyboard's lowest octave you hold down the notes D, F#, and A (a D major chord), you'll see the fingering for a standard D major chord show up on screen. For common folk chords (C, E, Am, etc.), the fingerings are identical to a stock guitar. On chords such as B-flat, the fingering is what a guitarist with a couple of extra fingers might play.

Keys above middle C on the controlling keyboard pluck the "virtual strings," sending MIDI notes and turning plucked strings from orange to green on screen. Both the black notes from middle C# and the naturals from middle C pluck the strings in ascending, then descending order as you move up the keys. Velocity of notes depends on how hard right-hand notes are struck, and has nothing to do with left-hand velocity. While this may seem confusing at first, just remember—the left hand plays the notes that will be used in the chord, and the right hand simply "plucks" the notes. What you do with your right bears no relationship to normal right-hand keyboard technique.

To get your right hand used to the program, begin by playing the six white keys starting with middle C (C, D, E, F, G, A). These "pluck" the first six strings on the virtual guitar, which are tuned to correspond to standard guitar tuning (from low to high, E, A, D, G, B, E). Play some major and minor chords with your left hand, and play various combinations of the six white keys to "pluck" the strings of the chord. If you use a patch that's even remotely guitar-like, you'll be truly amazed at how much your playing sounds like guitar.

Although KeyFrets seems to work with just about anything, I have heard of keyboard controllers that generate an All Notes Off message when you lift both hands from the keyboard. (This is not in strict accordance with the MIDI specifica-

Keyfrets Mini-Review

James presented us with a copy of KeyFrets for evaluation, so I booted it up in the EM labs. Loading occurred without problems, and the program didn't crash or exhibit any antisocial behavior during the course of our testing.

It took me a little bit of time to figure out what was going on between the left and right hands, but once that was squared away, bingo! Chords really do sound like they're being voiced on a guitar, to an uncannily accurate degree. If you set up a decent acoustic guitar patch, you (and any nearby listeners) will swear that you're strumming away. Proper use of the sustain pedal, as mentioned in the story, is also very helpful.

The only real limitation is that KeyFrets seems optimized for playing acoustic guitar-style chord voicings, not lead work. The main problem with leads is that since both hands are usually occupied on the keyboard, you can't conveniently use the left hand to bend strings. (If you do map a foot pedal or other continuous controller to generate Pitch Bend, or latch the chord and use the pitch bend wheel, any other voices that are sounding will bend as well.)

In a world of me-too sequencers and voice editors, software like KeyFrets is a refreshing change from the norm. James has come up with something truly innovative here, and once more shows that many creative options in the world of MIDI and computers remain to be discovered. If you have a C-64 laying around, it's well worth booting up this program and checking it out—it's that different and clever. In fact, I would imagine that some people, after hearing what this program can do, would be willing to go out and buy a C-64 just to dedicate it to this purpose. Sure is amazing what you can do with computers nowadays. —*Craig Anderton*

(Editor's note: KeyFrets is available for $15 postpaid, or $18 COD, from James Chandler Jr., 204 California Ave., Chattanooga, TN 37415.)

tion; presumably it's done to prevent the possibility of "stuck" notes.) Although this wouldn't crash the program or anything drastic like that, should you lift both hands off the keys (which is not uncommon when using KeyFrets), any notes left sounding would be abruptly cut off. I have not encountered this problem myself, however.

ADVANCED KEYFRETTING

KeyFrets is a rather open-ended program that lends itself to a variety of advanced techniques. When left-hand notes are changed while holding right-hand notes, MIDI reassignments yield hammer-on/hammer-off effects. When a string is triggered with the right hand, then hammered with the left hand, each new note decreases in velocity, giving a natural-sounding hammer decay.

The left hand plays the notes that will be used in the chord, and the right hand simply "plucks" the notes.

Sustain pedal events are passed through, but holding the sustain pedal down also freezes chord selection on the virtual guitar (much like sustenuto on piano), allowing one to strum through a progression without messy transition voicings between chords. Finger a chord with your left hand, press sustain to latch the chord, then fingerpick or strum the chord with your right hand—you can lift the left hand at any time without disturbing your chord assignment. Before the next chord in the progression occurs, play the new chord with the left hand and release the sustain pedal on the proper down beat to update the chord. Depending on right-hand playing style, this can yield either clean chord transitions, or "snatched" chord effects.

CHANNEL SELECTION

Initially, all output is on MIDI channel 1. Each time you press C on the C-64 keyboard, the output channel will increment by one. KeyFrets re-channelizes all MIDI input to the selected output channel. Controllers, pitch bend, etc., are passed through unaltered except for channel ID; one can thus sequence volume, pitch bend, modulation, or program changes in real time while playing.

When recording to computer sequencers, it is usually easiest to leave KeyFrets on the same channel and adjust the track's MIDI channel on the sequencer. With hardware sequencers such as the ESQ-1, it is more convenient to adjust the recording channel on KeyFrets.

TUNING

Press T and then play ten notes to retune the hypothetical guitar. Each string is illuminated on screen until you select the tuning of that string. One could retune to play a synth patch that is set in too high or low a register, or for unusual chord

Keyfrets Software Listing

```
1 REM KEYFRETGEN - TO GENERATE RUNNABLE KEYFRETS PROGRAM
2 REM RUN THIS PROGRAM WITH A FORMATTED DISK IN DRIVE 8
3 OPEN15,8,15,"I":OPEN9,8,9,"@0:KEYFRETS,P,W"
4 PRINT#9,CHR$(1)CHR$(8);:GOTO10
5 Z=VAL(Z$):IFZ=0ANDZ$<>"0"THENZ=ASC(Z$)-55
6 RETURN
10 FORI=1TO2908:READZ$:X$=LEFT$(Z$,1):Z$=RIGHT$(Z$,1)
11 GOSUB5:Y=Z:Z$=X$:GOSUB5:PRINT#9,CHR$(Y+Z*16);:PRINTI
12 NEXTI:CLOSE9:CLOSE15:END
100 DATA 0B,08,0A,00,9E,32,30,36,31,00,00,00,A9,00,8D,20
101 DATA D0,8D,21,D0,4C,45,08,8E,08,93,05,0D,0D,0D,0D,28
102 DATA 53,29,45,51,55,45,4E,54,49,41,4C,20,4F,52,20,28
103 DATA 50,29,41,53,53,4F,52,54,20,49,4E,54,45,52,46,41
104 DATA 43,45,3F,00,A2,00,BD,18,08,F0,06,20,D2,FF,E8,D0
105 DATA F5,A5,C5,C9,0D,F0,26,C9,29,D0,F6,A9,08,8D,82,08
106 DATA 8D,87,08,8D,92,0D,8D,97,0D,8D,E5,08,8D,1E,09,8D
107 DATA 83,0D,A9,09,8D,EC,08,8D,30,09,8D,8B,0D,78,A9,03
108 DATA 8D,00,DE,A9,95,8D,00,DE,A9,DF,8D,14,03,A9,08,8D
109 DATA 15,03,58,20,BC,08,A2,17,A9,00,9D,00,CD,CA,10,FA
110 DATA 8D,28,13,8D,29,13,8D,2A,13,8D,2B,13,8D,2F,13,8D
111 DATA 2D,13,20,D2,0A,20,11,0E,4C,4E,09,A2,09,A9,00,9D
112 DATA 53,13,9D,49,13,A9,01,9D,35,13,9D,3F,13,BD,60,0E
113 DATA 9D,6A,0E,A8,B9,74,0E,9D,19,13,CA,10,E0,60,48,8A
114 DATA 48,98,48,AD,02,DE,29,01,F0,14,AD,03,DE,AE,29,13
115 DATA 9D,00,CE,EE,29,13,68,A8,68,AA,68,4C,7E,EA,68,A8
116 DATA 68,AA,68,4C,31,EA,A9,FF,8D,33,13,AE,28,13,EC,29
117 DATA 13,F0,09,BD,00,CE,8D,33,13,EE,28,13,AD,02,DE,29
118 DATA 02,F0,11,AE,2A,13,EC,2B,13,F0,09,BD,00,CF,8D,01
119 DATA DE,EE,2A,13,AD,33,13,10,09,C9,F8,90,06,20,BB,0B
120 DATA A9,FF,60,C9,F0,B0,FB,29,F0,8D,33,13,60,A5,C5,C9
121 DATA 40,F0,03,4C,94,0C,20,07,09,C9,FF,F0,F0,AD,33,13
122 DATA 30,69,48,AD,2C,13,CD,59,0E,F0,36,CD,5A,0E,F0,31
123 DATA CD,5B,0E,F0,04,68,4C,E5,09,20,07,09,C9,FF,F0,F9
124 DATA 8D,31,13,AD,5E,0E,20,86,0A,68,AA,20,86,0A,AD,31
125 DATA 13,20,86,0A,E0,40,D0,B5,8D,2F,13,C9,00,D0,AE,F0
126 DATA 65,20,07,09,C9,FF,F0,F9,8D,32,13,C9,00,F0,0F,AD
127 DATA 2C,13,CD,5A,0E,F0,07,A9,01,8D,2E,13,D0,05,A9,00
128 DATA 8D,2E,13,68,C9,3C,90,28,4C,96,0A,8D,2C,13,CD,59
129 DATA 0E,F0,1A,CD,5A,0E,F0,15,CD,5B,0E,F0,10,C9,F0,B0
130 DATA 03,0D,34,13,AE,2B,13,9D,00,CF,EE,2B,13,4C,4E,09
131 DATA AA,BD,74,0E,AA,AD,2E,13,9D,00,CD,9D,0C,CD,AD,2F
132 DATA 13,F0,03,4C,4E,09,A2,09,BD,19,13,8D,12,0A,A0,00
133 DATA B9,00,CD,D0,07,C8,C0,05,D0,F6,A0,00,BD,60,0E,8C
134 DATA 25,0A,18,69,00,DD,6A,0E,F0,2A,48,BD,53,13,F0,20
135 DATA 4A,18,7D,53,13,4A,D0,03,BD,53,13,8D,32,13,9D,53
136 DATA 13,BD,6A,0E,20,5F,0A,68,20,72,0A,9D,6A,0E,D0,04
137 DATA 68,9D,6A,0E,98,9D,49,13,CA,10,AD,4C,4E,09,48,AD
138 DATA 5D,0E,20,86,0A,68,48,20,86,0A,A9,40,20,86,0A,68
139 DATA 60,48,AD,5C,0E,20,86,0A,68,48,20,86,0A,AD,32,13
140 DATA 20,86,0A,68,60,8C,24,13,AC,2B,13,99,00,CF,EE,2B
141 DATA 13,AC,24,13,60,AA,BD,F4,0E,10,03,4C,4E,09,AA,AD
142 DATA 2E,13,F0,1A,BD,53,13,F0,06,BD,6A,0E,20,5F,0A,AD
143 DATA 32,13,9D,53,13,BD,6A,0E,20,72,0A,4C,4E,09,BD,53
144 DATA 13,F0,0B,A9,00,9D,53,13,BD,6A,0E,20,5F,0A,4C,4E
145 DATA 09,A2,00,BD,49,0B,F0,06,20,D2,FF,E8,D0,F5,A2,50
146 DATA A9,20,20,D2,FF,CA,D0,FA,A9,92,20,D2,FF,A0,04,A2
147 DATA 03,A9,0D,20,D2,FF,CA,D0,FA,A2,28,A9,63,20,D2,FF
148 DATA CA,D0,FA,88,D0,E9,A2,00,BD,94,0B,F0,06,20,D2,FF
149 DATA E8,D0,F5,A2,00,BD,8C,0B,F0,06,20,D2,FF,E8,D0,F5
150 DATA A2,00,BD,60,0E,A8,B9,74,0F,20,D2,FF,B9,F8,0F,20
151 DATA D2,FF,B9,7B,10,20,D2,FF,A9,1D,20,D2,FF,E8,E0,0A
152 DATA D0,E0,A9,92,20,D2,FF,60,8E,08,93,05,20,20,20,20
153 DATA 20,20,20,20,20,20,20,20,20,20,20,20,4B,45,59,46
```

FIG. 1: KeyFrets software listing.

—continued on page 80

voicings and capo effects.

