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Electronic Musician

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December 1988

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REVIEWS: Lyre FDSoft (IBM) • Solid Sounds Xpander Patches • Softwind Synthophone • Synthia (Amiga) • D-50 Command (Atari) • Snap GP-8 Editor (IBM) • Book: Digital Electronic Music Synthesizers

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A Mix Publication

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Music Technology July 1988

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Craig Anderton
Electronic Musician November 1988

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Jim Aikin
Keyboard Magazine August 1988

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Electronic Musician

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DECEMBER 1988 VOL. 4, NO. 12

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OUTSTANDING PERFORMANCE.

D-10

Powerful Multi-Timbral Linear Synthesizer

L/A SYNTHESIS

Roland's award-winning breakthrough in digital technology is now available in the powerful D-10 Multi-Timbral Linear Synthesizer, a very affordably priced MIDI keyboard featuring 32-note polyphony with built-in programmable Rhythm Composer and Digital Reverb. The D-10 excels as a high-quality performance instrument by providing 128 programmable Patches, 128 programmable Timbres, plus 128 preset and 64 programmable Tones for an almost unlimited variety of distinctive L/A sounds. In addition, the Rhythm Composer offers 64 preset PCM Rhythm Sounds and 32 preset plus 32 Programmable Rhythm Patterns, which can be combined to assemble a fully independent Rhythm Track. (Optional IC Memory Card doubles complete internal memory.) Rhythms can be programmed from the velocity-sensitive keyboard, and in Performance Mode you have the ability to play two individual synthesizer sounds along with the programmed Rhythm Track at the same time. In Multi-Timbral Mode the D-10 becomes an impressive MIDI sound module, delivering its unsurpassed L/A sounds with performance capabilities equal to 8 independent polyphonic synthesizers. Used in conjunction with a microcomputer or sequencer, such as any of Roland's Micro Composers, the D-10 forms the core of a complete MIDI system that's ideal in live performance as well as being an indispensible songwriting tool. In addition, there's an exciting Autodemo that features a wide variety of musical styles specially built right into the unit, making it easy for you to directly hear the D-10's extensive capabilities at the touch of a button. Whether you're a seasoned professional expanding your MIDI system, or a talented beginner to the exciting world electronic music, it's time to visit your local Roland dealer and get your hands on the powerful D-10 today!

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WHAT'S NEW THIS MONTH:

We are pleased to introduce our relatively new managing editor, Frank Rothschild. Frank came to us last August from Chicago, where he'd been a radio jockey, hack writer, petty racketeer, and academic nuisance. Please direct all queries regarding editorial procedure to Frank. His job is to keep this department organized and operating like a well-oiled machine.

ABOUT EM (*Electronic Musician*):

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

SUBSCRIPTION SERVICES:

All subscriber services are handled by a different office than the main EM business offices. For subscription inquiries, address changes, renewals, and new subscriptions, contact: Electronic Musician, PO Box 3747, Escondido, CA; tel. (800) 334-8152 (outside CA), or (800) 255-3302 (CA). Do not send any other requests or items to this address. One year (12 issues) is $22; outside U.S. and Canada, $37—all amounts in U.S. dollars. Visa and MasterCard accepted (only Visa, MasterCard, or international money orders on foreign payments). Allow 6 to 8 weeks for new subscriptions to begin or to renew current subscriptions. Postmaster: Send address changes to Electronic Musician, PO Box 3747, Escondido, CA 92025-3747.

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EM BOOKSHELF:

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

BACK ISSUES:

Single/back issue price is $3.50. For a listing of published articles, send a SASE (self-addressed, stamped envelope) to our Emeryville, CA, address and request "Back Issue Listing."

ERROR LOG:

Occasional errors are unavoidable. We list known errors in "Letters." Make corrections in your magazines so your archives are accurate. We compile corrections annually for those who order back issues; to receive a copy, send a SASE to "Error Log Listing" at our Emeryville, CA, address.

CALENDAR ITEMS:

To have events (seminars, concerts, contests, etc.) listed, send dates and times *three months* prior to the event deadline to "EM Calendar Listing" at our Emeryville, CA, address.

EM NEW PRODUCTS AND REVIEW POLICY:

Manufacturers: Send press releases to New Products Editor at our Emeryville, CA, address. A release must be received three months prior to the cover date to be included in that issue. Regarding reviews, there are more products than pages available to review them. We welcome unsolicited software, books, etc., for review on a space-available basis; contact the editorial staff regarding hardware reviews.

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

LETTERS:

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

PROBLEMS WITH ADVERTISED PRODUCTS:

Information in ads is the responsibility of the advertiser. EM does not have the resources to check the integrity of every advertiser. However, we try to monitor ads and ensure that our readers get fair and honest treatment. If you encounter problems with an advertiser, let us know by writing to the Director of Advertising at our Emeryville, CA, address; tell us the problem and what steps you have taken to resolve it.

WRITING FOR EM:

Send a SASE (25¢ postage) for our author's guidelines. We welcome unsolicited manuscripts, but cannot be responsible for their return without a SASE.

MAIL ORDER:

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

DO-IT-YOURSELF (DIY) PROJECTS:

We do not have space to explain electronic construction in each issue. Read *Electronic Projects for Musicians* (available from EM Bookshelf) for the necessary background. If you detect an error in a schematic or listing, *let us know*. If a project doesn't work for you, contact us to see if anyone has reported any errors (wait at least a month for EM to be in circulation).

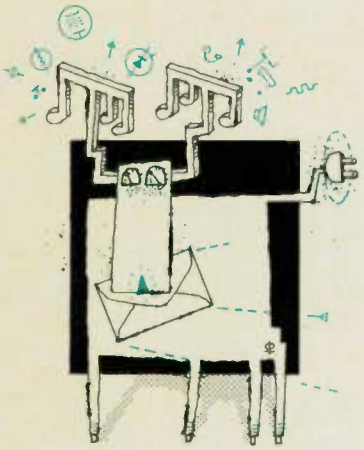
INTERNATIONAL PARTS SPEC:

EM specifies parts values following international protocol, thus minimizing decimal points and zeroes. A nanofarad (nF) = 1,000 pF or 0.001 μF. Examples: 2.2kΩ (U.S. nomenclature) = 2k2 (Intl. nomenclature); 4.7 μF (U.S.) = 4μ7 (Intl.); 0.0056 μF (U.S.) = 5n6 (Intl.).

HELP US HELP YOU:

Please reference EM when asking manufacturers for product information, returning warranty cards, etc. Advertising provides our financial base, and ad purchases are based on your feedback to manufacturers about which magazines you like.

Readers explore the issue of selling copyrighted song sequences and offer info on *Pyramid*, Roland's D-20, King Crimson video sources, and more.



DAVID POVLATIS

READER RECOMMENDATION

I will be forever grateful to **EM** and author Carter Scholz for the article on building a MIDI patch bay (June '88). Anyone whose musical creativity and production are frustrated by the need to repatch and reroute MIDI cables would do well to read the article and build their own unit. The instructions were easy to follow and did not require any more knowledge of electronics than how to use a soldering iron.

Now that my "low tech marvel" is in use, I have felt much less intimidated by my MIDI equipment, and my work in the studio is both faster and more fun.

Steve Dockendorf
Maryland

THOSE ELUSIVE KING CRIMSON VIDEOS

In the September '88 letters column, author Walter Daniel wanted to know where to order two videotapes, *The Noise—Frejus 1982*, and *Three of a Perfect Pair—Live in Japan*, both by King Crimson. These are available from Spectrum Music Video, PO Box 1128, Norristown, PA 19404; tel. (215) 887-0510. Call or write for current pricing and availability. Spectrum has a large selection of music videos; prices average around $30 to $40. Some cost less, but import videos can run over $100.

Mr. Daniel mentions seeing the live tape on MTV (remember when they actually played different forms of music?), but the video is much different: MTV cut several songs (their version was about 50 minutes, whereas the videotape runs 82 minutes).

An interesting note about these videos is that throughout them, Adrian Belew's guitar is in the left speaker and Robert Fripp's is in the right. It's fantastic with headphones, since you can hear what each guitarist is playing (something not too evident with the studio recordings of the songs).

Finally, let me say that I really like the change in **EM**'s graphic format: I find it much easier to read. I didn't think it possible, but you've actually improved an already excellent magazine! Keep up the great work.

Marty Saletta
New York

LIVE SEQUENCING

I enjoyed your article on sequencer essentials in the August issue. I am using Mark of the Unicorn's *Performer* software for the Mac and enjoy it very much.

What I would like from you is some information on a MIDI recorder/sequencer that would enable me to leave my Mac at home when playing gigs.

Bill Drozga
Maryland

Bill—There are several hardware sequencers that will let you do what you want to do. At the budget end of the spectrum, the Alesis MMT-8 stores about 10,000 events and costs under $300. However, if you need more storage, you will need to factor something like the Yamaha MDF-1 MIDI data filer into the equation or use the System Exclusive recording functions of an instrument like the Ensoniq EPS or SQ-80 to replenish the MMT-8's memory during a set. Yamaha also makes several excellent sequencers over a wide price range; and both the Roland MC-500 and Akai ASQ-10 have built-in disk drives, thus allowing you lots of available storage for onstage use. Finally, several keyboards (E-mu Emax/Emulator II/Emulator III, Ensoniq EPS/SQ-80, DX7IIFD with E! board, Roland D-20, etc.) have internal sequencing capabilities (and a disk drive for rapid loading of sequences) that may provide all the sequencing you need, since you won't require extensive editing. Of course, these are just guidelines to get you started; write to manufacturers for further info, visit your local music store, and keep reading.

SELLING SEQUENCED SONGS: THE FINE PRINT

This is in response to the letter you recently published from Mr. Simon Hamblin of Ontario, Canada, regarding the legality of selling sequenced versions of copyrighted songs. I'm not a lawyer, so what follows is not legal advice; it is personal opinion based on about a year of experience selling sequenced cover music. People interested in the subject should consult with attorneys skilled in music copyright law, as we have.

For the USA, there is a congressionally chartered, central, music licensing and royalty collection service, The Harry Fox Agency, Inc.; tel. (212) 370-5330. The corresponding Canadian organization is the CMRRA (Canadian Mechanical Reproduction Rights Agency); tel. (416) 926-1966.

The Fox Office represents about 90-95% of the music published in the USA. For sale of MIDI cover sequences they will issue one or both of two kinds of licenses, depending on the application.

If the application is purely audio in nature, a *Mechanical* license is probably sufficient. This license gives the user permission to publish a particular title in

some kind of recorded form. Royalty rates for Mechanical licenses issued by the Fox Agency are fixed by statute; contact their Mechanical Licensing department for further information.

Most MIDI sequencers can present music in editable form on some kind of display device. In this kind of technical environment, the Fox Office requires not only a Mechanical license, but also a *Synchronization* license. This is necessary even if the music display is as simple as an ordered list of MIDI events in hexadecimal. There are no statutory royalty rates for this kind of application, and at the moment, each license must be negotiated on a title-by-title basis. Contact the Fox Agency's Television Synchronization department on these matters.

In other words, for sale of cover music sequences into most MIDI environments, you would need both Synchronization and Mechanical licenses. The Fox Agency has asked us to make a proposal to them and their author/publisher clients for a streamlined, standardized approach to the issue of combined Synchronization/Mechanical licenses, with provision for a default royalty rate structure. We have sent them our proposal, and they are considering it. Whatever the form of the final agreement, we hope that these same uniform terms and conditions will be made available to anybody who proposes to enter the business of selling MIDI sequences of music copyrighted in the USA.

Once agreement has been reached with the USA music publishing industry, we hope to reach similar agreements with the various central licensing authorities in other countries.

The Recording Industry Association of America's chief legal counsel has given us a preliminary opinion that RIAA views us as a "sound-alike" recording company, and that we are not required to possess Master Recording licenses even though we make every effort to replicate the musical arrangements contained in companies' copyrighted sound recordings. (This opinion presupposes that we possess at least valid Mechanical licenses, which we do.)

Certain customers of our product (e.g., recording studios) probably are required to get Synchronization and/or Mechanical licenses. Anyone considering making audio or video recordings based on MIDI cover sequences should get in touch with the Fox Office and get a reading from them directly.

(They should also make it clear to *us* what they are doing. Our sequences are copyrighted by us as computer programs *and* as sound recordings. If anybody makes significant money using them, we too want our fair share of the dollar flow.)

I should also mention that customers of our product *may* be required to obtain Performance rights. My understanding is that whenever copyrighted music is performed in public in some kind of revenue-generating situation, *somebody* is required to pay performance royalties. This is usually done through blanket agreements between ASCAP, BMI, and SESAC on the one hand, and promoters, club/lounge owners, and radio stations on the other. In other words, "those who hire the hall shall pay the royalties."

Musicians performing at weddings or parties may, in principle, have some legal exposure here; I suspect that their agents *do* have legal exposure. The relevant phone numbers are (212) 595-3050 for ASCAP, (212) 586-2000 for BMI, and (212) 586-3450 for SESAC, which handles much country and western material.

These may sound like fearsome requirements, but they really aren't. We were a two-person company when we began dealing with the Fox office over a year ago. Tiny as we were (and are), we have found them to be consistently helpful and very supportive of clients, even though the total royalty amounts are (at present) miniscule by their normal standards.

The business of developing and selling MIDI cover sequences is open to all. There are plenty of headaches in getting going, but becoming properly licensed needn't be one of them—the Fox Agency *wants* to issue licenses, and the royalties fall somewhere between reasonable and ridiculously small.

I hope that any "pirates" who may be out there will read this letter and take the licensing issue to heart. The last thing any of us needs is for our potential customers to be afraid to do business with us.

If I were running the Fox agency, I personally would want to encourage *legitimate*, licensed use of copyrighted music. Again speaking personally, I would even be willing to ignore the sins of the past while this new industry was still small, on the grounds that few people understood the rules. However, my patience would be limited and would become even more limited as information about licensing requirements and procedures became common knowledge, as time passed, and as the stakes were raised.

There is a saying on Wall Street to the effect that "You can eat well or you can sleep well, but you can't do both." Fortunately, in the MIDI sequence business you *can* do both.

Michael P. McCarthy,
President
Golden MIDI Music & Software, Inc.
Colorado

SECOND OPINION ON SELLING SEQUENCED SONGS

First off, any professional artist should understand the standard copyright forms, SR and PA (if not, write to Copyright Office, Library of Congress, Washington, DC 20599), and be familiar with the general subject of copyright.

The legal implications of interpreting the copyright laws are better left to a lawyer, though it doesn't take a lawyer to tell vendors whether or not a copyrighted work can be sold for profit without the author's or the controlling copyright owner's consent. Here's my opinion.

There are two main steps in deciding whether or not a "deal" has to be worked out between the person programming a sequence of copyrighted material and the copyright owner(s):

1. Decide what the "use" will be for the sequenced material or song once it's recorded into the sequencer.

2. Determine whether the user (programmer) will profit personally from the "use."

If the answer to (2) is yes, then the user must find out who is controlling the copyright. Usually, this is a music publishing company. If the answer to (2) is no, then the user is probably sequencing for "personal use," which does not need permission from the copyright owner.

If you answer yes to (2), then the general steps that need to be followed are:

1. Find out who controls the copyrights for material you plan to record into your sequencer or tape by calling ASCAP, BMI, or the Harry Fox Agency. Often an album cover or printed sheet music/score will be labeled with a copyright year and owner; these may indicate who is the copyright controller.

2. You must submit (in writing) a description of the use to which the copyrighted material will be put. Include any rewritten lyrics or changes in the content of the new version. (Note that some artists won't allow music to be parodied, or lyrics to be changed, because the new image created may not coincide with the original artist's intention and/or may cause a negative image to be created in people's minds.)

3. Also include in writing such information as whether tickets will be sold for the event and whether you're going to use the material for film, video, records, CDs, audio-visual shows, performing at clubs, etc.

4. The music publishing company in control of the copyrighted work will contact you in writing if they have a definitive answer or call you if they need additional info.

These companies rely on the personal ethics and integrity of the people who want to use copyrighted material. If you're making a profit from someone else's work without compensating them, you could very well be stealing or pirating. Even though the MIDI sequence was entered into your sequencer by you, if the *idea* is the same as the original, you *are* in trouble if you're selling that sequenced "work" for personal profit without going through the proper channels.

Daniel Nemec
Connecticut

Michael and Daniel: Thanks very much for taking the time to help out our readers. We'd be interested in any followups from lawyers, other readers, or programmers of MIDI sequences, especially if their experiences contradict any of the above.

MORE ABOUT L/A SYNTHESIS

It was refreshing to read your article on digital workstations (Nov. '88), and I especially enjoyed your positive approach to writing. However, for the sake of completeness, there are some additional points I'd like to add about the D-20 in particular and L/A synthesis in general.

In the article you mentioned the availability of "sustained loops (synthesized or sampled, but usually consisting of only a few cycles)." However, it's important to differentiate between the looped *partials*, which are entirely sampled (and which cannot be filtered by a T.V.F.) and are of a different nature than the synthesizer partial. Synthesizer partials can emulate standard analog synthesizer sounds, but the comparison stops there, in that all parameters and functions (including the

Time-Variant Filter and Time-Variant Amplifier) are maintained in the digital domain. With the use of a T.V.A. envelope, it is also possible to control the amplitude shape of any of the sampled partials.

It was also said that "The D-20. . . compares sonically to the MT-32." While the D-20 can be compared to the MT-32 in features such as multi-timbral control and the like, the D-20 does offer a better signal-to-noise ratio, and the 128 PCM partials are totally different from those on the MT-32 (as you mentioned, the D-20's drum sounds are particularly worthy of note).

Craig Sibley
Roland Product
Specialist Mgr.
California

PYRAMID TIPS AND UPDATE

I'd like to clear up a few points in Carter Scholz's review of *Pyramid* (Sept. '88). Unfortunately, "character mode" is the lowest common denominator in all MS-DOS-based systems, and this usually ends up compromising the design or appearance of the screens. Conversion to Microsoft Windows will remedy this in the months ahead. His pen zinged especially hard, though, about the algorithm display being "ugly." I worked hard at making it visually unique to hook the user's attention (the background is a composite of all 32 algorithms and looks visually like a "pyramid"). *C'est la vie*; one person's flower is another person's weed.

I must admit that using the "Home/PgUp" keys for incrementing and decrementing values is, at first blush, very non-intuitive. But if you keep your right hand on the numeric keypad and your left hand on the shift (or control) key, once you're on the edit screen, you don't have to move your hands to have complete editing control. Move the cursor with the 4, 8, 6, 2 keys; increment/decrement with the Home and PgUp keys; and enter raw numbers by holding the shift key down with your left hand and keying in the numbers on the same keypad. This can save a lot of wear and tear on your digits.

Lastly, we have decided to abandon copy protection on Pyramid. Since Pyramid is distributed directly to dealers and end users (and not marketed through *Texture*'s distributors), we have complete control of whether or not to apply copy protection. We believe we have priced the program fairly and decided to remove the copy protection. It's now in the user's hands to not abuse our trust.

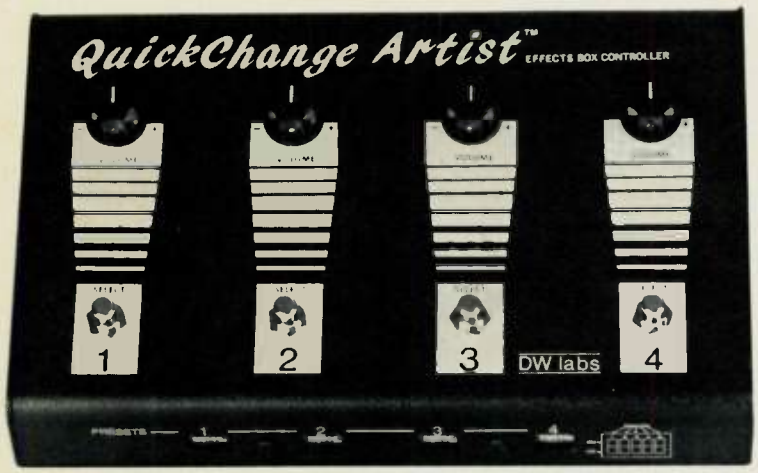
David Bartz
New York

ERROR LOG

The telephone number given for RP Micro in "Portable Power: Computers for the Road" (July '88) was incorrect. The correct number is (412) 356-4000.

Readers who enjoyed Craig O'Donnell's article on "Peak Performance Tips for Onstage Sound" (September '88 issue) should also note that while many people think of JBL in the context of recording studio equipment, the company makes an extensive line of products for onstage use (in particular, the Performance Series line). ■

From amps and accessories to software, samples, and synchronizers, December brings a plethora of tempting technology.



DW Labs QuickChange Artist

ACCESSORIES

The SFX Sound Expander ($110) is a simple device that plugs into the cartridge slot on any Commodore 64/128, turning the computer into a programmable, 9-voice, 6-operator, FM synthesizer. The basic SFX includes a software package offering a selection of voicings and control over keyboard split, chorus, transposition, one-finger chording, a rhythm machine, and more. Options for the system include a full-sized, 5-octave keyboard controller, and a 9-track MIDI compatible sequencer.

Fearn & Music
519 W. Taylor, #114
Santa Maria, CA 93454
tel. (805) 925-6682

QuickChange Artist ($249.95) provides "customized" control of rack-mounted or pedal effects devices for keyboardists and guitar players. Users can preset combinations of up to five effects connected to the QuickChange Artist and recall four combinations at the touch of a footswitch. Each preset has a volume control offering up to 6 dB of gain for precise level matching. A rack-mount version (with external footswitch control) is also available for $440.

DW Labs, Inc.
Box 882
Millburn, NJ 07041
tel. (201) 376-8453
or (800) 542-2454

The 1040 Composite Cable ($24.95) allows any Atari ST computer to be used with standard composite monitors. Internal circuitry within the cable alters the ST's low- and medium-resolution RGB output, yielding line-level audio and grey-scale composite video for connection to composite monitors and VCRs. A free catalog listing this and other products for the Amiga and Atari ST is available on request.

E. Arthur Brown Company
3404 Pawnee Drive
Alexandria, MN 56308
tel. (612) 762-8847

The Cord Control Kit ($34.95) provides a means of organizing multiple audio, AC, and MIDI lines into custom snakes for studio or performance setups via reusable tubing and cable ties. The tubing can accommodate from six to ten cords that can enter or exit the tubing at any point, and the kit also includes self-laminating, waterproof labels for marking plugs and cable ends.

Get Organized
55 Azalea Lane
Bonny Doon, CA 95060
tel. (408) 425-7269

AMPLIFIERS

The Marshall Keyboard Combo Amp ($1,130) is a solid state, 100-watt amplifier, mixer, and 2-way speaker system in a single, integrated unit. Features include four inputs with volume and effects send controls, 15-inch woofer, compression high-frequency driver, and 4-band equalization on the master output.

Korg USA/Marshall
89 Frost Street
Westbury, NY 11590
tel. (516) 333-9100

Marshall Keyboard Combo Amp

The DECA 528 ($749.99) digital energy conversion amplifier provides 250 watts at 4 ohms (or 210 watts at 8

AFTER TOUCH™

OFFICIAL NEWS FROM THE YAMAHA USERS GROUP

QX5FD brings powerful new features to sequencing.

IF YOU'RE TRYING to choose between a computer-based sequencer and a piece of hardware devoted to the cause, Yamaha® has just made a strong argument for the latter.

The news from Buena Park is that the QX5 Digital Sequence Recorder is now available in an enhanced format. It's called the QX5FD, and not only does it make sequencing faster and more convenient, it offers features you won't find on other sequencers of any type. Some of which can help inspire new creative ideas.

Starting with the obvious, the QX5FD comes with a built-in 3.5" floppy disk drive (thus, the moniker "FD"), capable of storing 720K worth of sequenced data. Another of its features is an editing dial that provides an effortless means of entering and altering data.

As for its performance, the easiest way to describe the QX5FD is that it can do just about anything you want it to. One good example is its new Quantize Duration function, which lets you quantize actual note lengths rather than note-on points. That can get you even closer to the ever-elusive genuine human feel. Another is a Crescendo feature that gives you control over fade-ins and fade-outs.

The QX5FD lets you combine the notes (pitches) of one track with the rhythm (timing and velocities) of another. You can also select the notes of any part of a track and apply a Reverse function—which can affect pitch, pitch bend, velocity, aftertouch or controller information. Obviously, these two new features can lead you down some very interesting creative paths.

As an example of its technical sophistication, the QX5FD makes it possible to free up valuable memory after you've recorded a track. Its Thin Out function automatically processes continuous controller information (from such sources as MIDI guitar and wind controllers)—vastly reducing the memory used with no audible loss.

If you'd like to see a QX5FD Sequencer in action, it's easy enough to arrange. Just visit an authorized Yamaha Digital Musical Instruments dealer.

YAMAHA QX5FD DIGITAL SEQUENCE RECORDER.

Hot Tips

Loading disk files into a DX7IIFD equipped with *E!*

Here's the best way to avoid problems when loading disk files into your *E!*-equipped DX7IIFD: Make sure that the appropriate *E!* bank is active not just in performance mode, but in voice mode as well. That way, when you load in a bank of sounds, you can be sure that the performance memories will call the correct voices.

Questions

Can I use my DX7IIFD disk drive to save data from RAM4 cartridges?

Easily. All you have to do is insert your RAM4 into the cartridge port of the DX7, call up the CRT directory, name the file and save it. With this method, you can save any kind of RAM4 data, including that created and stored on the RX5, RX7, DMP7, DX7S, DX11, TX802 and G10C. You can save some bucks, too—since one disk has the capacity to store up to 44 cartridges' worth of information.

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 Corporation of America, Digital Musical Instrument Division, P.O. Box 6600, Buena Park, CA 90622

ohms) from a single rack-space package weighing only 11.5 pounds. Features include forced-air fan cooling, 90% power transfer efficiency, and Peavey DDT™ compression circuitry.

Peavey Electronics Corp.
711 A Street
Meridian, MS 39301
tel. (601) 483-5365

COMPUTERS

Commodore Business Machines has extended its product trade-in program until Dec. 31, 1988, allowing the owners of any Commodore personal computer to receive a $100 credit towards the purchase of an Amiga 500 or 2000 computer. Both Amigas feature true multitasking as well as extensive graphics, animation, and sound capabilities.

Commodore Business Machines
1200 Wilson Drive
West Chester, PA 19380
tel. (215) 431-9100
or (800) 343-3000

INSTRUMENTS

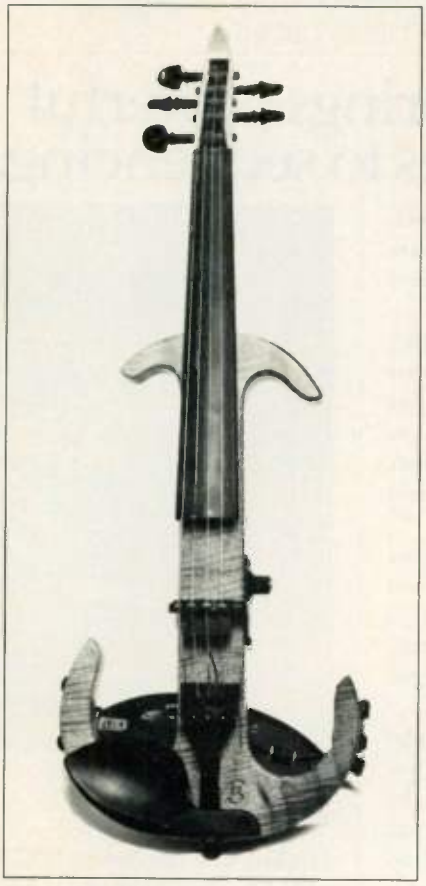
The EV-5 Five String Electric MIDI Violin ($1,345, including case) is a standard Barrett violin fitted with a polyphonic, MIDI-expandable, ZMS pickup. The EV-5 comes in a choice of curly koa, curly maple, sitka spruce, and clear acrylic; all are solid-body designs. The violin is also available in a non-MIDI electric version with Fishman transducer for $795.

T.F. Barrett Company
Box 130
Westminister Station, VT 05159
tel. (802) 722-9063

MIDI

The cMIDI Function Library ($79) is a set of over 50 C commands that allow users to quickly write applications to control MIDI equipment via IBM PC/XT/AT and compatible computers. The functions include cMIDI control, runtime error control, MPU-401 (or compatible) control, MIDI data receive enable/disable, MIDI message retrieve, MIDI track control, and MIDI message transmit control. The library can also read and write tracks of MIDI data in several different file formats (including Standard MIDI Files). Hardware/software requirements are a Roland MPU-401 (or compatible) interface, DOS 2.1 or higher, and Microsoft C, QuickC, or Borland Turbo C compiler. A demo program disk is $3.

cMIDI
Box 4903
East Lansing, MI 48823
tel. (517) 337-2569



Barrett EV-5 MIDI Violin

MIDI Long Shot ($140) is a system for extending the maximum effective distance over which MIDI information can be sent, up to 1,000 feet. The system is bidirectional, consisting of two identical units equipped with standard XLR connectors, each containing a transmitter and receiver. MLS is said to support all MIDI information transfer rates.

Audio M
952 Saturn Way
Livermore, CA 94550
tel. (415) 447-0284

PATCHES

The Modular Voice System ($39.95, disk or data cassette) is a collection of 120 voices (80 imitative and 40 synthesizer sounds) for the Ensoniq ESQ-1 and SQ-80 synthesizers. All the voices are designed to make full use of the instruments' stereo capability and include extensive implementation of the Ensoniq CV (control voltage pedal).

Sound Logic
1125 11th Street
Ramona, CA 92065
tel. (619) 789-6558

New Sound Packages ($25 each) on data cassette for the Yamaha DX11 and TX81Z feature 128 voices, with an emphasis on realistic instrument and percussion sounds. The packages also include four banks of effects as well as the alpha and beta microtuning tables used on Wendy Carlos' *Beauty in the Beast* album. Other sound collections (also priced at $25) are available for the Yamaha DX7, DX21, DX27, DX100, and FB-01.

Music Design
Box 28001
Crystal, MN 55428
(612) 537-5457

PERCUSSION

The ddrum 2 ($4,995) is an 8-channel, fully programmable, sampled drum brain utilizing 256K (expandable to 1 MB) of internal memory and external cartridge ports for storing additional drum kits. User-programmable parameters include pitch, pitch bend, decay, treble, bass, pan, and level. Rear panel connections are provided for eight XLR pad inputs, line inputs, and MIDI. Available options are snare and tom pads (fitted with Remo heads and steel hoops for a drum-like feel) and a compact, steel "kick" with a resilient head cushion.

ddrum
25 Lindeman Drive
Trumbull, CT 06611
tel. (203) 374-0020

ddrum 2

If you have one of these the MRC will get more out of it.

The MRC MIDI Remote Controller is everything you'd expect from the engineers who developed *Dynamic MIDI*® our much-admired (and still unequaled) system of real-time digital effects control. Connect it to the LXP-1 Multi-Effects Processing Module, the PCM 70 Digital Effects Processor, a DX7 or anything MIDI. And release hidden creative capacity you never expected.

Maximizing the LXP-1 Multi-Effects Processing Module

When you plug it into the LXP-1, the MRC gives you instant access to more parameters, more control and more setups. It goes beyond the front panel Decay and Delay controls to open up "hidden" parameters in each LXP-1 program. You can control all parameters (up to eight of them) in real time and store your favorite setups in the MRC's memory.

FM patch edits without programming

Connect the MRC to a DX7, DX711, TX802, or TX816 and you'll see something totally new on its two-line LCD display: *analog-style patch editing* for six-operator FM synths. Call up a preset, then change Brightness, Waveshape and Emphasis with the MRC faders. Build ADSR Amplitude and Timbre envelopes. Now you can customize your own FM sounds. And you don't have to spend hours programming. There's even a set of performance controllers for tone generators and live work.

Expanding the PCM 70

Only a very few digital processors can respond to parameter changes in real time — the PCM 70 is one of them. The MRC exploits its uncommon abilities to the fullest over MIDI. Call up any program and the MRC lets you control twelve essential parameters: in real time, of course.

You can tailor the sound to the track quickly and store the results in the MRC, without ever leaving your working/listening position.

Total MIDI Control

If you own MIDI keyboards, rack expanders, effects or a MIDI sequencer, the MRC will command all the performance they have to offer. Define each of the MRC's four faders and four switches as *any* MIDI controller — Pitch or Mod Wheels, Aftertouch, Breath, whatever. Plug in an ordinary footswitch or volume pedal and the MRC will turn it into whatever MIDI controller you want. You can keep last year's equipment in your system. And add next year's — the MRC adapts to anything that speaks MIDI.

The revolutionary MRC MIDI Remote Controller from Lexicon. Discover control that gets the full potential from your MIDI system, at your Lexicon dealer.

Lexicon

Lexicon Inc., 100 Beaver Street, Waltham,
MA 02154 (617) 891-6790
Fax: (617) 891-0340 Telex 923468

Now available at your Lexicon dealer.

Newark Electronics Catalog

PUBLICATIONS

The Newark Catalog (free on request) is a comprehensive directory of over 100,000 electronic components and parts from 230 leading manufacturers. The 1,040 page catalog also includes tools, connectors, wire, meters, switches, hardware, chemicals, and over 150 pages of semiconductors.

Newark Electronics
Catalog Merchandising Dept.
4801 N. Ravenswood Ave.
Chicago, IL 60640
tel. (312) 784-5100

SAMPLES

Livewire's Sample Library ($129 for ten disks) includes over 50 disks of acoustic and electric instruments—synths, strings, horns, keyboards, percussion, and ethnic instruments—for the Ensoniq EPS and Casio FZ-series samplers. A cassette demo tape of the library is available for $6.

Livewire Audio
Box 561
Oceanport, NJ 07757
tel. (201) 389-2197

The Northstar E-III Library ($100 per disk) is now available, with a large collection of ethnic, orchestral, traditional, and synthesized samples for the Emulator III. Sample disks for the Emulator II, Emax, Mirage, EPS, S900, S-50, and DPX-1 are priced at $20.

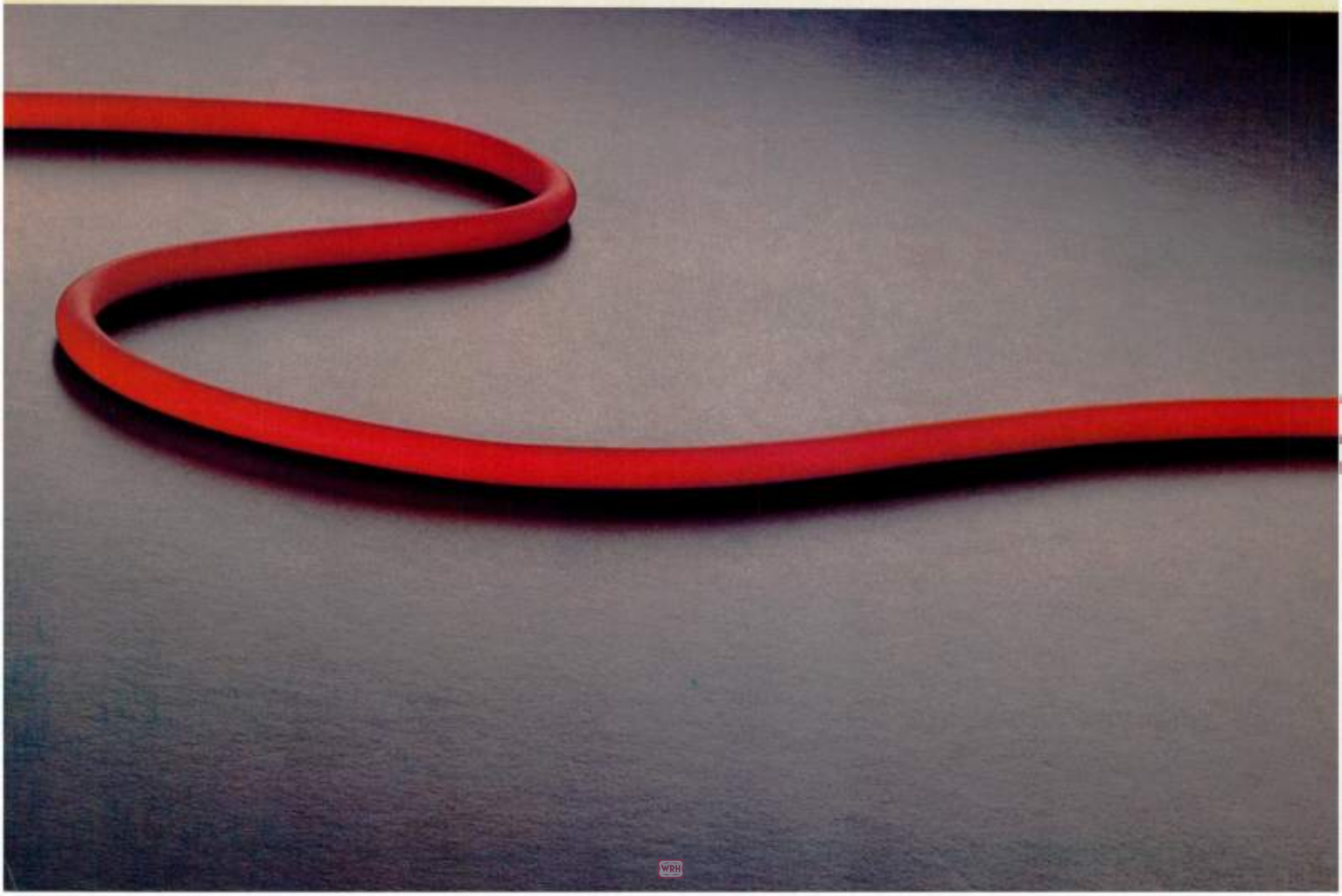
Northstar Productions
13716 S.E. Ramona
Portland, OR 97236
tel. (503) 760-7777

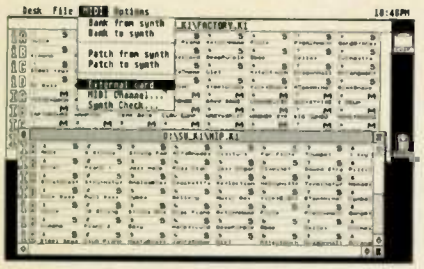
SOFTWARE

MidiDraw ($95) is a program allowing users to compose and perform music on their MIDI instruments by drawing on an Atari ST screen window. Features include a recorder that saves drawings for future playback, reverberation and echo effects, and redefinition of chords and scales in a conventional or unconventional sense. The resulting MIDI Files can be saved and read into sequencers or other MIDI programs.