That characteristic thick Nashville rhythm guitar sound comes from two or three acoustic guitars playing a chord progression from different locations on the neck. You can add this effect to your sequences by multi-tracking complementary picking patterns with different tunings and synth voices. Multiple picking parts can be packed into a single MIDI channel on synths such as the TX81Z, TX802, TX816, or multiple TX7s. Program a multiple split, with the low or very high parts transposed back to the middle area, then record several tracks on the same channel, each one offset two or three octaves.

For harp effects, tune KeyFrets for a big open chord spanning a couple or three octaves, then strum by running one or both hands up and down the right-hand keyboard half. Banjo parts are most realistic if the first five strings are tuned D-G-B-D-G, playing alternating roll patterns over the five strings, emphasizing the high G string.

Tunings by consecutive fourths or fifths yield the most harmonically useful chords, giving pleasing chord inversions as you play through a progression. Numerous songs rely on the sound of a particular position on the guitar, the most popular being the C, A, E, D, and G positions. If you are playing a song in D-flat but want a G position sound, just retune KeyFrets to suit.

Fast and complex fingerpicking patterns (a la folk tradition) are easier on KeyFrets than they are on guitar, but one must still develop the skill to play a pattern accurately without tying fingers in knots. Since up and down melodic patterns are easier to play than alternating patterns, you can fudge on fast alternating patterns by retuning KeyFrets so the strings are alternated up the neck (i.e., E-D-A-G-D-B-G-E-B-A). Now by playing a simple C scale, you get a hairy alternate-string finger roll.

Tunings by thirds, flatted fifths, or sixths may sound intellectually intriguing, but are only useful for "outside" applications since the harmonic possibilities are rather limited. With such odd tunings, you get an instrument that will not play all the notes on all chords, perhaps playing the full I and IV chords, but defaulting to a raw fifth plus a couple of weird drones on the V chord.

For spacey or folky parts, you might

—from page 78

Keyfrets Software Listing

```
154 DATA 52,45,54,53,0D,20,20,20,20,20,20,20,28,43,29,20
155 DATA 31,39,38,37,20,4A,41,4D,45,53,20,43,48,41,4E,44
156 DATA 4C,45,52,20,4A,52,0D,0D,12,9B,00,13,11,11,11,1D
157 DATA 12,05,00,0D,0D,20,20,20,28,48,29,45,4C,50,20,20
158 DATA 28,43,29,48,41,4E,4E,45,4C,20,20,28,45,29,58,49
159 DATA 54,20,20,28,54,29,55,4E,45,00,AE,2D,13,BD,49,13
160 DATA DD,35,13,F0,60,9D,35,13,A8,BD,8A,0C,AA,A9,5D,9D
161 DATA A2,04,C0,01,D0,02,A9,A0,9D,CA,04,9D,F2,04,9D,1A
162 DATA 05,A9,5D,9D,42,05,C0,02,D0,02,A9,A0,9D,6A,05,9D
163 DATA 92,05,9D,BA,05,A9,5D,9D,E2,05,C0,03,D0,02,A9,A0
164 DATA 9D,0A,06,9D,32,06,9D,5A,06,A9,5D,9D,82,06,C0,04
165 DATA D0,02,A9,A0,9D,AA,06,9D,D2,06,9D,FA,06,A9,5D,9D
166 DATA 22,07,9D,4A,07,AE,2D,13,BD,53,13,DD,3F,13,F0,49
167 DATA 9D,3F,13,C9,00,D0,04,A9,08,D0,02,A9,0D,48,BD,8A
168 DATA 0C,AA,68,9D,A2,D8,9D,CA,D8,9D,F2,D8,9D,1A,D9,9D
169 DATA 42,D9,9D,6A,D9,9D,92,D9,9D,BA,D9,9D,E2,D9,9D,0A
170 DATA DA,9D,32,DA,9D,5A,DA,9D,82,DA,9D,AA,DA,9D,D2,DA
171 DATA 9D,FA,DA,9D,22,DB,9D,4A,DB,EE,2D,13,AE,2D,13,E0
172 DATA 0A,D0,05,A9,00,8D,2D,13,60,00,04,08,0C,10,14,18
173 DATA 1C,20,24,C9,0E,F0,0F,C9,16,F0,14,C9,1D,F0,0A,C9
174 DATA 14,F0,09,4C,4E,09,4C,8E,0D,4C,A7,0D,4C,DB,0D,A2
175 DATA 09,A9,00,9D,60,0E,CA,10,FA,20,BC,08,20,D2,0A,A2
176 DATA 00,BD,1B,0D,F0,06,20,D2,FF,E8,D0,F5,A0,00,8C,5F
177 DATA 0E,A9,02,99,53,13,20,65,0D,CD,59,0E,D0,F8,20,65
178 DATA 0D,8D,64,0D,20,65,0D,C9,00,F0,EB,AD,64,0D,99,60
179 DATA 0E,A9,00,99,53,13,20,14,0B,EE,5F,0E,AC,5F,0E,C0
180 DATA 0A,D0,CE,AD,5D,0E,20,81,0D,A2,7F,8A,20,81,0D,A9
181 DATA 40,20,81,0D,CA,10,F4,4C,7E,08,13,20,20,20,20,20
182 DATA 20,20,20,20,20,20,20,20,20,20,20,54,55,4E,45,20
183 DATA 20,20,20,20,20,20,20,20,20,20,0D,50,4C,41,59,20
184 DATA 41,20,4E,4F,54,45,20,46,4F,52,20,45,41,43,48,20
185 DATA 48,49,47,48,4C,49,47,48,54,45,44,20,53,54,52,49
186 DATA 4E,47,00,00,20,07,09,C9,FF,F0,F9,C9,80,90,0D,C9
187 DATA F0,B0,09,0D,34,13,20,86,0A,29,F0,60,20,86,0A,60
188 DATA 48,AD,02,DE,29,02,F0,F9,68,8D,01,DE,60,78,A9,03
189 DATA 8D,00,DE,A9,15,8D,00,DE,A9,31,8D,14,03,A9,EA,8D
190 DATA 15,03,58,4C,E2,FC,A2,00,BD,FF,10,F0,06,20,D2,FF
191 DATA E8,D0,F5,A2,00,BD,F4,11,F0,06,20,D2,FF,E8,D0,F5
192 DATA A2,00,BD,D1,12,F0,06,20,D2,FF,E8,D0,F5,A9,40,85
193 DATA C5,A5,C5,C9,40,F0,FA,4C,7E,08,A2,00,BD,3A,0E,F0
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202 DATA 2D,32,37,3B,40,45,4A,4F,54,28,2D,32,37,3B,40,45
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208 DATA 05,06,07,08,09,0A,0B,00,01,02,03,04,05,06,07,08
209 DATA 09,0A,0B,00,01,02,03,04,05,06,07,08,09,0A,0B,00
210 DATA 01,02,03,04,05,06,07,08,09,0A,0B,00,01,02,03,04
211 DATA 05,06,07,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF
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213 DATA FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF
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215 DATA 00,01,01,02,03,02,04,03,05,04,06,07,05,08,06,09
216 DATA 08,07,07,08,06,09,05,04,08,03,07,02,01,06,00,05
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243 DATA 39,39,41,41,41,41,41,41,41,41,41,41,41,41,93,0D
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247 DATA 54,52,55,4D,45,4E,54,2E,0D,0D,4E,4F,54,45,53,20
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249 DATA 45,20,43,20,41,52,45,20,41,53,53,49,47,4E,45,44
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267 DATA 4E,20,50,45,44,41,4C,20,4F,46,46,2C,20,48,4F,4C
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270 DATA 4E,47,49,4E,47,20,4C,45,46,54,2D,48,41,4E,44,0D
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272 DATA 4D,45,52,2D,4F,4E,20,45,46,46,45,43,54,53,2E,00
273 DATA 0D,0D,41,4C,4C,20,49,4E,43,4F,4D,49,4E,47,20,4D
274 DATA 49,44,49,20,44,41,54,41,20,49,53,20,52,45,2D,44
275 DATA 49,52,45,43,54,45,44,0D,54,4F,20,54,48,45,20,53
276 DATA 45,4C,45,43,54,45,44,20,4F,55,54,50,55,54,20,43
277 DATA 48,41,4E,4E,45,4C,2E,00,FF,FF,FF,FF,FF,FF,FF,FF
278 DATA FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,00,00,00,00
279 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00
280 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00
281 DATA 00,00,00,00,00,00,00,00,00,00,00
```

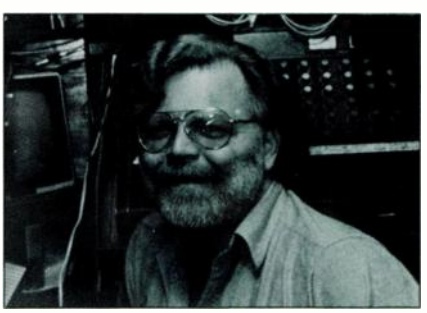
try tuning two or three open chords across the neck, for instance a C chord on the first three strings, a Bm on the next three, and an Am7 on the last four. Then experiment with two-handed picking patterns between the different sections of the neck.

SEQUENCER IMPLICATIONS

Since strums, hammer-ons, and snatched chords rely on tiny timing differences between notes, these effects will probably not survive in recognizable form if recorded at only 24 beats per quarter note resolution. Also, strums will not retain their characters if auto-corrected. So for best results, record your songs at as high a clock rate as possible, and do your take the old-fashioned way (until it is on the money, not just in auto-correct range). For difficult parts, you can always slow down the sequence tempo while recording.

The processing delay in KeyFrets is two or three milliseconds at worst. This is a smaller delay than the key or voice acquisition time in many synthesizers. As a musician plays to a groove, it's natural to automatically compensate for delays in this range. Interestingly, it is possible for a musician to lay down a part that successfully compensates for the cumulative delay in a system, but, feeling insecure about the part, auto-corrects and ends up with a track no longer in sync.

What makes this program so attractive to me is that it can be used to expand musical expression, and after all, music itself is the ultimate music software. This is not to say that sample-manipulating programs or algorithmic randomizers are not useful, but such things seem a little more "gadgety" than a program intended to enhance one's range of direct musical expression. Experiment with KeyFrets—you will not be disappointed. **EM**



James Chandler Jr. works a steady gig at a tourist attraction, writing MIDI software and recording in his spare time.

FIRST TAKE

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

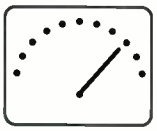
We would like to remind you that these are opinions, not gospel, and as always, **EM** is a communications medium that welcomes opposing viewpoints. We urge you to contact manufacturers for more information and, of course, tell them you saw it in **EM**.

Bacchus TX802 Graphic Editing System for the IBM PC ($249.95)

Usefulness 9

Reliability 10

Ease of use 9



Overall 9

By Burt Goldstein

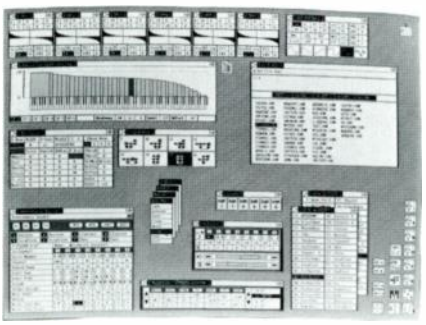
Bacchus Software Systems' Graphic Editing System puts the parameters of the powerful Yamaha TX802 on a screen 30 times larger than the synth's LCD, and in a much easier-to-understand and faster-to-use form. System requirements are an IBM PC/XT/AT/PS2 model 25 or 30 (or equivalent) with a hard disk, one floppy drive, and 640K RAM; graphic adapter (Hercules, EGA, AT&T, Wyse WY-700, T3100, PS2 or equivalent); and a MIDI interface such as the Roland MPU-401, IBM Music Feature or other compatibles.

The program controls every aspect of your TX802 from the computer. There are windows for editing operators, LFO/feedback, fractional scaling and algorithms, as well as directory, folder, performance and voice editing, audition, and microtune functions.

The Mac-like Bacchus user interface is very easy to use. Double clicking on icons opens windows, which can be moved and/or stacked on top of each other. Essentially, you can create your own screen display by opening program modules when and where you want. There's a convenient shortcut to open all the voice or performance editing windows; the same shortcut can close groups of windows too.

Bacchus also introduces an innovative menu system: *context-sensitive pop-up menu stacks*. Point and click anywhere inside a window, and a menu (or stack of menus) pops up where you clicked, containing only the commands relevant to that window. The cursor is already on the menu, so pointing to an item requires much less mouse motion than normal window environments with a menu bar and pull-down menus. I welcome anything that puts one less *computer* consideration between you and the music.

To change parameter values, point to the side of the value and click. There's no moving the mouse to a slider icon each time you want to change a number, and with over a hundred programmable numbers on the TX802, you appreciate the help. "Undo" functions in voice editing let you go back to previous settings of selected operators so you won't lose a good sound while experimenting.



Bacchus TX802 Graphic Editing System

The Performance Editor window edits all parameters of the TX802's performance mode. This mode allows for up to eight simultaneous timbres, each with two-note polyphony, its own MIDI channel assignment, and control of pitch range, detune, note shift, volume, stereo output location, microtonal scale assignments, layering/splitting, and more.

The Bacchus Editor also provides complete point-and-click control over all the fractional scaling functions and converts a sound with the old, DX7-style scaling curves to the new and more complex TX802 format. The old curve shows up on the new scaling graphic and can be tweaked to your satisfaction.

The librarian holds hundreds of sounds, performances, and microtuning data. Performances and voices can be "dragged" (copied) within and among folders, just like on many Mac librarians. Another Mac-like feature is that the only typing you'll do here is to name a performance or voice you're storing.

Whether you are editing a voice or a performance, you can hear the effect of your edits immediately. The *Audition Window* lets you adjust the loudness and duration of the note, or turn the sound off.

Testing new sounds in performance edit mode is a breeze. Point and click on any of the 512 sounds available on screen and hear it immediately, not only with all your current settings for microtonal tuning, volume, panning, loudness, and so on, but by itself or along with all the other sounds or a selection of them. You can even open the voice editing windows and tweak the new sounds.

Concerning suggestions, I'd like to see a tutorial that would take you through basic operations step by step. I would also prefer a display that showed all six operator envelopes on top of each other so that attacks and decays of the different envelopes could be easily coordinated.

I like the graphic display of the envelopes and found them easy to change, but being able to change them by clicking and dragging envelope breakpoints would be even more intuitive. A pop-up window in my sequencer that catalogued the sounds in each performance would be very handy, as would being able to print lists of performances and voices without printing the whole program screen. Bacchus's earlier DX/TX Voice Manager had both these features.

These suggestions aside, the bottom line is that the program looks and acts slicker than any other IBM editor I've seen for the TX802. The Bacchus Graphic Editing System is fast, easy to use, full of features, and plays back your TX802 patches immediately after each edit. Furthermore, I experienced bug-free operation—no small feat with a new piece of software! It offers far more programming power than the TX802 alone and should encour-

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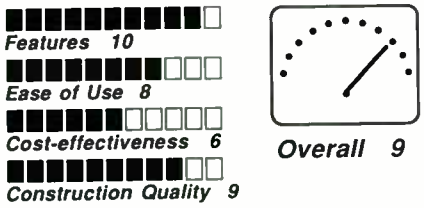
age TX802 owners to program their own sounds and performances, or at least tweak the ones they have.

Burt Goldstein is a composer/MIDI consultant/teacher/synthesist who lives on the Los Angeles freeway system. He can best be reached by traffic helicopter.

Bacchus Software Systems
2210 Wilshire Boulevard #330
Santa Monica, California 90403
tel. (213) 820-9145

Technics SL-P1200 Professional Compact Disc Player ($1,295)



By Daniel Kumin

Ever tried copping a sample from a compact disc? Ever tried to ride a bicycle up the stairs to the Lincoln Memorial? It's not the steps that kill you, it's the spaces in between.

The fact is, more and more musicians are fashioning samples from raw materials found on CDs, either from legitimate CD sound libraries, or off the latest hit record. Unfortunately, sampling with the typical consumer CD player can be a frustrating, slow process, since the search controls don't reliably place the laser pickup exactly where you want it. Made-for-sampling discs can be easier to work with, but not always. The bottom line is a protracted session of sample editing; anyone without sample-editing computer software had better pack a lunch.

Fortunately, pro audio has entered the arena. The best example so far is Technics' nifty SL-P1200, a professionally designed (and priced) player with the DJ in mind. Happily, the results are about perfect for MIDI musicians, too.

The SL-P1200 is a full-bore audiophile design, with double-oversampling digital filtering, dual D/A converters to optimize the phase alignment of the stereo channels, and considerable discrete-component, high-end circuitry in its audio sections. Its electrical and mechanical construction are first-rate, and it has one of the most shock- and vibration-immune chassis in the industry. Sonically, it will hold its own with most of the top dozen or so units on the market, but it merits our attention by virtue of three unique features.

A search dial—a big knob with a finger depression in its face—moves the laser pickup sled forward or back. With the search switch engaged and the player in pause mode, the disc plays audibly when the dial is turned, allowing a CD to be "rocked" back and forth like an analog tape or a record.

At the slower of the two search speeds (by far the more useful for sampling), one complete revolution of the dial yields one second of sound. (A pair of rocker switches advance or retreat the pickup by a single disc pit-track—around 0.13 seconds.) The useable resolution of the search dial is about 50 msec, roughly 18 degrees of knob rotation. While paused in search mode, the output cycles one disc revolution at the paused point, so you hear a repeated, roughly tenth-second fragment—sort of a "first draft" sample. This search system is unbeatable for locating, evaluating, and extracting sample fodder.

To keep track of what you're doing, the SL-P1200's flourescent readout—unlike every other CD player I've seen—displays minutes, seconds, and tenths of a second. You can locate disc points with ten times the accuracy of any other unit. Four *time display* modes are possible: elapsed or remaining time, both for either the current track or the entire disc.

The SL-P1200 has one more unique feature: a pitch control. This slider on the unit's right edge can produce a ±8% pitch shift by modulating the player's master clock, which controls sampling frequency, disc RPM, and everything else. It's extremely handy for pre-tuning sample data, simplifying looping, and providing the ideal overlay for multi-layered samples. The pitch control is switch-defeatable and has an LED to announce its engagement, reducing the chance of accidental use. A truly neat pro feature.

Technics SL-P1200

Technics' SL-P1200 sports a host of consumer-oriented features as well: a handy separate index number display for sample libraries that use indices, elaborate song programming, auto-space/auto-edit, and music-scan are just a few. There is a front-panel stereo headphone jack with volume control, a fully capable wireless remote that includes digital attenuation to -12 dB, and standard stereo RCA outputs.

Also on the rear panel are a digital subcode output (of possible future use with CD-Interactive, etc.) and an eight-pin DIN socket for an optional wired remote controller (controlling only stop, pause, and play). Technics thoughtfully provides a pin diagram for this in the manual, so you could make your own

controller from any momentary switch.

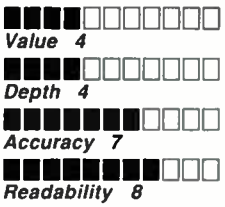
At $1,295, the SL-P1200 is a top-echelon CD player, pro or otherwise (for a couple hundred bucks more, Technics offers the SL-P1300, a similar machine with balanced XLR outputs and the wired remote). This is undeniably a lot for a CD player—especially when there are dozens of others available for a sixth the price—but if you're committed to building the perfect MIDI studio and a disc player is part of your plan, I can think of no better choice.

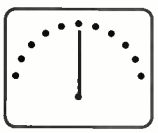
Daniel Kumin lives in New Hampshire and is technical editor of Digital Audio *magazine.*

Technics
1 Panasonic Way
Secaucus, NJ 07094
tel. (201) 348-7000

The MIDI Home Studio

by Howard Massey Amsco Publications/Music Sales Corporation, $12.95





Overall 6

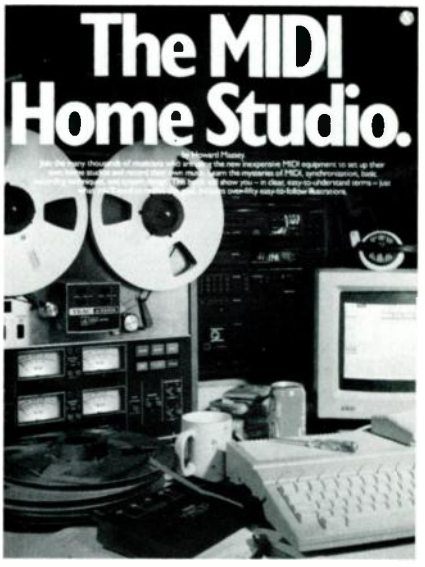
By David Doty

If there is any subject that begs for a good book, it is how to effectively design and use a MIDI-based home studio. Anyone trying to get started in this area is faced with the task of evaluating the advertising claims of a host of hardware and software products, all of which claim to be indispensable. Some expert advice on how to assemble a practical system on a limited budget could save the beginner much trial, error, and sorrow. Unfortunately, *The MIDI Home Studio* falls short of filling this need.

There are two principal problems with *The MIDI Home Studio*: the quantity of the information and the quality. The first problem stems from the overall format and organization of the book. A large-format paperback, *The MIDI Home Studio* is only 77 pages long. I doubt that any writer could effectively address all of the issues that confront the prospective studio owner in such a limited space, and Mr. Massey is no exception. The bulk of the book (40 pages) consists of descriptions of the various components (synthesizers, samplers, sequencers, tape decks, and so on) that can be included in a MIDI studio. A reader who was totally uninformed on these subjects might find these presentations useful, but I doubt that many EM readers fall into this category. ("Hey, I think I'll build a MIDI studio. . . I wonder what a synthesizer is.") Synchronization, a subject that can confuse even the experts, gets only five pages, and system design, the most important topic of all, is covered in nine pages, consisting mostly of diagrams. Effectively using the collection of equipment you have managed to assemble is really never addressed.

The qualitative problem stems from the author's avoidance of technical language where the subject matter requires it. The resulting discussions are neither precise nor detailed. While non-technical readers will not be intimidated by Mr. Massey's writing style, they will probably not be well informed, either. In addition to being vague, *The MIDI Home Studio* is plagued by a number of minor factual errors. For instance, Mr. Massey seems to be confused about clock resolutions: ". . . the MIDI clock . . . sends out twenty-four pulses per quarter note, allowing you to accurately place notes as fine as an eighth-note triplet (since you can fit 24 of these in a single measure)." Of course, 24 pulses per quarter note yields a continuous resolution up to 32nd-note triplets, and how many notes of any kind you can put in a measure depends entirely on the time signature. He also confuses drum clock sync (usually a pulse wave signal) with FSK tape sync. SMPTE is another source of confusion: "There are about thirty frames in each second of running film, and SMPTE time code also usually uses thirty frames per second as its reference." (Film runs at 24 frames per second; North American TV [NTSC] runs at 30 frames per second. SMPTE can sync to either standard as well as to European TV, which uses 25 frames per second; there's also drop-frame SMPTE.)

None of these errors is fatal in and of itself, but they demonstrate a lack of attention to detail that I find disturbing. The reader is paying for the writer's expertise. The writer and the publisher owe the reading public accurate information.



The MIDI Home Studio

My suspicion is that Mr. Massey was in a hurry to be the first to tap this particular market, and the quality of the writing and editing suffered as a result. This is all the more disappointing in that Mr. Massey has demonstrated previously that he is more than capable of doing a competent and workmanlike job of explaining complex subjects to a nontechnical audience. Let's hope that his next books show a return to form.

David B. Doty is a composer, technical writer and editor of 1/1, the journal of the Just Intonation Society.

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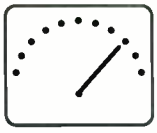
Casio FZ-1 and FZ-10M

(by Joe Scacciaferro and Steve DeFuria, 143 pages, $14.95)



By Patrick Houlihan

The owner's manual for a piece of equipment should do more than just outline basic operating procedures; it should convey enough data to ensure that the equipment's effectiveness is limited only by design factors and the user's imagination—not by a lack of information. The manual included with Casio's FZ-1 sampler fails to do this. For example, while the FZ-1 has the rather amazing ability to hold up to 63 copies of a sample without using any additional memory, the manual unfortunately mentions neither this fact, nor the fact that each copy of a sample has its own data values and can be assigned to a different velocity level and/or different MIDI channel.