Intelligent Music
116 N. Lake Avenue
Albany, NY 12208
tel. (518) 434-4110

SynthView K1 ($69.95 plus $3 postage) is a graphic sound librarian/editor for the Kawai K1 and K1m synthesizers and all Atari ST computers, color and monochrome. Editing is accomplished by clicking on the single or multi sound you wish to change, and envelopes are graph-





Synergy SynthView K1

ically displayed for point-and-click modification. Banks of sounds may be saved and loaded from disk and printed out. The program is also available for the Korg M1 and DW/EX-3000.

Synergy Resources
754 North Bolton Avenue
Indianapolis, IN 46219
tel. (317) 356-6946

SYNCHRONIZERS

The PPS-100 ($595) is a single rack-space SMPTE event generator and SMPTE/MIDI synchronizer that converts SMPTE to MIDI sync with Song Position Pointer as well as striping all formats of SMPTE time code. SMPTE time readout is shown on an LCD display, and the PPS-100 also generates MTC (MIDI Time Code), DIN sync, direct time lock, and ppqn sync. Two programmable relays allow for time code-referenced switching: a multi-track recorder could be connected to the PPS-100 for SMPTE-automated punch ins/outs. Optional software for the Atari ST and Macintosh provide for cue sheet entry of events.

J.L. Cooper Electronics
13478 Beach Avenue
Marina Del Rey, CA 90292
tel. (213) 306-4131

TELECOMMUNICATIONS

The WELL MIDI Conference is an on-line resource available to anyone with a computer and a modem. Hosted by **EM** author Carter Scholz and author/musician Warren Sirota, the conference provides information and support for MIDI users at all levels of experience. Shareware and public domain programs are regularly provided for download. To log on to The WELL, call (415) 332-6106 at 300 or 1200 baud. At the login prompt, type newuser (in lower case). Rates are $3/hour (with an $8 monthly minimum); billing is by Visa, MC, or monthly invoicing with a $25 advance payment.

The WELL
27 Gate Five Road
Sausalito, CA 94965
tel. (415) 332-4335 (voice)

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.* ■

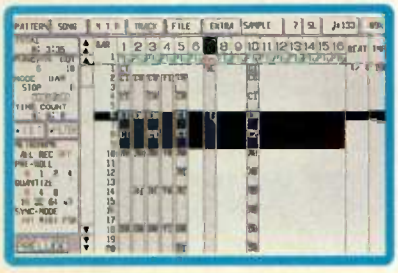
A Symphony of Features in a

Most music processing programs try to meet the needs of everyone but always fall short because composers, arrangers and performers need to work with music in different ways. DynaWare has addressed these special needs with **DynaDuet** and **Ballade**, two powerful new programs that let you fully express your creativity then easily play back or print out the results.

Dyna Duet™

Sequencer & Scoremaker

Dyna Duet is the most sophisticated music software available for the IBM PC/XT/AT and compatibles, combining MIDI sequencing and score editing programs in a single integrated package. MIDI data can be created quickly and easily using a mouse or entered in real-time from a MIDI keyboard and then edited. In addition, the MIDI data can be converted to a complete musical score for editing and printing out. Dyna Duet supports the entire composing and arranging process.



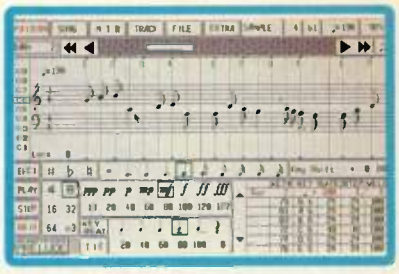
MTR Mode

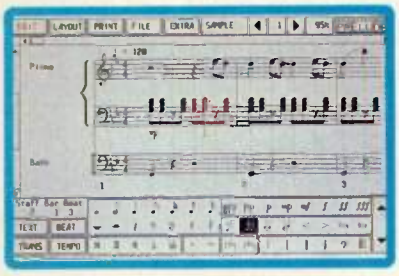
This mode is a powerful multi-track recorder with 16 tracks, providing the following features:

- Setting PLAY/REC/MUTE mode for each track
- Setting punch in/out points, pre-roll bar, metronome on/off
- MIDI clock and FSK are available for synchronization with a tape recorder
- Recording of real-time play from MIDI keyboard with quantizing and filtering of designated MIDI data

Pattern Mode

- Input data displayed as a score
- Notes on the music sheet can be input and edited by mouse
- Tone and length of sound, gate time, and velocity can all be set
- Flexible setting of major/minor key and tempo
- Data editing by numeric keypad
- Step data input from MIDI keyboard





Score Mode

The Score Mode is a music processor with advanced functions.

- Data input by placing musical symbols on the score with the mouse
- Complete score editing for up to 15 staves
- Input of score sequence data for staves
- Setting the direction of tie, slur, beam, and stem
- Input of dynamic marks, repeat marks, and other musical symbols

Suggested Retail Price $245

- **System Requirements:**

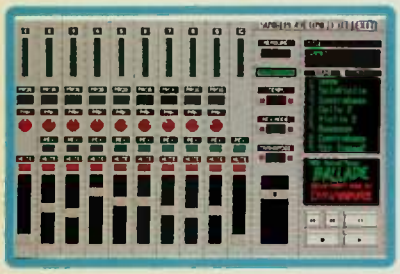
PC	: IBM PC/XT/AT or compatibles; 512K system memory
Graphics	: EGA or VGA graphic card
MIDI interface	: MPU-IPC or MPU-401 with MIF-IPC or compatibles
Printer	: IBM Proprinter, Epson FX, LQ or compatibles
Mouse	

Powerful Pair of Programs

BALLADE™

Sequencer for MT-32

Ballade is MIDI music software for the Roland MT-32 Sound Module, and contains both MIDI sequencing and tone editing functions. It runs on the IBM PC/XT/AT and compatibles.



Play Mode

● Visual screen for play

The level meters and volume faders move automatically, and the tone and volume can be adjusted even during playback.

Level Meter	Master Volume	Program Number
Measure	Program Name	Tempo
Panpot	Beat Counter	Part Volume

Song Mode

● Data input by real-time play and step method

Ballade allows the input of real-time play data from a MIDI keyboard, and also allows data input by the MIDI step method.

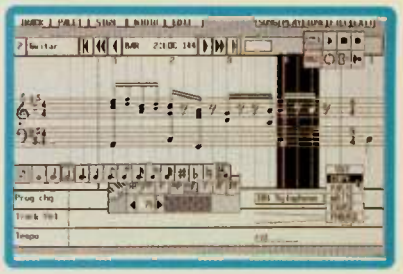
● Note input by mouse

Data can be input by simply clicking the mouse at the appropriate place on the staff. Additional information on notes such as Velocity, Step Time, and Gate Time can be set exactly.

● Effect data input by mouse

The following effect data can be input by simply drawing a curve on the graph with the mouse:

Pitch Bender	Part Volume	Modulation	Program Changes
Panpot	Hold 1	Master Volume	Tempo



Tone Mode

● MT-32 Tone Editor

Ballade allows for editing of all tone parameters of the MT-32. Parameters can be either input numerically or edited visually by drawing a graph with the mouse. This allows for easy creation of the perfect tone for your music

Suggested Retail Price $195

● **System Requirements:**

PC : IBM PC/XT/AT or compatibles; 640K system memory
Graphics : EGA or VGA graphic card
MIDI interface : MPU-IPC or MPU-401 with MIF-IPC or compatibles
Mouse
MT-32

DYNAWARE™

1163 Chess Drive, Suite J, Foster City, CA. 94404
TEL(415)-349-5700／FAX(415)-349-5879 1-800-444-3962 (For Orders Only)

Imagine an artist painting with an infinite palette. That's, in effect, what CASIO's VZ-1 can do for you, the musical artist. Giving you the freedom to play with sounds so rich, so full, they have to be heard.

The CASIO VZ-1 is a 61 key, 16-note polyphonic digital synthesizer that puts all the tools for complex sound construction at your fingertips. It gives you outstanding performance versatility, through initial touch, and user-definable routing for after touch, two control wheels, and optional foot pedal. Its 16-note, 8-part multi-timbral MIDI implementation allows extensive individual control of each sound.

The VZ-1 uses a whole new technology called iPD (interactive Phase Distortion) instead of sampled wave forms, or PCM partials. An open system of 8 multi-waveform oscillators interact in a variety of ways—mix, ring, phase, and external phase modulation. The result: sounds that are rich, full, and unique.

One of the VZ-1's strongest features is its Combination Mode, which lets you combine up to 4 different sounds in a variety of split and layer configurations, including multiple velocity split and positional cross-fade capability. You'll swear you're playing a MIDI stack instead of a single keyboard. As a MIDI master keyboard, the VZ-1 can be split into 4 "zones," with separate send and receive channels for each note range.

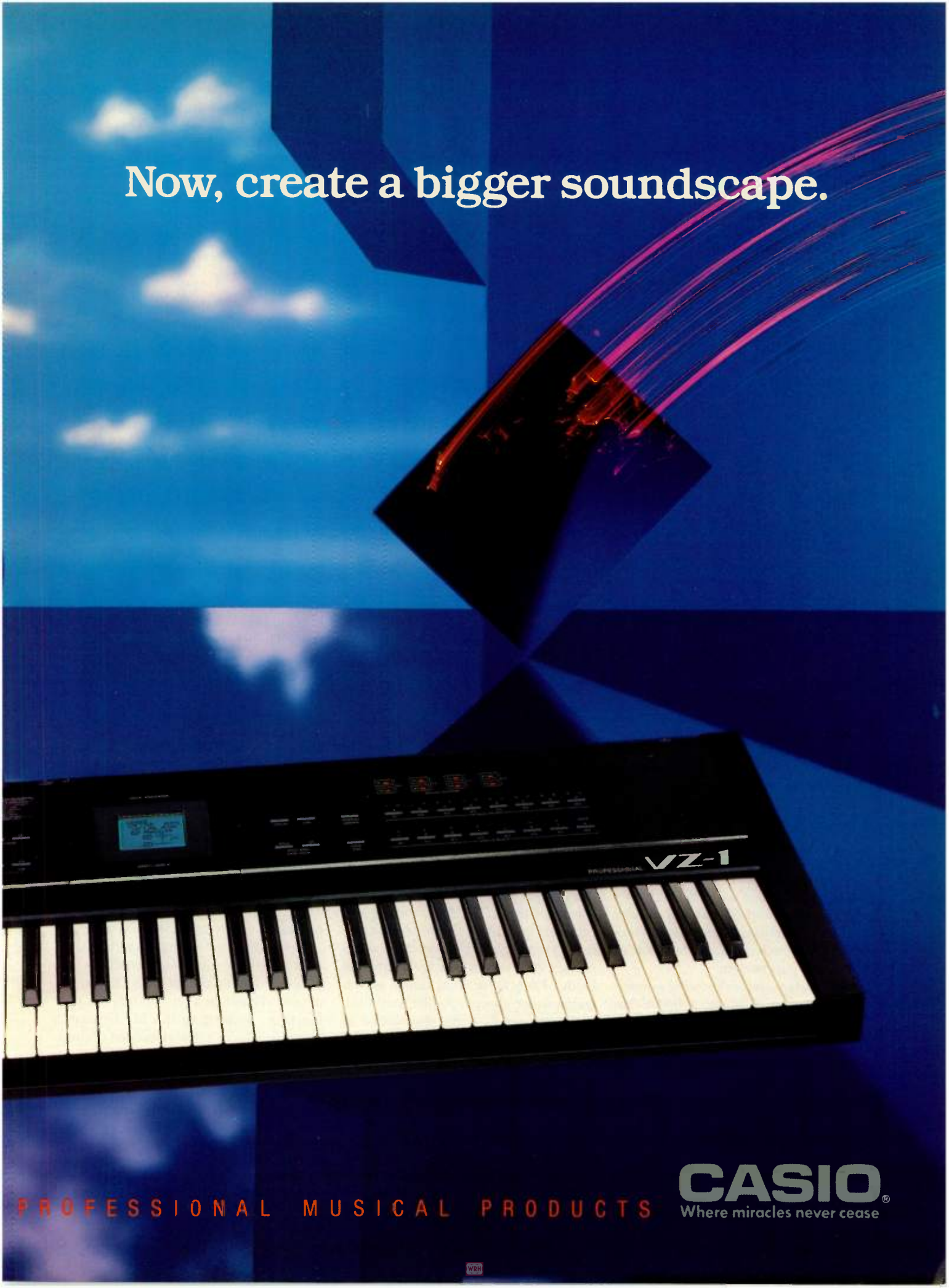
The VZ-10M is a 2 rack-space version of the VZ-1.

The VZ-1 comes complete with 64 sounds and 64 Operation Memories, plus a free ROM card (RC-100) with an additional 128 of each, for a total of 384 timbres out of the box. Optional ROM cards with additional sounds are also available. And with an optional RAM card (RA-500), you can store up to 64 sounds and 64 Operation Memories of your own.

And finally, to enable you to effectively manage all of its programming power, the VZ-1 has a wide, backlit LCD graphic display, making editing quick and intuitive under any lighting conditions.

If you want the artistic freedom to create a bigger soundscape, escape to a better instrument—a CASIO VZ-1. Now playing at your authorized CASIO Professional Musical Products dealer.

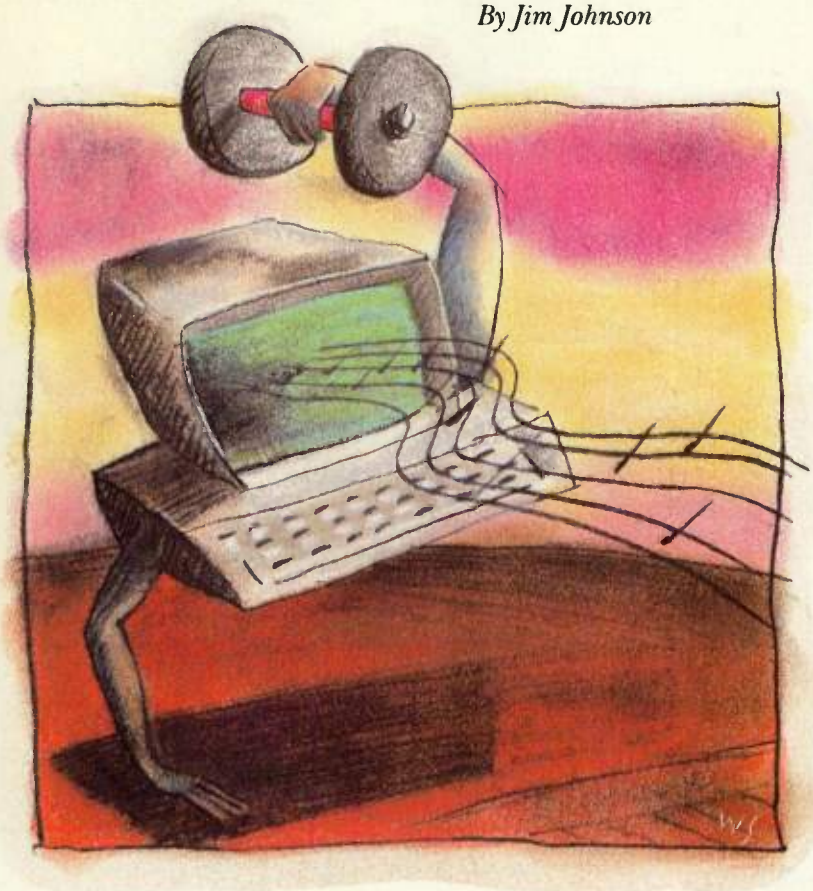
Casio, Inc. Professional Musical Products Division: 570 Mt. Pleasant Avenue, Dover, NJ 07801
Casio Canada Ltd., 2100 Ellesmere Road, Suite 240, Scarborough, Ontario M1H3B7


Now, create a bigger soundscape.
VZ-1
PROFESSIONAL MUSICAL PRODUCTS
CASIO
Where miracles never cease

THE ST POWER USER PART II: THE SOFTWARE

To make your ST a real power computer, you need the right software. Here's what it is and where to get it—and some of it is free.

By Jim Johnson



WHITNEY SHERMAN

Last month I outlined the hardware you need to become a power user on your Atari ST, but without the appropriate software, even the most complete ST system is nothing more than an overpriced paperweight.

ST musicians already know the wonderful assortment of music software out there but may *not* know about the many utility programs that can simplify the computer musician's life. These programs—some available commercially and many for free—fall into three categories: desk accessories, AUTO programs, and standalone utilities.

Desk accessories are programs the ST loads from the boot disk (either the hard drive or floppy) when the computer is turned on. Desk accessories just sit there, using up memory, until you select one from the desk menu in the upper left corner of the ST's screen, causing the computer to "suspend" the program currently running and jump to the desk accessory. Desk accessories can perform all kinds of functions, from simple system maintenance chores (like the Atari Control Panel supplied with the system) to more complex tasks like handling RAM disks, telecommunications, and even MIDI data dumps.

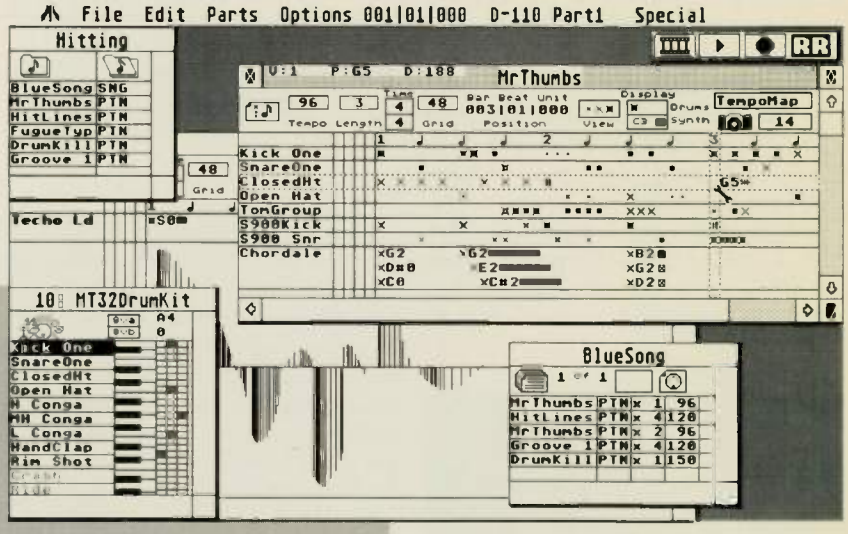
Since desk accessories are activated from the menu bar, they can only be run from programs that use the GEM interface, which includes most, but not all, ST programs. One of my favorite accessories, which I downloaded from one of the bulletin board services, is an auto-dialer called *MOBZDial* that maintains a list of names and phone numbers. A few clicks on the mouse will retrieve a phone number and dial it with your modem. More powerful auto-dialers are available commercially, but I'm happy with MOBZDial.

The *SI RamBuffer* is a combination RAM disk/print spooler program that lets you change the size of either the RAM disk or print spooler without rebooting the computer. A print spooler is a program that holds output going to your printer in an assigned part of memory (a "buffer"), so you can use the main part of the computer's memory to run some other program; no more waiting for files to print. The RAM disk included with this desk accessory is especially handy: when you install it, it automatically loads whatever files you've specified in the configuration file, saving you the trouble of loading them yourself.

One absolute *must* for the ST programmer is *MemFile*, a sector editor that lets you view and manipulate any byte in any sector of either your floppy or hard disk. MemFile is the only sector editor I've seen that works as a desk accessory and, unlike most others, allows you to directly access files as well as sectors. MemFile is a public domain program and can be downloaded from just about any information service or Bulletin Board System.

Equally handy, though less spectacular, desk accessories include: *ScreenSaver*, a program that blanks out the ST's screen at your request or after five minutes of inactivity, prolonging the life of your monitor; a lot of calculators (one of the flashiest is a complete simulation of the TI-59 programmable scientific calculator); *Caps*, which displays the status of the ST's Caps Lock key in the menu bar; and my favorite, a simple hex/decimal conversion calculator called *BiCalc*. Word processing desk accessories abound, though I prefer to stick with *1st Word* (the word processor that came with the earlier STs),

Life Is Too Short To Waste Time Making Music.



Chances are, if you're using a sequencer, you're wasting a lot of time. Unless, of course, you're using RealTime,™ the new sequencer from Intelligent Music.

RealTime lets you do everything as your music is playing. You can record a record-breaking 256 tracks. Graphically edit to the finest detail. Instantly access all MIDI controls. Load and save Patterns, Songs and device setups. Synchronize to MIDI Time Code. Even run other programs and desk accessories from within RealTime. All while you're listening.

And to speed up the creative process even more, RealTime includes the interactive features you'd expect from an Intelligent Music program. Like Track Bondage,™ which lets you slave elements of different tracks to produce new combinations of musical elements. Automatic Fill Generation, which enables you to enhance your original material. Time Deviation, which allows you to give each track its own rhythmic feel. Device Lists that remember your entire MIDI setup. And much more.

So stop wasting time while you're making music. Get into RealTime today. Call or write us for the dealer nearest you. Or send us a $10 check and we'll send you a demonstration package. For the Atari 520, 1040, and MEGA ST.

REALTIME

RealTime features include:

- 256 simultaneous tracks
- Virtually unlimited Patterns and Songs
- 768 parts per whole-note clock resolution
- Device Lists to store drum machine and synth setups
- Graphic editing of notes, transpositions, durations, velocities, and controls
- Copying, pasting, and editing of any region or Pattern
- Painting of tempo maps and MIDI control changes
- Independent, nested track looping
- Delaying and shifting of tracks
- Graphic arrangement of Songs
- Snapshot presets of control parameters
- Importing and exporting of MIDI Files
- Synchronization to SMPTE/MTC devices
- Real time multi-tasking environment
- Complete GEM windows implementation

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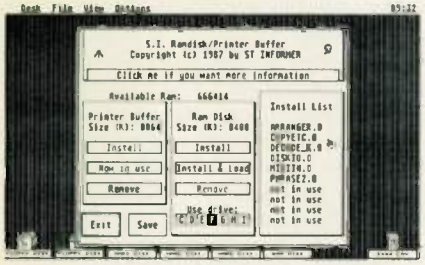
and there are plenty of clock/calendar accessories as well. Aside from public domain desk accessories, dozens of more powerful ones are available to those willing to pay.

AUTO-MATION FOR THE ST

Unfortunately, ST memory can only hold six desk accessories at a time, and you can't change them around without rebooting. This may seem a severe limitation, but there are palliatives: *AUTO folder* programs. Before it initializes the GEM desktop, the ST will run the programs stored in a folder named AUTO on your boot disk. This allows the knowledgeable power user to install all kinds of "patches" in the ST's operating system to correct some of GEM's infamous bugs, expand the capabilities of the system, or just make life a little easier. AUTO folder programs are no different from most ST programs; they just perform tasks you'll usually want to do only once in a session.

The automatic phone directory on the desk accessory MOBZDial.



SI RamBuffer lets you change the size of either the RAM disk or print spooler.

MemFile a desk accessory that lets you view and manipulate any byte in any sector of a floppy or hard disk.

Superboot allows a custom boot screen that greets you with an uplifting picture of your choice when you start your work day.

I discovered my favorite AUTO folder program on GEnie a few months ago. *Superboot* "intercepts" the ST's operating system before it installs desk accessories or executes AUTO folder programs and lets you select which of them, and which desktop configuration, it will actually install. This program alone has been the key to my transformation from a sullen, frustrated ST owner to a manically happy power user. Since so many ST applications are incompatible with certain desk accessories and/or AUTO programs, it's often necessary to reconfigure the system when going from one application to the next. If you use a floppy drive exclusively, you can use a different boot disk, but hard drive users have to rename all accessories and AUTO programs individually. Ugh! Superboot takes care of all this by providing up to ten different configurations, each accessed through a function key. It even allows you to install a custom boot screen that greets you with an uplifting picture of your choice when you start your work day, and to add password protection to your system so you needn't worry about the people your roommate lets in the house.

My second favorite AUTO program is called *FOLDRXXX*. In rushing the ST to market, Atari let the now-infamous "40-folder bug" slip past, causing the computer to crash or *appear* to wipe out large chunks of your hard disk if you accessed more than 40 folders in a single session. FOLDRXXX solves this problem by allocating extra space in the ST's memory for additional folders. Mega owners won't need FOLDRXXX—Atari fixed the bug in their latest ROMs—but if you use an earlier ST, FOLDRXXX is a must. Even worse than the 40-folder bug is another, more subtle bug (perhaps "quirk" is a better word) in the ST's DOS that causes immense frustration for hard-drive owners. As the ST writes and erases data from the disk, the free space on the disk is broken up into tiny chunks. Unfortunately, Atari's routine to search for these chunks of free memory is *very* slow and inefficient. I've never made measurements myself, but I've heard horror stories where disk write time increased by a factor of 20 or more within a few months of purchase. Atari is supposed to be fixing this bug in the next set of ROMs for the Mega and ST series, but for all the machines in the field now, there is a software fix.

FATSPEED.PRG is a public domain program that replaces Atari's FAT (File Allocation Table) search routine with a faster routine. Some commercial and public domain programs solve this problem by repacking the data on the hard disk, but I don't recommend them: the PD program I tried trashed my hard disk, and I've heard that commercial programs aren't much better.

PUTTING IT ALL TOGETHER

AUTO folder programs on the ST can be tricky to use for a couple of reasons. The order of execution of multiple programs in your AUTO folder can often be critical. For example, with the programs I use, FATSPEED must be run after FOLDRXXX, and Superboot must be the first program to run. The key to proper execution here is an obscure bit of information absent from the ST's documentation: AUTO programs execute in the order they are copied into the AUTO folder. Erasing a file from the AUTO folder will leave a "hole" in the sequence that will be filled by the next file copied to the folder. The best way to change the order of program execution in your AUTO folder is to copy every program in the folder to a temporary folder, erase the AUTO folder's contents, then copy everything back in the new order.

Another problem with the AUTO folder is that programs using any aspect of GEM (virtually all ST applications, even those that don't use the GEM interface) can't be executed if they reside in the AUTO folder, because the system runs these programs before GEM is initialized. This means you can't autoboot your favorite sequencer program when you power up the system—unless you've made

STARTGEM.PRG the last program in your AUTO folder. STARTGEM is a public domain program that automatically loads and runs any ST program once the other AUTO programs are finished. When used with Superboot, it can make each of Superboot's function keys autoboot a different application. This combination is the hippest thing since sliced bread.

WHERE THE PROGRAMS ARE

The following is a list of the location of each program and desk accessory discussed in this article, following the format of program name, location, and filename. The file locations listed are all on General Electric's GEnie network, for brevity; however, most of these files are also available on CompuServe, Delphi, and many private BBS's. Check with your local Atari user's group, too; most maintain a library of public domain programs that should have many of these programs.

FATSPEED (disk accelerator)—File 7193, GEnie—FAT.ARC
Superboot—File 7030, GEnie—SUPERBOOT_41.ARC
Turtle (hard-disk backup)—File 6392, GEnie—TURTL_217.ARC
Turtle Restore—File 5581, GEnie—TRESTORE.ARC
Arc (archiving program)—File 7240, GEnie—ARCV521.ARC
ArcShell (GEM interface for Arc)—File 7410, GEnie—ARCSH196.ARC
MemFile (sector editor)—File 7889, GEnie—MEMFILEV20.ARC
SI RamBuffer (RAM disk/print spooler)—File 3934, GEnie—STIRAM2.ARC
MOBZDial(auto-dialer)—File 2183, GEnie—MOBZDIAL.ARC
Penicillin (virus killer)—File 6343, GEnie—PENICILN.ARC
Virus Killer—File 7119, GEnie—VKILLER.ARC
Caps (caps lock indicator)—File 2480, GEnie—CAPS.ARC
FOLDRXXX (40-folder bug fix)—File 3632, GEnie—FOLDRXXX.PRG
Bicalc (hex/decimal calculator)—Files 75 & 76, GEnie—BICALC.ACC & BICALC.DOC
ScreenSaver (screen saver)—File 1731, GEnie—SCNSAVE.ARC
MI 59 (programmable scientific calculator)—File 6323, GEnie—MI59.ARC
Startgem (autoboots GEM applications)—File 6386, GEnie—STARTGEM.ARC

POWER UTILITIES

Not all the ST's useful programs must be installed on boot-up. A number of essential programs run from the desktop like any sequencer or word processor. For hard-disk users, the most important of these is *Turtle*, which, despite its name, is a high-speed backup program. Turtle gobbles up most of the memory in a 1-meg machine to create a RAM disk and load it

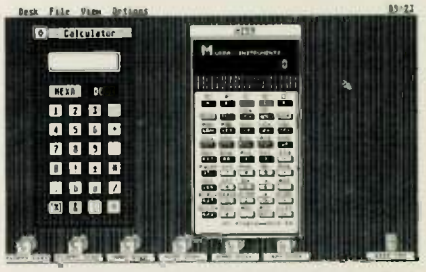
This program alone has been the key to my transformation from a sullen, frustrated ST owner to a manically happy power user.

with files from the hard disk. It then uses a high-speed, disk-write routine to save these files to the backup floppy. Turtle has been extensively refined since it first appeared on bulletin boards about two years ago, and its latest features and bug fixes make it the ST backup program of choice, commercial programs notwithstanding. Turtle won't work in a 1-meg machine with desk accessories installed, and I was reluctant to use it due to the hassle involved in reconfiguring my system. Superboot changed all that, allowing me to use a function key to reconfigure my system for Turtle, and backups are about as convenient as they can possibly be.

Perhaps the most prevalent ST utility is a little program called *ARC.TTP* that packs data and program files into an "archive" file requiring only 25% to 95% of the disk space of the original files. Used primarily in transmitting files via modem to save on connect time charges, ARC.TTP also saves hard-drive space. I keep programs I only use once in a blue moon, along with old letters, articles, and sequencer files, in archive files, so my 20-megabyte hard drive acts more like a 25- or 30-meg device. ARC.TTP is a "TOS Takes Parameters" program, which means it reads a "command line" from a dialog box that appears when you run the program, to determine which files to act on. For those who loathe typing commands, there are a number of "shell" programs out there that provide a standard GEM interface for ARC.

LEMONS

So far, I've only mentioned the useful public domain programs. Unfortunately, many more PD programs are marginally useful, not worth the download time, or positively dangerous to use. I'm not going to discuss the worthless programs in this limited space, but I want to warn you away from one class of programs that you should *not* use with your ST: the "extended disk format" programs. These programs create extra storage space on a floppy disk by formatting portions of the disk not normally used. While the programs themselves are functional, the extra sectors on the *disks* may be unreliable. I barely escaped a major disaster when my hard disk crashed because I had been using an extended disk formatter to squeeze about 925K onto my 720K backup disks. When I attempted to retrieve my backup data, many of the backup disks were unreadable. Fortunately, I had two sets of backups, and while I did lose a few



Two of the ST's calculator desk accessories.

The Superboot directory screen.

The good news is that the ST is much more resistant than other computers to virus programming techniques.

files, all of my critical data was saved. One extended formatter, *Twister*, is apparently a reliable means of increasing the amount of storage space on a floppy disk; avoid all others like the plague.

Speaking of plagues, let's talk virus programs. Viruses, usually transmitted by public domain programs, are programs that destroy other programs in a computer. The good news though, is that the ST is much more "resistant" to virus programming techniques, because its operating system is in ROM. All the other major personal computers have operating systems that reside on disk and can be modified by a virus program. ST viruses typically spread through the boot sectors of floppy disks, and to my knowledge, have not yet been seen outside Europe. Programs to detect and destroy virus programs are available on all the major networks, and since the authors of most public domain programs have accounts on one or more networks, it's possible to verify the source of many programs. Most networks also test any uploaded programs for a few days before releasing them, and news of viruses travels quickly through the networks. This all means that if you take a few simple precautions, you are probably safe, but careless behavior could wipe out your system.

Now it's time to put your power system to use. Once you've turbocharged your ST with the components I've described, you'll be amazed how much real work you can do with your computer. The hard drive, memory expansions, and other hardware will cost you some money, of course, but the total cost of all the items I've discussed should still be less than the price of a decent keyboard synth, and the software costs are practically nil, even after you send donations to programs' authors. When it's all together, you'll have more time for making music and more money for buying quality music software!

Using Your Sequencer as a MIDI System Analyzer

Sometimes you only need to look at your equipment from a different angle to see an entirely new set of uses for it.

By Craig Anderton

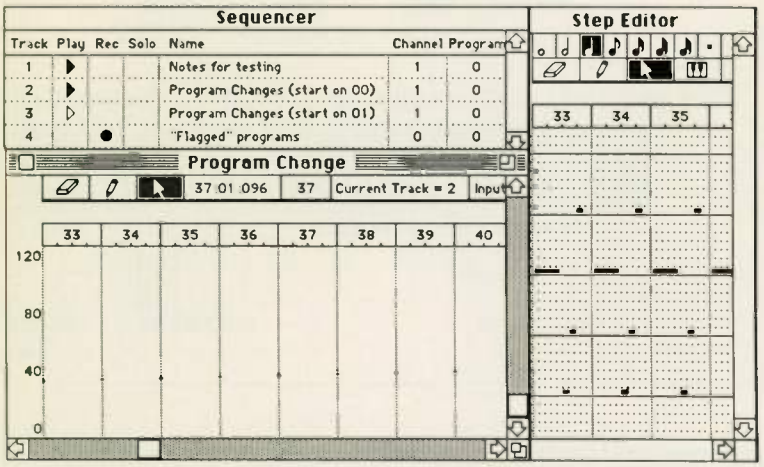


FIG. 1: Find the right synth patch easily by sequencing a measure of music for each patch in your synthesizer.

Quick, now: one of the most useful pieces of test equipment in the MIDI studio is. . . a sequencer?

If you've ever wanted to test a synthesizer's compatibility with MIDI guitar, audition a keyboard's patches quickly, check how rack-mount tone generators respond to notes at the extremes of the MIDI note range, align your tape recorder with a minimum of fuss, make sure all elements of your system are responding to MIDI . . . (whew). . . or just tune your axe, this is the tip for you.

Sequencers, as we know, are great for recording musical events, but it's a less well-known fact they can also be turned into powerful event *generators* using the world's simplest MIDI programming language: step-time recording. The idea is that you create sequences designed not to play back music, but to generate a stream of MIDI data that automatically puts a piece of MIDI gear through its paces while you sit back and judge the results.

These sequences (and screen dumps) were created with *Master Tracks Pro*, but you can use almost any other sequencer to create equivalent ones.

PROGRAM CHANGE TEST

The problem: I had just received an Oberheim Matrix-1000 for review and needed to audition all *1,000* programs. Punching buttons for all those presets got to be a little tedious, so I opted for some sequenced assistance. The sequence I came up with (**Fig. 1**) sends out a Program Change command, plays a measure of music, sends out the succeeding Program Change command, plays a measure of music, and so on. It steps through all a synth's programs rapidly and efficiently.

The Step Editor window shows the notes in track 1: C, played at four different octaves. You might want to transpose up or down to find patches for bass or high parts.

Track 2 contains Program Change commands, starting at 000. Track 3 also contains Program Changes but starts at 001 to accommodate synths that number their programs 001 to 128 instead of 000 to 127. (Note: Do not let tracks 2 and 3 play simultaneously.)