According to some people at Casio's U.S. headquarters, the need for a supplementary book was apparent as soon as the FZ-1 hit the market. The result, written with Casio's encouragement and assistance, is *The Casio FZ-1 and FZ-10M* by Joe Scacciaferro and Steve DeFuria. (The FZ-10M is Casio's new rackmount sampler.) The authors provide in-depth discussion of applications and basic information not covered in Casio's manual, yet avoid duplication of material Casio *does* cover.

Part one is an excellent introduction to sampling. (It has already found its way into the electronic music course I teach.) The remainder of the book deals specifically with the FZ, primarily with resampling, voice editing, and bank editing features. The insights to the FZ's unique ability to use up to eight loops per voice are particularly valuable, and there's some well-written advice on setting loop lengths and tuning short loops.

Casio FZ-1 & FZ-10M

The FZ's bank editing capabilities make it an incredibly versatile machine, but neither the manual nor most of the available sample disks even hint at this potential. Scacciaferro and DeFuria explain both the FZ-1's complex layering capabilities and how to use different MIDI channels within a bank. Probably the FZ's most powerful and most overlooked feature is its use of velocity to control more than *100* parameters, including loop points, LFO modulation, tuning, and the number of steps in an envelope. The four-page description of these features is required reading for anyone interested in FZ programming.

The book includes 28 hands-on experiments, aimed particularly at those new to sampling, that illustrate the points made in the text. (However, I would have welcomed some advanced experiments, perhaps using the sample disks Casio supplies with the FZ.)

This book fills an enormous need and I recommend it to any FZ-1 owner—beginner or experienced musician—who wants to get the most out of the instrument. Even if you've already discovered some of the "secrets" left out of Casio's manual, this book will undoubtedly spur you on to some new creative applications.

***Patrick Houlihan** is a composer and teaches music theory and electronics at Mississippi Valley State University.*

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EM

Digitech's DSP-128 Digital Effects Signal Processor

Here's a unit that promises a lot—and delivers a lot, too. But what kind of compromises were necessary when trying to design a champagne signal processor on a beer budget?

BY JIM JOHNSON

Digitech's new DSP-128 signal processor is another "quiet miracle" brought about by the current revolution in VLSI musical technology. This signal processor is a classic example of a positive trend that started in the last year or so and will hopefully continue for a while: very inexpensive digital audio equipment with specs exceeding those of all but the most expensive studio gear of just a few years back. As such, the DSP-128 has a lot to offer the average musician who may be looking for plate reverb on a spring reverb budget (to use two happily antiquated terms). Yet, it's also afflicted by a few "cut corners" that are typical of low-cost instruments. Will it help in your studio? My guess is yes—but please, don't take my word for it (at least, not until you've finished the review).

In a nutshell, the DSP-128 is a 16-bit stereo signal processor with 17 different effects algorithms, each of which is a combination of two or more effects. Each of the 128 programs can be selected with MIDI Program Change messages, and individual parameters are set with continuous controller messages.

With features like these, comparisons with Yamaha's SPX90 come naturally; so even though this isn't a comparison review, I will use the SPX90—pretty much the de facto standard in affordable digital effects units, and costing roughly twice as much—as a reference when discussing the DSP-128.

THE EFFECTS

The effects algorithms in a box like this are probably the single most important factor in determining its usefulness. As you can see from the listing of effects algorithms in the sidebar, the DSP-128's effects are pretty much "meat and potato" effects—delay, flanging, reverb, and chorusing in various combinations. This may disappoint some who like the more exotic effects obtainable with the SPX90—pitch shifting, parametric EQ, and "freeze"—but with the DSP-128 you can

use up to three of these effects *together*. No longer will you have to decide whether to use echo or flanging on a particular instrument—with this box, you can do both.

The quality of all the effects are top notch. Some parameters can only be adjusted in a few large increments (such as the low-pass filter, which only has ten settings, from 400 Hz to 12 kHz), while others have much finer control (delay time, for example, is adjustable in one millisecond increments from 0 to 1.8 seconds). The chorusing is especially silky, and the incorporation of delay and reverb in some of the chorusing algorithms allows the creation of incredibly rich string pads using "so-so" string patches. The flanging algorithms are quite versatile and can create a subtle, watery ambience or a nasty, buzzsaw effect with equal ease. Of the two special effects, I found the "bounce" algorithm (an echo that accelerates as it dies away) to be quite cute, but of limited overall usefulness. The "stereo imaging" algorithm is a little subtle for someone like me (who likes to be kicked in the face by an effects device), but will be especially handy for those looking for a unique way to spice up a vocal track. The multi-tap delay, which places successive echoes in the left, right, and center of the stereo field, is the kind of thing that sets sequencer-oriented musicians to uncontrolled giggling.

INS AND OUTS

Like most of the effects devices in its class, the DSP-128 is a pseudo-stereo device—the stereo image is maintained in the dry portion of the output, and many of the effects feature stereo output processing (such as the multi-tap delay algorithm mentioned earlier); however, the signal processor itself operates on a mono mix of the two input signals. Again, this is typical for effects processors of this type, but since Digitech doesn't really stress this in their advertising, it's worth mentioning here.

On the back panel, there are two input jacks, two dry output jacks, and two mix output jacks. The inputs and outputs use stereo ¼-inch plugs for balanced connections, but plugging in standard mono plugs converts these into unbalanced connections. The back panel also has two level switches (+4 dBm or -20 dBm) for the inputs and outputs—a nice touch which, in combination with the balanced/unbalanced jacks, means you should have no trouble at all hooking the unit into your system.

THE FRONT PANEL AND PROGRAMMING

The front panel contains a minimum of controls, as expected on today's effects units. Along with four programming but-

FOR THE BEGINNER

The Importance of Reverberation

When we hear a musical instrument, it is usually in the context of an acoustical space—a room or concert hall, for example. Therefore, we hear not just the sound of the instrument, but the interaction of the instrument's sounds with the room. Some sound waves are absorbed by the listening environment, some bounce off the walls and reach our ears shortly after we hear the primary sound waves generated directly by the instrument, and so on. The effect created by having sounds interact with a room is called reverberation.

Many recording studios are designed specifically to be acoustically "dead" in order to capture the most accurate instrument sound possible and minimize room interaction. However, this creates an overall sound that, since we are so used to hearing sounds in an acoustical space, often seems lifeless and dry. To solve this problem, most studios use signal processing equipment to add artificial reverberation. An additional bonus is that modern digital signal processors can create a variety of alterable room sounds, from a tiny closet to a massive cathedral.

Signal processors can also create special effects that have no counterpart in nature—echoes that speed up or slow down, for example. The DSP-128 is one of a new breed of signal processors that provides standard reverberation effects as well as special effects, and what's more, can do both simultaneously. —*Craig Anderton*

tons, there are three knobs (one each for input level, output level, and mix), a four-digit LED numeric display, and 12 LEDs that show the currently selected effects. Programming the DSP-128 is somewhat tougher than programming similar units, simply because of the paucity of controls, but is not as tough as programming some other devices that I've complained about in these pages.

Each effect algorithm has between three and 11 programmable parameters. Strangely enough, there is no "edit buffer" in the DSP-128—any changes you make are immediately stored in the preset you're editing, so there is no way to compare an edited program with the original. Programs can be easily copied from one location to another, though, and with 128 slots available, the lack of an edit buffer shouldn't be much of a problem. My only real complaint about the DSP's programming is that the output mix is not programmable. This critical parameter (which *is* programmable on the SPX90) must be set by hand for each program, which can be cumbersome if you're using the DSP as a dedicated processor for a single instrument. If you place this device in the effects loop of a mixing board, though, this limitation may not be important; on many of the multi-effects algorithms, it is possible to set the output level for each of the various effects, so you can kluge up a programmable output mix in this way. Still, I would prefer a fully programmable mix. (According to a Digitech representative, adding this feature would have required the use of digitally controlled analog circuitry, which would have raised the price of the box considerably.)

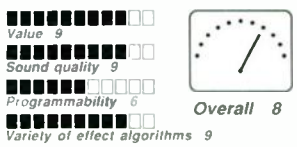
Another problem with this machine, which some may consider to be a very serious flaw yet others may not find problematic at all, is the amount of time it takes to switch programs. After selecting a new program, either from the front panel or through MIDI, the DSP-128 does nothing for about a half a second, then it switches to the straight (unprocessed) sound for an instant, then it finally settles into the new program. Other boxes of this type usually put out some kind of

The DSP-128's Effects Algorithms

Algorithm	Effects
1	Small Room, Delay, Filter
2	Medium Room, Delay, Filter
3	Large Room, Delay, Filter
4	Gated Reverb, Filter
5	Reverse Reverb, Filter
6	Delay, Filter
7	Multi-tap, Filter
8	Chorus, Delay, Filter
9	Flange, Delay, Filter
10	Hall, Filter
11	Live Medium Room, Filter
12	Live Large Room, Filter
13	Multi-tap, Reverse Reverb, Filter
14	Medium Room, Delay, Chorus
15	Large Room, Delay, Chorus
16	Bounce, Filter
17	Stereo Image, Filter

PRODUCT SUMMARY

Product:
DSP-128
Type:
MIDI-controlled multi-effects processor
List Price:
$425
Manufacturer:
Digitech
5639 South Riley Lane
Salt Lake City, Utah 84107
tel. (801) 268-8400



click if you switch programs while a signal is passing through the device, but in this case, it's more than a simple click. There is no way you'll be able to change programs during a mix with this machine, unless you can mute the output (either by pulling down a fader, or with a MIDI-controlled mixer) during the change.

DID SOMEONE SAY MIDI?

Yes, the DSP-128 does have a trio of MIDI jacks on the back (In, Out, and Thru), along with a rather unusual MIDI implementation. Any of the unit's 128 programs can be called up with a MIDI Program Change, as mentioned; and the DSP-128 can receive on any channel, all channels (Omni mode), or none. In addition, any or all of the DSP-128's parameters may be assigned to a MIDI continuous controller for remote control by an external MIDI device. Now, before you get all excited about "real-time MIDI control" and rush out to buy one of these things, with visions of using aftertouch or modulation wheel to change reverb pre-delay, I need to point out that this feature functions in a very limited way and is not well-suited to real-time control. The problems? First of all, the controller assignments are global—if you assign (for example) reverb amount to the mod wheel, that assignment holds for all 128 programs that contain reverb (if the program doesn't contain reverb, then the assignment doesn't affect the sound). Second, the controller value is not added to or subtracted from the programmed value for the assigned parameter; it simply replaces the programmed value. Finally, the device makes nasty glitching sounds when some of the parameters are changed in this way (delay time in particular), though some change quite smoothly (feedback, for instance). So what good is this feature, you ask? For the sequencer user who is rapidly running out of MIDI channels (as most of us are), this makes it possible to send "program changes" that consist of nothing but a string of continuous controller messages on the same channel as some other device (such as a typical drum machine) that does not receive controller messages, but *does* receive MIDI notes and patch changes. Admittedly, this is a little clumsy, but for the MIDI musician on a budget, anything that conserves MIDI channels without the need for an expensive second MIDI output on the computer is welcome.

On a more prosaic level, the DSP-128 will dump its entire memory on receipt of a dump command, or dumps can be initiated manually from the front panel. Memory dumps only require about 3,000 bytes of memory, and no handshaking is used, so you can use any generic dump program to store this data. Alas, there are no hidden user-accessible System Exclusive codes.

CONCLUSIONS

The competition in the inexpensive effects arena is starting to heat up. Some of these products are stunning, some are dogs, and most fall somewhere in the middle. While the DSP-128 is not the perfect effects unit, it definitely falls in the upper levels of this category. For those who need multiple effects simultaneously, and don't want to tie up a lot of money in effects boxes, the DSP-128 is a good choice.

One final note: you may have noticed that the price listed in this article is a tad higher than then one Digitech has been quoting in their ads. According to their representative, this reflects a "worldwide increase" in the price of memory chips, so we can probably expect to see such increases in many MIDI products in the next year. Ah, well. **EM**

Until very recently, ***Jim Johnson*** *was an engineer drone for a major electronics company. Then the example set by Craig Anderton convinced him to toss it all away for the freewheeling life of a freelance musician/writer/programmer. Currently, Jim is still saving for that new pair of shoes.*

Alesis

MMT-8 Sequencer

Alesis brought affordability and quality to drum machines and digital reverbs. But this time it's real time, and it's no surprise that sequencers were the next step in their program.

BY NEIL MCKAMEY

A lot of people might think that buying a sophisticated MIDI sequencer means shelling out three months' rent money for a computer/software combination—or maybe just *two* months' worth for a big-name hardware sequencer. The Alesis MMT-8 is a dedicated unit that completely rewrites the rules of the sequencer game. In terms of what users can expect to get for their money, the MMT-8 is easy to learn and use, has extensive recording, editing and performing capabilities, and carries a list price of just $299. The unit has a wide range of features, but beyond that, its real value is in its *depth*. Like any well-thought-out product, this one has many hidden creative applications waiting to be discovered by the user who takes the time to find them.

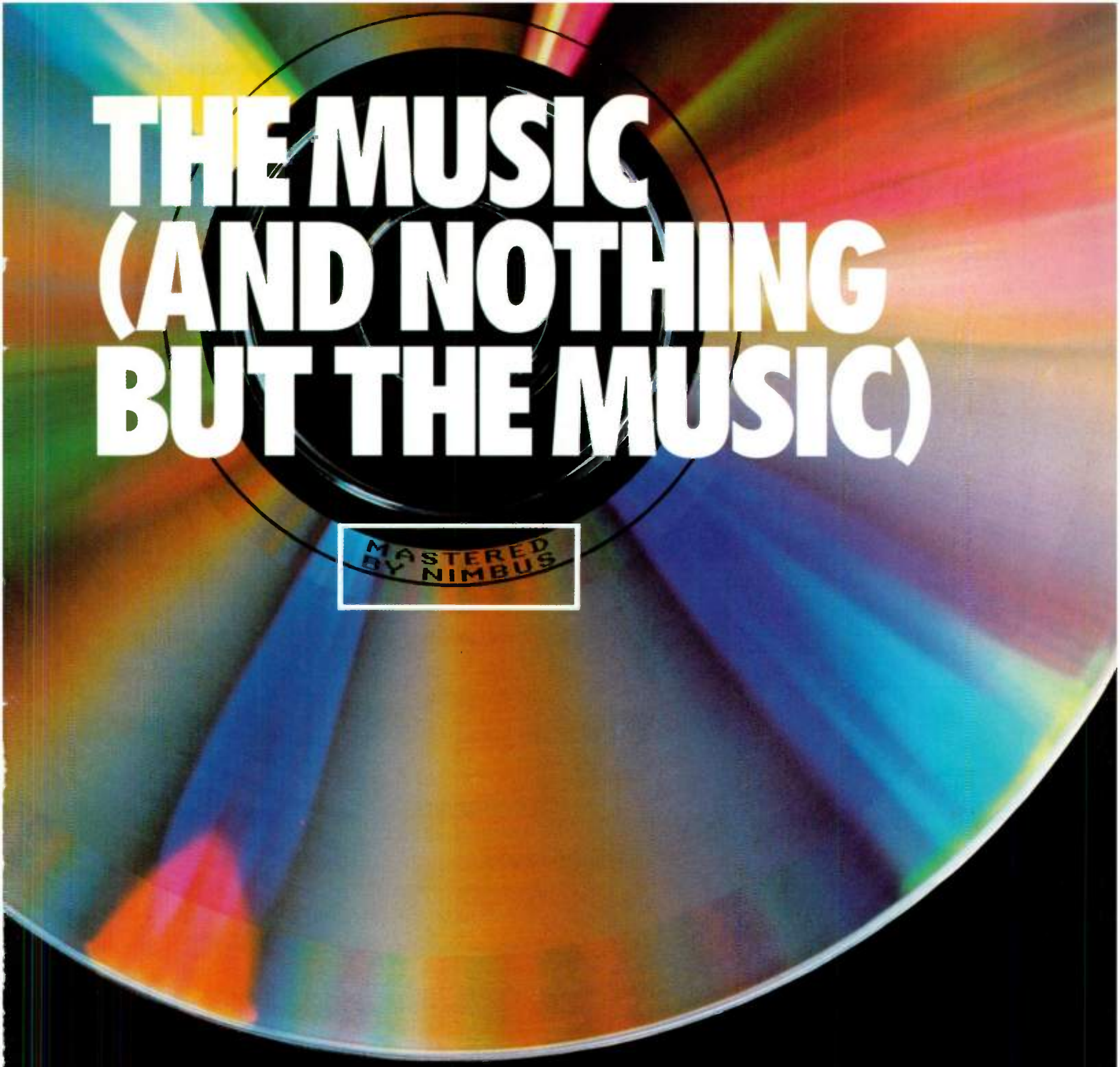
THE USER INTERFACE

Alesis gets high marks in this department. Sequencers are often confusing, and the easy way out—the one taken by many electronic music manufacturers—is to view functional complexity and ease of use as mutually exclusive. Alesis has shown it has the vision not to accept that limitation; the MMT-8 is both comprehensive in its functions *and* easy to use.

The MMT-8's front panel has five groups of buttons and a 32-character, backlit LCD. The buttons are grouped functionally, so the 45 front panel buttons don't create the confusing morass you might expect.

The unit's eight *track select* buttons select which tracks will be active while you're recording, playing, or editing data. Another group of buttons emulates the transport controls of a standard tape recorder. A third group accesses such overall settings as Clock Mode, Click Mode, Tempo, MIDI Data Filter, Loop Play, and MIDI Echo (not to be confused with MIDI delay, this feature is more like a software MIDI Thru). A fourth group of buttons is for data entry and editing (0-9 digit keys, +, -, page up, page down). The fifth group contains the controls that sculpt raw MIDI recordings into finished performances: Edit, Quantize, Copy, Transpose and so on.

The uses of all these buttons became remarkably self-explanatory once I began working with the MMT-8. There is enough consistency here that, having learned a



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few of the buttons' functions, the rest worked exactly as I expected. Alesis has built an extensive pop-up reference card into the front panel, but after using the MMT-8 for 30 minutes, I never needed to look at it again.

The 32-character display is the biggest—and very nearly the sole—inconvenience of the MMT-8's design. In edit mode, only one MIDI event (out of the 10,000 the machine can store) is displayed at a time. Editing complicated sequences using this display can be like editing on a word processor that shows only one word at a time, so if you're long on editing needs and short on patience, consider yourself warned. Unfortunately, it's difficult to see how Alesis could have avoided this without substantially increasing the price of the unit. One thing Alesis *could* do towards making the small display more useable would be to allow the insertion of comments pages at specifiable locations in a track. This would facilitate keeping track of operational status while in the edit mode. In addition, this would permit the user to name programs, identify Program Change commands, and annotate MIDI controller data to distinguish, for example, filter changes from sustain pedal commands. So how about it, Alesis?

RECORDING AND PLAYING

There's no need to describe the recording and playing procedures here: if you can use a cassette deck, you already know how to record and play with the MMT-8. It's really that simple. In fact, I found the operation of the MMT-8 to be easier and quicker than any software sequencer I've used.

The MMT-8 can record (and insert, edit, filter, and delete) Note On/Off, Aftertouch, Program Change, Pitch Bend, Breath Control, mod wheel changes, filter cutoff and sustain pedal data and, for most MIDI devices, System Exclusive data. Although the folks at Alesis tried the unit out with System Exclusives from all the major synths, I found that the Sys Ex data from my Chroma Polaris (a slightly quirky synthesizer from the early days of MIDI) crashed the MMT-8, causing it to lose all its memory. This was not a pretty sight after an evening's worth of painstaking sequence editing. So if you've got an off-the-beaten-path synth, take it down to the store and try it out before buying if you plan to record Sys Ex data. The MMT-8 will *not* record polyphonic aftertouch, MIDI Mode Change commands, tuning requests, or Note Off velocity. These are not particularly missed, since few MIDI devices are capable of sending or receiving them anyway.

The MMT-8 allows you to record parts—a track at a time—and then assemble the parts into songs. This resembles the way drum machines generally work, where you record a number of rhythmic patterns, and combine them into songs. An MMT-8 "part" is a passage of musical information of up to 682 beats. The MIDI events that make up a part can occur on any of the 16 MIDI channels and can be distributed in any way over the eight tracks.

Alesis has neatly sidestepped the always-sticky problem of time signatures by entirely eliminating measures as a unit. Parts are only divided into beats (which are assumed to be quarter notes) and sub-beats, which can take some getting used to for those of us who have spent our entire musical lives counting measures to keep track of where we are in a piece of music. Part lengths can be changed at any time by adding or removing beats at the beginning or end of a part.

The song modes on most sequencers are fairly similar, and as they go, the MMT-8's is a pretty good one. It is easy to assemble songs, and the option of mut-

PRODUCT SUMMARY

Product Name:
MMT-8 Multi-Track MIDI Recorder
Type:
Hardware MIDI sequencer
Retail price:
$299
Main Features:
Records and plays notes, Aftertouch, Pitch Bend, Program Change, MIDI controllers, and System Exclusive data on 16 MIDI channels. Eight tracks. Full editing capabilities.
Manufacturer:
Alesis
PO Box 3908
Los Angeles, CA 90078
tel. (213) 467-8000

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MACINTOSH

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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 EII Sound Designer
Seq Prophet Sound Designer
Ensoniq Mirage Sound Des.
Korg DSS1 Sound Designer
Akai S900 Sound Designer
EMAX Sound Designer
Universal Sound Designer
SoftSynth
Q-Sheet
Lexicon PCM70 Ed/Lib.
Turbosynth

DR. T
KCS Sequencer
Roland D-50

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OPCODE
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Casio CZ/RZ Lib.
Cue 2.0
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Ensoniq ESQ-1 Ed/Lib.
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Timecode Machine
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Yamaha FB01
Yamaha SPX-90 Ed/Lib.
Yamaha TX81Z Ed/Lib.

PASSPORT
Midi Interface
Master Tracks Pro
Master Tracks Jr.
Midi Transport

SONUS
Yamaha 7th Heaven
Yamaha DMP7 Pro
Yamaha FB01 Pro
MacFace Interface
SMX-2000
Yamaha TX802 Pro

SOUTHWORTH
Jambox/2
Jambox/4
Midipaint Sequencer

ATARI ST

DIGIDESIGN
Softsynth

DR. T
Casio CZ Patch Ed/Lib.
The Copyist
Roland D-50 Ed/Lib.
Yamaha DX-Heaven
Ensoniq ESQ-Apade Ed/Lib.
Kawai K3
KCS 1.6 with P.V.G.
Korg DP 2000 Ed/Lib.
Korg DS-8 Ed/Lib.
Lexicon PCM-70 Ed/Lib.
Matrix 6 Ed/Lib.
Midi Recording Studio
Roland MT-32 Ed/Lib.

DRUMWARE
Akai S 612 Soundfiler
Akai S 900 Soundfiler
Akai X 700 Soundfiler
Genwave

HYBRID ARTS
Casio CZ Android
Yamaha DX Android
EZ Score Plus
EZ Track
GenPatch
MidiPlexor
Ensoniq Mirage Oasis
SMPTE Track
SYNC Track

INTELLIGENT MUSIC
M

PASSPORT DESIGNS
Master Tracks Pro
Master Tracks Jr.

SONUS
Roland D-50 Design
Live Performance
Masterpiece Sequencer
Midi Plus Port "B"
Ensoniq Mirage Editor
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 Syncbox

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
Score
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
Mesa

SONUS
CakeWalk Live
CakeWalk Sequencer
Yamaha DX-TX Design
Ensoniq ESQ-1 Design
Yamaha TX-81Z Design

VOYETRA
OP4000 Interface
OP4001 Interface
Patchmaster Plus
Sequencer Plus MK I
Sequencer Plus MK II
Sequencer Plus MK III

APPLE IIe, IIc, and GS

DR. T
KCS Sequencer
Yamaha DX

PASSPORT
Midi Interface
Master Tracks
Polywriter

SONUS
Interface
DX Design
Glass Tracks
Personal Musician
Super Sequencer

COMMODORE C-64/128

DR. T
KCS Sequencer
Yamaha 4 OP Deluxe

PASSPORT
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WRH

ing any of the tracks during any iteration of a particular part is a nice touch.