Track 4 is set up to record, so when you find a patch you like, just press a key on your synth, and the note will register on the Song Editor window. If you used track 3 to send Program Changes, the measures in which you've recorded a note (shown in black on the Song Editor window) correspond to the numbers of the programs you liked. For example, if measures 5, 12, and 37 are black, you "flagged" programs 5, 12, and 37 as they were playing.

If you used track 2 to send Program Changes, subtract one from the measure number. In the example given above, programs 4, 11, and 36 were "flagged," and you have a quick list of the patches you want to use.

TUNE AND CHANNEL TEST

This sequence (**Fig. 2**) plays an A-440 every measure and tests which instruments are responding to which MIDI channels.

Sequencer tracks 1 through 16 play two looped measures on MIDI channels 1 through 16, respectively, each measure containing a whole note. To tune one instrument to another, set the appropriate tracks to play, and run the sequence.

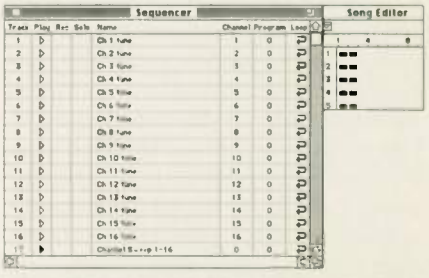
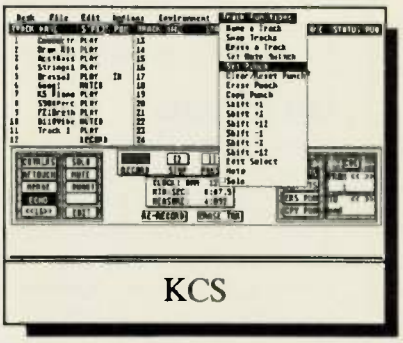


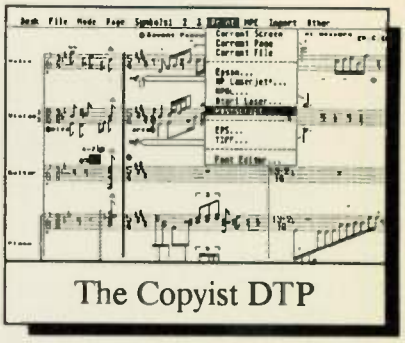
FIG. 2: This sequence plays an A-440 for tuning your instruments and tests which instruments are responding to which MIDI channels.

I WANT MY MPE

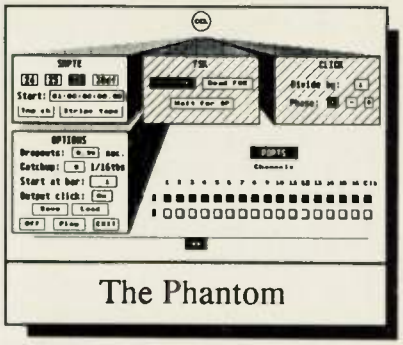
You said you wanted a digital music workstation at a price you could afford, and we gave it to you. MPE, the Multi Program Environment for the Atari ST computer, is the only integrated system combining simultaneous programs in memory, dynamic data exchange between programs, and across-application control. More than 17 programs are available; from sequencing to patch editing, scoring to SMPTE synchronization, one for almost any need you have. New applications are coming from other manufacturers as well. Once you try it you will never want to work any other way!



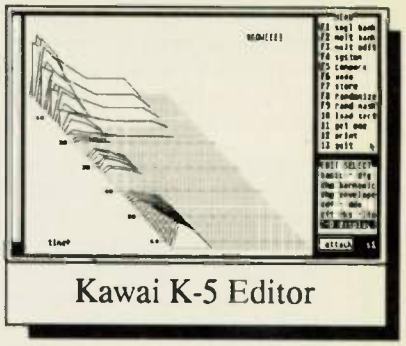
KCS



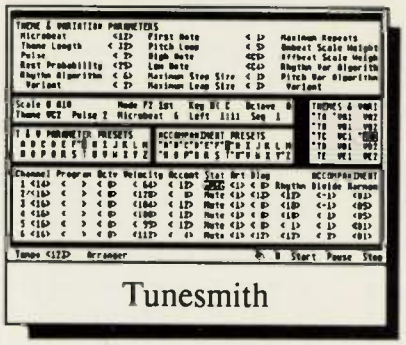
The Copyist DTP



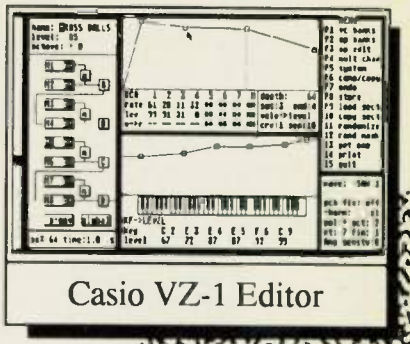
The Phantom



Kawai K-5 Editor



Tunesmith



Casio VZ-1 Editor

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As the sequence plays, tune the other instruments.

To test which instruments respond to individual channels, either solo one of tracks 1 through 16 and check which synth responds, or create a "channel sweep" sequence (shown as track 17). This track generates an A-440 for one measure on channel 1, then on channel 2, then channel 3, and so on up to channel 16. This is useful if you want to do a quick check of a MIDI system and see which channels are triggering which instruments. It's easiest if the measure number is the same as the MIDI channel over which data is being sent.

Instruments set for Omni mode, by definition, will be triggered on all MIDI channels; similarly, multi-timbral instruments will also be triggered on more than one channel, depending on their settings.

TAPE TEST TONES

You may already have a test tone generator sitting in your rack, but if you don't, and need to lay test tones on your tapes, here's another approach. Yamaha's TX-802 rack-mount synth can generate a sine wave you can use for alignment and testing purposes. The sequence below generates notes appropriate for obtaining 100 Hz, 1 kHz, and 10 kHz test frequencies from the TX802. You will need to adjust the 802's output level for your particular system.

To set up the TX802:

1. Select a Performance and place the cursor on any voice. Edit the Performance so the selected voice is assigned to MIDI channel 1.
2. Press Voice Select and, from Utility Menu page five, initialize the Voice edit buffer (this produces a simple sine wave). Do not save the initialized voice.
3. Run the sequence. Because you didn't save the initialized voice, as soon as you select another Voice the initialized voice will return to its original settings.

Regarding the sequence (**Fig. 3**), program track 1 to provide 20 measures of 100 Hz tone by playing G1 with +15 pitch bend, track 2 for 20 measures of 1 kHz tone by playing B4 with +14 pitch bend, and track 3 for 20 measures of 10 kHz tone by playing D#8 with +5 pitch bend. Play whichever tone you want to use. When changing tones, stop the sequencer, go back to the beginning, select the new tone, then restart the sequence.

At 40 bpm, each tone lasts two minutes. At 80 bpm, each tone lasts one minute. At 160 bpm, each tone lasts 30 seconds. Of course, you can also test response at other frequencies by selecting different notes.

Do a quick check of a MIDI system and see which channels are triggering which instruments.

TUNE YOUR GUITAR/BASS

This simple but useful sequence (**Fig. 4**) generates the standard E-A-D-G-B-E notes used for tuning guitars, starting with E1. Each note lasts four measures, which seems about right for tuning, and the entire sequence is looped so that you can verify tuning as the sequence repeats. This is necessary with guitars that use vibrato tailpieces, since bringing strings up to tension may sometimes loosen the tension on other strings.

I found the guitar sequence so useful I also did one for bass that plays E-A-D-G.

GUITAR SYNTH COMPATIBILITY TEST

Many MIDI guitar controllers are optimized to work in MIDI Mode 4 (Mono

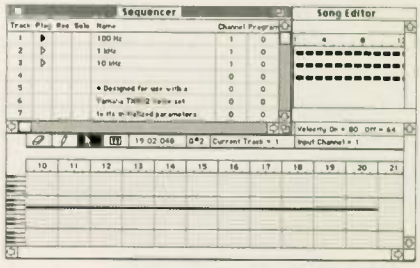


FIG. 3: You can use the Yamaha TX-802 and your sequencer to generate tape test tones of 100 Hz, 1 kHz, and 10 kHz.

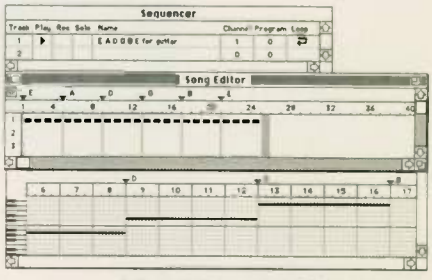
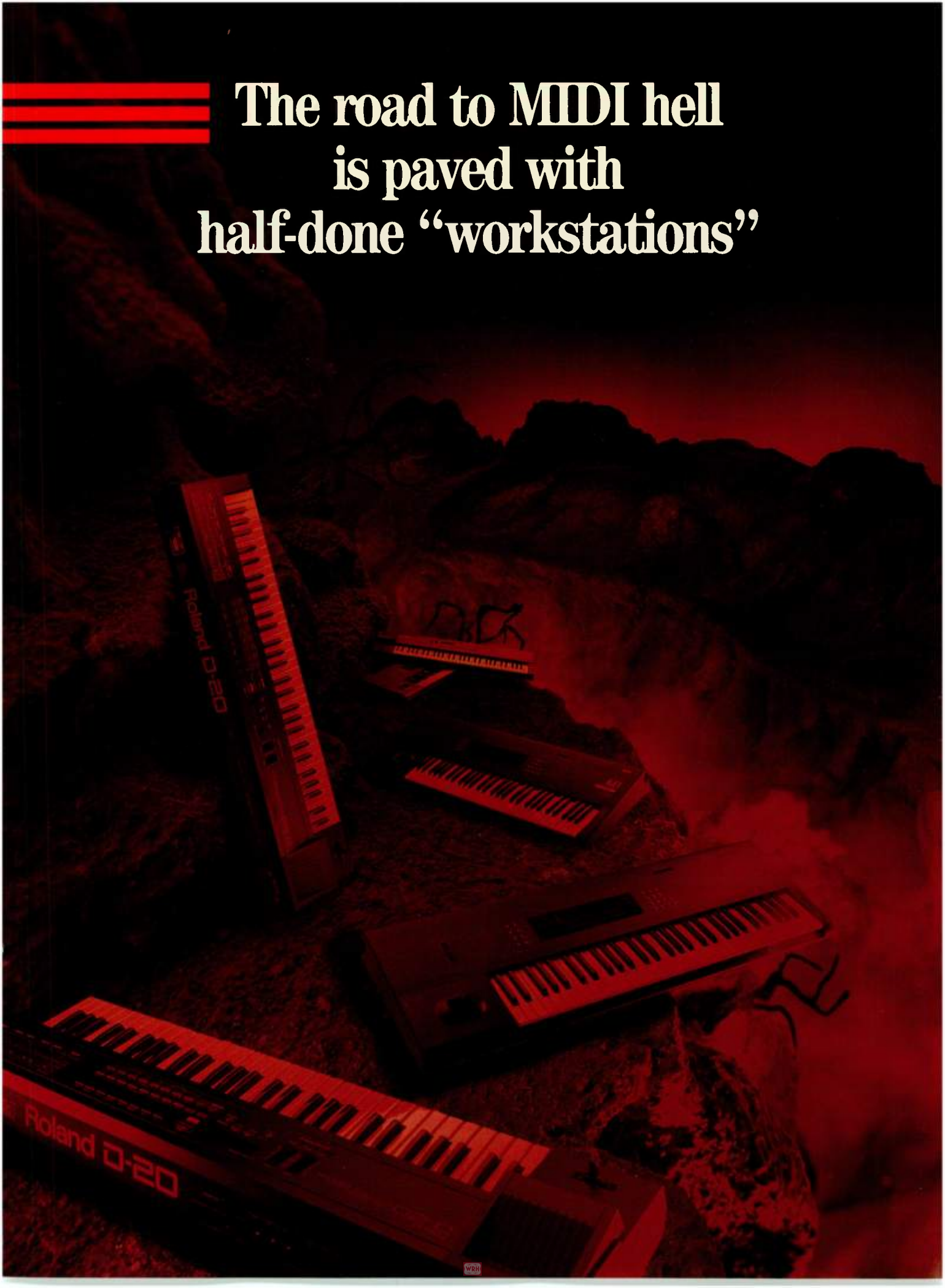


FIG. 4: This simple sequence generates four measures each of the notes E-A-D-G-B-E for tuning guitars.

The road to MIDI hell is paved with half-done "workstations"



The Ensoniq EPS . . .

where sampling, recording, mixing and control

The Ensoniq Performance Sampler is what a *true* workstation is all about — a complete instrument for writing, recording, studio control and performing.

The EPS puts a world of innovative features at your fingertips. Its advanced technology and dozens of "Smart MIDI" features let you do things that just can't be done any other way.

You can record *and mix* an entire composition on the EPS. The on-board sequencer is so advanced, it's like having an automated 8-channel mixer and 16-track recorder controlling internal voices and external MIDI gear. There's also a built-in disk drive to store sounds, songs and Sys Ex data.

Expert system technology puts sampling to work
With sample rates of up to 52.1kHz and a 96dB dynamic range, your sampled sounds are crisp, clear and lifelike. The "expert system" loop and edit processing uses artificial intelligence technology to let you quickly and easily put sampling to work for you.

Creative, professional quality sampling is nearly automatic with the EPS. Automatic multi-sampling and automatic volume smoothing make it simple to map complicated sounds across the keyboard. Internal sample rate conversion helps you manage the memory. There's even a choice of 5 different types of crossfade loops.

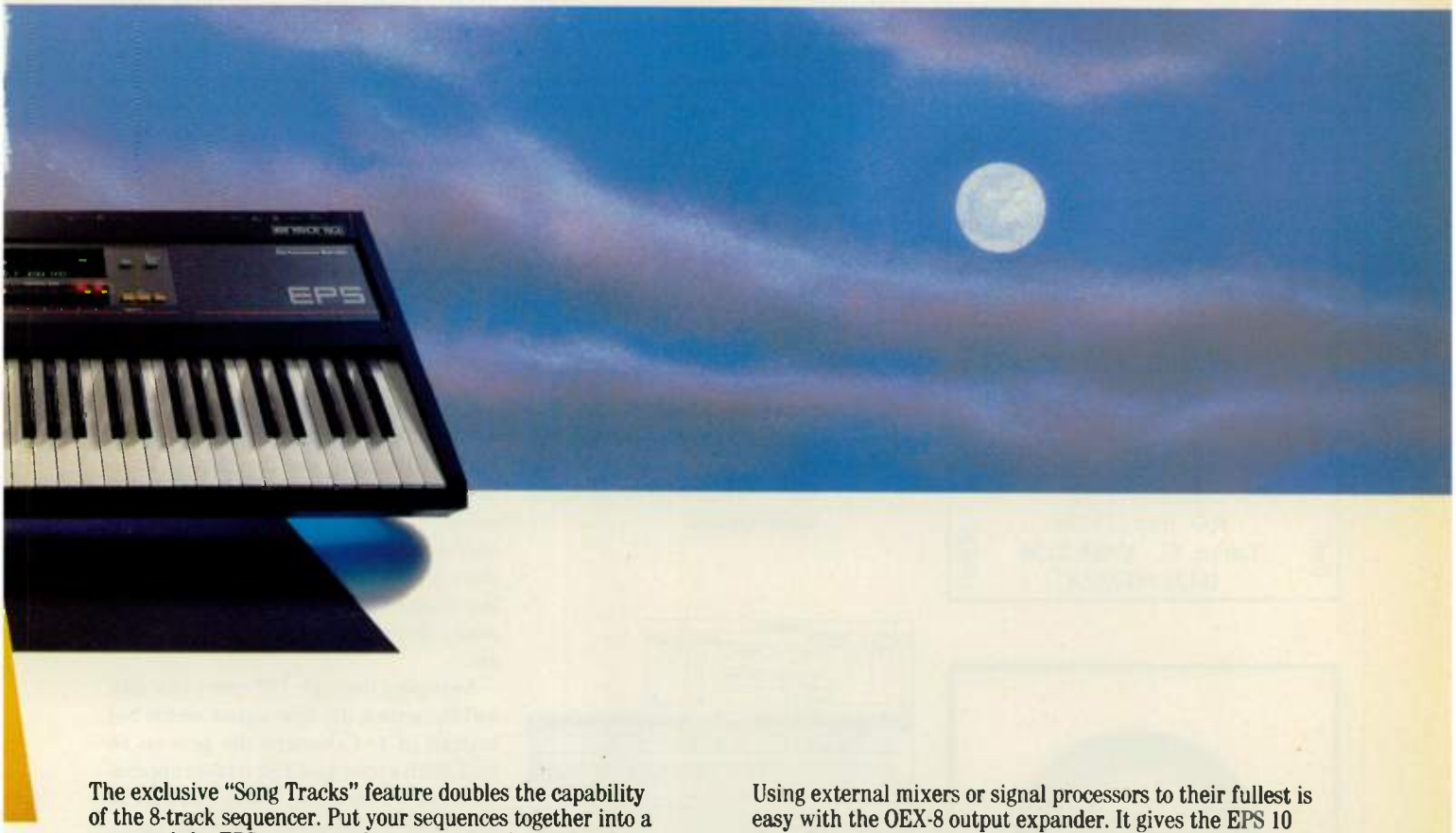
Poly-Key™ and Patch Select™ for expressive realism
When it comes to creative voice architecture, the EPS has no match. Each voice has three 20-parameter envelopes, two multi-mode digital filters and its own LFO. The 20 voices can be layered up to 8 deep and can be dynamically switched or crossfaded with the Ensoniq exclusive Poly-Key keyboard or Patch Select buttons.

The EPS comes complete with the 13 essential sounds that you need for composing or performing, including: piano, brass, strings, sax, bass, vocals, drums, synth and electric and acoustic guitars. Each sound is specially designed to take particular advantage of Poly-Key and Patch Select.

The sequencer that goes beyond multi-tracking
Ensoniq pioneered the on-board sequencer concept with innovative features like dynamic voice allocation. The EPS sequencer is the most powerful ever put in any keyboard, with features like an 80,000 note memory, the ability to time-shift individual tracks one clock at a time and an audition page that lets you compare old and new versions of every edit and punch-in.

the complete workstation

put you on the fast track to creative freedom



The exclusive "Song Tracks" feature doubles the capability of the 8-track sequencer. Put your sequences together into a song, and the EPS sequencer lets you create 8 additional song-length tracks giving you 16-track recording ability.

MIDI Auto Mix makes the EPS a complete controller
The EPS can be an *automated* mixer. The sequencer has an exclusive new MIDI Auto Mix feature that remembers all the volume fades — up or down — anywhere in the song. MIDI Auto Mix can control the internal instruments or external MIDI modules.

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mode). For a synth to work well with MIDI guitar, each synth voice should be able to respond to its own MIDI channel and provide a monophonic response on that channel. Furthermore, playing a new note on a string before releasing a previously played note on that same string should *not* trigger a new attack (legato response).

The sequence in **Fig. 5** generates one measure of notes on each of the 16 MIDI channels (only 12 are visible). Measure 1 generates notes over channel 1, measure 2 generates notes over channel 2, etc. As the sequence plays, the notes in the measure should repeat once for each of six contiguous channels. If you hear the measure once instead of six times, the synth is in Poly mode instead of Mono. If you hear the measure 16 times, the synth is in Omni mode. If you hear the measure more than six times but less than 16, the synth is probably in Mono mode, but some of the voices may be assigned to channels that the guitar synth will not trigger, since most of the time a Mono mode guitar sends data out on only six channels.

The notes in each measure are arranged so that the second note's attack occurs before the first note is released, and the third note's attack occurs before the first and second notes are released. This tests for legato response: if the notes do not retrigger, but the first note simply changes pitch twice, all is well. If each note retriggers, or if the first note continues sounding after the second and/or third note triggers, then the individual strings are responding polyphonically (albeit over a single channel) or retriggering with each new attack. The latter response works well with sounds that have long decays but is less commonly used with MIDI guitar. (For more information on how to set up synths for MIDI guitar, see the article "TX81Z Tips for the MIDI Guitarist" in the October 1988 **EM**.)

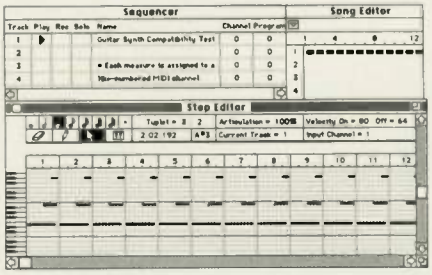

FIG. 5: A great help for MIDI guitarists, this sequence determines if a synth is in MIDI Mode 4 and provides legato response.

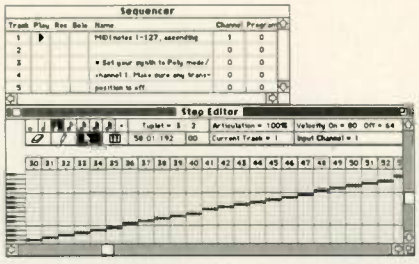

FIG. 6: The sequencer can play each MIDI note from 1 to 127 to check how a MIDI synthesizer responds to notes at the high and low ends of its range.

MIDI NOTES 1 to 127

The sequence in **Fig. 6** steps through each MIDI note from 1 to 127 (it does not play back MIDI note 0), with the measure number equal to the note number (e.g., measure 60 plays MIDI note 60). This test is useful for checking how a MIDI synthesizer responds to notes at the high and low ends of its range: does it ignore the notes, double back to a different octave, etc.?

Sweeping through 127 notes can take awhile; setting the time signature for 2/4 instead of 4/4 shortens the process by half. With a tempo of 250, it takes approximately 50 seconds to sweep through all 127 notes, which seems just about right.

ONWARD

There are many other ways to use test sequences. You can test how synths respond to different numbered controllers, generate a bend change to verify that all your synths bend by the same amount, check for aftertouch response, and more. The tape alignment sequence, for example, could be enhanced easily to use all eight TX802 outputs to feed individual tape tracks.

In any event, start thinking of your sequencer not just as a recorder, but as a piece of test equipment. You'll be surprised how much more useful it will become.

Acknowledgments: Thanks to Ian Gilby, editor of England's *Sound-On-Sound* magazine, for initially turning me on to the concept of MIDI test sequences, and to Jim Johnson, who wrote about live applications of test sequences in his article "Sequencing for Live Performance" (March 1988 **EM**). ■

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It started as a sort of MIDI science project, but sometimes a tune has a life of its own.

The Transcontinental MIDI Songwriting Shuffle

By Al Hospers

Projects have a way of getting out of control, and Al Hospers and I ended up going a lot farther than we'd expected. We had realized, talking about MIDI one day, that we'd never read about anyone doing long-distance, computerized, MIDI songwriting collaborations. So we decided to try the concept out, see what worked and what didn't, and write up the results so EM readers wouldn't have to re-invent the wheel.

But being two songwriters on opposite coasts, using different computers and musical instruments, writing and producing a single without face-to-face collaboration until the final mixdown, is not as simple as it may seem. Here's what happened. *—Craig Anderton*

I LOOKED ACROSS the crowded control room and smiled. After all the hard work and sleepless nights, we were nearing our goal. High above the sleeping city we sped along at 30 ips behind a complex digital console. There were no windows in the control room, so my mind began to wander as the hour grew later and later. I drifted back to that fateful day when I drove up Greenbush Mountain to visit the Captain at his retreat...

It started when Craig played me his Phoneme sound disk for the Emulator II. It had an absolutely great demo sequence on it called "Gibberfunk" that used nonsense syllables to produce an amusing, cartoony gibberish. It was looped, and the more I listened to it the more I heard bass, drums, and keys along with it—not surprising, since I'm the kind of bass player who makes up parts to the rhythm of windshield wipers.

Craig had an Atari 520ST computer in his studio, and I had a copy of Dr. T's *Keyboard Controlled Sequencer* (KCS; yes, I *do* use what I create), so we booted it up, and I added simple bass and drum parts to Gibberfunk. I took copies of the sequence and Phoneme disks home with me, and the project was underway.

At that point, it seemed like the collabo-

J. OTTO SIEBOLD

ration would certainly present enough challenges: Craig mostly uses *Master Tracks Pro* (MTP) for the Mac, and I use KCS for the Atari. We also had hardly any instruments in common. He has several high-end vintage instruments, and I have a collection of new, cheaper, trendy instruments. Our work was cut out for us.

Over dinner, we hatched the concept of adding sampled voices to the tune, and in keeping with its gibberish nature, agreed that samples of presidential candidates would be thematically consistent. The ground rules were set: the samples would constitute the words and melody of the song, and we would write the tune using two different programs running on two different computers, doing all our collaboration via computer, modem, and FAX; we would not physically work together on the tune (now called "Election Gibberfunk") until mixdown time. We also decided that trying to sell the tune to a major label would add an interesting element to the story.

■ **Lesson 1:** *Have a definite plan mapped out for the collaboration; establish as many ground rules as possible. When you're separated physically, a detailed, shared vision of the end result is important.*

On getting home, I immediately set to work recording the rhythm tracks: two eight-bar loops with drums, bass, and clavinet that fit well with the "gibbers" (synthesized speech). I sent the results to Craig.

He made a frustrating attempt to learn KCS, without a proper manual, in a couple of hours, then decided to go with his familiar environment, Mac and MTP. He played my tracks from an Atari to the Mac in real time (MIDI Out to MIDI In) and cut, pasted, and transposed until the two eight-bar segments became a complete arrangement.

■ **Lesson 2:** *You don't have to present a complete idea to your collaborator; sometimes a short, melodic fragment is enough to inspire the other person. Hand off your work before you get tired of it; it's important to keep the song moving back and forth.*

A problem cropped up because all the E-II gibber sounds, originally intended for speech synthesis, were recorded at the same pitch. The solution was to pitch bend the entire keyboard by a fixed amount when the chords changed. Thanks to its graphic pitch bend editor, MTP really shines at this kind of task (this

is one competitor who appreciates a good tool when he sees one).

■ **Lesson 3:** *With MIDI, there always seems to be a work-around to problems if you try hard enough to find solutions.*

Trying to flesh out the drum part, Craig ran into timing problems: the notes were off by varying degrees. This was strange, as everything I sent was totally quantized. What neither of us realized was that the KCS tracks were at one clock resolution and MTP at another. This caused problems that got worse before they got better, but they were still in the future.

Burned out on cut/paste operations, and remembering Lesson 2, Craig sent back the tune as an MTP file and as a MIDI "almost-standard" data file (the MIDI File standard hadn't been officially adopted yet). I was totally blown away with what I heard; my two eight-bar segments had turned into a really hot dance tune. I had hoped to transfer the file to the Mac version of KCS, but the program wasn't finished, so I followed Craig's example and played the file in real time, Mac MIDI Out to ST MIDI In. It went uneventfully, but I forgot that the drums and some other parts were all on the same MIDI channel, and they got all mushed together. So, it was back to MTP to rechannelize as many parts as I could.

I then copied the merged sequence into KCS track mode, which placed all the MIDI channels on separate tracks. Craig had named his instruments in MTP, so I assigned *my* instruments to approximately corresponding sounds. With high expectations and properly assigned channels, I hit the play button. *What a mess*! The drums were all assigned to incorrect pitches on my machine, and there seemed to be some horrible timing problems. This didn't even sound like the stuff I sent to him, so I checked out the reference cassette Craig had sent along with the disk.

■ **Lesson 4:** *Always send a reference audio cassette along with any data disks; it's the only reliable way of knowing what sound qualities are supposed to be assigned to different instruments.*

It was obvious that the differences were induced by the sequence transfer, so I read through the MTP manual. MTP uses a resolution of 240 ppqn, but I had KCS set up at 96 ppqn. Thus, KCS was quantizing everything played into it from MTP at a factor of 2.5 (no wonder the timing wasn't right). So I reset the KCS to 240,

With high expectations and properly assigned channels, I hit the play button . . . what a mess!

played the data in again, and the timing was fine, but the drum pitches were still a mess.

■ **Lesson 5:** *Use sequencers with the same timing resolution.*

Fortunately, Craig sent the note assignments for his E-mu SP-1200 drum sounds, so I spent ten minutes setting up a pitch-map macro in Level II KCS that converted his drum mapping to that of my Roland D-110 and back again. This made it a one-click operation to map the drum keys from one instrument to another, which turned out to be a real time-saver.

■ **Lesson 6:** *Decide early on about drum assignments. It's a good idea to remap drum sounds so that equivalent drum sounds on different drum machines are mapped to equivalent MIDI note numbers.*

I'd added some extra melodic lines and drum fills, and although we had hoped to be transferring via MIDI Files, the Mac KCS didn't support them yet, and we also didn't have a way to get them from the Mac to the ST and back. Unfortunately, Craig wasn't set up for telecommunications with his Mac yet; that would have simplified matters.

■ **Lesson 7:** *Modems are the great equalizer. No matter what kind of computers you're running, squeeze the data through a modem and it all looks the same. Anyone seriously considering songwriting collaboration via MIDI should invest in a modem.*

At this point we thought the tune was pretty hot, and we felt compelled to follow it through to the end—actually put it on tape and send out demo tapes and promo copies. This meant taking a tune produced at home into a "real" studio for mixdown and finding out what surprises would greet us there. But which studio?

Not too long after the MIDI spec was adopted, Bobby Nathan, co-owner of Unique Recording in New York, got the

idea that you could create a tune at home in a computer, come into the studio, and play it back through the studio's high-end instruments directly onto tape. This has become almost standard procedure for pop albums, but back then it was a radical and new idea. Bobby's MIDI studio, MIDI City (no relation to the music stores of the same name in Southern California), has since undergone numerous expansions and has been used by an endless stream of top artists. We figured if any studio was set up to handle our type of project, this would be the one. It was. What's more, given the studio's history, it seemed only fitting that we should cut our project where the whole concept of MIDI production started in the first place.

Bobby and I had been casual acquaintances through PAN (the Performing Artists telecommunications Network), and when I described what Craig and I had been planning, he was intrigued. We booked two evenings—one for tracking, one for mixing—starting at 8 p.m. Most studios are on 24-hour schedules, so you can start almost any time of the day or night; often the rates at night, and for MIDI rooms, are reduced.

■ **Lesson 8:** *All studio time is not created equal. Booking time during off-hours and using a room no larger or more capable than necessary will save you money.*

Now it was time to gather the samples. There are a bunch of good samplers on the market, but from what Craig says, and from my limited experience, the combination of the Ensoniq EPS sampler, the Mac, and Blank Software's *Alchemy* editor makes for an absolutely awesome system—sort of a "baby E-III." When I got the first set of Craig's disks of edited politicians' voices, I was really excited by what he had done.

At this point I had switched to the Mac version of KCS and pressured the programmer working the project, Cobey Gatos, to put MIDI File conversion into the program in a hurry. But since I didn't have a SMPTE synchronization box available for the Mac, I recorded the sequencer tracks on my 4-track cassette and played the samples on tape by hand, *sans* sequencer. Actually, this came in handy, because when we went into the studio, we ended up changing some parts at the last minute, and I had to play some directly to tape.

■ **Lesson 9:** *You should be able to play all the parts you sequenced, just in case. Sometimes, when played in context, a sequenced part won't have the right "feel." Playing the part by hand compensates for that.*

STANDARD MIDI FILE FORMAT

The existence of MIDI has allowed the proliferation of musical computer software, but until recently there has not been a standardized method for storing this data. Although all the MIDI software is recording the very same protocol, most of the existing software stores that data differently. Recently, the Standard MIDI File (SMF) format was approved by the MIDI Manufacturers' Association. SMF provides the ability to transfer files between programs that support the format, preserving the original sequences and their timings. *(Look for our article on SMF in an upcoming issue.—Ed.)*

—Michael S. Czeiszperger

Another difficulty was that the Mac KCS was not yet finished. I was using a Beta test copy to do all the work on the tune, which turned many working sessions into debugging sessions. I can really appreciate the user who gets a piece of software and finds it to be full of problems. Still, every week the tune and the software got better.

Another problem occurred using my EPS to control the Roland D-110: it would go completely nuts. A frantic call to Paul Young at Roland service solved the mystery: the D-110 cannot respond to polyphonic aftertouch, so we had to turn that option off at the EPS. (Paul also told me that the way to reset all the D-110's parameters is to turn it on while pressing "write" and "enter" at the same time.)

Some of the samples were words, and some were phrases. I started stringing them together in phrases to make the speakers say things they hadn't said. For instance, we had three different speakers saying "I've been in," "I want," and "I am President." We had another one saying "four more years." So I played the samples in a way to make it sound as if the speaker was saying: "I've been in four more years," "I want four more years," and "I am President four more years."

■ **Lesson 10:** *When playing vocal samples, break them down into individual words. Entire sentences are difficult to phrase rhythmically, but you can trigger individual words right on the beat. The same principle applies to playing samples of background vocals.*

The first track (with the samples) I sent to Craig was pretty disjointed. He suggested thinking of the samples as if they were a melody line and using them in a verse/chorus structure. Once I started doing that, I made a lot more progress.

Around this time, a major glitch struck.

David Karr

Engineer Matt Hathaway (left) and the author listen to the "Gibberfunk" tracks at MIDI City.

Don't panic when you run into a brick wall; either go around the wall, or tunnel under it.

We needed more samples, so I set up my VCR to record the Democratic Convention, but the VCR was broken and we lost our best sampling opportunity. Craig is the kind of guy who figures everything happens for a reason, if one can just figure out what the reason is, and he decided this meant that we were to add a rap instead of just using sampled sounds. Craig enlisted Vanessa Else's help, and in one evening, they sat down and wrote two verses of lyrics that really tied the whole thing together. To make up for the lost samples, Craig used his vocoder and speech synthesizer to create some amazing processed voices. In an all-night editing session that included several phone calls coast-to-coast, we completed the tune, about three days before the session at MIDI City.

■ **Lesson 11:** *Sometimes glitches are opportunities. Don't panic when you run into a brick wall; either go around the wall or tunnel under it.*

About this time, I realized that KCS for the Mac had not been tested fully enough with SMPTE, or even MIDI Song Pointer, to chance using it in the studio, so I transferred the track files over to the ST, which I *knew* worked with SMPTE. Unfortunately, the file transfer between the Mac and the ST did not go smoothly.

■ **Lesson 12:** *Never transfer files using* Macbinary. ST-Talk (ST) *and* Red Ryder *(Mac) communications programs work fine together, and you can put both KCS and MIDI Files up on a service like PAN from one machine, then download them on another (including the Amiga) with no problem. We also found a great data file conversion program from Amiga to ST or IBM called* DOS-to-DOS *and a board for your PC, by Central Point, that has a 3.5-inch disk drive and will enable the PC to read and write Mac disks.*

If you're a computer software programmer, developer, or publisher, don't rely solely on beta-testers; use your products yourself, in real-world situations. You'll never see them the same way again.

The last bit of pre-production happened on my way to New York. I listened to the tape and realized it had no hook! It wasn't until the plane was landing that I came up with what we needed and had figured out a spoken introduction to tune the listener into the concept. Talk about down to the wire.

It was time for the session. Always get there early; I have never been to a recording session that started on time, but the first time you are not there, it will. Being early also sets the tone of the session: you let the personnel know you're taking things seriously and want them to run efficiently.

The session got pushed back to 10 p.m., but this gave me, Craig, Vanessa, and David Karr (a consultant on the project) a chance to meet for dinner and discuss tracking strategies and scheduling. (I must say it was strange to meet face-to-face after all those months of disk swaps and phone calls.)

■ **Lesson 13:** *Remember, you are paying for the session time, so use every minute carefully. Plan out the exact order in which you want to lay down the tracks. Try to schedule your session time realistically so you're not in a constant panic about what's going to happen next. The more practice and planning you do prior to the session, the more self-assured and relaxed you will be at the real thing.*

Next, the engineer got sick, pushing the session back to midnight. Craig is a night person, but I'm pretty much 9-to-5, and the waiting was getting to be nerve-wracking.

■ **Lesson 14:** *Don't be upset if a session runs over into your time. Not only is it bad form, but you may run over into someone else's session sometime.*

Prior to the session, we explained the idea behind the project to our engineer, Matt Hathaway, and second engineer, Ken Quarterone. They reacted favorably to the concept, and we felt we were now all tuned to the same conceptual wavelength.

■ **Lesson 15:** *Try to get together with the engineer a day or two before the session to give him or her an idea of what type of session to expect. It makes life easier for the engineer and puts everyone in the proper frame of mind.*

I had previously asked for a copy of MIDI City's studio instrument list to determine which instruments we would have

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to bring or rent. It turned out that the only two common instruments were the E-II and the DPX-1, so I brought my EPS into the studio. Craig is a big fan of the EPS, and he sampled the sounds from his other synths into it, so he only had to bring a bunch of disks instead of a slew of instruments. We also MIDIed the studio's D-50 and DX7II to our synth sounds to fill them out a bit, even though we hadn't planned on using them.