EIGHT TRACKS OR SIXTEEN?

The MMT-8 is billed as an 8-track MIDI recorder. This is deceiving, as it brings to mind comparisons to 8-track tape recorders. The multi-track tape recorder to which it is more analogous is a 16-track: one track for each possible MIDI channel. This is because on playback, the 16 MIDI channels become 16 functionally distinct

Much of the power of sequencers comes from the global editing features they offer, and the MMT-8 is no exception.

streams of information, each capable of controlling a different MIDI device (synth, sampler, mixer, effects processor, drum machine, etc.). What the eight tracks of the MMT-8 amount to are eight simultaneous *workspaces*, each containing data from any of the MIDI channels. Most of the functions operate on one track at a time. You can specify by track which data to play, record, erase, quantize, copy, filter and more. Using the tracks as workspaces, all 16 channels can be manipulated independently using the Merge function and a combination of the channel-filtered Copy and selective Erase functions (which, when used together, work exactly like an unmerge function). Just merge the MIDI channels you're not currently editing into one track of the MMT-8, leaving seven tracks open as workspaces.

MIDI guitarists whose controllers operate in Mono mode (simultaneously generating data over six MIDI channels) will be pleased to know that the MMT-8 can record data from several MIDI channels onto a single track. If desired, this data can be "unmerged" using the MMT-8's

Copy function, and assigned to different sequencer tracks for additional editing and creative manipulation.

SYNC OPTIONS

The MMT-8's clock can be either the master (sending sync data over MIDI and/or to tape) or it can be synched to MIDI or a tape sync track. Although at first I had some difficulty matching the MMT-8's fixed output level to the input level required by my 4-track cassette recorder, synchronization worked like a charm once I figured out the proper tape deck level adjustments. Using the MMT-8 with a 4-track and tape sync is like having four times as many synths—you'll be amazed at how much music you can get out of your setup. If you don't want to have to start from the top of a song each time you sync up (which is the case when using tape sync), the MMT-8 can respond to Song Pointer messages issued by a sequencer or drum machine, SMPTE-to-MIDI converter, or sync-to-tape device such as the J.L. Cooper PPS-1, Harmony Systems MTS-1, or Tascam MTS-30.

EDITING

In edit mode, the MMT-8 can access every parameter of every MIDI event it records. You can move the events in time, insert or delete them, or alter any of their parameter values. For example, for any note you've recorded or inserted you could change the note number, duration, initial velocity and/or MIDI channel. The MMT-8's display shows one MIDI event at a time; pressing the Fast Forward or Rewind button brings the next or previous event into view. Holding either button down scrolls the screen rapidly through individual MIDI events just slowly enough so you can follow the events that are going by.

Much of the power of sequencers comes from the global editing features they offer, and the MMT-8 is no exception. In addition, its features can be combined to give a wide range of useful options. One of the most versatile functions is the Copy command. A song can be copied to another song, one or more tracks of a part can be copied to another part, a part can be tacked onto the end of another part, or a track can be copied to another track within a part (the crafty user will be able to figure out even more permutations). When executing each copy, you have the option of selectively copying only certain types of information from a track: you can copy only Note On/Off events or only data on a particular MIDI channel, or you can filter out System Exclusive, Aftertouch, or continuous controller information as you execute the copy.

For those of us born without a natural sense of rhythm, the MMT-8 allows quantizing (auto-correction) of note timing in four different flavors: Note On (Note On changes, Note Off remains at its original position); Note On and Note Off (both Note On and Note Off are quantized to the selected rhythmic value); Note Off (Note On remains at its original position, but Note Off is quantized); and Note On with preservation of note length (Note On is quantized, and Note Off is shifted as appropriate to preserve the note length). I expect that most people will find that the first suits their needs and will never even try the latter three, but it's nice to have the option. The quantizing

resolution is selectable in ten steps, from a half note to 1/64th of a beat.

DATA STORAGE

The MMT-8 can store about 10,000 notes if there's no controller data. Controller data can use up memory space much faster than note data, so whether or not this is enough memory for your applications is something you'll have to decide for yourself. I would guess that for most people's purposes it will be enough (it is for mine). Those of you who gravitate towards lengthy, note-filled compositions, or who use an especially large amount of controller data (such as MIDI wind controller players or MIDI guitarists) should consider your requirements carefully before buying. You need worry only about the memory space that will be taken up by the song on which you're currently working, since the MMT-8 can store and retrieve data to and from tape. Using tape is slower than floppy disk storage, but if you've got the extra two minutes, tape storage works just as well. (Tape storage is also convenient for storing the MMT-8 data at the head of a multi-track master.) For those who *must* have disk storage, the MMT-8 can save its memory over MIDI. So if you have a MIDI data filer program for that dusty old computer you once used for sequencing, a stand-alone filing device like the Yamaha MDF1, or any of the several instruments (Yamaha DX7IIFD, Ensoniq SQ-80 or EPS, Mirage with appropriate software, etc.) that can record Sys Ex data to disk, you can have disk storage capability.

There are quite a few features I haven't discussed, such as the options for note transposition, MIDI channel revision, and track merging. A painstaking exposition of each and every feature built into the MMT-8 would be misleading, though, because it would appear to define the boundaries of what the machine can do. In reality, with a little patience and thought, the MMT-8 can be coaxed into doing many surprising things. Here are some examples just to give you an idea of the possibilities.

LOCALIZED QUANTIZING

Suppose you have recorded a 100-beat passage that you would like to quantize. The passage is primarily made up of eighth-note figures, but right in the middle are 32 beats of eighth-note triplets. The smallest block of notes that can be quantized in one shot is a single track of a single part, but quantizing the entire part to eighth notes will destroy the triplets, and quantizing to eighth-note triplets will destroy the regular eighth notes. Luckily, there's a way to get around this. To quantize a shorter musical segment, split the part into smaller parts by making copies of it and then truncating the beginnings and ends of the copies with the Part Length function until the shortened copies together add up to the original part. Quantizing can then be done to the new shorter parts, and afterwards the shorter parts can be chained back together into a single part using the Copy function.

THE FEEL FACTOR

To compensate for timing inconsistencies caused by MIDI delays or aberrant response times of different synthesizers, Alesis has included the option, during playback, of shifting any of the eight tracks forward or backward relative to the other tracks in increments of 1/96th of a beat. This should make a light go on in the heads of regular readers of EM who have been following the running discussion of putting "feel" into sequenced music. Much of the "naturalness" and "groove" of live music can be re-created by shifting certain instruments, such as snare drum or bass, around the beat by very small amounts. This may be one of the discoveries that brings electronic music to life, so don't hesitate to experiment with the track-shifting feature even if you have no MIDI delay or triggering problems. For more of the theory behind track-shifting for "feel," see the October '87 and March '88 issues of EM.

INCREASED TIMING RESOLUTION

The timing resolution of the MMT-8 is 1/96th of a beat (96 pulses per quarter note), which exceeds that of many other hardware sequencers whose resolution is often 24 or 48 ppqn. For some people with very exacting needs this may not be enough (some software-based sequencers have resolutions of up to 1/768th of a beat). To increase the timing resolution

of the MMT-8, simply double the clock rate (tempo) while recording, and set the metronome (which serves as a timing reference) to click only once every two beats. What used to be treated as two beats can now be treated as one beat, giving an effective timing resolution of 1/192nd of a beat. Since the maximum length of a part is 682 beats, redefining two beats as one beat means that the longest part that can be recorded is 341 beats. The total number of notes that can be recorded is not diminished, but a long performance may have to be broken up into shorter passages for recording and strung together later as a song.

PATCH LIBRARIAN

Some older MIDI synths do not have memory cartridges, cards or disks for extra patch storage. Most of these have tape memory storage, but loading patches from tape can be quite time-consuming. Using System Exclusive, these same synths can save and retrieve their memories over MIDI in a fraction of that time. To save this data into the MMT-8, put it in Record mode and initiate your synth's MIDI program save (dump) routine. Playing back the part you've just recorded will now load patch data back into your synth (assuming it is set for program load). The MMT-8 allows up to 100 different parts to be recorded and individually named—much more than you'll probably ever need—so don't be afraid to use lots of named parts for patch storage. Recording patches in banks of eight related patches per part with one patch on each track will use up only 20 parts to store 160 patches, leaving 80 parts for musical passages. The row of track select buttons then becomes a row of patch select buttons!

CONCLUSIONS

I wouldn't describe the difference between the MMT-8 and a computer-based sequencer in terms of what either one can or can't do (there's not much difference), but in terms of where each one is at its best. The MMT-8 is faster and simpler for the basic record and play functions, but a computer-based sequencer with graphic editing capabilities will always be less taxing to edit than the MMT-8. A computer is not nearly as portable, roadworthy, or easy to set up as the MMT-8, but has the MMT-8 licked as far as memory capacity and loading time from storage. And of course you can't write letters or file recipes on the MMT-8. But at this price, I think a lot of smart people will rush out and buy MMT-8s, if for no other reason than to have a sequencer that can get "on the air" quickly when creative ideas need to be captured. Alesis deserves praise for a job well done. **EM**

Neil McKamey spends his time reading, making music, and pondering such questions as "Why are we here?", "Where did we come from?", "Where did I leave my keys?", and "What is that thing growing in the back of my fridge?". He currently lives in San Francisco and works on the staff of EM *and* Mix *magazines.*

Soundprocess
Software for the Mirage

So you own a Mirage, but you've been seduced by some hot new synth. And now, to finance a small portion of your new *inamorata*, you're thinking about selling the old workhorse. Well, don't make a move until you read this.

BY CARTER SCHOLZ

Open your jaded eyes. Under that patina of age and despite its quotidian familiarity, your faithful old Mirage or Mirage DSK *is* a hot new synth. A small company called Triton has released *Soundprocess* for the Ensoniq Mirage and its rack-mount cousin, the DMS. It turns old faithful into a true multi-timbral, user-tunable synthesizer with 48-voice memory, 32 dynamically assigned instruments and eight-voice polyphony. Each of the eight voices uses four oscillators (which can draw on up to 72 different wavesamples and waveforms resident in memory), two DCAs and one VCF (each with separate ADSR envelopes), and an LFO. Finally, all this stuff can be patched together in a variety of ways.

How is it that the Mirage, a renowned low-budget sampler, can turn into a synthesizer? I'll let Triton tell it: "Your Mirage is a computer. When you load in an operating system (like MASOS), its instructions tell your Mirage exactly what it's supposed to do. Soundprocess is a new set of instructions. By defining a completely new voice architecture, your Mirage can now play 48 memory-resident multi-timbral sounds."

If you're familiar with the *Transoniq Hacker* (an excellent publication for adventurous Ensoniq owners), you already know your Mirage is a computer. The *Hacker* has published several alternative operating systems for the Mirage that enable functions Ensoniq never intended, but to my knowledge, Soundprocess is the most complete rewrite of the system to date. By taking control of the Ensoniq's sound chips at the lowest level and putting them together in a more general architecture, different from Ensoniq's original sampling schema, the Mirage is transformed into an entirely new instrument —not just an extension of its former self.

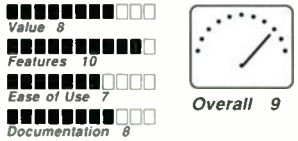
THE VOICE ARCHITECTURE

Fig. 1 shows the structure of a Soundprocess voice (or "patch," as they call it). It's standard subtractive synthesis, done digitally, except that the oscillators have a wealth of waveforms available, including samples. You define a wave (by setting the levels of its first ten Fourier components), or you load wavesamples from standard MASOS disks and tell an oscillator how you want it to play back its waveform: continuously (as an analog oscillator would); looping (through a marked section of the wave); one-shot (playing it just once, beginning to end); or timed retrigger (play it once, pause, repeat). A pair of oscillators can be hooked together in one of eleven "algorithms" (**Fig. 2**). Two oscillator pairs, with two DCAs and one VCF, make up a patch. The LFO default waveform is a sine, but via MIDI you can download any user-defined 256-point waveform to replace it.

Patches are then combined to make *programs* where you can set up keyboard splits and the like. Six patches can be split (but not layered) across the keyboard in one program. Programs also store multi-timbral information, i.e., which patches

PRODUCT SUMMARY

Product:
Soundprocess
Type:
Operating system for Ensoniq Mirage and DMS
Retail price:
$245
Features:
Eight-voice multi-timbral, fully programmable digital synthesis (four oscillators, two DCAs, and one VCA per voice), and user-definable tunings.
Manufacturer:
Triton
PO Box 395
Grand Island, NY 14072
tel. (716) 773-4085



respond on which MIDI channels. You can set "MIDI overflow" on, so that if you have a second Mirage, and your master unit is already sounding eight notes, additional notes will be passed on to the slave.

Now, you can't just load in your favorite sample and expect to get it playing multi-timbrally with seven other sounds; there isn't enough memory in the Mirage for that. You'll have to spend some time figuring out how best to use memory to craft the sounds you want. Soundprocess offers 72 places to store waveforms: 56 for waves, and 16 for wavesamples. Waves defined by Fourier component are all one page (a 256-byte unit in the Mirage's memory) long. Waves loaded from a MASOS disk can be one, two, or four pages long. (Longer ones obviously use more than one wave slot.) Wavesamples loaded from MASOS can be either 16 or 32 pages long. Since there are eight slots for each length, the longest "sampled" wave you can play will be 64 pages long: two 32-page wavesamples using algorithms 5, 6, 10, or 11. The trick is to break the habit of thinking of the Mirage as a sampler. Use the "samples" as an expanded palette of sounds, and play, for example, a wavesample of a flute "chiff" at the start of a simpler looped wave to give the sound more character.

Digital electronics removes all the practical barriers to alternate tunings, and it's a mark of extreme conservatism that only a few manufacturers have offered the option.

USING IT

Triton has done everything possible to make Soundprocess easy to use. But they're stuck with that damnable Mirage keypad and two-character display, so programming a patch is time-consuming and tedious at best, and the lack of an edit buffer for making temporary changes to a patch is a bummer. Like the Mirage itself, Soundprocess cries out for a good computer editing program. Fortunately, the manual includes all the details of a very good System Exclusive implementation—you *can* access all the programming parameters over MIDI, and I'm sure that some enterprising hacker is already at work on a Soundprocess voice editor.

The manual is lucid, with helpful diagrams and adequate text. It took me a couple of passes through the terse, reference manual style to "get" the way the architecture really worked, but the information is all there. A few by-the-numbers patch programming examples, starting from one of the supplied patches, would be a welcome addition.

If you don't want to dive into programming right off, you can use the 32 programs that Triton provides on the disk, which include some very nice sounds. Of the 32, I have 14 marked as "usable," and for a tough customer like myself, who usually finds about 10% of any given synth library "usable," that's remarkable. A few of these are splits, including a six-way drum kit that's as good as any of the sampled Mirage drums I've heard. The familiar digital grunge on many Mirage sounds is present in some cases, but that's the fault of the Ensoniq's eight-bit architecture. Some of the sounds are stunning—the piano on my beta-version library disk is just as good as the well-known Mirage piano. Triton is actively producing a library of sounds on disk (three banks of 32 sounds), which they plan to make available to Soundprocess owners at a nominal cost.

Triton also sells a $10 demo disk which will boot your Mirage with 32 Soundprocess programs. You can't play them multi-timbrally, and you can't do any programming, but it's a good, cheap way to get some new and different sounds out of your Mirage and to get a taste of what Soundprocess is about. By the way, Triton also provides a backup disk in the package—none of this "send us another $10" garbage so prevalent in the industry.

THE USER TUNINGS LECTURE

Triton can access the Mirage's tuning tables; although this feature is hidden back in the manual's appendix, at least it's there. Now I may be weird—pardon a brief lecture here—but I find it unbelievable that most manufacturers stick a user with 12-tone equal temperament as the only tuning option on an electronic instrument. A forte of electronic instruments, and one of the best reasons for using them, is that they can provide effortless, immediate, accurate, and stable retuning at any moment. Traditionally, musicians have experimented with tunings throughout history, and it's only recently, with the advent of the modern grand piano and the large symphonic orchestra, that it became too much of a pain in the neck and everyone settled on a single standard. Digital electronics removes all the practical barriers associated with retuning, and I find it a mark of extreme conservatism that only a few manufacturers so far have offered the option. So kudos to Triton for recognizing

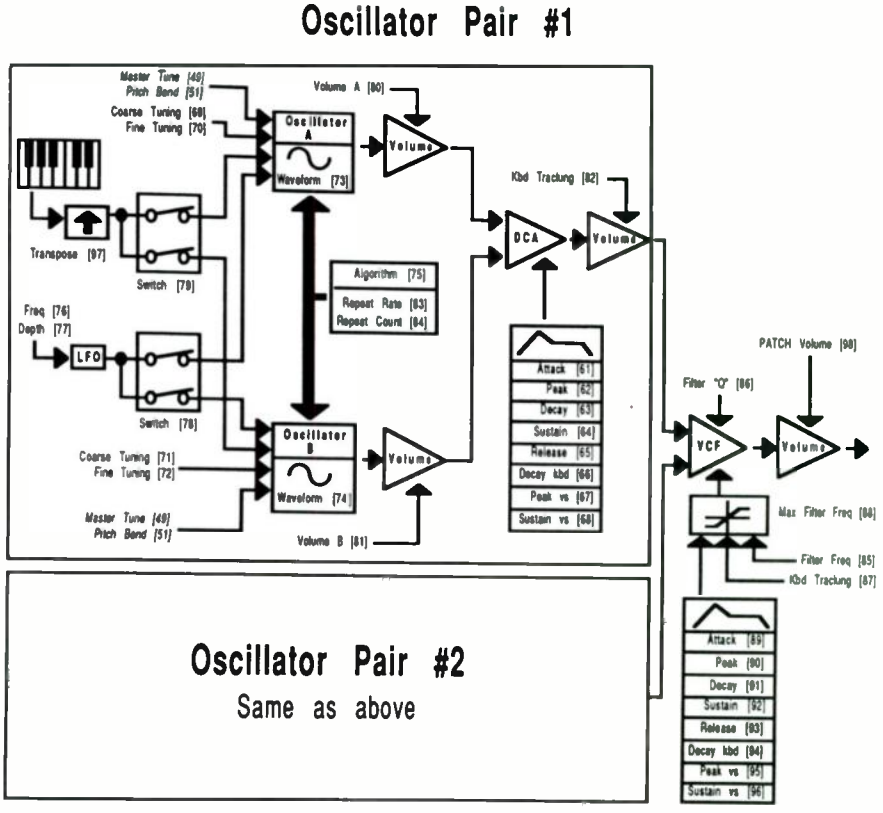


FIG. 1: The Soundprocess patch structure applies standard subtractive synthesis to the digital domain.

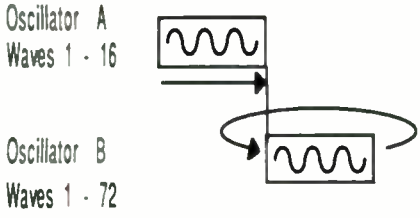


FIG. 2: One of 11 algorithms for joining two oscillators and eventually building a patch.

this point.

This function, however, is not accessible from the front panel. You have to send a System Exclusive message for each MIDI key number along with the tuning data for that key. Tuning data is sent as two bytes: octave number and fine-tuning. The fine-tuning byte divides the octave into 256 parts, giving a resolution of 4.6875 cents—which is not great, but it's a limit of Ensoniq's hardware, not of the Triton software. You'll need a computer to use this feature, or a master keyboard or MIDI mapper that allows you to program Sys Ex messages. Finally, tunings can be saved to disk, but only one per bank. (Actually the 4.6875-cents limit can be circumvented, to an absolute resolution of .5 Hz; Triton is considering that for their next release, as well as direct tuning control from the Mirage keypad and better disk storage.)

OVERALL

Soundprocess deserves the highest possible marks for creativity. It's a joy to see a brilliant hack extend the application and useful life of existing, and cost-effective, equipment. With the release of Ensoniq's powerhouse EPS, I expect a lot of Mirages will be hitting the used market, and if you're shopping for budget gear, Soundprocess makes these guys look more attractive. And if you already own a Mirage this is almost a must-have product. I do think the list price of Soundprocess is a bit high, but it's so well thought out, technically slick, and nicely implemented (given the hardware restrictions of the Mirage) that I don't really feel like complaining. Sustained applause for Mark Cecys, who wrote Soundprocess, and for the folks at Triton for supporting a solid, innovative piece of work. **EM**

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

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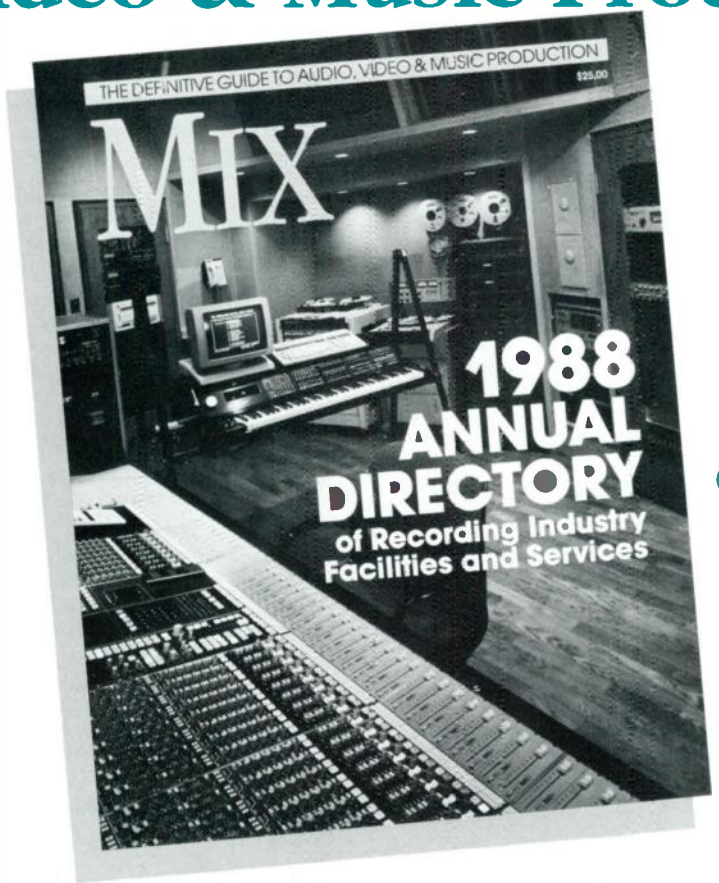

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Korg DVP-1 vocal processor; RK-100 strap-on; Mirage rack-mount; Yamaha TX81Z; Minimoog. (601) 846-1161 after 5.

MIDI Thru Systems
Price Technology must remove from inventory a very limited number of factory demo systems which cannot be sold as new. These systems are backed by the same one-year limited warranty that covers new systems. Prices start at $30. MT9500:1 in/4 out, MT8500: 2 in/6 out. **Price Technology**, PO Box 60773 Longmeadow, MA 01106 (413) 567-5969.

Richer's Digital Audio! A full-line music store with an emphasis on electronic music production. From the keyboard to the printed score; **keyboards, computers, software,** etc. 24-hours service. Richer's Digital Audio, 1539 N. China Lake Blvd., Ridgecrest, CA 93555. Please call (619) 446-5838. Outside CA (800) 227-MIDI.

Lasers, analog synths, digital drums, Apple IIe system, Macintosh software, processing, more. Request list. Trades. (206) 364-7881.

INSTRUCTION

Dr. Maury Deutsch: Arranging, Composition, Improvisation, Electronics. Send for catalog. 150 W. 87th St., NYC 10024.