■ **Lesson 16:** *Use samplers to store synth sounds rather than carting a bunch of synthesizers around. Regarding synth patches, if the studio has some of the same instruments you normally use, bring your patches with you, either stored in a System Exclusive dump in your sequencer, or in an appropriate editor or librarian. Very often the studio instrument will* not *have the factory sounds you are counting on still stored on it. Finally, take extra copies of everything, including your program disk (and get a backup if you don't have one).*

Remember, if your whole tune is built around a particular sound on that old Crumar Orchestrator of yours, you're probably not *going to find an E-II or D-550 patch that will do the same job. Take the instruments that are vital to your sound with you into the session; otherwise, you might spend all your time searching for sounds instead of recording them.*

I had also brought my Roland D-110, a multi-purpose instrument with drum as well as instrument sounds. This was fortuitous, since, through a misunderstanding, I had thought that MIDI City had an SP-1200 drum machine when they actually had an SP-12. Craig arrived with several disks of carefully tweaked SP-1200 sounds, but there wasn't an SP-1200 to be found in all of New York on such short notice. What to do? We used the D-110 drum sounds and the hi-hat from the SP-12. Fortunately, Matt, who did a great job throughout the entire session, spent a lot of time on the D-110 drum sounds, and they ended up sounding just fine.

■ **Lesson 17:** *Be flexible. Incompatibility problems are bound to arise, so prepare a backup plan. Craig could have transferred his SP-1200 sounds over to an SP-12 to cover all possible bases, but didn't think to do that (I bet he will next time). Do as much pre-production at home as you can.*

Relying on the EPS almost turned out to be a serious problem, as Craig's had been recently updated and his operating system wasn't compatible with mine. Fortunately, I had brought my own operating system disk.

"Compatible" instruments are not always so, due to different software revisions.

■ **Lesson 18:** *"Compatible" instruments are not always so, due to different software revisions and such. Always bring any operating system disks with you, and when checking a studio's equipment, determine whether the software revisions are compatible. You may need to pull the system PROMs from your gear and temporarily install them in the studio's synthesizers for your session.*

Once we had the gear squared away, we striped SMPTE on the tape with an SBX-80, loaded up KCS and the Phantom synchronizing software into the ST, and crossed our fingers. Luckily, the system worked like a champ, and we laid down all the sequencer tracks in a couple of passes. Since I had the D-110 editor in KCS's Multi Program Environment, it was easy to reassign the separate drums to different outputs and for Matt to EQ each separately.

By this time, Craig was acting as producer, while I played computer jockey. It was an ideal combination, as he blended and coaxed just the right sounds from each instrument.

■ **Lesson 19:** *Decide on a division of labor before going into the studio. Divide up the tasks you do best and stick with the plan. At studio time rates, you can't afford any wasted time, motion, or effort.*

Listening back to the monitor mix, we found that the clav part had some balance problems that made it very hard to record. Editing the sequence to reduce the velocity on selected four-bar sections solved the problem. I then retracked the part, using SMPTE.

■ **Lesson 20:** *Different instruments have very different velocity curves. Sometimes it's worth switching to a similar sound on a different instrument to see if its velocity curve will match up with the curve of the instrument that was used as a master controller when recording the sequence. Also, be aware of how to "compress" velocity on your sequenc-*

er to help smooth out velocity variations. Usually, this is done by adding a fixed amount to all velocity values: the highest values "clip" against the velocity limits, while the lower levels are brought up. This is essentially "digital compression."

Now it was time for the vocals. I recorded lead vocal parts with Craig making suggestions, then Craig put on some additional parts to thicken the texture.

We were finally down to printing the sampled voices on tape. Some of them were sequenced, so they went on with no problem, but a few of the other parts stubbornly refused to fit in the groove. I had upped the tempo a few beats per minute, but Craig had prepared the sample lengths specifically to work at 120 bpm. Trouble. Phrases that had synched up perfectly with the beat were now off.

■ **Lesson 21:** *It's often better to keep the tempo consistent throughout a project and make any final tempo changes when mixing down to 2-track by using the master recorder's variable speed control.*

Fortunately, Craig, through his intimate knowledge of the EPS, was able to modify the problem samples so that they meshed with the new tempo.

Another problem was calling up the right samples at the right time for the right place in the track. (There were three disks of samples, but the EPS could hold only one disk's worth of sounds at a time.) Luckily, I had written out the whole piece on staff paper, and this proved to be a real time-saver.

■ **Lesson 22:** *Create a lead sheet for the tune before the session. I generally write this as a three-stave score with a rhythm sketch on the two bottom lines and melody and "hits" on the top, much like a standard piano/vocal score. This gives me a place to indicate SMPTE points for the mix and helps refresh my memory about what is supposed to happen on bar 83 when it's 4:45 a.m. and I'm cross-eyed.*

When mixing, make final tempo changes by using the 2-track's variable speed control.

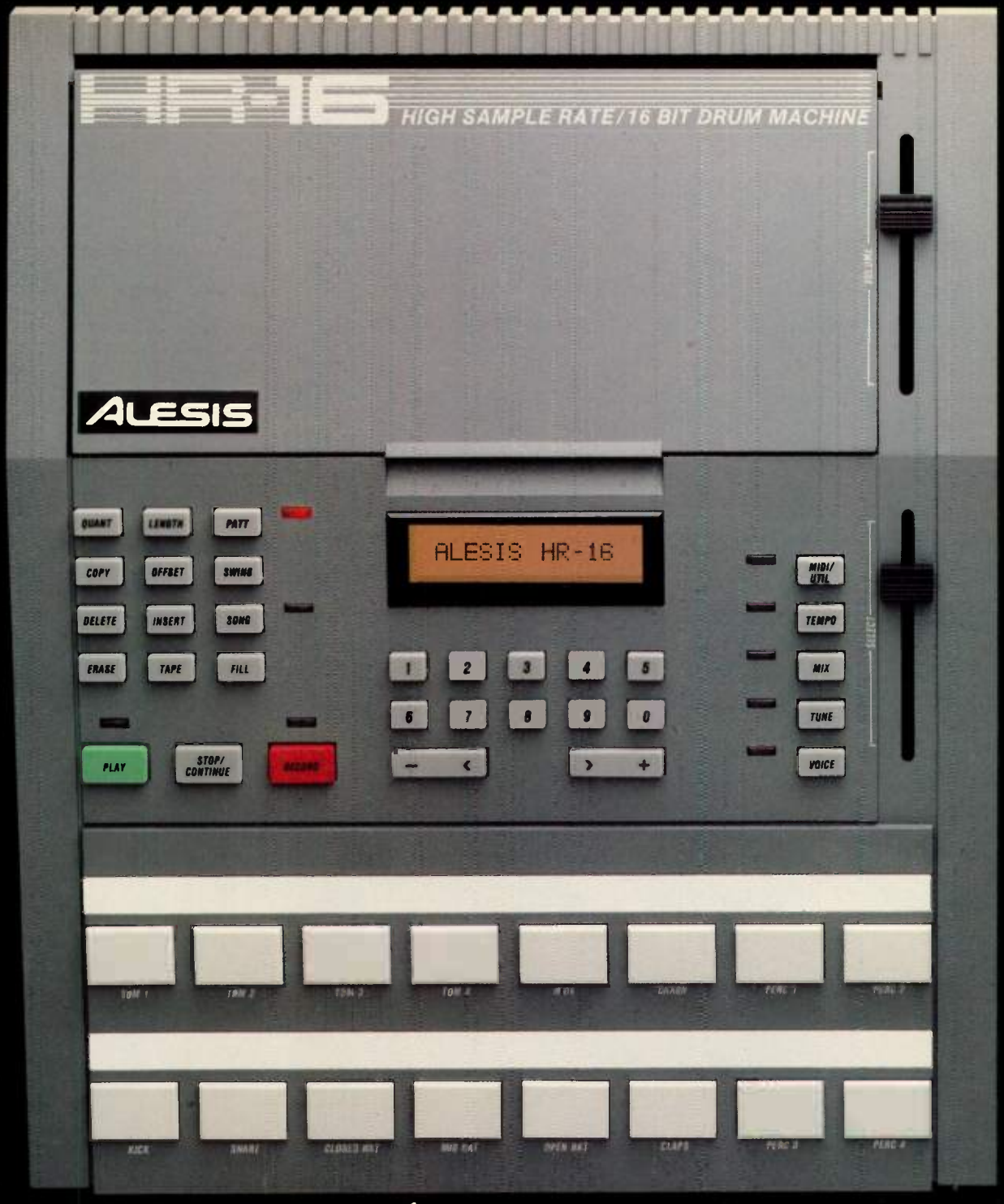
For the mix, we graduated to Unique's Studio A to take advantage of the Solid State Logic automated mixing board. I listened to the rhythm section tracks and noted SMPTE hit times on my lead sheet. This proved to be a great tool for jumping to SMPTE cue spots when working with the SSL, and it saved us a lot of time. The mix was actually the most exciting part of the sessions for me; I could hear how it all fit together and how the right tweaking could affect everything.

At 11 a.m. we walked out into the bright sunlight with a final half-inch master tape. The first thing we saw was a photo vendor on the corner with a full-size cutout of President Reagan that Craig and I *had* to get our pictures taken with, considering he had supplied some of the lead vocals. It was a perfect end to the session.

Of course, the story is still being written. When I took the tape to have cassette copies made, I found out that although it's common practice in New York to make dubs from half-inch tape, in Boston the standard is to use VCR, Beta, or quarter-inch tape. So I had to go to a studio and do a dump of our tape to VCR. The VCR dub came out brighter, but when the cassette copies were made, they were fine. And now we are in the same place that many of you are, waiting to hear from the A&R person. Who knows, by the time you read this article, you may hear "Election Gibberfunk" on the radio.

One for the gibber? Featured vocalist and chief executive Ronnie poses proudly with the boys and the completed "Gibberfunk" master tape.

Al Hospers *is a graduate of the University of Florida in sculpture, and the University of Miami in jazz performance. A bassist for 20 years, he has performed with Buddy Rich and David Clayton-Thomas/ Blood, Sweat and Tears, and has done session work in New York. The last four years he has been CEO with Dr. T's Music Software, Inc.*



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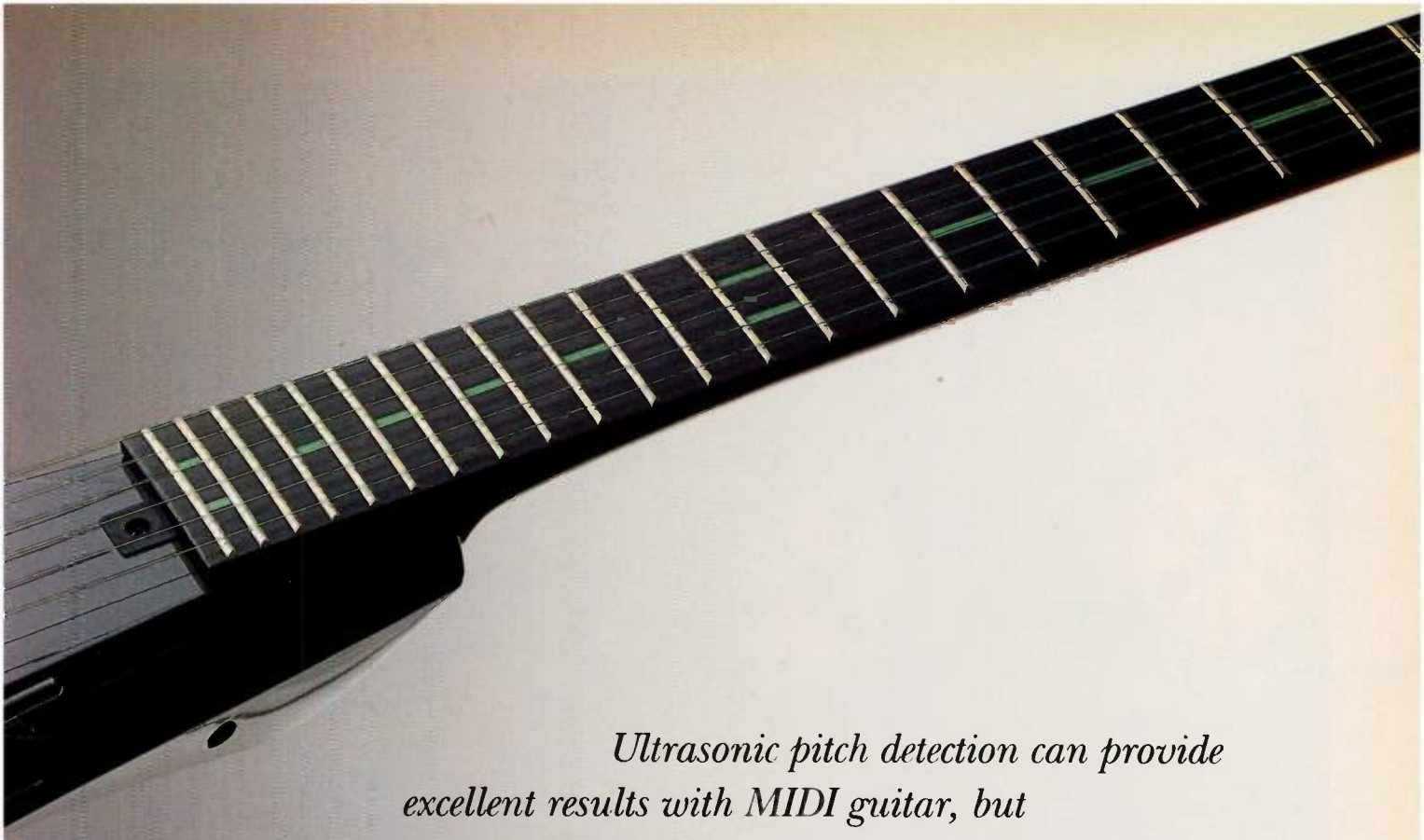
Yamaha's G10 MIDI Guitar:

Does it really work?

DAVID BISHOP



Ultrasonic pitch detection can provide excellent results with MIDI guitar, but new technology also means a new learning curve.

Okay, I should have known better. I've played with enough MIDI guitars to have recognized the pattern:

1. Get your hopes up that the latest MIDI guitar will be The One.
2. Breathlessly break open the box, plug in, and start playing.
3. Experience frustration and disappointment.

At this point, most people would give up and run for the nearest Stratocaster. But MIDI guitar deserves a better break, and fortunately, I remembered the final stages of the pattern:

4. Spend the necessary time to tweak, adjust, and set up the guitar controller.
5. Spend some more time programming synth patches that work with the guitar.

As with the better MIDI guitars I've tested, shortly after completing steps four and five, I experienced the *combination lock* effect: all the parameters clicked into place, all the controller settings were customized to my playing style, and the synths were all making great sounds. At that point, it was time to play nasty leads into MIDI sequencers, trigger sampled pianos from block chords, layer noises so rude that fuzztones seem downright conservative, and just plain enjoy what a MIDI guitar can do.

Does the G10 really work? If you have more than a passing acquaintance with MIDI and synthesizer programming, do the proper setup and calibration, are willing to investigate non-traditional playing styles, and have the time and knowledge to tweak both your synth patches and the controller, the answer is most definitely yes. In fact, it's a gas.

By Craig Anderton

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Roland's GM-70 originally made me realize that there was hope for MIDI guitar, but that hope didn't come easily. It took me several days just to adjust the pickup correctly, and almost two years later, I'm *still* tweaking some synth voices. The Beetle guitar (reviewed October '88) followed a similar learning curve. At first, I thought it was not even the same instrument I had been so impressed with at NAMM. Several weeks later, the combination lock clicked, and I was blown away by just how satisfying MIDI guitar can be.

The G10 followed an even more extreme path, because it's a very complex device. That complexity means you have a nearly infinite number of ways to mess up the sound, but the flip side is that you also have a nearly infinite number of ways to tweak the controller for your particular playing style. When everything did fall into place, *wow*! Interestingly enough, it wasn't so much the guitar-like possibilities that really intrigued me, but the *new* techniques that the G10 makes possible.

Before you can decide whether any MIDI guitar is good or not, you have to make sure that it is indeed working up to spec. The October **EM** discussed specific techniques for programming synthesizers for use with MIDI guitar, so we won't get into those here. Instead, this is a summary of the many things I learned about making the G10 work properly, along with some extra tips. Let's get the routine stuff out of the way first, then move on to accessing the goodies.

THE VIRTUES OF HEADPHONES

If you don't have your amp turned up loud, you'll hear the faint sound of the G10's strings jangling in the background, and since the strings are all tuned to the same pitch, this can be kind of disconcerting. For minimum confusion, wear closed-ear headphones when first working with the G10. This lets you hear only the synth sound (note that the TX81Z and TX802 both include headphone jacks).

GETTING TO KNOW YOU . . .

According to the documentation, the strings should all be tuned somewhere between F and G (the lower the pitch, the looser the string tension; I prefer G). To find what degree of tension you like, play the guitar by itself without feeding any MIDI instruments. Since the relationship between string-bending and pitch change at the synthesizer is programmable, there is no fixed correlation between the physical bending of a string and the amount of pitch shift at the synth. Thus, it's easy to be misled into thinking that if the pitch doesn't bend enough, you need to lower the tension. A better strategy is to set the tension as desired, *then* adjust the pitch-bending parameters to suit.

SENSOR ADJUSTMENTS

This is mostly covered on pages 38 through 39 of the manual, but there are a few fine points. I found that proper calibration made a tremendous difference in expressiveness, particularly with the velocity sensor. You'll note that while the calibration screws are all Phillips heads, there is no Phillips screwdriver in the G10's supplied "tool kit." However, the provided yellow-handled regular screwdriver will fit the G10 screws.

When adjusting string height, screw the four adjustment screws *clockwise* to increase sensor (and thus string) height, counterclockwise to decrease. Yamaha suggests each string be about 2 mm from the top of the 22nd fret (±0.2 mm), and the sensor be parallel to the strings. To determine the latter, hold a straight-edge so the end straddles the top of the string-bend sensor (**Fig. 1**). When I checked the factory setup, I noticed the straight-edge leaned considerably toward the rear of the guitar, especially at lower string heights. Here's the adjustment procedure I used to correct this:

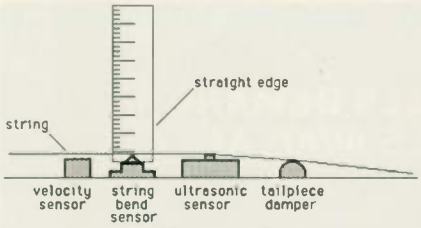


FIG. 1: When straddling the top of the string-bend sensor with the edge of a ruler, keep the ruler perpendicular to the strings, leaning neither backward nor forward.

1. Unscrew the two height-adjustment screws closest to the neck until they are loose, then screw them back in a bit until they just start to grab.

2. Adjust the two rear height-adjustment screws (i.e., closest to the tuning pegs) until the first and sixth strings are exactly 2 mm above the 22nd fret (measured from the middle of the string). This seems to automatically adjust the string-bend sensor to be as parallel as possible to the strings.

Before deciding whether any MIDI guitar is good, make sure that it's working up to spec.

3. If 2 mm is too high an action for you, screw the two rear height-adjustment screws counter-clockwise one or two extra turns. However, you can't obtain too low a string action without making the string-bend sensor less parallel to the strings.

Perhaps other G10s will have slightly different manufacturing tolerances that invalidate the above procedure, but I doubt it; the instrument seems carefully made and tooled.

If you encounter string buzz, yet the neck is properly adjusted for between 0.05 and 0.25 mm of relief at the seventh fret, don't assume the problem is insufficient string height: the velocity sensor may not be adjusted properly, and the strings may be rattling against this sensor. We'll take care of that next.

Referring to page 39 of the manual, bring the velocity sensor up as close to the strings as possible, but not so close that the strings rattle against the sensor when played. *The closer the sensor is to the strings, the better the velocity response; this is a very important adjustment.* Unlike the string-bend sensor, turning the height-adjustment screws *counter-clockwise* raises the sensor height.

The height and angle adjustments are interactive and very sensitive—a 16th of a turn makes a noticeable difference. Expect to spend quite some time getting this adjustment right. If you can't kick the meters in the Utility Menu's Velocity Peak Page up to maximum (99) with the sensitivity up all the way, you need to move the velocity sensor closer to the strings.

The ultrasonic sensor and string damper height are easily adjusted: turn the screws clockwise to lower, counter-clockwise to raise.

WATCH THOSE FRETS!!

Probably the most important playing technique modification is to always place your fingers behind the frets. Placing a finger on top of a fret can trick the pitch detection sensors.

TX81Z/TX802 ODDITIES

It's convenient the G10 includes Voice and Performance data for the TX81Z and TX802 in System Exclusive form (although I would have preferred fewer guitar patches; if I want guitar, I'll play *guitar*), but for me, downloading to the TX81Z and TX802 was problematic. My TX81Z's display showed a MIDI Checksum Error every time I downloaded to it, and the TX802 refused to load performances 33 to 64. This drove me crazy until I got an applications bulletin from Yamaha saying the checksum error message did not reflect corrupted data, and early TX802s need a ROM upgrade to work properly. This information came from the pamphlet *G10 Performance Tips and Suggestions* by Yamaha Product Specialist Vincent Bitetti; if you end up with a G10, make sure you get this publication. Owners of recent TX81Zs and TX802s should experience no

ROCK AND ROLL TRAINING WHEELS FOR THE G10

If you go into a music store and try out the G10, the odds are that it will not be set up properly for your playing style, particularly if you like rock and roll guitar. Although the G10 is capable of some very subtle velocity effects, rock and roll guitar is not exactly about subtlety; I *like* the feel of going through a compressor and fuzz. There are two easy ways to make the G10 more "rock and roll" and less sensitive to individual playing techniques: program a "compressed" velocity curve, and set muting to minimum.

To program the velocity curve, select Utility Page 11, Function 2, and program U1 as follows:

30 40 50 60 70 80 90 99

Don't forget to store it. This curve acts like a "digital compressor" that brings up low-level signals. The ability to program four different velocity curves is great; I don't use the factory preset curves at all anymore.

Now select Edit Page 10, and set Mute to 1 for all strings. As you get more familiar with the system, you'll find the mute function can help "tighten up" your playing, but when starting out, minimum mute means maximum sustain.

—Craig Anderton

downloading problems. If you do, contact your local Yamaha service representative for new ROMs.

Many guitarists will look at the substantial price difference between a TX81Z and TX802 and wonder if the difference is worth it. Although the TX81Z is an extraordinary machine for the money, the TX802 has considerably better sound quality and offers twice as many Performance memories. It's my favorite FM synth.

The G10 is optimized for use with the TX81Z and TX802, but I've had good luck interfacing with the Oberheim Xpander and Ensoniq EPS, both of whose MIDI implementation is well-suited to guitar synthesis. I've also been told by friends that Roland's MT-32 works well with guitar. If your taste runs to samplers, Yamaha recently released sounds for the TX16W designed to accommodate the G10.

PITCH BENDING OF THE GODS

Edit Page 12, Function 1, matches the G10 pitch bend data range to that of your synth. Although you can set an overall pitch bend curve with Utility Page 11, Function 3, that's a global setting that affects all programs. If you want an individual program to offer huge amounts of pitch-bending, the answer is to *lower* the pitch bend range for that program.

With the Yamaha factory patches, the TX81Z and TX802 are set for a pitch bend range of 12, so the G10 should theoretically be set for 12, too. However, lower values give more bend for a given amount of physical string displacement: setting the value to 7 produces about a four semitone bend for two semitones of string pitch change. This is good for effects and also helps speed up your overall playing (you don't have to move your fingers as far when you bend).

The whammy bar comes programmed for an octave of pitch bend; dramatic, yes, but difficult to control. Select Edit Page 12, Function 2, and try a whammy bar

pitch bend of ± 2 or 3. And don't forget, the bar doesn't affect the string tension at all, so you can pull the pitch way up without worrying about breaking any strings.

When recording into a sequencer, the G10 is well-behaved. There is no extraneous pitch bend "garbage," and I didn't really see any redundant bend data. Of course, sending pitch bend data through six different channels burns up a lot of sequencer memory, but hey, it sounds great. (Note that the QX5, QX5FD, and some other sequencers include "thin data" commands that can help minimize this problem.) The TX802 and TX81Z will support global channel Pitch Bend messages, which cuts down on memory usage, but bending strings and using global whammy bar messages at the same time is not advisable.

KEEP THE WHAMMY BAR FROM WANDERING

Speaking of whammies, on the G10 sent for review, the whammy bar fell down and out of the way when not in use. I prefer having the arm maintain the position where I last left it. The solution is crude, but simple. With the whammy bar removed, take a piece of somewhat thin plastic (I used a plastic 3.5-inch disk cover) and place it over the thread where the whammy bar screws in. Gently screw in the bar; strips of plastic get caught in the threads, adding friction between the threads and the whammy bar. Tear away the remaining plastic. For a stiffer action, fold the plastic to double the thickness. This doesn't damage the guitar at all; if you don't like the feel, unscrew and screw the whammy bar a few times, and eventually the pieces of plastic will all fall out.

TAP (LEFT HAND) MODE

Edit Page 5 lets you tap the strings to produce a sound, *a la* Chapman Stick. I'd also suggest setting Edit Page 7, Legato, to Off so that each tap produces a new note and attack.

Using this option requires a pretty specialized playing technique. Don't tap too hard, or the string won't trigger. Press the string as if you were gently closing a switch by touching it to the fret (which is basically what is happening). With Legato set to Off, sliding up and down the string will produce a nifty chromatic flurry of attacked notes.

By tapping with your left hand and using your right hand to control the whammy bar, you can get *great* steel guitar-type sounds and all kinds of cool sliding effects. Try starting with the bar all the way down, tap a chord, then slide up—instant country & western. To add to the illusion, program a bit of attack time in the synth patch to simulate the way a steel player uses a volume pedal to bring up the attack. Maybe I'm just partial to sliding guitar sounds (I love the Beetle's MIDI slide guitar mode, too), but this option is one of my favorites.

Few people realize that Shakespeare's *Taming of the Shrew* is actually an allegorical play about using MIDI guitar.

TAKING CARE OF YOUR AXE

Once you've made friends with the G10, you'll want to keep it in good shape. The first order of business is replacing the G10's rather silly case: the latches tend to pop open or not close properly in the first place. However, the G10 fits like a glove into a stock Gibson case for a standard Les Paul (just add some padding to hold the G10 in place during transport). Acoustic guitar cases will usually work, too, if you don't mind the leftover room and extra bulk. Fender-style rectangular cases for Telecasters and Strats will *not* do the job; there's not enough depth.

Regarding the cable, I'm always paranoid about any cable that cannot be duplicated from parts available at Radio Shack. The cord that connects the G10 to the G10C rack-mount is a multi-conductor affair with *plastic* ends, so factor the cost of a couple of spare cords in with the cost of the system.

You also need to do something about the strap. Considering the G10's price (around $2,500 list), you'd be crazy not to use a locking strap instead of the one Yamaha provides. (Locking straps make it impossible for the strap to work loose from the strap post accidentally. Especially if you move around a lot, this keeps the guitar from crashing to the floor.) However, this means that the locking strap ends need to remain permanently connected to the guitar, and the molded Yamaha case does not allow sufficient room. This again underscores the need to get a proper case; the only other options are to de-install the strap ends before putting the guitar back in its case (ugh) or cut away at the Yamaha case to make additional room for the strap ends.

MONO NON-GLOBAL STRING BEND

Here's a final tip that is not documented anywhere in the manual (I wonder how many others are lurking out there, just waiting to be found). Suppose you play a chord and want to bend just one note. Although you can do this to a certain extent with your fingers or by programming the whammy bar to affect only one string, you can achieve a very wide-range pitch bend by placing your pick on the string and pushing laterally against the string after plucking it (**Fig. 2**); just placing the pick on the string will not cause a Note Off. This works best with sustaining sounds and may seem difficult to control at first, but once you get the hang of it, this technique can provide some very dramatic effects (try pushing on the string closer to the neck than the tailpiece). Note that this works only on fretted notes, not open strings.

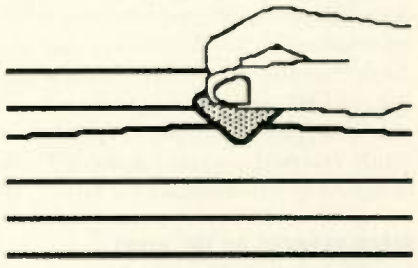
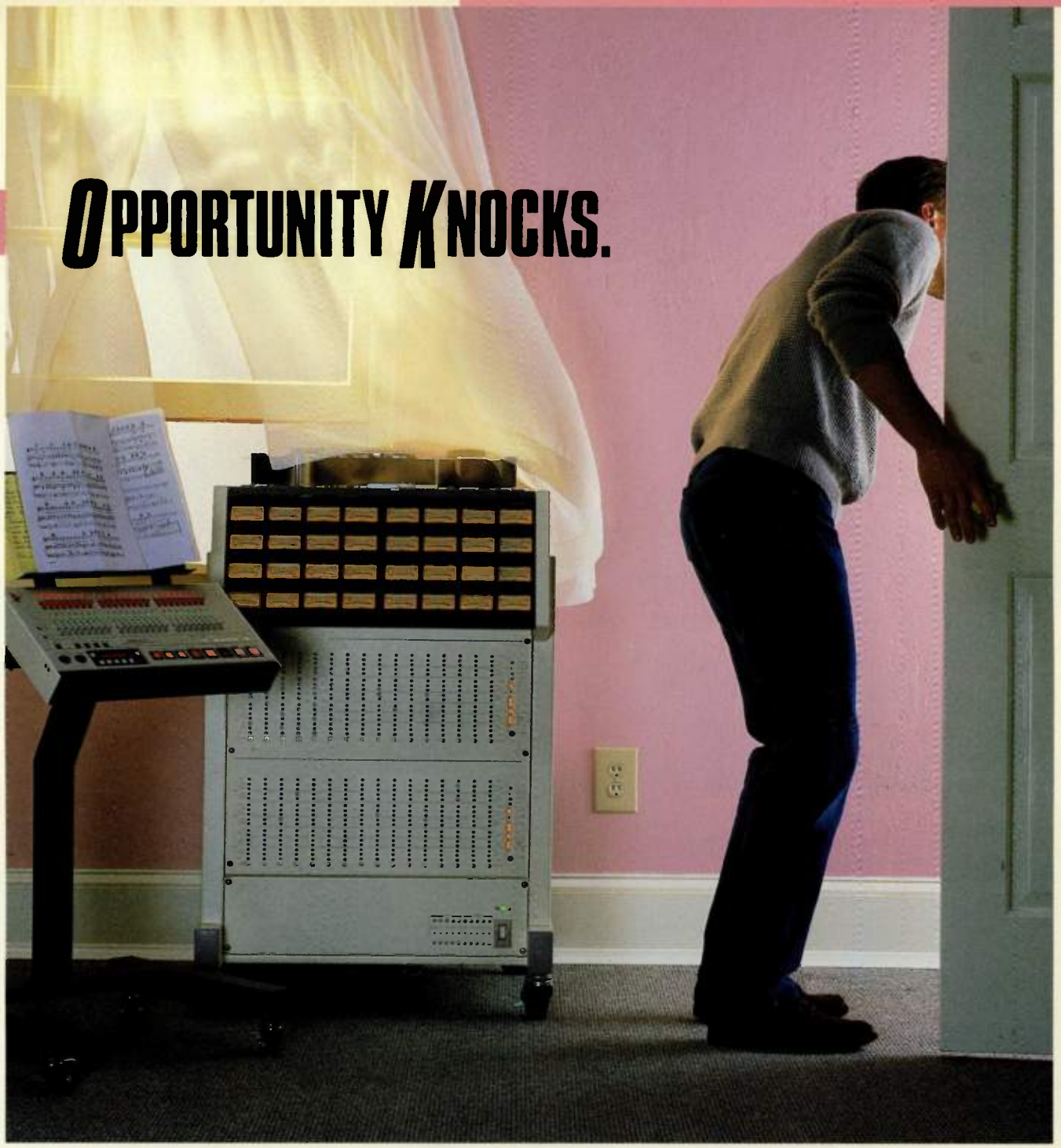


FIG. 2: How to bend one note out of a chord.

SHAKESPEARE AND GUITAR SYNTHESIS

Few people realize that Shakespeare's *Taming of the Shrew* is actually an allegorical play about using MIDI guitar. In the end, through perseverence, the shrew was tamed not by force, but by love. Sounds like MIDI guitar to me. Controllers are getting better, and other companies are waiting in the wings with their offerings. If you have patience and bucks, the new generation of MIDI guitars really does work.

Craig Anderton *has been a fan of guitar synthesis since buying one of the first Roland GR-300s. He has written articles about the subject for* Musician, Output, *and* Guitar Player *magazines as well as for* **EM**.



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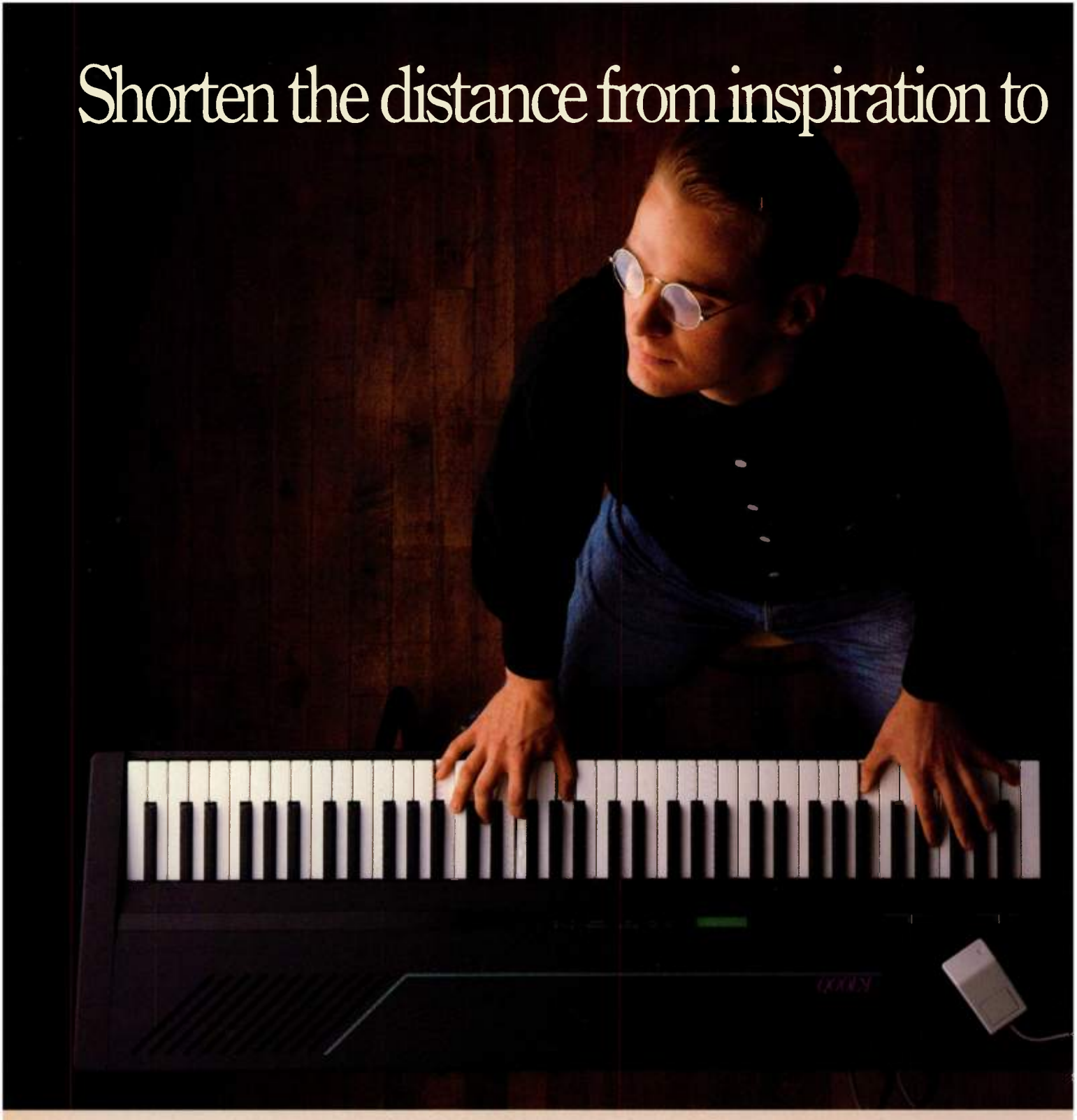

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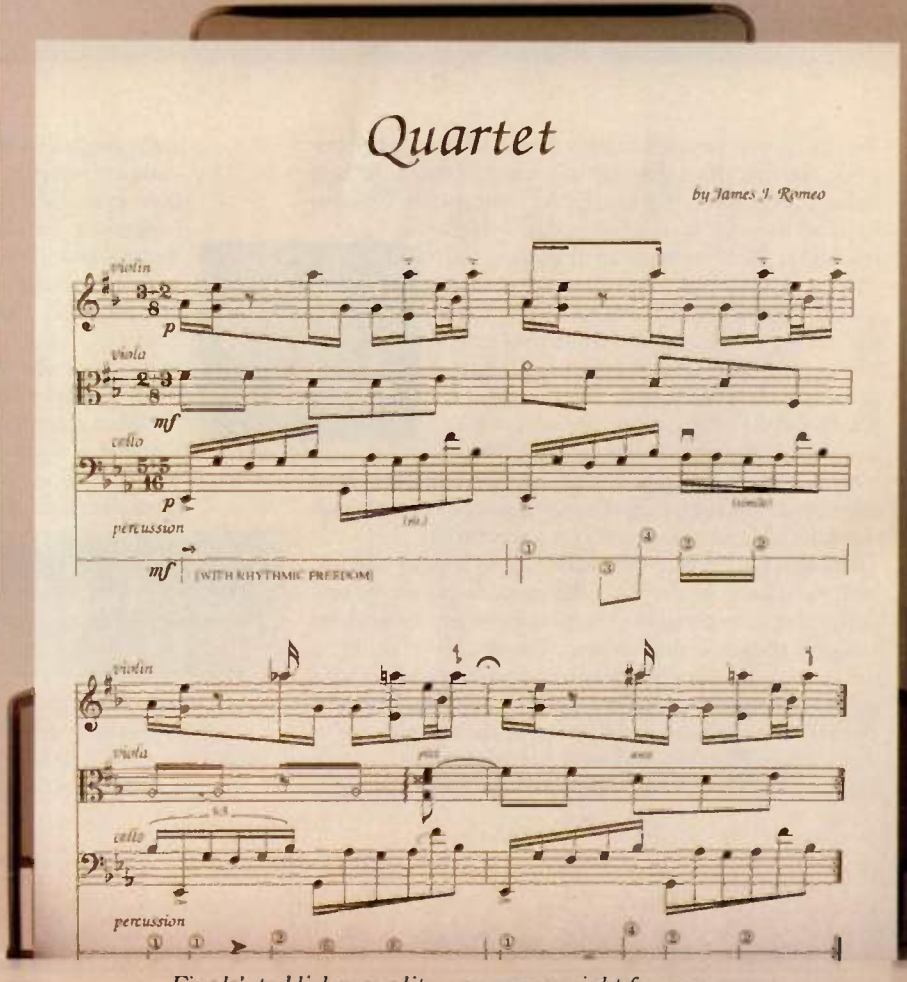

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Program Your Amiga For MUSIC

Though its graphics outclass personal computers five times more expensive, and its multi-tasking environment is a first on personal computers, people are just starting to notice the Commodore Amiga. The February 1988 **EM** described how to build an Amiga 1000 MIDI interface that can easily be modified to work with the 500 and 2000 (see sidebar). That, and the availability of commercial interfaces for the 500 and 2000, make it time for some do-it-yourself Amiga programming: first some libraries of routines and some tips that will help you write any music-oriented Amiga program, then a patch librarian for the ubiquitous Casio CZ-101 that demonstrates these routines in action.