PARTS & ACCESSORIES

MIDI retrofit kits. Musicians, don't be left out of the MIDI revolution! Even if you already have a budding home MIDI studio you can benefit from upgrading your older equipment. Imagine those fat analog sounds of yesterday with the power and control of MIDI. We have kits for Korg Poly 6/61, BX/CX3, EPS-1/SP-80S, Lambda as well as our new Universal Series for organ, (pipe, electric and electronic) pedalboards and accordions. Kits can be easily installed by user or local technician. Write or call for free details and price list. **Technical Magic**, Dept EM7, PO Box 3939 Station "C," Ottawa, Ontario, Canada K1Y 4M5 (613) 596-9114.

Attn. Jupiter-8 owners! MIDI Retrofit finally available for only $380. (MIDI in, out, pitch bend) call Dr. Sound for info. Dr. Sound Repair Center (212) 391-4544, 155 W. 46th Street, NY, NY 10036.

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Attention: SQ-80 owners! Introducing "Sound Bank." 1,000+ voices on disk $39.95 plus $2 p&h. Order from Fred's Music Shop, 212 W. Lancaster Ave., Dept. EM, Shillington, PA 19607. Phone orders (215) 777-FRED (3733).

EM Classifieds

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TX81Z Owners! The high quality of our ESQ-1, SQ-80 and D-50 libraries are reflected in these five volumes. 160 sounds on cassette for $25. Cesium Sound, 1640 Walnut St. #C, Berkeley, CA 94709, (415) 548-6193.

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ALGY—Commodore 64, real time, interactive, algorithmic MIDI controller. $20. Don Malone, 21806 River Road, Marengo, IL 60152.

MT-32 Controller/Editor/Librarian—Partial Express—Apple IIe (other **Apple II series** available soon). Mix with **Moving Fader** and panpot graphics—see all 9 parts concurrently. Snapshot and real time mixing control—**Automate!** Plus comprehensive professional patch/timbre editing and disk support. Passport type or MPU-401 interface. Check or MO, $69.95 + $2 p&h—additional info: Kirkhouse Music, 33470 Adelfa St., Lake Elsinore, CA 92330. (714) 678-3889.

BASIC MIDI 64 adds MIDI commands to BASIC on the **C-64**. Write your own software or customize existing programs. Includes manual, FB-01, CZ-101, ESQ-1, generic librarians, data viewer, other examples. $39.95 ppd. (PA add $2.40) or SASE for information. **Lepton Productions,** PO Box 42378, Philadelphia, PA 19101.

The definitive D-50 Library—2,000 voices in two 1,000-voice groups—Rhythm, Orchestra—$100 each. **MT-32 library, $100. 2,250 TX81Z/DX11 voices** for $100 (tape or diskettes). **4,000 TX-802 voices,** $100; on **DX7IIFD disks,** $100. All libraries: highly organized by categories and alphabetized. **No duplicates.** Available on diskettes for IBM/Macintosh/Atari/Commodore Amiga. Please indicate your software. **Satisfaction guaranteed.** ManyMIDI Products, PO Box 2519-EM8, Beverly Hills, CA 90213. (213) 650-6602.

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Patches for **Matrix-6, 6R, 1000** on **floppy disk** (Opcode Lib./Mac) 100 patches/50 splits; also for GM-70; $20 to: **Musical Waves**, PO Box 25078, San Mateo, CA 94402; Cal. res. add 6% tax.

Commodore 64 MIDI processor on disk. **RTX8** 8-zone mapper-splitter with transpose, manual channel crossfades, much more. Perfect for multi/synth setups like **Kurzweil K1000, Roland MT-32**, etc. Requires Sonus/Passport type interface. $39 or SASE for information. Realtime Music, PO Box 8144, Loveland, CO 80537.

EPS Samples Huge sound library available for EPS. Free sound list. Send $10 for demo disk. Bearpaw Sound, PO Box 65, Lyman Sta., White River Jct., VT 05001 (802) 296-6757.

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MISCELLANEOUS

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Phone ( )

—from page 16, WHAT'S NEW

GP-8 Companion ($100) from Snap Software is a patch editor/librarian for the Roland GP-8 Guitar Effects Processor and IBM PC, XT, AT, and compatible computers. The edit screen displays all parameters of a patch for editing, and the program's real-time editing feature allows changes to be heard immediately. An "autowrite" function automatically writes changes into the GP-8 as they are made on the screen. With autowrite disabled, changes are written to a buffer so they can be played immediately and written to the GP-8 later. In the librarian mode, any number of patches can be marked as belonging to a "song" for convenient retrieval. The librarian allows swapping of patches, banks, and songs in and out of the GP-8 and to and from disk. Libraries and the GP-8's memory can be arranged as the user wants. Other disk management functions are also available.

Snap Software
1116 Janey Way
Sacramento, CA 95819
tel. (916) 451-9914

Tape Recorders

The **PMD420** ($449) and **PMD430** ($599) are two new professional portable cassette recorders from Marantz. Both feature AC or DC operation (three "D" cells provide 7.5 hours of recording time); selectable 0, -15, or -30 dB mic attenuation; switchable internal limiter to prevent signal overload; large illuminated VU meters; ±6% variable playback speed; switchable Dolby B noise reduction; bias fine tune and three-position tape type select. The top-of-the-line model PMD430 also includes selectable dbx noise reduction and three-head, off-the-tape monitoring capability.

Marantz PMD430

Marantz
20525 Nordhoff Street
Chatsworth, CA 91311
tel. (818) 998-9333

All prices are suggested retail prices, as supplied by the manufacturers. All prices and specifications are subject to change without notice. Inclusion of product information and manufacturers in this magazine does not necessarily constitute a recommendation by Electronic Musician *magazine or its staff; we suggest all mail order purchases be COD. Contact the manufacturers or your local music dealer for further information.*

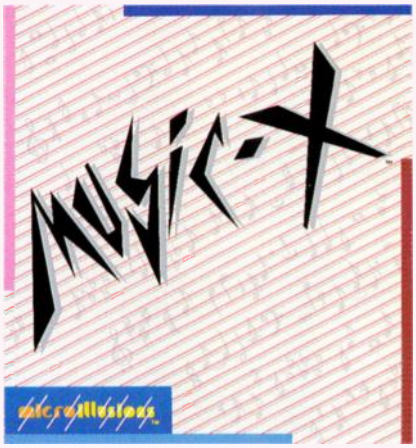
EM

—from page 65, SYNCHRONIZATION

(with optional 4035 remote controller). MIDI-oriented studios can use sequencers that read SMPTE directly or via a SMPTE-to-MIDI converter box (see sidebar). Major studios still require the exacting performance specifications, long-term durability, and technical support (which goes along with the higher price tag) of the modular units. For use in the home studio, however, ease of installation, insured system compatibility, and cost-effectiveness may be higher priorities. In any event, make your choice and sync up soon—you will be pleasantly surprised how it will expand the horizons of your smaller recording studio. **EM**

Writer/producer ***John Barilla*** *has performed extensively with rock bands, as a solo artist and studio musician, as well as engineered, produced, and arranged for Amphion records. He recently served as consultant and editor for a new book entitled* The Songwriter's Guide to Great Demos *(published by Writer's Digest Books) and is currently president of Hip Records International, a company dedicated to making multi-lingual techno-pop music for a very small planet.*

Music-X™



MUSIC X SOFTWARE, *like a fine instrument is crafted from the heart. It is more than an excellent tool, it is also a work of art.*

COMMITMENT: *We have committed ourselves to pushing ahead state of the art in professional music software, enabling you to open new worlds of creativity at a cost, both in hardware and software, that is well within the budget of any serious musician.*

NO COMPROMISES *or shortcuts have been tolerated as we designed this product. The master clock is accurate to 1 millisecond with a resolution of 192 clocks per quarter note. Sequences and library data can be any length, limited only by available memory — if you want, you can dump a 100K or larger sample into a library entry!*

KEYBOARD MAPPING *features allow almost any function of the sequencer to be controlled from a MIDI keyboard, footpedal, or other MIDI device. This includes starting/stopping the sequencer, initiating sequences, and even changing the key map itself!*

REAL TIME: *The system supports real-time recording of systems exclusive data, as well as full graphic-oriented and event-oriented editing of sequences. You can even record while in edit mode and watch notes appear on your edit display as you play them!*

LIBRARIAN: *A configurable librarian is included with the program. You can teach the librarian how to communicate with any MIDI instrument which outputs system exclusive data.*

EDITING: *An impressive battery of editing features will be supported. In fact, new editing features are being added daily as we interact with our network of working, professional musicians whose input has greatly contributed to the quality of this program.*

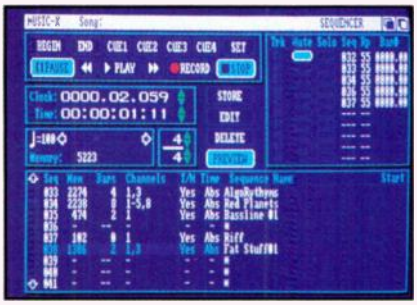
COMMITMENT: *Our commitment to music production does not stop here. A future product, Patch Editor Construction Kit, will allow you to create graphical patch editors for virtually any synthesizer you may own. Some technical knowledge will be required, but since patch editors, once created, can be traded between users, you should have no problem getting an editor for your needs.*

THE POWER: *Part of the power of Music-X comes from the computer it was created for: The Amiga, one of the most powerful and inexpensive personal computers available. At last you can run these many powerful applications in an environment that is a pleasure rather than a chore to use!*

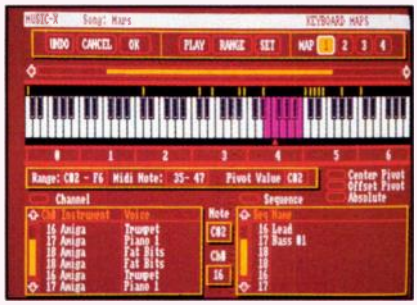
MICRO MIDI: *Although Music-X will work with any of the many MIDI interfaces for the Amiga, we offer our own MIDI interface which we feel is a cut above. It features six outputs (each output switchable as OUT, THRU or OFF), two switch-selectable inputs, a channel loading indicator, and an external clock output (sync/start stop) for synchronizing older, non-MIDI drum machines, and a serial pass-thru!*

MICRO SMPTE: *This complete SMPTE Reader will allow Music-X to synchronize with video or audio tape decks. It connects to the Amiga parallel interface and includes a pass-thru so as not to interfere with printer operation. Our Micro SMPTE is compatible with all Amiga models (A500/A1000/A2000).*

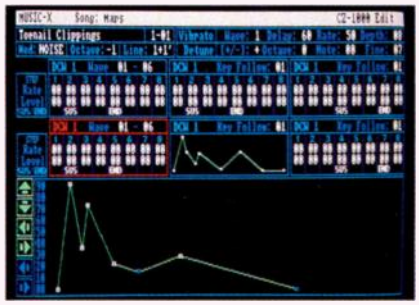
PHOTON VIDEO: *Photon Video is a complete, integrated video animation system. It includes facilities for both 2-D and 3-D animation, as well as automatic tape transport control and real time playback of rendered images. Our 3-D rendering module supports variable light sources, shadows, transparency, and reflections in a 3-D environment. Other modules include Cel Animator, Object Editor and Transport Controller with SMPTE support.*



SEQUENCER PAGE: *Tape transport-type controls allow manipulation of up to 250 sequences; each contain 16 MIDI channels worth of data.*



KEYMAP EDITOR PAGE: *Create keymaps by dragging the mouse over a selected area of the keyboard. The highlighted region can then be redefined in terms of real-time behavior.*



PATCH EDITOR: *A sample patch editor (CZ-1000) of the type that will be included with the product.*

COMMODORE AMIGA™

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The 7110 combines the smooth predictable RMS style performance of the LA-4 with the precise automatic peak control of the 1176LN.

Our new 7110 Limiter/Compressor incorporates the characteristics of its predecessors, is the natural addition to a legendary line and has all the potential to become a major hit in its own right. The 7110 combines both peak and average limiting action, producing smooth, predictable RMS style performance like the LA-2A and LA-4 with the precise automatic peak control of the 1176LN.

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To make set-up as simple as possible, we've included an Automatic Preset function. Punch the button on the front panel – the 7110 automatically defaults to program dependent attack and release times, and presets the peak threshold and ratio to consistently used settings. Perhaps the best news of all, the 7110 produces crystal clean sound and is virtually transparent.

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