Bring your Amiga to life with these tips and techniques for musical multi-tasking; it's not that hard, and this free CZ librarian/patch generator will get you started.

By Jim McConkey

MIDI, Memory, and Multi-tasking

In a multi-tasking environment, several programs can run simultaneously. This is not the same as some switcher-type programs commonly found on the IBM and Mac, which, while allowing several programs in memory at once, can only *run* one at a time. As with film, which displays individual pictures so fast that your eye is fooled into seeing constant motion, each application in a multi-tasking environment runs during very short, successive time "slices," giving the impression that all the applications are running simultaneously.

Only on a multi-processing computer (one with a separate processor for each task) can all applications run truly simultaneously. Normally, in a multi-tasking system, each program (or task) is assigned a priority. More important tasks may get more time and faster response to interrupts, depending on how the system is set up.

RELATIVE AND ABSOLUTE TIME

It was rumored in the past that sequencers running on the Amiga could not have stable timing clock generators because of multi-tasking. In fact, the first Amiga programmers simply did not know how to control the priority structure. Giving the clock generator a high enough priority will allow the Amiga to be just as stable as any other computer.

A prime consideration in multi-tasking systems is allowing all tasks to access all system resources. With MIDI applications, several programs need access to the same incoming data. (Perhaps to record patch librarian edits into a simultaneously running Sys Ex librarian or to run an algorithmic composer along with a sequencer.) Most programs physically read and write the serial port directly. This is a definite no-no in a multi-tasking environment; once the hardware port is read by one program, the data is lost for all other programs.

THE ANSWER

The solution is to use a common library to read and write the port directly and let all applications programs communicate with this library to read and write the port. Libraries are collections of useful routines, normally written in C or assembly language, that can be called from user programs to provide functions not otherwise available. Several libraries are found internally in the Amiga, including system resource allocation, graphics, the user interface, and operating system calls. Other libraries are available from outside sources.

Bill Barton, of Pregnant Badger Software, has written a very complete library of functions useful in a MIDI environment for the Amiga, and he's graciously put it in the public domain. This library is the program that physically reads and writes the hardware serial port. The incoming MIDI messages are duplicated for all applications that have requested incoming MIDI data; all outgoing messages are sent to the library, which takes care of the proper merging before sending them out the serial port. Numerous library functions are provided to define input and output nodes and specify and alter paths between them. For instance, a sequencer could have one path from its output to the MIDI Out port and another path from the MIDI In port to its input. An arpeggiator might set up a path from the MIDI In to its input and route its output directly to the sequencer's input. Meanwhile, a software VU meter could make a path from its input to the output of the sequencer, and so on.

Each path can be set up to pass only certain types of data. This feature is used in the CZ patch librarian below to pass only Casio Sys Ex messages. Several types of functions are provided to send and receive single or multiple messages and to free these when the program is finished with them. Other functions allow a program to look for certain other defined

CZ-Plus program listing

```
'CZPLUS for the Amiga by Jim McConkey
' loosely adapted from the C64 version by Tim Dowty
'  published in Electronic Musician Feb. & Aug. 1987

CLS : LOCATE 1,1 : DEFLNG a-Z : RANDOMIZE TIMER : DEF FNrnd16=INT(RND*16)
Casio%=&H44 : MMF.SYSEX=&H400

'Assumes a subdirectory defined by Path$ off the current directory
' for the storage of patch files
Path$="CZfiles"

'Assumes exec.bmap and midi.bmap in the current directory
LIBRARY "exec.library" : LIBRARY "midi.library"

Declarations:
 memf.public = 1 : memf.clear = 65536&
 DECLARE FUNCTION AllocMem() LIBRARY
 DECLARE FUNCTION CreateMDest() LIBRARY
 DECLARE FUNCTION CreateMSource() LIBRARY
 DECLARE FUNCTION GetMidiMsg() LIBRARY
 DECLARE FUNCTION MidiMsgLength() LIBRARY
 DECLARE FUNCTION MRouteDest() LIBRARY
 DECLARE FUNCTION MRouteSource() LIBRARY
 DestName$="MidiOut"+CHR$(0) :  SourceName$="MidiIn"+CHR$(0)

'sysex voice request and header:
 RequestSize=10 : HeaderSize=8 : VoiceSize=264
 DIM SHARED Rqst(RequestSize-1),Header(HeaderSize-1)
 DATA &hF0,&h44,0,0,&h70,&h10,0,&h70,&h31,&hF7
 DATA &hF0,&h44,0,0,&h70,&h20,0,&hF7

AllocateBuffers:
 MainSize=16*VoiceSize : main=AllocMem(MainSize,memf.public+memf.clear)
 IF main=0 THEN CloseDown
 RandomSize=VoiceSize :  Random=AllocMem(RandomSize,memf.public+memf.clear)
 IF Random=0 THEN CloseDown
 Request=AllocMem(RequestSize,memf.public+memf.clear)
 IF Request=0 THEN CloseDown

SetupMIDIRoute:
 RouteInfoSize=14 : RouteInfo=AllocMem(RouteInfoSize,memf.public+memf.clear)
 IF RouteInfo=0 THEN CloseDown
 POKEW RouteInfo  ,MMF.SYSEX  'Allow only Sysex messages
 POKE  RouteInfo+6,1          'from only 1 manufacturer
 POKE  RouteInfo+7,Casio%     'which is Casio in this case

CZPLUS:
 PRINT"CZPLUS for the Amiga"
 PRINT" by Jim McConkey after C64 original by Tim Dowty" : GOSUB Init
 Dest=CreateMDest(0&,0&)
 IF Dest=0 THEN PRINT"Can't create Dest": GOTO CloseDown
 Source=CreateMSource(0&,0&)
 IF Source=0 THEN PRINT"Can't create Source": GOTO CloseDown
```

continued on page 71

nodes and link to them; the arpeggiator just described would use these functions to attach itself to the sequencer.

Several MIDI software companies, including my own, are already using this library, and more have expressed an interest. If everyone would agree to use this standard, interaction between programs would give rise to a whole new class of MIDI applications.

The MIDI library is available for $5 from:

Triangle Audio, Inc.
PO Box 1108
Sterling, VA 22170

or directly from the author (write for details):

Bill Barton
Pregnant Badger Software
1111 El Sur Way
Sacramento, CA 95864

It is also available from the usual Amiga public domain sources: Fred Fish, Amicus, and many Amiga bulletin boards. The latest version of the library contains several demo programs written in C and BASIC, including the CZ librarian/patch generator described here and an Amiga version of Jim Johnson's Atari ST *Chord* algorithmic composition program.

CZ-Plus, the Patch Librarian

CZ-Plus is loosely based on Tim Dowty's *CZPL*, a C-64 program from the February '87 **EM**, and its enhancements from the August '87 **EM**. CZ-Plus was written in Amiga BASIC, which provides a LIBRARY command to use up to five libraries at a time. In addition to some of the libraries found in the Amiga, CZ-Plus uses the Pregnant Badger multi-tasking MIDI library that provides the Amiga with capabilities similar to the ones Altech's popular *MIDIBasic* provides for the Mac. The MIDI library should reside in the *:libs* directory, where all libraries go (if it's not there, put it there); the corresponding *.BMAP* file should be found in the same directory as the program being run.

PROGRAM OVERVIEW

The CZ-Plus program (which includes no line numbers; you *can* use them, but alphanumeric labels make the program easier to read and understand) starts by clearing the screen and taking care of some initial setup. All variables not otherwise declared are specified as long in-

tegers, since these are preferred for passing most types of data to and from library functions. BASIC's random number generator is seeded from the timer, which counts the seconds since booting. A function is then defined that returns a random number in the range of 0 to 15 for use in the random patch generator, and two constants are defined for the MIDI library. Next, the two libraries to be used are called up; *Exec.Library* is one of the Amiga's internal libraries dealing with system resource allocation, and *midi.library* is the PB public domain standard you will use to get and send System Exclusive data dumps. The two libraries must be in the *:libs* directory of your boot disk. The corresponding *.BMAP* files must be in the same directory as the CZ-Plus program.

After the *DECLARATIONS:* label (all labels end with a colon), declare all those functions, used from the libraries, that return values; the declaration is necessary so BASIC knows that these are functions and not arrays. Those functions that don't return values need not be declared. Several constants that will be used by the library functions are also defined, as well as the System Exclusive header and the request for the CZ series. The two arrays are declared as SHARED, meaning that they can be accessed from any *subprogram*. Subprograms are like subroutines, except their variables are all local. This means changing a variable within a subprogram will not affect a variable with the same name in the main, or calling, program. Local variables are found in all structured languages since they prevent a lot of programming headaches.

MEMORY AND MIDI SETUP

In any well-behaved multi-tasking program, the program does not assume it can access any system resource without asking first. It also surrenders resources when they are no longer needed, so another program can use them. In this case, we need about 4K of RAM to store the Sys Ex dumps from the CZ and to use as workspace. Whom do we ask for resources? The system resource allocation functions in *Exec.Library*, that's who. The *AllocateBuffers:* section calls the function that allocates blocks of memory, *AllocMem*. It returns the address of the allocated memory, if available, or zero if there is not enough contiguous memory left to allocate. We tell *AllocMem* how much memory we want and what kind. The *mmf.clear* argument tells *AllocMem* to clear (zero) the memory it allocates. The sizes will be

A prime consideration is allowing all tasks to access system resources.

needed later to de-allocate the memory when you are done with it. If any allocation fails, you cannot run the program, so under these conditions the program is diverted to a *CloseDown:* routine.

SetupMIDIRoute: sets up the MIDI routing information. The route info constitutes a structure (a programming construct found in many high-level languages, such as C, that lumps several different types of data together). One of the few shortcomings of Amiga BASIC is its inability to use structures; however, structures can be simulated using *AllocMem* and some *POKE* commands. In this case, the structure is set up to allow only Sys Ex data from Casio instruments on MIDI Channel 1.

THE MAIN PROGRAM

The main program starts at the *CZPLUS:* label. The program title and credits come up, and you create the MIDI source and destination nodes, which are then linked to the "public" MIDI nodes, MIDI In and MIDI Out.

Next, the pull-down menus normally used in all Amiga programs are defined. Notice how easy this is to do. In C, this process takes several pages of code, but Amiga BASIC incorporates high-level support for many of the user interface functions, making programming a breeze. After the menus are defined, use the *ON MENU* command to tell the program where to go when the menus are accessed by the mouse or its keyboard equivalents. Then the program is put to sleep until something happens (like a mouse selection of a menu). Even if a BASIC program does not appear to be doing anything, it is still hogging processing power. The sleep function stops the interpreter temporarily until something worth noting happens. Again, this is a good multi-tasking programming practice. The *WHILE* loop puts the program back to sleep after every interruption until the quit flag is set.

The *CloseDown:* routine de-allocates any allocated memory blocks and MIDI routes. Again, it is absolutely essential in a multi-tasking environment to free up

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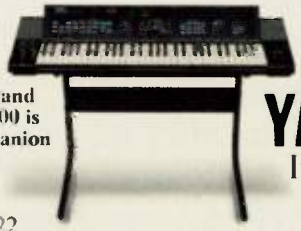

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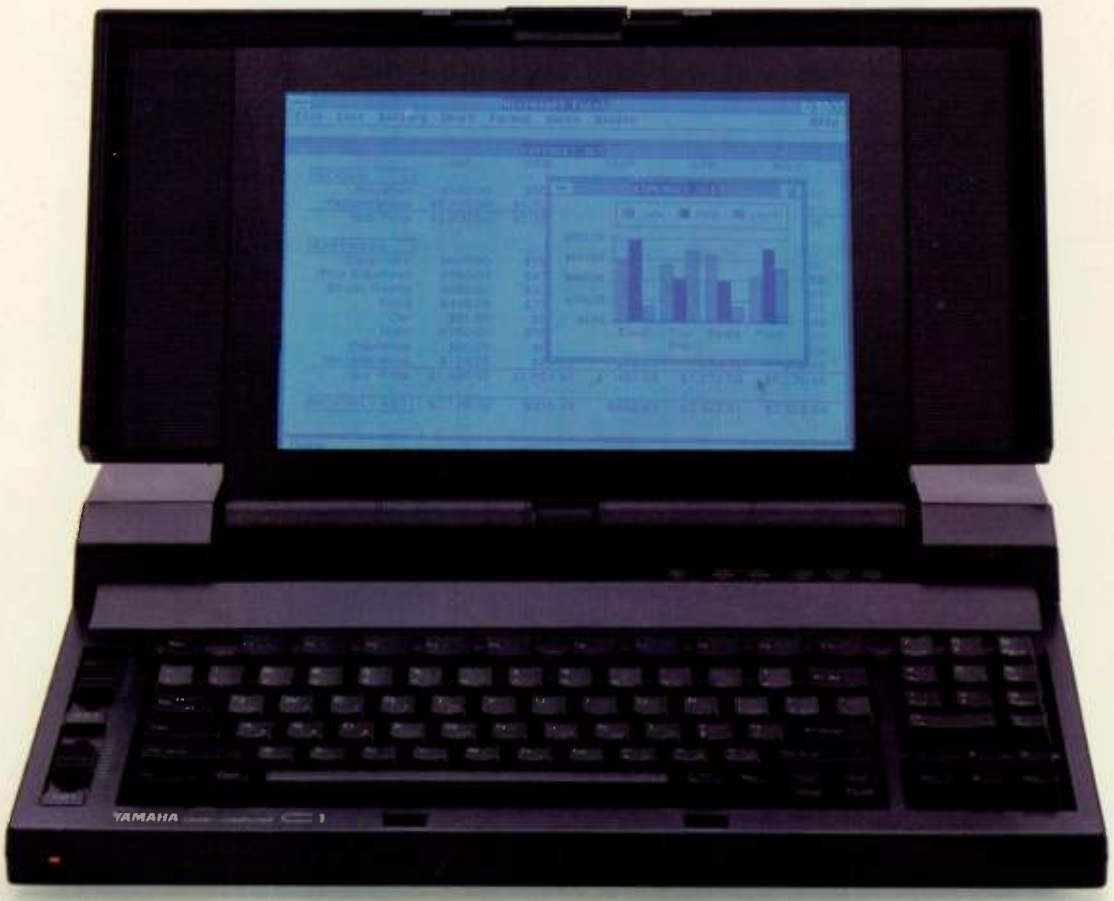
And a few other numbers.



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in digital audio technology is.

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AD808 Format Converter.

Once again, it's easy to see when it comes to innovation, there's nothing new about the name Yamaha.

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any system resources when they are no longer needed.

The *MenuHandler:* was designated by the *ON MENU* command to be what gets executed when a menu is selected. The handler sends the program off to various routines depending on what was selected. *MENU(0)* returns the ID number of the menu that was selected, in this case 1 to 3, and *MENU(1)* returns the item selected on that menu.

The random patch generator works the same as in the C-64 version of CZPLUS: it picks up each parameter from a randomly selected voice in the bank of 16. If the bank contains a diversity of voices, diverse voices will be created. If the bank contains mostly one type of sound, slight variations on that sound will be generated. You can tailor the generator to your needs by defining its input.

When you select the quit option from the first menu, it simply sets a quit flag. The *WHILE* loop that puts the program to sleep checks this flag each time it is awakened and closes down when the flag is set.

The *GetPre:*, *GetInt:*, and *GetCart:* routines, which get the preset, internal, and cartridge voices, respectively, from the CZ, are all identical except for the voice numbers they request. To get a bank of voices from a CZ, each voice must be requested separately. There is no bank-retrieve Sys Ex command in any of the CZ synths.

The *Send:* routine sends each of the 16

BUILD AN AMIGA 500/2000 MIDI INTERFACE

Mark Braunstein's do-it-yourself article in the February 1988 **EM** described building a MIDI interface for the Amiga 1000. Since then, the Amiga 500 and 2000 have come out with different serial ports (matching the IBM-style "standard"). This means printers, modems, and other serial devices for the new models no longer require oddball cables, but Amiga 1000 interfaces won't work with the new models.

Using the schematic in **Fig. 1** and Mark's original article for construction details and theory of operation, you can build an interface for the 500/2000 Amigas or modify your 1000 interface.

Of the several changes made to the serial port, the most noticeable is that the gender of the output connector is now male. Perhaps more important, several pins have changed functions, and the available power supplies are different.

The schematic shows that the data transmitting and receiving sections are identical to those published for the 1000 interface, except that the DS1488 driver is now powered by ±12 volts instead of ±5 volts. Only the power supply section has changed. The Amiga 1000 provided ±5 volts on the serial connector, but on the 500 and 2000, ±12 volts is supplied on different pins. We can use this ±12 volts as is for the RS-232 transmitters, but must regulate the +12 volts down to +5 volts for the 7405 and the 6N138 opto-isolator. We can do this easily with the 330-ohm resistor and 1N4733 5.1-volt zener diode. Refer to Mark's article for more details.

PARTS LIST

RESISTORS (¼-watt, 5% tolerance)

R1, R3	2k2 (2.2k)
R2, R4, R5	220Ω
R6	3k3 (3.3k)
R7	330Ω

CAPACITORS

C1, C3	10nF (.01 μF) polyester film
C2, C4	2μ2 (2.2 μF) tantalum

SEMICONDUCTORS

D1	1N4148 silicon diode
D2	1N4733 5.1V zener diode
U1	DS1488 quad line driver
U2	6N138 opto-coupler
U3	DS1489 quad line receiver
U4	7405 hex opto-coupler inverter

OTHER

J1, J2	MIDI jacks (Switchcraft #57GB5F)
P1	DB-25S RS-232 connector

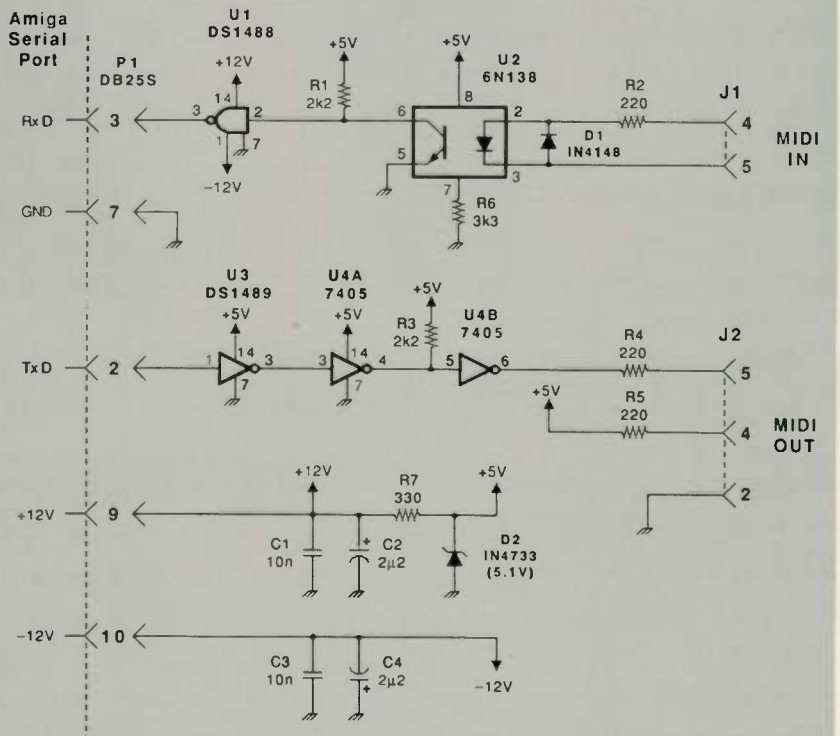


FIG. 1: Amiga 500/1000 MIDI interface schematic.

LISTING, *from page 62*

```
 Out=MRouteSource(Source,SADD(DestName$),RouteInfo)
 IF Out=0 THEN PRINT"Can't route MIDI output": GOTO CloseDown
 In=MRouteDest(SADD(SourceName$),Dest,RouteInfo)
 IF In=0 THEN PRINT"Can't route MIDI input" : GOTO CloseDown

 MENU 1,0,1,"CZPLUS"
 MENU 1,1,1,"Quit        "

 MENU 2,0,1,"MIDI"              : MENU 3,0,1,"FILES"     : MENU 4,0,0,""
 MENU 2,1,1,"Random Patch     " : MENU 3,1,1,"Load File"
 MENU 2,2,1,"Get Presets      " : MENU 3,2,1,"Save File"
 MENU 2,3,1,"Get Internals    " : MENU 3,3,1,"Directory"
 MENU 2,4,1,"Get Cartridge    "
 MENU 2,5,1,"Send to Internals"

 ON MENU GOSUB MenuHandler : MENU ON
 Quit%=0 : WHILE NOT Quit% : SLEEP : WEND
 CLS : MENU RESET

CloseDown:
 IF Dest<>0 THEN CALL DeleteMDest(Dest)
 IF Source<>0 THEN CALL DeleteMSource(Source)
 IF In<>0 THEN CALL DeleteMRoute(In)
 IF Out<>0 THEN CALL DeleteMRoute(Out)
 IF RouteInfo<>0 THEN CALL FreeMem(RouteInfo,RouteInfoSize)
 IF main<>0 THEN CALL FreeMem(main,MainSize)
 IF Request<>0 THEN CALL FreeMem(Request,RequestSize)
 IF Random<>0 THEN CALL FreeMem(Random,RandomSize)
 LIBRARY CLOSE
END

MenuHandler:
 MenuID%=MENU(0) : MenuItem%=MENU(1)
 IF MenuID%=1 THEN
  ON MenuItem% GOSUB Quit
 ELSEIF MenuID%=2 THEN
  ON MenuItem% GOSUB RandomPatch,GetPre,GetInt,GetCart,Send
 ELSEIF MenuID%=3 THEN
  ON MenuItem% GOSUB LoadFile,SaveFile,Directory
 END IF
RETURN

RandomPatch:
 LOCATE 5,1 : PRINT"Generating Patch ...       "
 addr=Random : POKE addr+6,&H60
 FOR i=7 TO 262 : POKE addr+i,PEEK(main+i+VoiceSize*FNrnd16) : NEXT
 LOCATE 5,1 : PRINT "Sending Patch ...         "
 CALL PutMidiMsg(Source,addr) : RcvdPtr=0
 FOR i=200 TO 0 STEP -1 : RcvdPtr=GetMidiMsg(Dest) : IF RcvdPtr<>0 THEN i=-1
 NEXT : IF RcvdPtr<>0 THEN CALL FreeMidiMsg(RcvdPtr)
 LOCATE 5,1 : PRINT SPACE$(30)
RETURN

Quit:
 Quit%=-1 : RETURN

GetPre:
 LOCATE 6,1 : PRINT SPACE$(30)
 FOR voice=&H0 TO &HF : CALL GetVoice(voice,oops) : IF oops THEN voice=&HFF
 NEXT : IF voice<>&H100 THEN LOCATE 5,1 : PRINT "Presets received!     "
RETURN

GetInt:
 LOCATE 6,1 : PRINT SPACE$(30)
 FOR voice=&H20 TO &H2F : CALL GetVoice(voice,oops) :IF oops THEN voice=&HFF
 NEXT : IF voice<>&H100 THEN LOCATE 5,1 : PRINT "Internals received!     "
RETURN

GetCart:
 LOCATE 6,1 : PRINT SPACE$(30)
 FOR voice=&H40 TO &H4F : CALL GetVoice(voice,oops) :IF oops THEN voice=&HFF
 NEXT : IF voice<>&H100 THEN LOCATE 5,1 : PRINT "Cartridge received!     "
RETURN

Send:
 addr=main
 FOR voice=32 TO 47
```

continued on page 72

LISTING, *from page 71*

```
  LOCATE 5,1 : PRINT "Sending voice"voice+1"      "
  POKE addr+6,voice : CALL PutMidiMsg(Source,addr)
  FOR i=200 TO 0 STEP -1 : RcvdPtr=GetMidiMsg(Dest) :IF RcvdPtr<>0 THEN i=-1
  NEXT : IF RcvdPtr<>0 THEN CALL FreeMidiMsg(RcvdPtr)
  addr=addr+VoiceSize
 NEXT voice : LOCATE 5,1 : PRINT "Finished sending bank.  "
RETURN

LoadFile:
 ON ERROR GOTO LoadErrMsg
 LOCATE 5,1 : INPUT "File to get patches from: ",FileName$
 LOCATE 5,1 : PRINT "Reading patches from "FileName$" ..."SPACE$(15)
 OPEN Path$+"/"+FileName$ FOR INPUT AS 1
 FOR i=0 TO MainSize-1 : POKE main+i,ASC(INPUT$(1,1)) : NEXT
 LOCATE 5,1 : PRINT SPACE$(50)
EndLoad:
 CLOSE #1 : RETURN

SaveFile:
 ON ERROR GOTO SaveErrMsg
 LOCATE 5,1 : INPUT "File to save patches to: ",FileName$
 LOCATE 5,1 : PRINT "Saving patches to "FileName$" ..."SPACE$(15)
 OPEN Path$+"/"+FileName$ FOR OUTPUT AS 1
 FOR i=main TO main+MainSize-1 : PRINT#1,CHR$(PEEK(i)); : NEXT
 LOCATE 5,1 : PRINT SPACE$(50)
EndSave:
 CLOSE #1 : RETURN

LoadErrMsg:
 LOCATE 5,1
 IF ERR=53 THEN
  PRINT "File not found" SPACE$(30)
 ELSEIF ERR=70 THEN
  PRINT "Disk is write protected" SPACE$(20)
 ELSE
  PRINT "Load error" SPACE$(30)
 END IF
RESUME EndLoad

SaveErrMsg:
 LOCATE 5,1
 IF ERR=70 THEN
  PRINT "Disk is write protected"
 ELSE
  PRINT "Write error"
 END IF
RESUME EndSave

Directory:
 CLS : FILES Path$ : MENU OFF : PRINT : PRINT"Touch any key to continue"
 WHILE INKEY$="" : WEND : MENU ON : CLS : PRINT"CZPLUS for the Amiga"
 PRINT" by Jim McConkey after C64 original by Tim Dowty"
RETURN

Init:
'Set up voice request message & setup headers in buffers
 FOR i=0 TO RequestSize-1 : READ Rqst(i) : POKE Request+i,Rqst(i) : NEXT
 FOR i=0 TO HeaderSize-1: READ Header(i) : NEXT
 FOR voice=0 TO 15 : addr=main+voice*VoiceSize
  FOR i=0 TO 7 : POKE addr+i,Header(i) : NEXT i
  i=VoiceSize-1 : POKE addr+i,Header(7)
 NEXT voice
 addr=Random : FOR i=0 TO 7 : POKE addr+i,Header(i) : NEXT i
 i=VoiceSize-1 : POKE addr+i,Header(7)
RETURN

SUB GetVoice(voice,oops) STATIC
 SHARED main,Request,VoiceSize,Source,Dest
 LOCATE 5,1 : PRINT "Getting voice"voice+1"       "
 POKE Request+6,voice : CALL PutMidiMsg(Source,Request)
 FOR i=200 TO 0 STEP -1 : RcvdPtr=GetMidiMsg(Dest) : IF RcvdPtr<>0 THEN i=-1
 NEXT
 IF RcvdPtr=0 THEN
  LOCATE 5,1 : PRINT "CZ is not responding!      " : oops=-1
 ELSE
  addr=main+VoiceSize*(voice AND 15)+7 : RcvdPtr=RcvdPtr+6
  FOR i=0 TO 255 : POKE addr+i,PEEK(RcvdPtr+i) : NEXT
  FreeMidiMsg(RcvdPtr-6) : oops=0
 END IF
END SUB
```

voices in the buffer to the CZ, one at a time. The *FOR* loop checks for the CZ's reply. If a reply doesn't occur in a short time, the program figures the CZ is not connected and gives up.

The load and save file routines simply copy the data between memory and the disk, one byte at a time. This is not very elegant or fast, but there isn't another way to do it. The Apple- and IBM-style *BSAVE*, which saves blocks of memory in one fell swoop, was somehow forgotten on the Amiga. There may be a system library routine that will do this, but I haven't found it yet. Note that the load and save routines contain *ON ERROR* commands, which send the program to *SaveErrMsg:* or *LoadErrMsg:* if there is a disk error.

The *Directory:* routine displays a directory of all files in the patch directory, *CZFILES*, which is assumed to be a subdirectory of the current directory. When BASIC creates a file, it also creates an *.info* file. This is the icon that will appear under the workbench. Unfortunately, the ability to put wild cards in the *FILES* (i.e., *FILES"*.CZ"*) command also got lost on its way to the Amiga, so the directory also shows icons and other non-patch files.

The *Init* routine sets up the voice buffers. Each buffer contains 256 bytes per voice (the CZ has 128 bytes per voice, which are split and sent in high and low nibbles via MIDI) with the Sys Ex *header* and *end of exclusive* messages tacked on. *Init* also puts this information in the temporary buffer used to create the random voices.

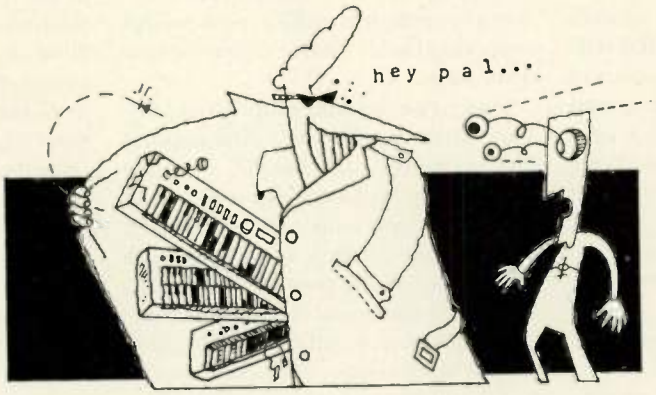
Finally, we get to a subprogram, *GetVoice*, which is called by all the routines that get voices from the CZ. First, the voice-request Sys Ex message is sent to the CZ. A *FOR* loop waits a short time for a reply. If none comes, it assumes the CZ is not connected and gives up. *GetMidiMsg* returns the address of the message if one was received or zero if one wasn't. Upon receipt of a message, it is copied into the buffer and de-allocated with *FreeMidiMsg*. If we didn't free the messages as we finished with them, the free memory in the Amiga would keep dwindling until we had none left.

And there it is: a complete CZ patch librarian and patch randomizer for the Amiga. The PB MIDI library makes the MIDI functions not only easy to use, but well-behaved in a multi-tasking environment. In about an hour, using the MIDI library, I was also able to convert Jim Johnson's Atari ST algorithmic composition program, from the April 1988 issue of **EM**, to run on the Amiga. If you are interested in getting into BASIC programming on the Amiga, I recommend *Advanced Amiga BASIC* by Tom R. Halfhill and Charles Brannon (published by Compute! Publications, Inc.). For serious work, several good BASIC compilers are available. These let you keep the convenience of the interpreter for debugging, yet provide speed once the final version is compiled. The compiled programs can also be run from the workbench. Have fun, and may your programs never crash.

Jim McConkey *is the keyboard-, guitar-, MIDI sax-, and dulcimer-playing president of Triangle Audio. When not writing MIDI software, he can be found climbing mountains, exploring caves, and looking for a nice, down-to-earth woman with similar odd interests.*

INSIDER INFO:
Tips From EM Readers

12 Hints For Buying a Used Synthesizer



1. Prices of instruments in identical condition can vary wildly for no apparent reason whatsoever. Some owners just want to get rid of something they no longer want or need and are willing to sell out cheap. Other folks don't seem to realize that synths depreciate with time. Most people fall somewhere between these two extremes and are probably willing to negotiate. You might want to refer to **EM**'s classifieds and check with local music stores to get ballpark figures for used synth prices.

2. Check whether the manufacturer is still in existence and if not, whether parts and service are still available.

3. A good way to check on an instrument's condition is by its appearance. While an axe can look terrific and still be a lemon, it's rare to find a neglected beast that works well. Dust, dirt, and grime are sure signs of a neglected instrument.

4. If you're trying out an analog synth, let it warm up for 15 to 30 minutes before playing it. It's just not fair to expect a VCO-based system to play in tune the instant that it's turned on.

5. Grab some knobs or sliders and listen for noise. If a knob crackles when turned, it's either dirty or worn, and service is necessary. I always grab the volume control because it's used the most and seems to go first. Sliders and switches are prone to the same disease, so do a little pushin' and pullin' there as well.

6. The keyboard contacts also seem to attract dirt and crud. Play each note on the keyboard and make sure that each produces a clean, glitch-free, in-tune note. If not, expect to have to clean the keyboard contacts.

7. Does the instrument in question have 1 volt/octave control voltage jacks and gate in/out jacks? If so, it can often be controlled by MIDI-to-CV converters (see the November '88 **EM**). For more about control voltage protocols, see "Updating Your Dinosaur" in the January '88 **EM**.

8. If the instrument you're considering can store programs in memory, check its age. User-programmable machines require some sort of battery for patch backup, and these batteries must be replaced from time to time. The one in question may be on its last legs.

9. If the axe has MIDI, keep in mind that some of the first generation MIDI synths were real dogs due to confusion about the MIDI spec. The Memorymoog sounds great, but I have yet to meet an owner who was satisfied with the MIDI implementation; early DX7s also had problems. Check if software revisions are available to fix any original problems.

10. Are accessories included with the instrument? Special goodies can be hard to find, especially if the maker went out of business years ago. If any items are missing (footpedals, footswitches, etc.), be sure to find out if they are necessary or just a convenience.

11. Don't buy something just because the price is right; buy it because you like the sound and feel.

12. Do not buy equipment that appears to have been stolen, no matter how great the price is. Somebody had to have been ripped off for you to get the deal, and out of respect for your fellow musicians, you should not participate. *—C. R. Fischer*

The Multi-timbral CZ-101: Mono Mode Revealed

The Casio CZ-101 was one of the first low-cost synths to offer multi-timbral (four-voice, four-channel) operation, also called Mono Mode or MIDI Mode 4. Getting the CZ-101 to play different timbres simply involves assigning different programs (patches) to different channels.

Note that in the CZ-101, these channels must be consecutive: for instance, 1, 2, 3, 4, or 10, 11, 12, 13. The lowest of the group of four is called the *base* MIDI channel, and cannot be more than 13, since the highest channel number is 16.

To assign timbres to channels:

1. Activate the CZ-101 Solo button (its indicator will light).

2. Press the MIDI button. The display shows:

MIDI CH=01,VO=01
PROG CHANGE=ENA

3. CH indicates the base MIDI channel, which is 1. VO indicates which of the group of four MIDI channels is selected (in this case, it's the base channel, but it could be 2, 3, or 4). The second line, which relates to Program Change, isn't particularly related to multiple voicing.

4. Use the cursor and value keys to adjust the CH or VO values. For example, suppose you want to set the CZ to channels 3, 4, 5, and 6, and want channel 5 to have a violin tone. Change CH to 3 and VO to 5.

ILLUSTRATIONS BY DAVID POVILAITIS

5. After selecting the channel, use the usual CZ-101 patch buttons to select the sound for that channel.

6. Repeat steps 4 and 5 until all four channels have an associated timbre.

7. There's one more step: press the Solo button (indicator goes off), then press the button again (the indicator lights). If you don't do this, at least if you're playing on my CZ-101, subsequent multivoiced music will indeed play with different timbres, but not the right timbres: sometimes parameters are mixed between voices, related in some way to the first timbre that sounds and the current phase of the moon. Now you're ready to put the sequencer in play mode and groove.

Some of the above setup can be done from the sequencer (if it's up to it) so there's one less thing the human being has to remember. My CZ-101 responds well to an external MIDI Mono On command, thus getting around the Solo button's peculiarities. You do, however, have to set the basic receive channel—the "MIDI CH=" part of the display—from the CZ-101.

—J. G. Owen

The End of Sampling! (or: The Electronic Harpsichord)

No, analog synthesis hasn't finally backlashed; what we're talking about here is the sampling of end attacks. We all know how crucial those first few milliseconds of a note are, where the transients give the brain those vital clues as to whether it's an oboe or a violin we're listening to; but what about the ends of the notes?

Lots of musical sounds have characteristic endings, the most famous of these probably being the harpsichord. Here, the string is plucked by a tiny quill to produce the original sound. When the key is released, the quill produces an audible chiff as it returns to its original position. This sound is partly responsible for the very lively feel of a real harpsichord keyboard, and the percussive ending of the notes is a crucial part of the harpsichord sound.

Consider sampling a harpsichord. If we sample a complete note and play it back, we get the chiff at the end, but only if the note is the same length as the original. A shorter note means no chiff, and a longer one won't sustain. You can fix the sustain problem by looping the note, but then you lose the chiff. Even a loop in the release won't solve the problem.

The solution is to split the sound into two parts, the note and the chiff, so we now have two samples. First, loop the harpsichord sound for the sustaining portion of the sound. Now for the chiff. You don't want it to play when you hit the note, but when you let it go. So sample a bit of silence (you can get this off an old John Cage record), making it as short as possible. Splice the chiff onto the silence and loop the *silent* segment of the composite sample, remembering to turn off the loop in the release. With this sample, you should hear nothing when you play the note, but on release you should immediately hear the chiff. (If you like, you can do this trick with any sound and amuse your friends with a

continued on page 76

Changing the Mix in CZ-101 Mono Mode

There's no way to vary the level of each of the CZ's four channels over MIDI. The only answer, aside from ripping the thing apart and reeducating its ROMs, is new patches. If you want a softer violin, take the existing violin preset, decrease all the DCA (digital-controlled amplifier) levels, and store it as a custom patch. This can take care of relative level setting, and it's not too time-consuming, particularly if you have some nifty computer librarian program to make these things easier. Limited level changing during performance can be handled by a few Program Change commands to call up different versions of the same patch.

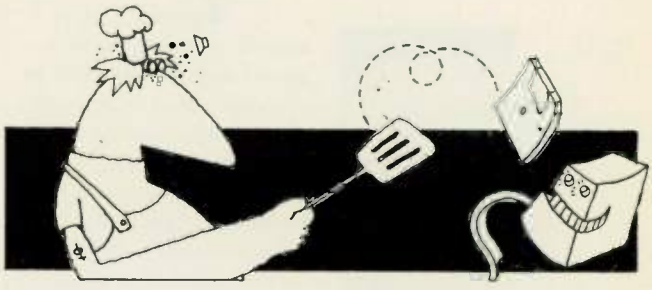
Although technically you still can't fade in or out on a single note, a way around this limitation is to "sustain" all the patches, that is, customize each patch so it will sustain after Note Off and die away very gradually. In polyphonic (normal) playing, this would usually be unacceptable, like playing the piano with the sustain pedal down all the time. In Mono mode, however, it's unnoticeable until the last note in a part is played (this is because Mono mode specifies one tone generator per channel, so a new note will always turn off any previous note).

The moral of my exciting tale is simple: you can't always get what you want. And that was Mick Jagger; the rest of us can't *ever* get what we want. However, despite the pain and suffering, I did get my little ensemble up and playing, fade-outs and all. Things might've been a little easier, but I still get some pretty impressive effects from a small, inexpensive synthesizer.

—J. G. Owen

Flip Over Your Floppy

When I recently tried to format a disk, the drive stubbornly refused to format it. I examined the disk, and it was fine; I tried other disks, but they didn't work either. A look inside the drive revealed the problem: a piece of paper had lodged itself over the heads! Apparently, when I took the floppy out of the protective sleeve, the static buildup was sufficient to attract a piece of paper to the disk's underside, which then got stuck in the disk drive.



I now routinely look at both sides before inserting a disk into a drive. Only the Great Upstairs knows what else can stick to a floppy.

—Matt J. McCullar

SAMPLING, *from page 75*

piano, or whatever, that plays when you let the notes go.) When you play back both samples, the original harpsichord sound provides the attack and sustain, while the second chiff sample provides an authentic release sound.

This technique is also applicable to all sorts of sounds, producing not only attacks on the ends of notes, but pitch bends, extraneous noises, and sound effects.

—Billy Crowie

Budget Rack for Rack Mount Modules

Today a lot of effects and tone modules (keyboardless synths) are sold in rack-mount form. Unfortunately, pro-quality racks are fairly costly. One solution is to buy a stand for microwave ovens; they look nice and are relatively inexpensive. If it's too wide, just add two pieces of wood to each rack-mount device (**Fig. 1**). I made two of these rack-mounts for my studio, putting the patch bay on top and adding doors to give more protection to the equipment. *—Claude Giroux*

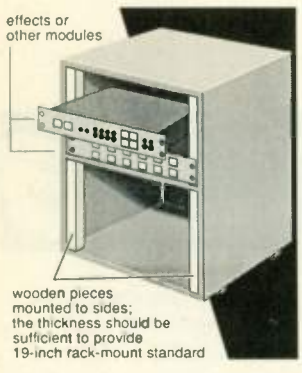


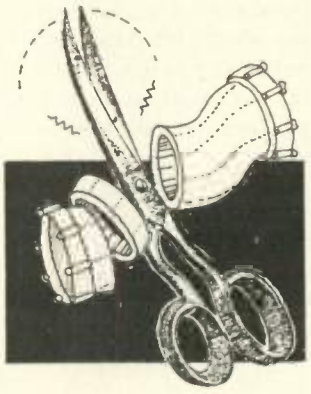
FIG. 1: A microwave oven stand converts to a cost-effective studio rack.

The Dynamic Duo: Sequencer as Drum Machine

More and more people are not using their drum machines to program drum parts, opting instead to use a sequencer. One reason is that drum machines often do not have velocity-sensitive buttons, but *do* respond to velocity messages received via MIDI. Thus, you can program dynamics into your sequencer, and the drum sounds will respond dynamically.

Another reason for using a sequencer for drum parts is that you are not limited to the drum machine sounds. Loading an inexpensive sampler with drum sounds (hopefully, there will be separate audio outputs for each sound) can produce great drum parts with more flexibility than a drum machine can offer.

If you don't want to give up the "modular" drum machine style of programming, though, you don't have to. What makes a drum machine easy to program is that you can break the drum part composition process down into a number of short patterns, which you then string into songs. Any sequencer that has lots of tracks and lets you mute each track is excellent as a drum machine.



The trick is to use some of those extra tracks to store a couple of measures of drum riffs: a repetitive bass drum, a bass/snare combination, snare hits on beats two and four of a measure, a measure of tom fills, etc. If you have a sequencer with enough tracks (it seems 64 is about the minimum), you can keep a semipermanent collection of around a dozen preset drum patterns and still have plenty of sequencer space left over. I stick all these patterns at the end of the song for easy access, one per track, and mute them so they stay off until needed. Since most drum machines assign different drums to different notes of one MIDI channel, you usually need only one track to play a drum set's entire repertoire of sounds.

Now all you have to do is cut-and-paste the various patterns. Once you have a "skeleton" drum part created by cutting and pasting your stock riffs, chances are the part will be sufficiently complete to let you continue working on a tune. As you come up with more ideas, add them to the basic track. You may want to create new patterns and paste them over existing ones or dedicate a track to overdubs of fancy drum riffs.

While cutting and pasting stock riffs may not result in a finished part, it will at least get you a drummer—fast—before the inspiration goes away. After you've safely locked the essence of your song in the sequencer, go back and tweak the drum part into being all it can be. *—Craig Anderton*

MPU-401 Reset for Texture 2.5: Unlocking the Exit

Texture 2.5 users know that exiting the program leaves the MPU-401 in a "locked" state, which prevents running any further MIDI programs again (even Texture itself) unless the computer is powered down. What follows is a simple fix for this problem: a utility program called *RESETMPU*. RESETMPU will also work for many other ill-behaved MPU-401 programs.

To create RESETMPU, you'll need the DOS utility called *DEBUG*, which was supplied on your original DOS diskette. Type in the following in response to DEBUG's prompts. (What you should type is listed below in boldface type. XXXX can be any four-digit hexadecimal number, depending on your system. Hit Return at the end of every line you enter and after the *empty* line following "XXXX:0115." The hyphens and colon that begin certain lines are prompts and will appear on the screen.)

```
A>debug
-a100
XXXX:0100 mov dx,0331
XXXX:0103 in al,dx
XXXX:0104 test al,40
XXXX:0106 jnz 0103
XXXX:0108 mov al,ff
XXXX:010A out dx,al
XXXX:010B dec dx
XXXX:010C in al,dx
XXXX:010D cmp al,fe
XXXX:010F jz 0113
XXXX:0111 jmp 0100
XXXX:0113 int 20
XXXX:0115
-rcx
CX 0000
```

```
:15
-n resetmpu.com
-w
Writing 0015 bytes
-q
```

That's it. RESETMPU has been created and is ready to run. Copy it to the disk or directory where you keep Texture and run it every time you exit the program. You could even put the command into a batch file like this:

```
A>copy con: texture.bat
tx25
resetmpu
^Z [^Z = control-Z, followed by Return]
  1 File(s) copied
```

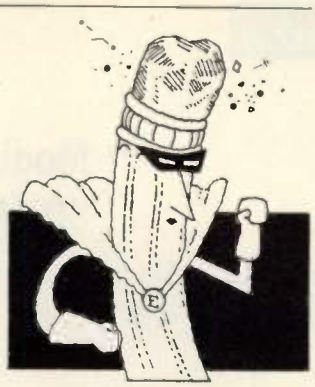
Now type "texture" to start Texture, rather than "tx25," and Texture will run as usual, but when you exit it, RESETMPU will automatically run after it, fixing the "stuck" MPU-401.

—Carter Scholz

On the Edge

A friend of mine asked me to look at his Intellivision game system. One of the game cartridges was working only about 10% of the time; when I unscrewed it and saw all the edge connectors covered with a black, gunk-like oxide, I knew what the problem was. If a cartridge's edge connectors get dirty, chaos results when the computer tries to access the circuitry contained in the cartridge.

Rubbing the connectors with a pencil eraser quickly eliminated all of the accumulated crud, and thereafter, the game ran fine. Periodically check the edge connectors in your computer cards, peripherals, keyboards, RAM cartridges, etc. Of course,



you can clean them with isopropyl alcohol or head cleaner, but erasers smell better and will certainly do in a pinch. *—Matt J. McCullar*

Don't Curse the Darkness

Ever have a battery-operated device go dead because the power switch got accidentally bumped on? To prevent that, slip a piece of paper between the battery and one of the end connections to prevent the flow of electricity. Even if the unit's switch clicks on, no power will reach it.

Try this with your car's flashlight as soon as possible; the only thing worse than no light at 3 a.m. with a flat tire in a strange city is an emergency light with dead batteries in it. For techs, this technique helps prevent arriving at a service call with a dead test instrument.

However, don't try this technique on instruments that store information in internal memory when powered down, such as synthesizers with patches stored in RAM. You'll wind up having to reload the sounds, and you'd better have a backup.

—Matt J. McCullar

Modifying the ESQ-1/SQ-80: "DeWitt's Click"

Performing live with on-board sequencing? Add a click-track direct output to your Ensoniq synth and keep the band in step.

By Kim Monday and Greg DeWitt

Sequencers are a fact of life in the club scene today, primarily because of well-implemented sequencers like those found in the ESQ-1 and SQ-80. Both units let you play live while the sequencer plays backup on the same synth. But this good deal has one serious drawback for club work: the click.

The simplest way for a drummer (or any band member) to follow the ESQ-1's sequencer is to listen to the click it generates. Unfortunately, the click only comes out of the main audio output jacks along with the synth's sound, so if the band members can hear it, so can everyone in the club. Luckily, there are several ways around this problem.

Using synchronizing devices such as Kahler's "Human Clock" or synching a drum machine to the ESQ-1's tape or MIDI Out provides one solution, as does writing a click track in the sequencer for a separate synth, then feeding the output to the drummer's monitor. The problem with these solutions is that they waste a drum machine, synth, or sequencer track.

The answer we came up with doesn't waste any of these resources. It's a small modification to the ESQ-1 or SQ-80 that removes the click from the audio outs before it's mixed with the oscillator output, then routes the click to another jack (see **Fig. 1**). Since both the oscillator and click signals are analog at this point in the circuit, this modification in no way tampers with the ESQ-1's digital circuitry. The mod does have a small drawback in that it voids your warranty, but since both of these instruments have been on the market for a while, this is most likely moot for most of you.

The mod is very simple, consisting only of removing one leg of a capacitor on the main board and installing a switching quarter-inch jack in the back. We've added a 150 nF (0.15 μF) blocking cap in case someone plugs something silly into the jack instead of a lead to the monitor system (of course, a strong enough signal, such as a speaker output, will do grievous damage, blocking cap or not).

On earlier ESQ-1s the cap is number C74; on the SQ-80, and on later ESQ-1s (the models with a plastic body), the cap is number C54.

THE MODIFICATION

First, save your data to tape or disk, as the disassembly you'll do in this project will wipe out all your sequences and internal sounds. Next, power the ESQ-1 down, disconnect its AC cord, and remove the four hex screws from the top of the synth. Free the keyboard by unscrewing the ten Phillips-head screws from the bottom, making sure to remember which way the keyboard plug goes in (red stripe to the front). If you have a sequencer expander cartridge, this is the time to remove it. Now, remove the seven nuts from the jacks in back and one screw from the board between the left and right output jacks. Only the standoffs now support the board. Pull the board free and tilt it up; just remember, you have to put this all back together again, so arrange the parts you removed so that it's obvious where they all go.

PARTS LIST

¼", insulated, switching phone jack
150 nF (0.15 μF) capacitor rated at 15 VDC minimum

Next, locate C54 (or C74 on older ESQs) on the main board. It's directly in front of the CV jack, about an inch-and-a-quarter away. Unsolder the leg of C54 closest to the rear of the board. Remember, this double-sided board requires a little more heat than normal and is therefore easier to damage, so be careful.

With the board loose, drill a hole in the chassis, next to the right output jack, just big enough to accommodate the new quarter-inch jack. Carefully solder one end of a wire to the loose leg of C54 and the other end to the tip of the jack. Connect another piece from the hole in the circuit board from which you removed the cap leg to the 150 nF cap that you will mount on the switched side of the jack.

Use two-conductor, shielded cable and an insulated jack, and tie the shield to ground on the board. Using a non-insulated jack would create ground loops and produce noticeable hum and noise.

REASSEMBLE, REINITIALIZE, AND RELAX

Reassemble by following the above instructions in reverse order. Make sure that the jack you installed is not shorted to the case or main board. If you removed a sequencer expander cartridge, you have to reinitialize the system by pressing the Record button and the upper left Soft button on the front panel and answering Yes to the prompt (**Fig. 2**).

With nothing plugged into the newly installed "click jack," the synthesizers operate normally. Inserting a quarter-inch plug diverts the click sound from the normal outputs to the new jack. All the Control Page functions are still operational, so make sure you've enabled the click or you won't hear anything.

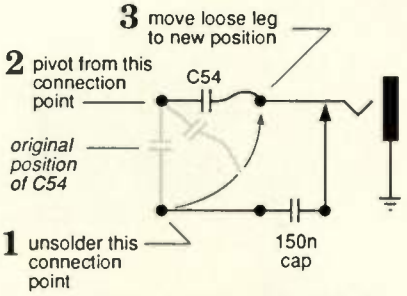


FIG. 1: Connecting the click jack.

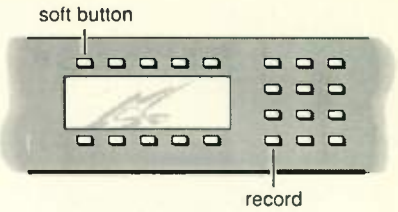
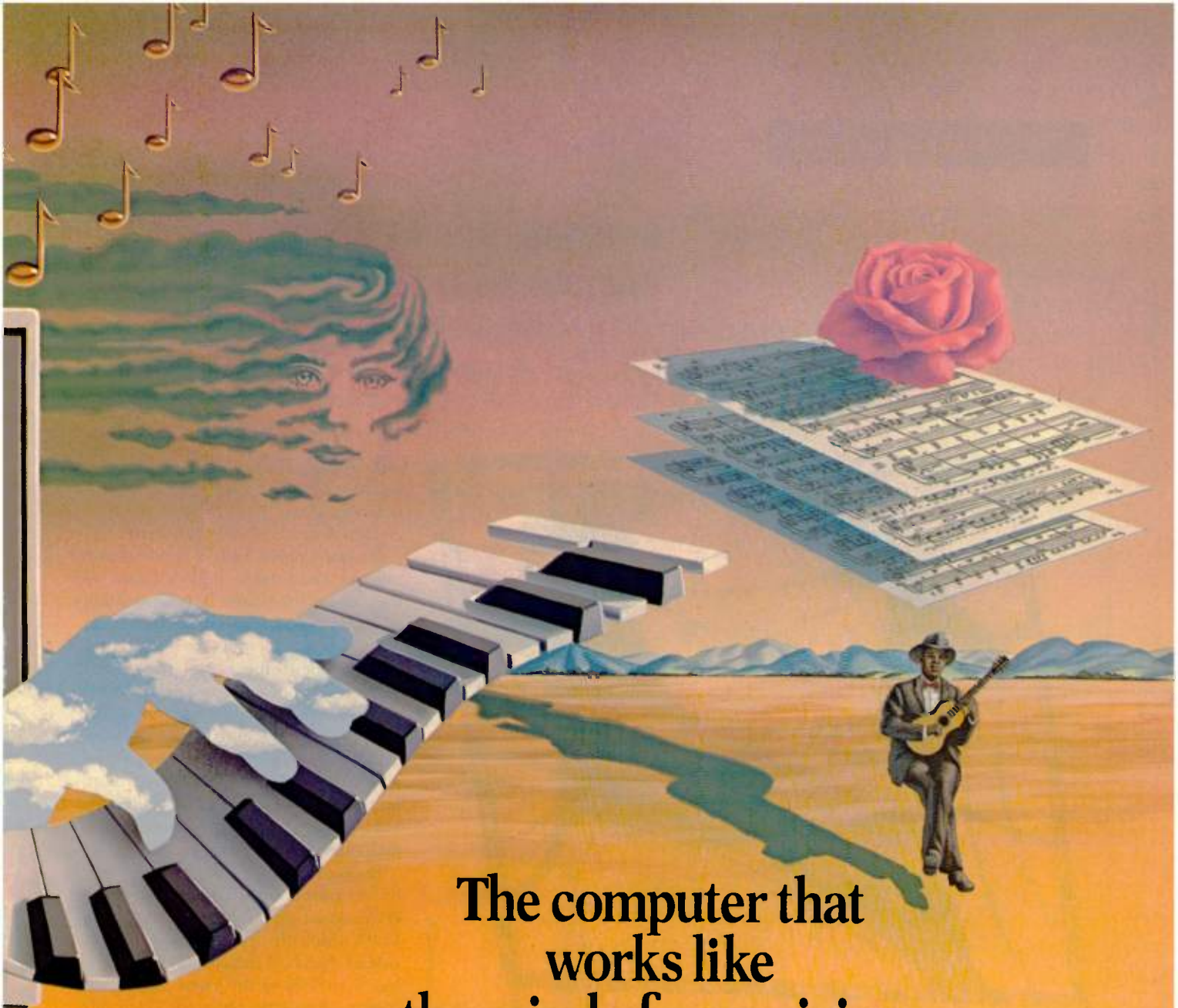


FIG. 2: Location of the Record and Soft buttons needed to reinitialize either the ESQ-1 or SQ-80.

Now relax; your drummer no longer has an excuse for not following your sequences.

Greg DeWitt *is a technician at O.B. Fawley Music Company in Morgantown, West Virginia, an authorized Ensoniq Service Center. He's an accomplished keyboard player and modifies and burns ROMs for arcade games.* **Kim Monday** *is also a technician at O.B. Fawley's, is a talented recording engineer, and lives under a rock.*



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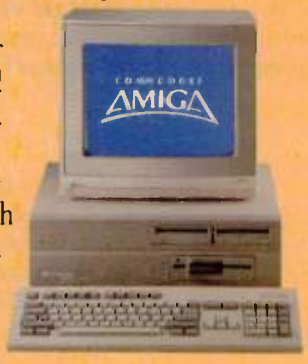

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QUESTIONS AND ANSWERS: Tips from the Tech

Internal batteries provide a safety net for your synth's memory. A voltage drop can spell disaster; check your net in case you fall.

By Alan Gary Campbell

RICK BISACCIA

Q. I have a Sequential Circuits Prophet-5 I purchased in 1982. I've heard that the internal battery that backs up the programs is good for only five years. Where can I get a suitable replacement, and is installation a job for a technician?

How can I determine if and when the batteries in my programmable synths and signal processors need to be replaced?

A. Many programmable devices—synths, effects, even sequencers—incorporate internal batteries in order to retain program data when powered down. Cylindrical or button-type, lithium-based batteries are commonly used, depending on the memory circuit current requirements. Both types are available in versions that have an average service life of about five years, but some batteries are rated for longer life and some shorter. The average service life is usually listed somewhere in the equipment owner's manual (in tiny print), but remember, it's just an *average*. The battery is not likely to fail obediently exactly five years after the date of manufacture, whenever *that* was.

You might consider measuring the battery terminal voltage every few months and plotting a depletion graph to predict the failure date, but this technique isn't all that reliable. When batteries get in the mood to go dead, they can do so in a hurry. In addition, those nifty battery-testing diagnostic routines in some gear, e.g., the DX7, can be fooled by certain failure modes such as an internally shorted battery or a faulty A/D converter.

But don't panic. Battery failure is usually not catastrophic. Batteries back up data when equipment is *powered down*; the main power supply takes over upon power-up, so memory-loss symptoms usually evidence themselves when gear is first turned on. Even with a dead battery, you can reload the memory if you've saved it elsewhere, and the unit will work fine—at least until you power down again. That's why it's so important to back up programs via secure and preferably nonvolatile media: patch sheets, disks, data cassettes, cartridges, etc.

Backup battery-terminal voltage should be measured with a high-impedance DVM; do *not* use a low-impedance analog VOM, which can deplete the battery. As a rule of thumb, if the terminal voltage is less than 75% of the rated output, the battery should be replaced. Practically speaking, the only way to insure that backup batteries don't pass on in the night is to replace them at recommended intervals, although in my experience, the average-service-life ratings are conservative, and most batteries last longer.

It's very important to use the same type and rating for replacement, so normally you would purchase a replacement from the equipment manufacturer's service center. Batteries and other components for Sequential products are available from National Service Concepts, Inc., 1405 Pioneer Avenue, Brea, CA 92621; tel. (213) 690-9089 or (714) 992-4715. An aside: A Yamaha RX11 I serviced had suffered battery failure in the field just before an important engagement. In desperation, the owner had purchased a similar lithium battery from Radio Shack, ripped the welded leads from the old one and tack-soldered them onto the replace-

ment; it actually worked for a while. High marks for ingenuity here, but not for safety. Soldering to leadless batteries is inadvisable; they tend to explode.

Not all backup batteries are lithium-based cells. Some Oberheim products use rechargeable nicads, for example, and the Fender Polaris uses two alkaline D cells *inside* the unit. You have to disassemble it to get at them.

Portable keyboards such as the Casio CZ-101/1000, CZ-230, and Korg Poly-800 are another story. They use the same conventional batteries for both power *and* memory backup. If you let them go flat or leave them out too long when installing fresh ones, the internal memory will disappear. Thankfully, such keyboards usually have a large, low-leakage capacitor in parallel with the battery supply, so during replacement, you can take a little longer than the "five minutes" specified in the

MIDI AND THE DROUGHT OF '88

Yes, even the weather affects equipment service; it certainly did in the southeastern USA last season. Months of hot, dry weather resulted in a distinct absence of fried-power-supply-type repairs. No storms, no lightning; no lightning, no surges; no surges, no smoke.

But the late-summer deluge—weeks of solid rain—and unseasonably low temperatures more than made up for it. I began to see a flood of instruments (pun intended) that appeared to have had liquid spilled into them, but the owners claimed otherwise. It turned out that the contamination was the result of condensation *inside* the instruments, caused by supersaturated air coupled with an abrupt reduction of ambient temperature.

Some of the affected instruments were really out to lunch. Fortunately, flushing and scrubbing the boards with TF (a solvent used in electronic cleaner/degreaser solutions, also called Freon-113™) was all that was required to rejuvenate most, though one DX7 had a totally zapped battery and severe corrosion in the ROM and RAM sockets.

Add one more course to the music technologist's multidisciplinary education: *Climatology*. —*AGC*

manual. (I've seen CZ-101s that retain memory for weeks without batteries. Now, *that's* a low-leakage cap!)

Some other keyboards, such as the Casio CZ-3000 and CZ-5000, are line-powered, but rely on conventional batteries for memory backup. I strongly recommend Duracell-brand batteries in such applications. (No, I don't get free ones from Duracell!) In my experience, they have the longest shelf- and service-life of any and virtually refuse to leak under normal conditions.

Battery replacement is a reasonable do-it-yourself project, though to replace soldered-in types, the associated PC board must sometimes be removed from the gear, and it helps if you have access to a desoldering station (Ungar 4000 series or similar). Note: Work quickly when you replace soldered-in types. Take care not to short a battery during removal, or more importantly, during replacement. This will ruin the battery, and it may get quite hot!

Q. I recently purchased an ailing DeltaLab DL-4 Digital Delay. An inside inspection uncovered numerous cold solder joints. After nothing more than resoldering, the unit worked fine, except for one little irritation I can't pin down: it will intermittently switch from Active to Bypass mode. It may switch after ten seconds, two hours, or not at all. I've tried to locate the manufacturer for help or at least to purchase a schematic, but they are out of business. Any advice?

A. DeltaLab went out of business apparently without providing us techno-types with service manuals. However, Magic Music Machines (1207 Howard Street, San Francisco, CA 94103; tel. [415] 864-3300) purchased a quantity of parts and circuit boards prior to DeltaLab's demise and has since come to specialize in DeltaLab repairs. Unfortunately, they don't offer schematics or service manuals, either; rather, they rely on their accumulated expertise to repair units in-house, on a flat-rate basis. Current job rates, not including parts costs, are: DL-1, $150; DL-2, $200; DL-3, $125; DL-4, $150; DL-5, $250 (write or call regarding the 2-Second Memory Module). Prices are subject to change, which is probably obvious if you've recently purchased a keyboard or been to the grocery store. If these rates seem high, consider that the DeltaLab products can be a bit tricky to fix.

At the do-it-yourself level, most bypass circuits use simple FET or CMOS switches to route the dry signal "around" the rest of the circuitry. If the bypass function isn't working properly, either the switch or its control circuit is defective. Before you ship the unit off for repair, you might analyze the PC board traces associated with the input and output stages, looking for any switched interconnection; it's helpful to make a sketch as you go. I believe the DL-4 used one section of a 4053 CMOS Triple 2-Channel Switch IC for the Bypass function. If so, replacing it, or the chip that controls it, might solve the problem.

Q. What are common service uses for silicone sealer?

Q. What's the difference between the silicone sealer sold by electronics supply stores and that available from hardware stores or Radio Shack?

A. Silicone sealer, that indispensable, sometimes *un*dispensable, gooey stuff, is used for just about everything. It's a viscous, putty-like adhesive that stays where you put it, is easily formed, sets quickly, is virtually waterproof and weatherproof, has excellent insulative properties, and remains flexible after it cures. Common electronic service uses include: securing loose knobs, lenses, bezels, grommets, rubber feet, and other lightweight mechanical parts; reinforcing cracked instrument cases; providing strain-relief for tack-soldered leads and components; reinforcing damaged PC board traces and minor board cracks; insulating line-voltage contacts on transformers, fuseholders, and the like; securing loose keyboard-switch membranes; sealing speaker gaskets; repairing minor tears in speaker cones; and on and on.

It's an old trick to form uncured sealer with a moistened fingertip or popsicle stick (yes, it's okay to slobber on your work), but watch out: silicone sealer precipitates acetic acid as it cures—hence, the "vinegar" smell—which can irritate sensitive skin.

Most silicone sealer is manufactured by General Electric or Dow Corning, though it's available under many brand names. The most popular are Radio Shack's Silicone Rubber Sealer, stock number 64-2314A, in a 3-ounce tube; General Electric's Clear Silicone Household Glue & Seal, stock number GE 361, in a 2.8-ounce tube; and GC Electronics' Silicone Rubber Sealant, stock number 10-150, in a 3-ounce tube. All these products are clear and become translucent when cured. The primary differences among them are viscosity and cost.

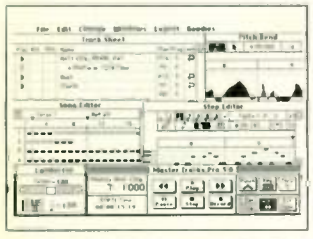
The Radio Shack product is the least viscous of the three, but it's not "runny" and is easy to form. At $2.99 list, it's slightly more expensive than the GE product, but that's offset somewhat by Radio Shack's convenience. The GE product is slightly more viscous than Radio Shack's, but is also easy to form. At $2.59 list, it's the least expensive and the best buy for bench work. The GC Electronics product is the most viscous and, at $3.99 list, the most expensive. It reportedly has a greater dielectric strength than the others, but that's important only in high-voltage, insulative applications.

The GE and GC products are also available in opaque white and the GC product in black. The GE product can be purchased in an economical 10.3-ounce cartridge for use with a caulking gun, but the bulky cartridge can be awkward to handle.

Anecdote: Allan Tamm, programmer, technician, and **EM** author, told me of the time he was working at Bozotronics, and a Prophet-5 came in with voice problems. Opening the unit, Allan discovered that the customer had used silicone sealer to glue all the socketed components—most of which are on the voice board—permanently in place, apparently out of concern for roadworthiness! As Al then had to cut all the silicone sealer away with an X-acto™ knife, I'd say the customer had little to worry about with regard to his synth, since he no doubt had cardiac arrest when he got the bill.

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

Stop Playing Hit and Miss with Audio for Video Production.



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BEAT-IT: A Drum Sensor Interface for the Atari ST

If you have an Atari ST and know how to solder, here's what you need to start pounding out MIDI program numbers that'll turn your synth into a drum synthesizer.

By David Snow

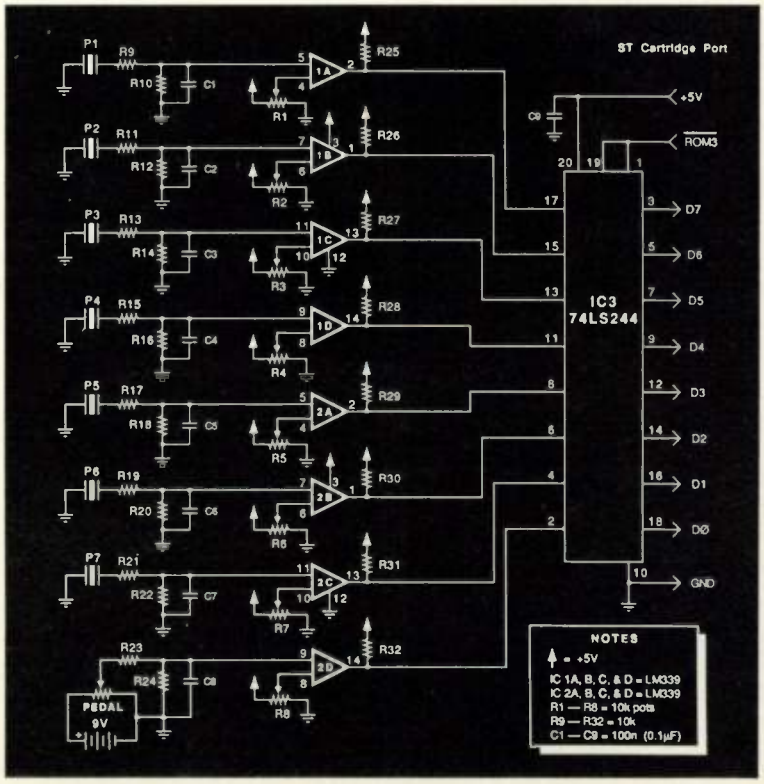


FIG. 1: Beat-It drum interface schematic.

You might think that percussionists are a well-adjusted lot, given that they regularly vent their aggression for fun and profit, and they are; it's just that some of them look and act like Animal from *The Muppet Show* (then again, he was a good drummer, wasn't he?). Hey, I'm not criticizing; I *want* to be like that. As a matter of fact, one can get pretty tired of being pigeonholed as some bow-tied, ivory-tower, pseudo-intellectual, button-pushing nerd. I want to rock. I want to roll. I want to get down, crank it up, kick out the jams, bite off chicken heads, and . . . you know what I mean. The problem is that it's just not spiritually moving to spend hours at a stretch entering step-time data into your sequencer with tiny, plastic buttons. You've got to keep in touch with the Big Reality, play your music in the Here and Now. For *that* transcendental purpose, nothing, you might say, beats a drum.

Since nobody's gonna let you beat up on the furniture, you have to get an instrument. Of course, money to indulge your muse is no object unless you run into a snag ("Hey Pop, how about 15,000 weeks advance on my allowance?"). Well, if the Real Reality says you need something substantial, but that Hot Rockers Drum Kit on sale at the local toy outlet isn't going to make the grade, don't panic.

You have a CZ-101 (or other multi-timbral synth)? You have an ST? You have a soldering iron? You're covered. Beat-It is a drum sensor interface that plugs into the ST's cartridge slot and turns that synth into a drum synth with eight, count 'em, eight different sounds available at your fingertips. The sensors (triggers) can be piezo elements, mics, pedals, all kinds of junk. The possibilities are mind-boggling, and the boggling follows forthwith.

THE CIRCUIT

The interface circuitry (**Fig. 1**) is simple enough. Quad comparators IC1 and IC2 detect voltage inputs from the sensors. If the input exceeds the threshold set by trimmers R1 to R8, the comparator output goes high. Octal buffer IC3 has tri-state outputs that isolate the comparator outputs from the computer's data bus unless enabled by strobing pins 1 and 19 low (see also **Fig. 2**). The ST's cartridge port provides two decoding lines: ROM3, which goes low when reading from addresses $FA0000 to $FAFFFF, and ROM4, which goes low when reading from $FB0000 to $FBFFFF. By reading address $FA0000, one enables the octal buffer and loads the comparator states onto data lines D0 to D7.

The hardest part about building the circuit is obtaining a circuit card to mate with the cartridge port (**Fig. 3**), as the contacts use an unusual 0.079-inch spacing. I

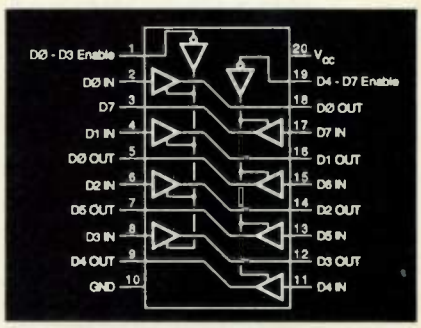


FIG. 2: 74LS244 Octal Tri-State™ Buffer pinout.

BEAT-IT
Drum Sensor Interface for the Atari ST

```
defwrd a-z

dim static prog_array(8)
dim static note_array(8)
dim static chan_assign(4)

' INITIALIZE PROGRAM/NOTE ASSIGNMENT
for drum=0 to 7
     prog_array(drum)=drum+32: note_array(drum)=60
next

display:
     clearw 2
     print "DRUM:     PROGRAM:  NOTE:"
     for drum=0 to 7
          print drum+1;tab(10);prog_array(drum);tab(20);note_array(drum)
     next
     print: print " ENTER DRUM NUMBER, OR PRESS 'RETURN' TO START:";

get_input:
     input " ", drum$
     if drum$="" then
          print
          print " READY TO PLAY. PRESS ANY KEY TO STOP (CTRL-C TO EXIT)."
          gosub play
          goto display
     endif

     drum=val(drum$)-1
          if drum <0 or drum>7 then display

     input " ENTER NEW PROGRAM NUMBER OR PRESS 'RETURN': ", prog$
          if prog$="" then get_note
          prog_array(drum)=val(prog$)

     get_note:
          input " ENTER NEW NOTE VALUE OR PRESS 'RETURN': ", note$
          if note$="" then display
          note_array(drum)=val(note$)
     goto display

play:
     out 3,176: out 3,126: out 3,4: '   MONO MODE ON

     for channel=0 to 3:'     ASSIGN PROGRAMS TO CHANNELS 1-4
          chan_assign(channel)=channel
          out 3,192+channel
          out 3,prog_array(channel)
     next

     new_channel=0: old_input=0

     while inp(-2)<>-1
          drum_input=peek_w(&hFA0000)-&hFF00
          if drum_input<>0 and drum_input<>old_input then
               for drum=0 to 7
                    test=drum_input and 2^drum
                    if test<>0 then
                         channel=0
                         find_channel:
                              if chan_assign(channel)=drum then note_on
                              channel=channel+1
                              if channel<4 then find_channel

                         chan_assign(new_channel)=drum
                         channel=new_channel
                         new_channel=(new_channel+1) mod 4

                         out 3,192+channel
                         out 3,prog_array(drum)
```

```
                        note_on:
                             out 3,144+channel
                             out 3,note_array(drum)
                             out 3,64
                             out 3,note_array(drum)
                             out 3,0
                    endif
                next drum
            endif
            old_input=drum_input
        wend
        junk=inp(2)
    return
```

LISTING 1: Beat-It software listing.

kluged my own connector using the Radio Shack PC board kit, drawing the card-edge fingers on the copper-clad side of the board with a resist-ink pen, and putting Bishop Graphics EZ Circuit adhesive copper traces on the other side. I built the interface circuit on a separate prototype board (Radio Shack #276-154) and connected it to the card-edge board with a 16-pin DIP jumper. If all that is too much trouble, a custom wire-wrap plugboard for the ST cartridge port is available from Douglas Electronics (see Parts List). Circuit construction is not too critical, but make wire runs short and direct and keep the comparator output leads away from the input leads to prevent oscillation.

For drum pads, I used wooden plaques purchased from a crafts shop and attached piezo-element sensors (Radio Shack #273-073) with epoxy (see "Quad Piezo-Electric Drum Trigger" by Chris Lucht, July '86 **EM**). The plaques are cushioned on a bed of styrofoam for isolation and mounted on a wooden frame at a comfortable angle for playing. For a bass pedal, I use a volume pedal reconfigured as a "voltage pedal" (**Fig. 4**). When using a pedal as the input sensor, the associated threshold trimmer should be adjusted so that the comparator turns on when the pedal is almost completely depressed, which gives the best "feel." That's all there is to Beat-It hardware.

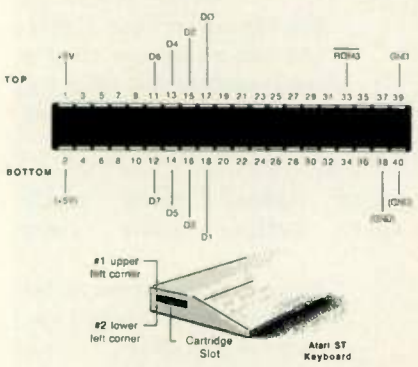
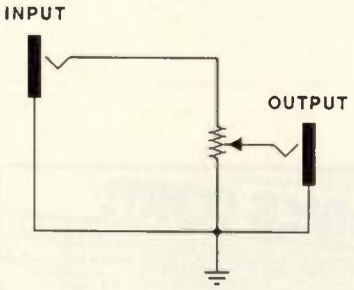
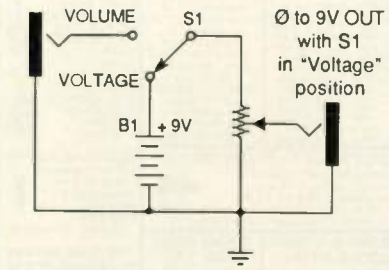


FIG. 3: Atari ST cartridge port (viewed looking into computer).



Standard volume-pedal configuration



Volume / voltage pedal conversion

FIG. 4: Converting a volume pedal into a drum footpedal.

THE SOFTWARE

The main function of the controlling software is to input data from the comparators, test each comparator's bit, and output a MIDI message if it's high. The only special software trick Beat-It performs is to make it seem like you have eight different voices available when, in the case of the CZ-101, you really only have four (using two different timbres per note in a TX81Z Performance also yields a total of four voices). Although the multi-timbral CZ is limited to playing up to four different timbres simultaneously, each triggered by information on a different MIDI channel, you can instantly change an active

voice to another sound by sending a MIDI Program Change message over a designated MIDI channel.

A brute force software solution would be to send a MIDI Program Change message before every Note On message, but this isn't satisfactory because it slows down the synthesizer's response. The best approach is to let the Atari sort out the details and send Program Change messages only when necessary, that is, whenever a sound program number is requested that isn't already assigned to one of the four synthesizer channels.

In order to do this, the software maintains a list of four of the eight sensors (which are numbered from 0 to 7) whose programs are currently assigned. If the computer detects a sensor whose number is on the list, it outputs that sensor's MIDI Note On over the channel corresponding to its place on the list. If the sensor number is not on the list, it is placed on the list in a position determined by a rotating pointer. Then, its MIDI Program Change is sent to the synth on the channel determined by its place on the list, followed by the Note On information (see sidebar).

The software program (**Listing 1**) was written using the *LDW BASIC* compiler, which produces fast .PRG files that do not require an interpreter. Anyone who wants to write useful software for the ST, but doesn't want to learn C, should get a BASIC compiler. Beat-It doesn't exploit the elegance of GEM (although LDW BASIC provides full access to it), but that's the price of simplicity. It gets the job done.

Enough technical stuff, now let's BEAT IT—hard.

CUSTOMIZING

The only user input Beat-It requires is MIDI program and note values for each of the sensors. The note range is from 36 (lowest C) to 84 (highest C). On the CZ-101, the programs are assigned as follows:

Presets	program numbers 0 to 15
Internal	program numbers 32 to 47
Cartridge	program numbers 64 to 79

The software's default settings assign the first eight internal programs to the eight sensors, each with a MIDI note number of 60 (middle C).

After typing in and saving the program, run Beat-It and enter the MIDI program and note values of your choice for each sensor. Press the Return key to activate the interface, and adjust trimpots R1 to R7 so that a strike on the drum pads produces a single note with no multiple (false) triggering.

The best patches to use are percussive sounds with no sustain; a selection of percussion patches accompanies my "Drumbox" article in the February '88 issue of

NOTES ON MIDI

MIDI Note On and Note Off messages consist of three, 8-bit bytes of information indicating type of command (first half of first byte), channel number (nnnn), note number, and key velocity.

Note Off:	1000nnnn	note####	velocity
Note On:	1001nnnn	note####	velocity

Program Change messages are two bytes long and include channel number and program number.

Program Change:	1100nnnn	program#

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Professional Plus Int
Roland D-50 Ed/Lib.
Sequencer 2.5
Sonata Font
Studio Plus 2
Yamaha TX81Z/DX21 Ed/Lib.
Timecode Machine
Yamaha DX7II/TX802 Ed/Lib.
Yamaha FB01
Yamaha SPX-90 Ed/Lib.
ALL OPCODE Librarians

PASSPORT
Click Tracks
Midi Interface
Master Tracks Pro Version 3.0
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
Universal Sound Designer

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
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STEINBERG
Yamaha DX/TX Synthworks
Ensoniq ESQ-I 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

TURTLE BEACH
Sample Vision

DR. T
Casio CZ-Patch
Kawai K3 Ed/Lib.
Roland D-50 Ed/Lib.
Roland MT-32 Ed/Lib.

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

MAGNETIC MUSIC
Yamaha DX/TX Pyramid
Texture 3.0R/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.

ROLAND
Desktop Music Studio
Ease Sequencer
MPU IPC
Mesa

SONUS
CakeWalk Live
CakeWalk Sequencer
Yamaha DX-TX Design
Ensoniq ESQ-I Design
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Roland D-50 Editor
Ensoniq ESQ/SQ80 Editor
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Yamaha DX

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P1-P7	piezo element (Radio Shack #273-073)

SEMICONDUCTORS

IC1, IC2	LM339 quad comparator
IC3	74LS244 octal buffer

MISCELLANEOUS

Circuit card: custom wire-wrap plugboard for Atari ST from Douglas Electronics, 718 Marina Blvd., San Leandro, CA 94577 ($10; catalog #33-DE-40) or equivalent (see text).

EM (pages 39-43).

If you really want to get strange, you can use other kinds of input devices for sensors. Any device or circuit that outputs up to 10V will trigger the comparators, such as mechanical and electronic switches (how about mercury-switch "maracas"?), light-sensitive devices incorporating photocells, pressure-sensitive voltage dividers made with conductive foam (see "Build an Electric Drum Pad" by Thomas Henry, December '84 *Polyphony*), analog envelope followers, or line-level audio. I've used Craig Anderton's Envelope Trigger device (*Keyboard*, September '83) to trigger Beat-It from a microphone. What I'd really like to see is an infrared switching array that triggers the comparators when the performer interrupts the beams with his hands: invisible drums!

What a concept.

David Snow *took up the trumpet at age 11 but turned to MIDI in his twilight years to compensate for instrumental technique he couldn't acquire honestly. He holds degrees in composition from Eastman and Yale and is the recipient of numerous grants, awards, and commissions, including two Composer Fellowships from the National Endowment for the Arts.*

FIRST TAKE: Capsule Comments

This month we look at some new Xpander/Matrix-12 sounds, a digital synthesizer primer, and editor/librarians for the Roland D-50 and GP-8.

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

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

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

the EM rating system

D-50 Command for the Atari ST ($160)

By Jan Paul Moorhead

It's almost impossible to find software that doesn't have at least *one* nasty flaw, but Command development's *D-50 Command* is a welcome exception. The program not only does what you'd expect a D-50 editor to do in an Atari environment, but also includes one unique feature with the potential to change the way people create sounds on synthesizers.

D-50 Command, though not copy-protected, requires a hardware key (sometimes called a "dongle") that works with either the joystick *or* cartridge port (a real convenience if you're using another program that also requires a key). The program includes three major sub-modules: the *librarian*, the *editor*, and the *offspring generator*.

The librarian provides four buffers of 64 voices each. To arrange a bank of voices, just point to the location you want a voice to go, and click. Alternately, you can easily and automatically fill a buffer by pointing to voices in other buffers. Selecting a voice highlights it and instantly sends it to the D-50 for auditioning.

The editor is less simple to use, merely because the D-50 is not a simple synth (but that's why we have patch editors). The five editor screens cover patch parameters, both commons, upper partial, lower partial, and reverb. Increment or decrement a value by clicking on a parameter with either mouse button, or hold one mouse button and click with the other to scroll through the values rapidly. The program uses graphics well, even displaying graphic representations of the available LFO waveforms to help you choose the one you want. You can also edit TVF and TVA envelopes (but not the pitch envelopes, although they are graphically displayed) by clicking and dragging points on the displayed envelope.

Since Roland has been somewhat secretive about their reverb implementation, a curious situation exists. Although the developers of D-50 Command haven't discovered all the *functions* of the 188 D-50 reverb parameters, they've found a way to display their values so you can edit them and move them among sound banks. However, because you can't be sure what an individual value *does* to a sound, editing the reverb is a sort of hit or miss proposition. Still, experimenting can be fun, and the editing option is gravy anyway; as far as I know, no other program (or the D-50 itself) offers any reverb editing whatsoever. Ray Soular, one of the program's developers, hopes to discover what each reverb parameter does by sheer force of trial, error, and user feedback. If he gets enough information from users, perhaps we'll eventually figure out the mystery of the D- 50 reverb implementation.

The ground-breaking feature of D-50 Command is the *offspring* process. We've all seen programs that create new patches by generating user-limited, random parameter values. Offspring goes a signifi-

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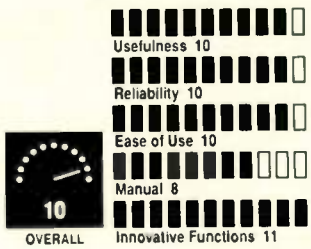
cant step beyond this concept. To use the developer's terminology, the program "breeds" new patches based on "genetic" variations of the "parent" patches you choose. Select the menu option Produce Offspring, and in about ten seconds, buffer 3 is filled with 64 *usable* variations of the "parents." In my experience, if the parents were, for example, two or three good string patches, the odds of ending up with another good—but different—string patch seemed to be about a hundred percent.

On the down side, if this process catches on, it could put a serious dent in the synth patch cottage industry. If you select the parents well, you have better odds of coming up with usable patches than you do with some of our less reputable third-party patch developers. There is a potential side effect of D-50 Command that is *genuinely* unsettling: although the timbrally creative and demanding will continue to meddle with the sound and tweak the patches, you don't *have* to with this program. This provides those so inclined with a reason not to learn their synths, and that is not what patch editors are about.

Jan Paul Moorhead *is a computer consultant, freelance musician, and writer. He is the owner/operator of Pulse Music, a Los Angeles recording studio.*



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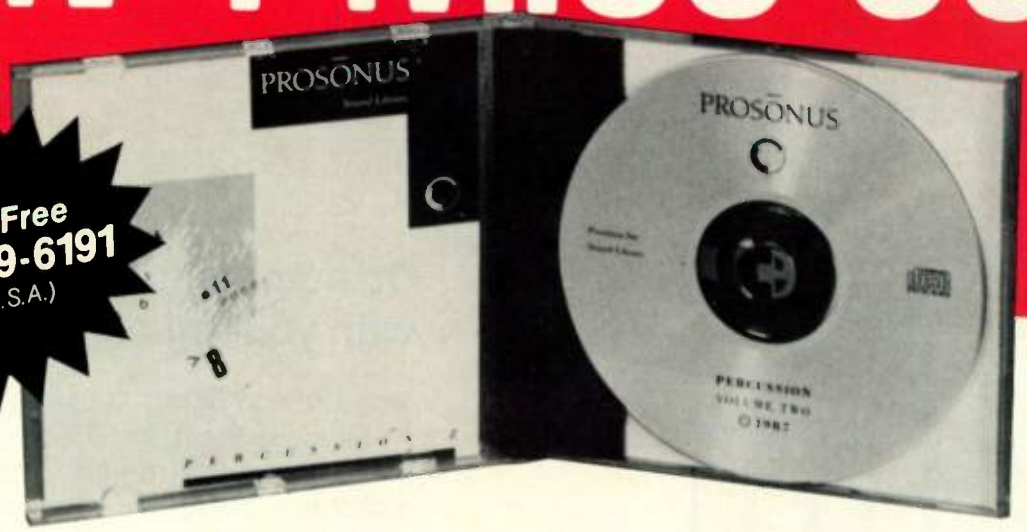

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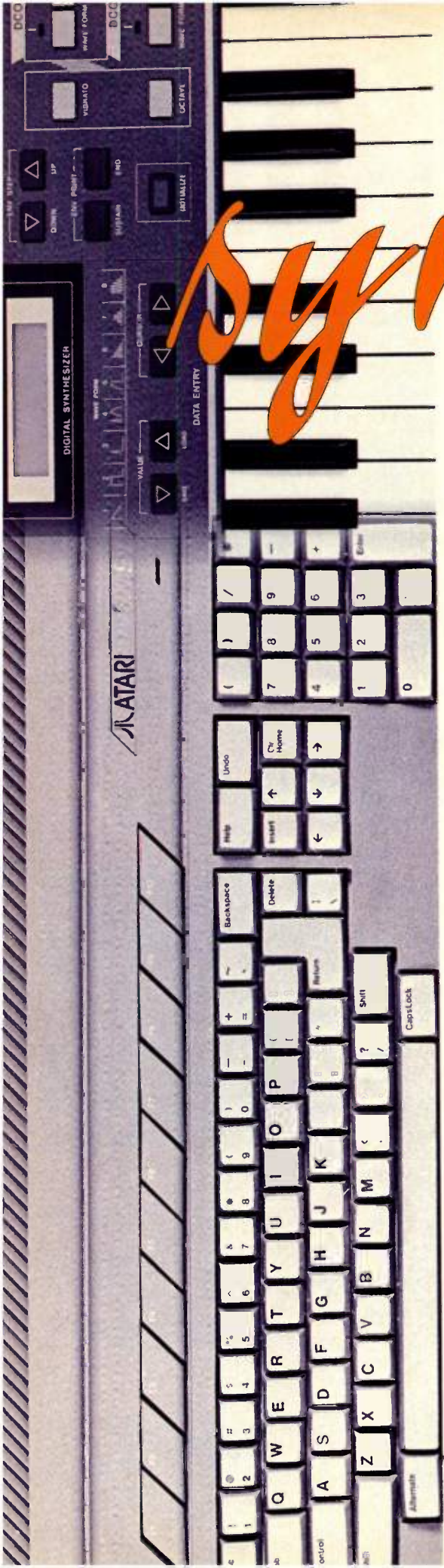

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subject, so it was inevitable that eventually someone would write a book bad enough to merit a review that serves mostly as a warning to prospective customers. That's strong criticism, but I feel this book's idiosyncrasies will make it useless to a great majority of its intended audience. The contents are a very odd mix of monophonic modular synthesis (circa 1975), current musical instruments, and a few simple construction projects. Despite the title, the book devotes very little space to digital technology and how it is used in the music industry today.

The book's first section, "Basics of Sound Synthesis," opens with a chapter called "Why Do You Want A Synthesizer?" This chapter and the introduction contain the book's strongest writing, with the author using style, substance, and a bit of humor to get his point across. If the entire book had been as strongly written, we would probably have a useful item on our hands.

Chapter 2, "Components Of Analog Synthesis," contains statements like, "Most current synthesizers are monophonic; that is, they play only one note at a time." Considering that this is an updated second edition, circa 1988, this is an unforgiveable error. Still, the chapter does give beginners a reasonably solid explanation of analog synthesis.

Digital oscillators, filters, and other hardware are covered in the third chapter. Only the crudest examples of digital synthesis are discussed; sampling and FM are not mentioned, and a complicated subject like digital filtering receives only a half page. Chapter 4 discusses MIDI in a simplistic manner. A few elementary applications are given, but I've seen more thorough discussions of MIDI in manufacturers' brochures. The next chapter discusses the uses of SMPL, an early SMPTE tape automation system based on the VIC-20.

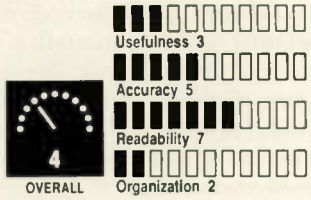
Part 2, "Commercial Synths," lives up to its billing and describes a number of synthesizer products from Casio, PAiA, Oberheim, Yamaha, and others. Although basic features are covered (*a la* spec sheets), the *types* of sounds produced by various synths are barely mentioned: this book does not educate the reader about the tremendous timbral differences in analog, FM, phase distortion, and sampling instruments. I strongly suspect that the author spent more time reading manufacturers' brochures than playing the instruments discussed. Other chapters cover drum machines, MIDI accessories, and software.

The final section, "Building Your Own Synthesizer," is the worst of the three. The simple circuits presented are more toys than musical instruments. The projects might help you to learn how to solder or follow schematics, but they sure won't find a space in your keyboard rack. Anyone purchasing this book with the hopes of building a serious musical instrument is going to be disappointed.

I'm not sure whom Mr. Horn is trying to reach. The errors throughout this book make it a poor choice for the beginner, and the text contains little information for the advanced user. The internal details of digital synthesizers are completely ignored, and do-it-yourselfers are going to turn up their noses at the construction projects. A little more homework at the conceptual stages, coupled with more practical advice, might have made this book worthwhile.

C.R. Fischer *is a San Francisco Bay area resident who teaches and plays synthesizers, in addition to consulting for recording sessions and live work. He can be reached*

via Mescal Music, PO Box 5372, Hercules, CA 94547.



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Solid Sounds
Xpander/Matrix-12
Patches, Volumes 1-3
($30 each)
By Jim Johnson

There are two possible relationships a synthesist can have with the Oberheim Xpander: either you love it, or you've never worked with it. When I first purchased my Xpander, I had visions of experimenting with the almost embarrassing wealth of programming options hidden behind that gorgeous front panel. But now that my day is filled with activities such as backing up my hard disk and untangling MIDI cables, there's little time to agonize over how much velocity control I should apply to the decay stage of the envelope controlling the speed of the LFO that controls the lag rate of the keyboard signal applied to the filter resonance.

Enter David Ziegele, who markets three volumes of Xpander/Matrix-12 patches under the name Solid Sounds. Each volume contains 100 single patches (no partial sets here) organized in between seven and ten logical groupings: brass, keyboards, plucked, strings, percussion, bass, etc. Logically enough, there are no multi patches, as these need to be tailored for the MIDI system in which they are used.

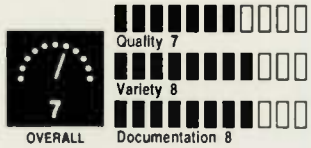
The sounds themselves range in quality from mediocre to wonderful, though most of the sounds are pretty good or better. Generally the instrumental simulations are the least successful, especially pianos and brass. The string and pad sounds—the Xpander's forte—are generally good, though two solo violin sounds are not up to par. The harpsichord rendition on Volume 1 includes the "after-pluck" that occurs when the key is released, and Volume 2 includes a fantastic church organ sound that's perfect for weddings. Among the blatant synth sounds, standouts are NASTY 1, an edgy sustained sound created with filter FM, and SPOOKFLT, an eerie pad that will definitely come in handy next Halloween. The clavinet in Volume 1 doesn't cut it, but Z-CLAV, from Volume 3, is quite good. Each volume includes a number of good bells and vibes. Many of the percussion sounds are above average, though the kick, snare, and tom sounds are nothing to write home about. I'll pass on judging the obligatory special effects patches (there are ten per volume), except to say that CRICKETS is hilarious.

Each volume includes a single-page listing of the sounds included, along with a short list of the controllers (velocity, pressure, etc.) used in each, and another page of performance notes. My only real com-

plaint is the inconsistent programming of the performance controls. Many sounds change only slightly when played at higher velocities, while others use velocity very effectively; some sounds barely respond to controller motions while others are too sensitive. Even worse, most of the patches in Volume 1 have no velocity control at all; an otherwise good clarinet in Volume 1 is pretty much ruined by the complete lack of dynamic control. On the other hand, the sounds in Volume 3 are fairly consistent and respond well to variations in playing technique.

I estimate that about 25% of these sounds will end up in my permanent "working" Xpander library, which, considering the highly personal nature of synth patches, is quite good. If you've been neglecting your Xpander's programming capabilities, these patches could provide a needed shortcut to improving your overall variety and quality of sounds or, at the very least, could serve as a point of departure for further experiments.

Jim Johnson *wrote* Algorithmic Composer *and* Tunesmith *for Dr. T's Music Software. In addition to writing for* **EM**, *Jim's articles have appeared in* STart, Transoniq Hacker, *and* Keyboard.



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Snap Software GP-8 Companion for the IBM PC ($100)

By K. K. Proffitt

Anyone who uses Roland's GP-8 guitar effects processor will derive both pleasure (from the time you save programming) and peace of mind (from the ease with which you can save patches) thanks to *GP-8 Companion*, Snap Software's new patch librarian/editor for the IBM PC.

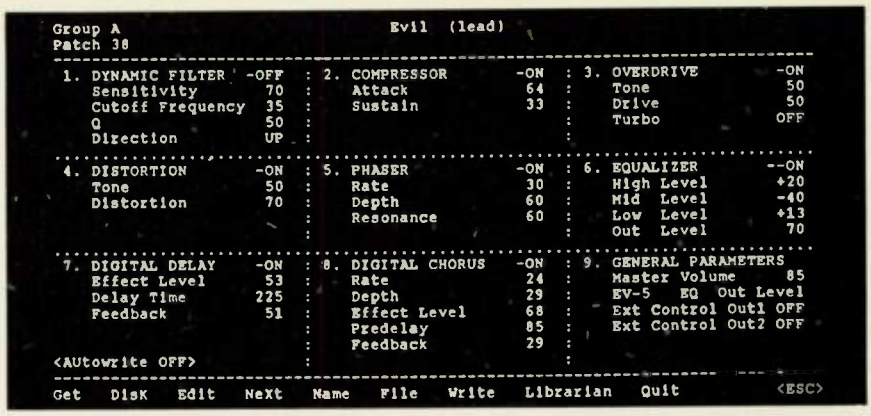
As soon as it boots up, GP-8 Companion asks you if you want to save the GP-8's memory; you don't have to push any of the buttons on the GP-8 to immediately save your work. You can save patches, banks, and groups, but you can also "mark" patches and save them as a *song*. If you edit a patch, the program reminds you by highlighting the patch's right digit. One of my favorite features is being able to name patches directly from the computer keyboard; I'll *never* use the alpha dial for this function again.

The program is quite a bit like its sister, *GM-70 Companion* (reviewed in June '88 **EM**) but incorporates a new feature called "autowrite" that lets you write directly to the GP-8 as you edit. The program also has safeguards that prevent you from autowriting without meaning to (good idiot-proofing).

Although the manual looks somewhat cheesy, it is adequate. In fact, some of the digressions on bug fixes are excellent

mini-lessons in real-time programming problems. Since I hate to read manuals, I was glad that I never needed it; thanks to the crystal-clear user interface, anyone who is familiar with the GP-8 should be able to navigate through the program quickly and easily. (Just remember that "Get" means "load a file," and "File" means "save a file.")

I ran GP-8 Companion on both an XT clone and a "plain vanilla" IBM AT using monochrome and CGA monitors. There were no problems with the XT, but with the AT, the program crashed fairly frequently. This was solved by upgrading my MPU-401 to ROM Version 1.5. (Snap assures me that the software will now run on older 401s, but it's still a good idea to upgrade the 401, as this will speed up other software. And while you're at it, upgrade your MIF-IPC card to MIF-IPC-A functionality. This solves lots of AT lock-up problems.)

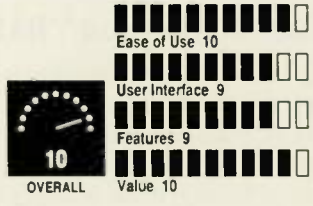


The GP-8 Companion's edit screen displays all available parameters.

One minor complaint is you can't use the Microsoft mouse, so if you want to "mousify," you must program a mouse with keystrokes. A major plus is that the program is not copy-protected, so if you have a hard disk, you need not worry about crashes and backups.

The most important aspect of GP-8 Companion is it allows you to back up all your great sounds, create new ones very quickly, and spend more time playing instead of programming. All in all, GP-8 Companion is an excellent buy.

***K.K.Proffitt** is a New England club musician, MIDI programmer, and studio music consultant, and has produced several albums on independent labels. She is also the mother of twins.*



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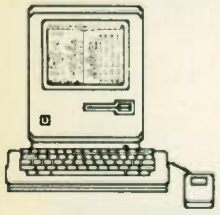

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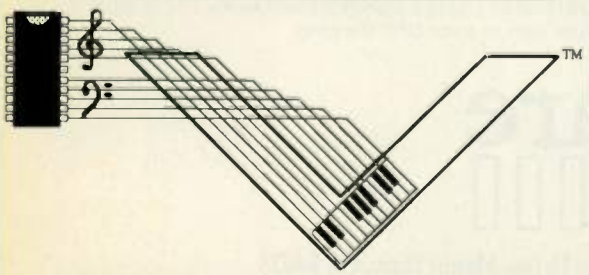

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-Ted Greenwald July 1988 KEYBOARD

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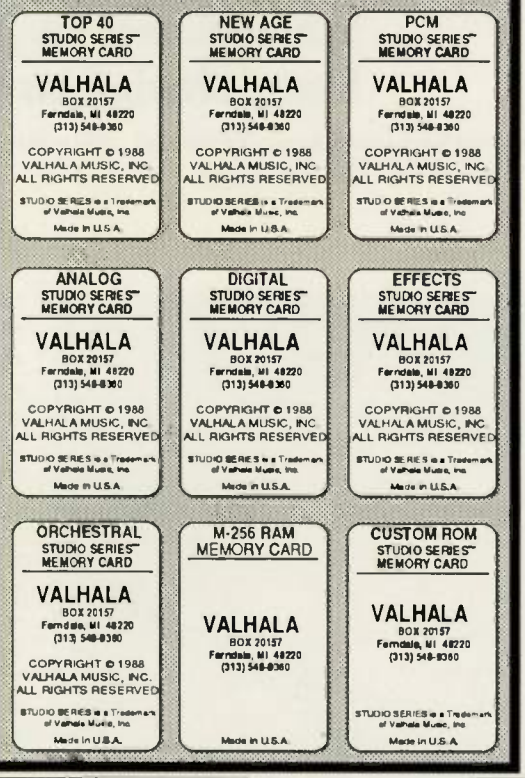

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I can't imagine anyone being disappointed with any of the Valhala cards. They put a bunch of useful and attractive sounds in your pocket, and against the time you'd spend programming your own sounds, $40.00 is a bargain.
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Synthophone: the MIDI Sax from Softwind Instruments

The answer, my friend, may be blowing wind into this innovative MIDI wind driver.

By Tim Tully

C.R. KING

The first thing you notice about the Synthophone is that it looks just like a standard issue Yamaha alto sax with a metal plate stuck in its bell. This is because it *is* that very sax, filled with and connected to a bunch of circuitry and software designed to convert a sax player's gestures (the motions involved in playing a sax) into the stuff that plays MIDI synthesizers.

Coming on the heels of offerings from Akai, Yamaha, and Casio, the Synthophone is the most recent of the "MIDI wind drivers," instruments designed to allow woodwind or brass players to play synthesizers and otherwise frolic in the fields of MIDI. Having been designed around an actual sax immediately separates the Synthophone from the rest of the field. Each of the other available wind drivers (as well as a couple of on-the-market, off-the-market phantoms like the Artisyn and MIDI Sting) uses a chassis designed specifically to house a MIDI controller. But aside from the obvious cost burden the sax adds to it, the Synthophone is *sui generis* on other fronts as well.

WHAT?

Synthophone is the—I can only say "brainchild"; it's that kind of device—of Swiss musician/inventor Martin Hurni, who has wanted to join electronic music and the sax since his days as a Berklee School of Music student in the early '70s. After developing a number of versions of electronic sax, analog as well as digital, he introduced the Synthophone commercially in 1987 and has been improving it ever since.

When you open the standard alto case in which the Synthophone is delivered, you see nothing but the usual saxual components—mouthpiece, body, neck, box of reeds—but there are differences. The neck dangles from the body by a couple of inches of coiled electrical cable; otherwise the two go together normally. The mouthpiece is fitted with a five-pin plug that, when you slide it onto the neck, connects with a jack mounted inside the neck (which unfortunately prevents twisting the mouthpiece around to find a comfortable playing position, a small inconvenience). A MIDI cable attaches the bottom front of the horn's body to a solid-feeling, butter dish-sized power supply (with an on/off switch and LED) whose two MIDI Outs in turn attach to the MIDI In(s) of your synth(s). Under the metal plate sitting just inside the bell of the horn are the circuits and microprocessor that make the thing go.

WHY?

The obvious appeal of the Synthophone is that much (although not all) of the technique it requires is *exactly* the same as sax technique, simply because physically, it *is* a sax. For the fingers, tongue, lips, and teeth, the experience of playing the Synthophone is the experience of playing the saxophone, with a few new additions and a few limitations.

The question that immediately arises is, since the engineering (or more properly, the *crafting*) of a saxophone is so centered around it being a generator, shaper, and resonator of a vibrating air column, why go to the expense of using it just to generate a string of electrical messages?

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Notator requires an Atari 1040 or Mega ST with a monochrome monitor. Creator owners can upgrade to Notator directly through Digidesign.

Why not go the more usual route and put your circuitry in a much less expensive casing? The answer has to do with the "user interface" and begs two other questions. Does putting a real sax, reed, and mouthpiece around this MIDI wind driver make it more playable? Further, how well does this hardware function as a MIDI engine?

Having played every MIDI wind driver I've been able to get my hands on, I can say categorically that I feel much more at home fingering and blowing the Synthophone than any of the others. Nor do I think this is all that subjective a judgement. While it makes sense that after 20 years of practicing and playing saxophones, I feel comfortable playing one, it also stands to reason that over a century of craftsmanship has developed the sax into a very playable instrument—or "user-friendly interface," if you will. Ignoring the price (not that that's easy), to whatever degree you need your personal MIDI wind driver to *feel* like a real sax, this is the axe that fills that particular bill. Weight, balance, size, heft, feel, mouthpiece, key functioning, and all its physical attributes are big winners on the Synthophone. But there's more going on than that.

RANGE

In addition to triggering notes from the traditional low B-flat to high F, the Synthophone player can play in the altissimo range—from high F# to the F above that—by holding the right-hand F# trill key, then fingering the notes from F# above middle C on up. At the low end, holding down the right-hand low C key transposes the fingerings from middle C# to low E down an octave. It's quite easy to get used to both sets of fingerings, novel as they may be. I found myself using them almost glitchlessly after just a few minutes, and the added range (four octaves and a half step, as opposed to the standard two octaves and a fifth, sans altissimos) is obviously useful. (By contrast, this is a smaller range than either Akai's 8-octave EWI or Yamaha's 6-octave WX7.) As an added bit of customer care, Softwind includes in the manual a pageful of fingering charts for the 12 notes above the Synthophone's high F. If you fill in the fingerings you prefer for those pitches, Softwind will send you an EPROM programmed to respond to your preferences. Like all the instrument's software upgrades, a few minutes and the supplied screwdrivers are all it takes to pop this chip onto the circuit board in the bell.

OTHER MIDI FUNCTIONS

In addition to playing synthesizer notes, the Synthophone keys also control a wide and intelligently chosen array of MIDI functions. Using various key combinations that don't occur in playing, the Synthophone can control an impressive portion of the functions that operate a MIDI studio or stage setup.

Pressing the unlikely key combination of the side F# trill key, high D, D#, and F, for example, lets you use the low E-flat and C keys to set the Synthophone to send on any one of the 16 MIDI channels. OK, you're thinking this is a weird set of keys to remember. But it's actually just weird enough to make sure you don't

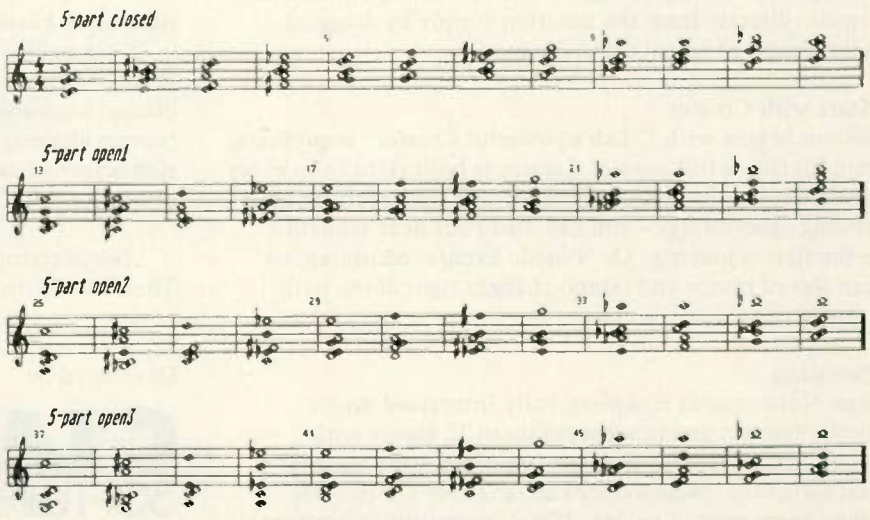


FIG. 1: The Synthophone's C major chord voicings; tighter lip pressure creates progressively closer voicings.

accidentally change MIDI channels in the middle of your Big Solo and end up trailing dinky kalimba notes down the rough side of the Peak of Passion you've built up for the last 28 bars with your King Curtis in the Great Pyramid of Cheops patch. It's a good setup; the controls are right at your fingertips, yet out of the way of your actual playing.

Once you've set the Synthophone to the MIDI channel of your chosen synth, holding the side F# trill key and pressing E-flat and C will change the patches of the synth up or down, either one patch per press, or by continuously scrolling through all 128 MIDI patch numbers (this is actually one of the handiest implementations of Program Change I've seen in any controller, wind or keyboard); holding the side C and high D# lets E-flat and C set the amount of MIDI Aftertouch the horn sends to one of six levels. Other keypress combos set one of six levels of MIDI Breath Control, Modulation, Pitch Bend, and Volume. You can also transpose the synth you're playing up or down by octaves and put the horn into concert, B-flat, or E-flat tuning. A set of "Panic keys" sends your synthesizer an All Notes Off message and reinitializes the Synthophone's own settings.

Using these fingerings felt cumbersome at first—since they purposely don't make saxophonic sense, I felt like I was doing something *wrong*—but after making up a small reference chart for visual assistance, I found myself changing patches, MIDI channels, and controller configurations as easily as I've done with any device, more easily in cases where the function on the synth (changing MIDI channels, for instance) is buried under a couple of levels of LCD pages. I found a small problem in that the patch-change mechanism would occasionally jump about five patches instead of one, but this is the sort of thing software revisions are for (and Softwind does seem devoted to refining theirs). Even as it is though, keeping track of your patches only requires eyeballing your synths when you send a Program Change, and the range of voices that the Synthophone will address is a real plus.

As I began to learn the new key combos, I was able to develop a sense of control over my various MIDI synths and processors that I hadn't experienced before with a wind driver. Particularly with a sequencer, the Synthophone's ability to adjust, easily and accurately, the amount of Pitch Bend, Aftertouch, Volume, Breath Control, and Channel select information it sends reduced the amount of tinkering and tweaking I did and let me get closer to the music.

For both operational ease and breadth of MIDI controller functions, give the Synthophone a big plus, for live as well as studio applications.

POLYPHONY

The most distinguishing—unique, for that matter—function of the Synthophone is the sax player's dream: it can play true, diatonic harmony. Assuming the synthesizer you're using can respond polyphonically, with the Synthophone you can play *diatonically correct* chords of up to five notes. You tell the instrument what key you're in simply by pressing low E-flat and C, then fingering the tonic of your key. Each note you play will then be accompanied by your choice of from one to four *harmonized* notes.

But that's only the beginning. Regardless of the number of voices you've chosen, changing your embouchure pressure produces *four different voicings* of the chords you blow. Choose a two-note harmony in C, for example, and play the

• SYNTHOPHONE

tonic. Progressively tighter lip pressure will produce chords consisting of C and either the D, E, G, or A below it. Adding voices to produce three-, four-, and five-note harmonies requires pressing just two keys, and lip pressure shifts these voicings around too, according to some pretty clever algorithms. **Fig. 1** shows you the C major voicings for five-voice harmony.

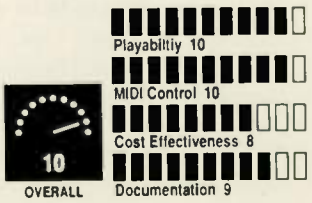
This feature won't let you blow harmonies to Coltrane's "Giant Steps," nor does it turn the sax into a piano. There *are* only four voicings, and the unit sends on only one MIDI channel—and hence to only one synth—at a time (devices like the Yamaha MEP4 or Axxess Mapper can remedy this limitation, however). But it is *great* for horn section riffs and tunes with simple changes or for modal stuff, and it is nothing short of a raw, musical power surge to blow through a fully harmonized line, changing the voicings by lip as you go and feeling all those voices dance for you. It's not even that tricky to change tonalities or the number of accompanying notes, and I'm not at all convinced a real virtuoso couldn't do magic with this feature.

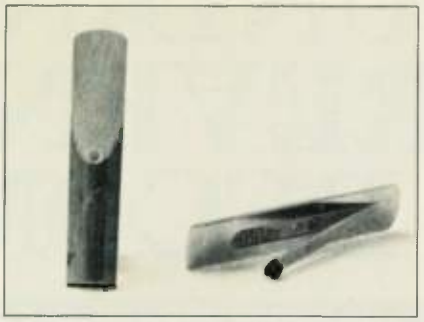
DOWNSIDE

There are some negatives. The Synthophone's reeds are unusual concoctions. They're ordinary Ricos that have been glued to a thin metal plate exactly the size

Product Summary

PRODUCT:
Synthophone
TYPE:
MIDI saxophone
HARDWARE REQUIREMENTS:
Any polyphonic MIDI synthesizer
PRICE:
$3,450
MANUFACTURER:
Softwind Instruments
Munstergasse 52
CH-3011 Bern, Switzerland
tel. +031-222-820





C.R. KING

FIG. 2: The angle of the metal tongue attached to the Synthophone's reeds must be set precisely.

and shape of the reed. A tongue about one-third its width and three-quarters its length is cut out of the center of the plate and sticks down into the mouthpiece (see **Fig. 2**). A magnet mounted on the end of this tongue has to sit at a precise distance from a sensor in the mouthpiece for things to work properly, and getting and maintaining this setting proved to be the most persistent problem I had with the Synthophone. You have to bend the tongue to just the right angle, then mount the reed in *exactly* the right position in order for the reed-triggered functions—pitch bend, harmony voicing, and modulation—to work properly. A simple test tells you whether this placement is right, but I found myself spending a minute to adjust the reed after every second or third tune.

With the first mouthpiece I received, the control of harmony notes especially suffered from this situation. When it worked, it was great, but as soon as the reed got out of position, finding and sustaining the different voicings was spotty. The functioning of the pitch bend was temperamental, too. Sometimes I got the instrument to bend up from concert pitch, other times only up *to* concert from below, but never both ways. However, when I told the Softwind people the situation, they immediately sent me a new mouthpiece that both gave me controllable voicings and let me bend a pitch up and down from concert (which was located at a stable, comfortable embouchure). Though I still had to adjust the reed regularly, the results were more than worth the trouble.

OVERALL

The manual that comes with the instrument is succinct, clear, and informative. Although obviously a translation, the manual communicates all the instrument's features quite well.

The Synthophone itself feels solid, well-crafted, and MIDI-powerful. Although a few points seem to need refining, Martin Hurni is eager for user input and dedicated to the development of his instrument. Like any wind driver, the Synthophone requires a learning curve, but for an experienced sax player, I believe it would be a shallow one. A synth programmed with the right patches is an absolute necessity of course, but given these factors, this instrument can put a sax player in control of synths, sequencers and other MIDI-controlled devices in a hurry and offers some utterly unique features. If you can afford the price, the Synthophone deserves a long and careful look.

Tim Tully *occasionally breaks from reading, writing, editing, and thinking about electronic music, its various devices, theories, and practices, and gets to play some.*

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*Rick Allen notwithstanding

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FDSoft—Harmonic Analysis and Resynthesis for the IBM

Not just a sample editor, this software for the IBM PC delivers both additive synthesis and—the buzzword of the year—resynthesis.

By Carter Scholz

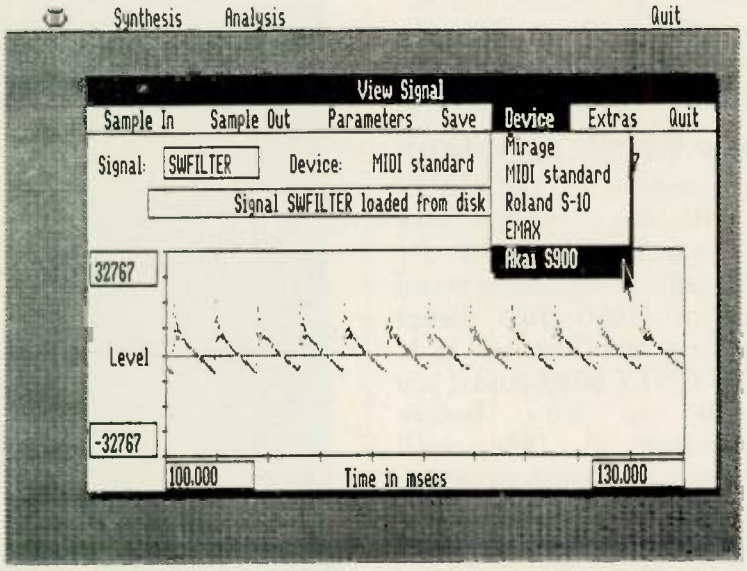


FIG. 2: FDSoft's signal window shows any part of the waveform at any magnification.

I was hunting for a string harmonic to sample and found a pure, isolated, beautiful one on the Concord String Quartet's recording of John Cage's *String Quartet* (a gorgeous recording of a splendid piece, by the way). Only after sampling it and scrutinizing it for a loop point did I realize the sound was actually full of flaws. It was too short. There was a pop from the record just after the attack. There was a vibrato near the end (which is unacceptable in a sample when you want to transpose it over a range of more than a few semitones). The entire note rose ever so slightly in pitch—just enough to make a quiet loop impossible. And my fifteen-year-old turntable had added its share of rumble and hum.

It's at this point that the enterprising samplist assesses his options and either screams in pain, decides to sell his equipment and give up electronics forever, falls into a sulk, and/or prays for divine guidance. Well, dear friends, I am neither Pat Robertson nor Dr. Eugene Scott, but I can offer some guidance. I managed to clean up that string harmonic, double its length, take out the pop, eliminate the vibrato, and hold the pitch constant. When I was done, this sucker sounded like a professionally sampled sweetheart, not something pulled off an old record on a cheap turntable.

THE SECRET

I did it all with *resynthesis*, electronic music's buzzword of the year (see sidebar). This new (to the MIDI world, anyway) technique lets us extract the essence of a sound, then tweak it to our hearts' content. But for all the talk, there's only one program available as of this writing that really does harmonic spectrum analysis and resynthesis: *FDSoft*, from a Canadian company called Lyre (pronounced LEE-rah). FDSoft, a software emulation of Lyre's hardware additive synthesizer, FDSS Studio, loads in samples from a Mirage, Roland S-10, Emax, or Akai S900 (or files that conform to the MIDI Sample Dump Standard) for analysis and resynthesis.

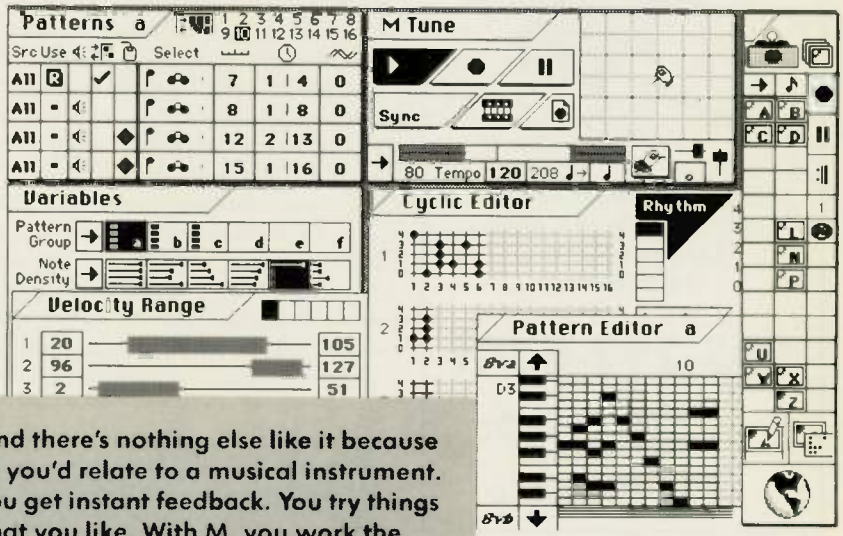
HOW FDSOFT WORKS

FDSoft's *heterodyne filtering* technique approaches real analysis and resynthesis more closely than do Fast Fourier Transforms. Like the FFT, heterodyne filtering uses equally spaced analysis bands (like bandpass filters) centered on harmonics of the sound's fundamental frequency. The program measures the amplitude of each harmonic and how far its frequency deviates from the center of the analysis band (a must for tracking the subtle detuning effects of acoustic instruments). But inharmonic partials are problematic: if a partial deviates too far from center, information is lost and so is accurate reproduction of the sound. For an accurate analysis, FDSoft requires a sound with a definite, stable pitch.

(By the way, Lyre's documentation tantalizes with a reference to a future implemention of the *phase vocoder*, an analysis technique that works on inharmonic partials as well as harmonics and *does* give you back what you put in. Look for this to become next year's buzzword.)

I pushed FDSoft's envelope by analyzing a nasty, six-partial, additive sound that had partials of equal amplitude at 1.00 (the fundamental), 2.02, 3.06, 4.12, 5.20, and 6.30. FDSoft pegged the frequencies at 1.00, 2.06, 3.13, 3.92, 5.00, and 6.09. The fourth, fifth, and sixth amplitude envelopes showed deep vibrato, indicating FDSoft misinterpreted the frequency deviations as amplitude variations. I could have tweaked the analysis parameters to improve the result, but I was interested in how FDSoft would perform with its default settings. Using the defaults, it would seem that any partial varying more than about three from a harmonic frequency would suffer distortion, but the proof is in

It's Not Just Another Pretty Interface.



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● FD SOFT

the listening, and the sound I resynthesized from the mistaken analysis data sounded very much like the original.

Not content with these satisfactory results, I pushed FDSoft over the edge by analyzing a perky announcer-over-jingle sample. Nothing like a coherent analysis emerged from this unruly (and unsavory) mass of sine waves, but I resynthesized it anyway and the result suggested, oh, let's say Lloyd Bridges of *Seahunt* attending a lecture on just intonation while wearing his tanks and regulator and inhaling too much nitrogen. Clearly, this seeming "limitation" has potential for sampling fanatics from the twisted to the exigent.

The partials of pitched sounds are likely to be harmonically related or only slightly detuned, and FDSoft retains slight detunings. FDSoft will actually clean up the sound by losing the "noise" frequencies outside the harmonic analysis bands, often making an unusable sample (like my string harmonic) usable. It can also impart a sterile, cold feel to some complex sounds, which may be a boon or a bane, depending on your tastes. On yet another hand, you can load in industrial noise and get a weird sort of new age translation out.

WHAT IT IS AND ISN'T

FDSoft is not a waveform editor. It won't help you set loop points or crossfades, or change your sampler's ADSR envelopes. Because it's meant to support a wide range of samplers, it doesn't cater to the specific implementations of each. FDSoft is a tool for a single task: analysis/resynthesis. I tried the program with a Mirage and an S900, and it worked well with both, but you have to select the sample you want, the end points, and so on from your sampler's front panel.

FDSoft is not fast, either. Spectral analysis is one of the heaviest computational

FOR THE BEGINNER:

Resynthesis and Spectral Analysis

The theory behind analyzing and resynthesizing sounds goes back to the mathematician Jean-Baptiste Fourier (1768-1830), who proved that any waveform could be represented as a sum of sine waves. The math is complex, but the idea is simple: the sine wave is the fundamental unit of sound, and if you add together enough sine waves (partials) of the right frequencies and amplitudes, you can produce any sound. That's the heart of additive (also called Fourier) synthesis.

Additive synthesis requires enormous amounts of data and computation. Sounds with upwards of 100 individual sine waves, each with 100-point amplitude and frequency envelopes, aren't uncommon. The labor is enormous, but the results can be impressive, as evidenced by Wendy Carlos's latest album, *Beauty in the Beast*, created entirely with additive synthesis.

Most pitched musical sounds are made of "harmonics," partials at frequencies that are integer multiples of the fundamental frequency (the lowest partial). If the sound is noisy, clangorous, or of indeterminate pitch, like drums or bells, the components are *not* related by simple integers, and are called "inharmonic partials." In either case, the set of partials is called the "spectrum" of the sound, by analogy to optics. (A prism breaks white light into its component colors; Fourier analysis breaks sound into its component sine waves.)

The inverse operation is spectral analysis: breaking a sound apart to find out which sine waves it's made of. This can ease the labor of creating additive sounds from scratch. Breaking a complex sound into its partials gives a clue as to its makeup. Most sample editing programs today include spectral analysis by "Fast Fourier Transform" (FFT). They'll create a graph of the sound's components, but it's for show only—you can't change any components. (Blank Software's *Alchemy* lets you change FFT components, but the result is more like sophisticated equalization than true resynthesis.)

The problem with FFTs is they lose some of the information necessary for the accurate reconstruction of the sound. The ideal analysis system should be able to break any sound into its partials and, in the absence of intentional changes, reassemble them into an exact replica of the original sound. FFTs can't do that, but FDSoft gets pretty close. —*Tim Tully*

task	with 8087	without 8087
pitch extraction	25	25
envelope extract	210	525
envelope approx	40	155
transfer	20	20
resynthesis	720	980
totals	1,015	1,705

1.7-second sample at 40,000 Hz (68,000 sample points) using 16-band analysis with FDSoft's default parameters. Computer: 8 MHz 8088 XT clone. All times in seconds.

FIG. 1: Some benchmarks with FD-Soft.

tasks around, and under its strain my normally brisk 8 MHz XT began to labor like the Little Engine That Couldn't. The addition of an 8087 math coprocessor gave the engine a push, but not a jump. **Fig. 1** shows times for the complete process of analyzing and resynthesizing a fairly long sound. Changing FDSoft's default options can give some speedup in exchange for lowered resolution, but for the whole process, we're talking nearly *half an hour* for the plain vanilla XT and close to fifteen minutes for the 8087-equipped XT.

Fortunately, it's only at the beginning and end of the analysis/synthesis cycle that the time-consuming stuff occurs, so you can grab lunch while they crank away. The intermediate steps, like redrawing envelopes, are gratifyingly fast. Still, be aware that the overall turnaround time mounts up. I had to make several passes at my string harmonic—about three hours of work in all—to perfect it.

THE DETAILS

FDSoft requires a CGA display and Microsoft-compatible mouse. The program won't run in their absence. (Lyre is working on support for Hercules-compatible displays.) The user interface is very Mac-like, relying on pull-down menus and windows. Samples appear in the signal window (**Fig. 2**), and those longer than about 90K words are truncated.

FDSoft first finds the signal's pitch (or you can type it in) to set up the analysis bands in the analysis window (**Fig. 3**) and does an excellent job on sanely pitched samples. The manual explains FDSoft's pitch extraction and how to reset defaults like window length, hysteresis, and threshold, but I never needed to do this.

Next, the program extracts amplitude and frequency envelopes for up to 128 harmonics (you'll probably need no more than 32), and you can set parameters for analysis increment, length of analysis window, type of window, and squelch threshold (although the defaults gave me good results).

The final step in analysis is making straight-line approximations of the actual envelopes to give you a manageable number (up to 128) of breakpoints. Again, the default values generally work quite well, and the manual explains what to do in exceptional cases. And that ends the analysis. It's really far easier to do than ex-

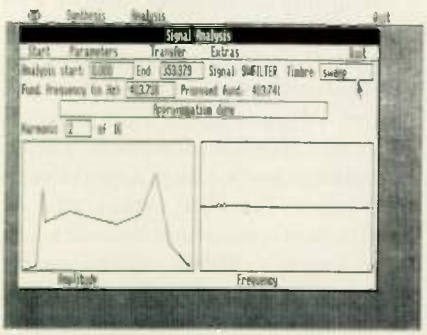


FIG. 3: The analysis window is used to extract the harmonic content of a sound prior to its transfer to the timbre editor.

plain, requiring only the pull of a menu, but allowing you to monkey with the parameter about as much as you'd like.

EDITING AND RESYNTHESIS

At this point, the timbre editing screen (**Fig. 4**) lets you edit pitch and amplitude envelopes in a number of ways and detune the frequency ratio of each harmonic (to an inharmonic value if desired). The harmonic scaling mode (**Fig. 5**) displays the overall average amplitude of each harmonic in a bar graph that you can scale up and down or detune.

The timbre editor is a wonderful playground and a powerful tool for shaping sounds. It was here that I located and erased the pop in my string sample; I saw spikes in the same place in every harmonic envelope and deleted them all. Another marvelous tool lets you stretch any section of your sample out in time, which is how I transformed my one-second recording into a two-second sample. Microsurgery in the frequency domain is *so* much easier than in the time domain. You can resynthesize at the same pitch and sample rate or at any other, and if you want a hotter version with less noise, or to fix a sample recorded at too low a level, you can scale the amplitude up or down as you resynthesize.

The result suggested Lloyd Bridges attending a lecture on just intonation while wearing his tanks and inhaling too much nitrogen.

The only thing lacking is instant gratification: you can't *hear* what your edited timbre sounds like until you resynthesize it and send it back over to your sampler, which takes time. (Of course, you can always get FDSS Studio, with which timbre editing is instantaneous, if you have an extra $5,500 to spend.)

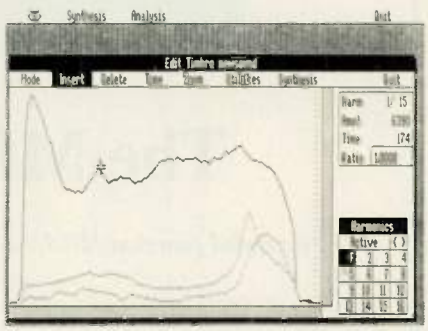


FIG. 4: The envelope of the first harmonic is being modified in the timbre editor, while two other envelopes are kept in the background as a reference.

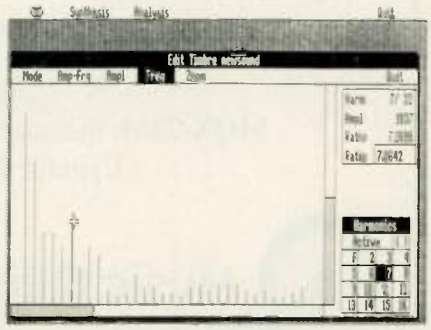


FIG. 5: The seventh harmonic is about to have its overall amplitude (and/or frequency) changed.

PROBLEMS AND WISHES

Problems with FDSoft are remarkably few. Screen updates on my monochrome CGA monitor (with cheapo clone CGA card) produced some tiny random glitches that didn't affect operations or legibility. The windowing software permits only eight windows open at once and complains if you try to open more. You can move windows, but you can't resize them. A minor problem with the time-consuming resynthesis is the difficulty in interrupting the process once it's started. You have to wait for the synthesis of the current harmonic to finish, then in the couple of seconds while the screen is redrawing, stop the process.

Navigating the program could be a lot easier. In fact, I had to draw a map to get it straight. The confusion is needless, since it's inherited from the FDSS Studio architecture. I'd guess Lyre's main project is FDSS, and FDSoft is a low-priced spinoff, ported from and meant to underwrite its big brother. The FDSS organization by timbres, instruments, and orchestras just doesn't apply to FDSoft, which supports only non-FDSS samplers. Therefore, you have to open an unneeded orchestra and an unneeded instrument before you get down to timbre editing, which is all you want do with FDSoft anyway; this also

makes irrelevant two chapters of the manual. The timbre/orchestra scheme also needlessly multiplies DOS subdirectories and hence, disk clutter. I can't help feeling that *something* could be done to optimize the resynthesis code, but I could be wrong. I just like FDSoft so much that I wish it would run faster.

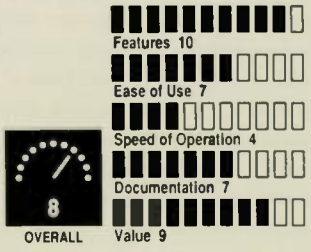
CONCLUSIONS

Nothing else does what FDSoft does. If it were simply an additive synthesizer for samplers, it would be well worth the price. The addition of analysis/resynthesis makes it an invaluable tool for musicians who like to sample *and* for experimenters who like to play around with harmonic analysis and additive synthesis. Caveats aside, it's so rare for a program to serve both kinds of musician so well that FDSoft has my unreserved commendation.

Carter Scholz *is a musician, writer, and programmer living in Berkeley, California. His favorite hardware/software combination is fingers and a piano.*

Product Summary

PRODUCT:
FDSoft 1.04
TYPE:
Sound analysis/resynthesis
PRICE:
$250
FEATURES:
Harmonic analysis (up to 128 harmonics), spectral editing, and resynthesis of sampled sounds for Mirage, S-10, Emax, S900, and MIDI Sample Dump Standard files
SYSTEM REQUIREMENTS:
IBM PC/XT/AT, 640K memory, 2 disk drives, CGA display, Microsoft-compatible mouse
MANUFACTURER:
Lyre Inc.
1505 Ch. Ste. Foy, Suite 101
Quebec, PQ, Canada
G1S 2P1
tel. (418) 527-6901



Synthia: A Digital Synthesizer for the Amiga

Inside your Amiga is a digital synthesizer—but you'll need this program to get the most out of it.

By John Loffink

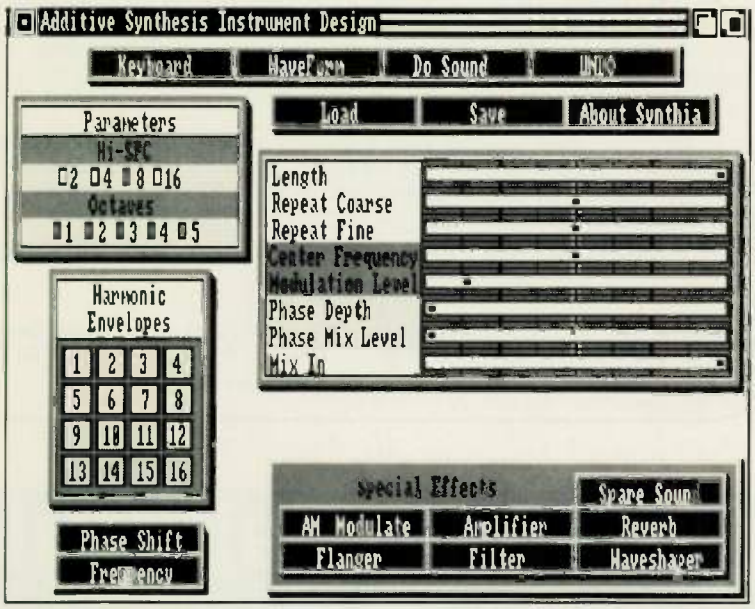


FIG. 1: The Additive Synthesizer Design window lets you create one of the five different kinds of synthesizers in Synthia.

Undoubtedly, if you design your own sounds, there have been many times when you've wished for just one more oscillator, envelope generator, or filter. While the arrival of digital synthesis has greatly expanded the range of possible sounds, we have ended up with a variety of synthesis techniques with overlapping capabilities and not a single omnipotent one. A typical setup consists not of a bank of DX7s, for example, but an FM synthesizer, a wavetable synthesizer, an analog synthesizer, and so on. In the future, with the help of powerful computer software like Synthia and high-resolution samplers, this situation may change.

Synthia, for the Amiga 500, 1000, or 2000, accomplishes its synthesis through software algorithms that calculate playback data for the Amiga's 4-voice audio channels. The set of programs comprising Synthia create and modify digital samples in the standardized 8-bit, 5-octave IFF format used by most Amiga music programs. Hitting a Synthia Do Sound gadget starts a calculation that lasts one to 15 seconds, depending on the complexity of the selected function. The resulting sound can be played back through the Amiga keyboard, a 6-octave keyboard window, or MIDI Channel 1. A generous manual of almost 300 pages includes 36 step-by-step examples of how to use Synthia's functions.

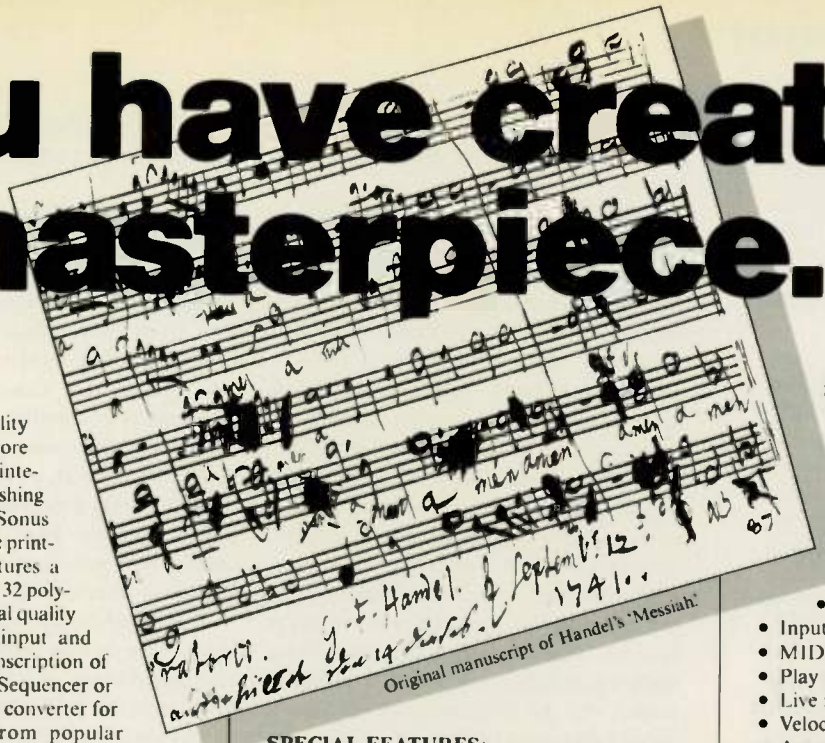
Synthia is easy to use, and one reason is its standardized 256-point resolution Waveform/Envelope/Table Editor. Every parameter not controlled by an on/off switch or level slider uses an identical window for user input. The Waveform/Envelope/Table Editor window includes the standard synthesizer waveforms (sine, triangle, square, sawtooth), graphic editing aids (mirrors, reverse, scale, etc.), freehand drawing, and a Harmonics Mixing Panel of 16 sliders whose function varies with one of five selectable gadgets. You can generate linear or spline (rounded) envelopes, a polynomial function useful for waveforms and the waveshaper function, an addition of the first 16 sine harmonics for custom waveforms, or an addition of the first 16 "harmonics" of the initial waveform. There are eight slots called Clips for storage and retrieval of graphs.

WHAT TYPE OF SYNTHESIS?

Instrument design is divided among five programs with a set of special effects common to all. The five synthesizers also share adjustable sound length (a maximum of two seconds in the lowest octave), loop point, envelope-controlled frequency and phase, octave range, and initial waveform. Synthia lets you select which of the five octaves of the created sound will be modified by your input, allowing a different sound for each octave if you so desire.

The first synthesizer, String, is an implementation of the Karplus-Strong plucked string algorithm and creates a plucked sound based on a few simple parameters: string type (steel or nylon), stretch factor, and initial waveform. The Additive Synthesizer (**Fig. 1**) provides Waveform/Envelope/Table Editors from the amplitudes of the first 16 harmonics of your selected waveform. The Subtractive Synthesizer gives the same capability as a wavetable synthesizer, since you can define the initial waveshape and then modify the sound with the amplifiers and filters. The Interpolation program creates a mix of eight successive waveforms across time. In percussive instrument design, four different techniques based on resonating filters and nonlinear waveshaping are available.

You have created a masterpiece.


Original manuscript of Handel's 'Messiah'

Power, control and flexibility are at the heart of SuperScore for the Atari ST. A fully integrated desktop music publishing system, SuperScore from Sonus offers more than just music printing capabilities — it features a built-in 32 track sequencer, 32 polyphonic staves of professional quality scoring, text and lyrics input and placement, automatic transcription of MasterPiece, SST Super Sequencer or SuperScore files and a file converter for transcription of files from popular sequencers.

SCORING FEATURES:

- 32 polyphonic staves
- Full layout abilities for all score formats with special quick modes for the most popular types. Extendable library comes with layouts for solo, jazz ensemble, and orchestral formats
- Musical symbol palettes and drawing tools for complete paste up facilities — Draw crescendos, staves, curves, slurs and free hand lines
- Note spacing controls offering global control down to individual positioning of each note
- Treble, Alto, Tenor, Bass and Percussion clefs
- Chord symbols and guitar frames for any chord with extendable custom library of fingerings allowing the addition of your own chords and fingerings
- Lyrics with auto alignment
- Titles, labels, unique headers and footers on every page
- Text placed anywhere on page
- Load and Save icons from popular picture/paint programs
- All types of bar lines with and without numbers, including 1st, 2nd, 3rd endings
- All key signatures/Double sharps and flats automatically computed
- Key, Meter and Clef changes at any bar
- Horizontal or slanted beams
- Automatic pagination and staff spacing/pagination control — Automatically chooses optimum page layouts
- Variable staff sizes
- Hide individual staves of any system
- Print full score or individual parts (up to 3 staves) transposed to appropriate keys

SPECIAL EDITING FEATURES:

- Powerful mouse based screen editing providing the option to edit MIDI data in musical terms and symbols
- Supports cut and paste style editing and easy non-MIDI note entry
- Insert and delete bars
- Insert, delete, change and move notes and rests

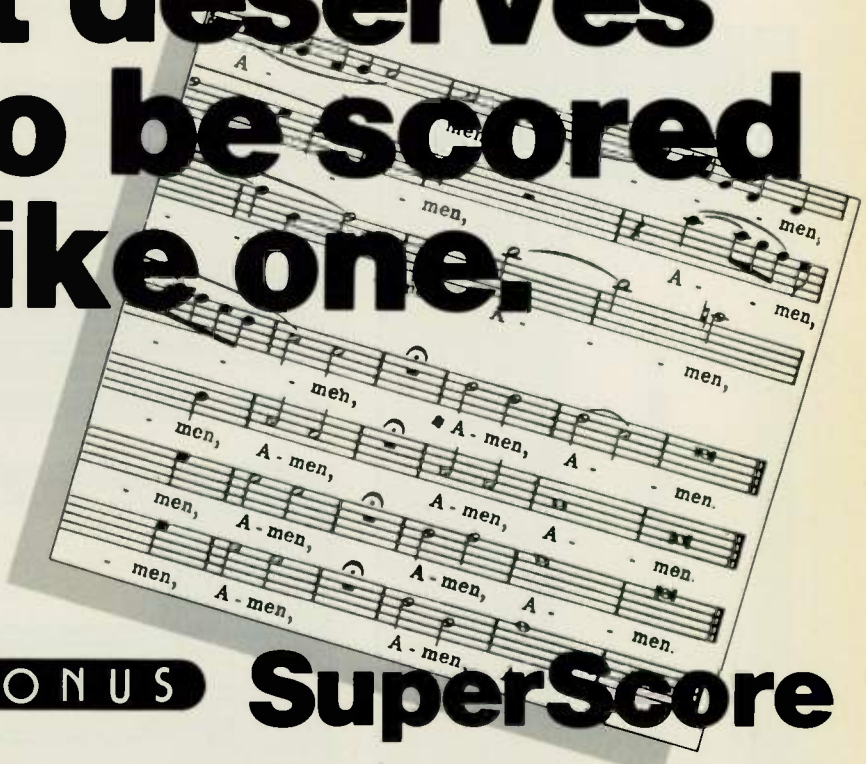
SPECIAL FEATURES:

- Separate score and sequence quantize controls
- Automatic transcription of MasterPiece, SST Super Sequencer and SuperScore sequences
- Converts files from Hybrid Arts, Steinberg and other popular sequencers

SEQUENCER FEATURES:

- 32 Tracks, 24 Sequences
- Split tracks by pitch (for recording keyboard parts) or by channel
- Selectable count off
- Loop flag
- Sequence and track displays
- Multiple track selection
- Multiple meter selection
- Drum channel transpose protect
- Input filter selects
- MIDI data viewer
- Play thru/Captive play thru
- Live muting/unmuting (programmable)
- Velocity leveling
- Automated punch/live punch
- Quantization from a whole note to a 1/128
- 192 PPQN internal resolution
- Mod wheel to MIDI volume conversion
- Shift track left or right
- Specifiable exit data

It deserves to be scored like one.



SONUS **SuperScore**

HARDWARE REQUIREMENTS:
Atari 1040 ST, Monochrome monitor, Epson or IBM compatible printers.

Sonus Corporation: 21430 Strathern St., Suite H, Canoga Park, CA 91304 USA,
Sonus International, LTD.: P.O. Box 18 Wokingham, Berkshire RG11 4BP England
USA: (818) 702-0992 • Telex: 650-297-9928
FAX: (818) 704-0638
England: 44 0734 792699

• SYNTHIA

This is useful for generating almost any kind of sound with no discernable pitch center.

While the range of sound-generating techniques is impressive, added to the Special Effects windows it makes a monster synthesizer program. These windows, identical for all the instrument design programs, allow modification of the created samples that's essentially unlimited, since the processes can be applied as many times as desired. The Special Effects windows will also work with instruments sampled in the Amiga's IFF format, such as those supplied with Electronic Arts' *Deluxe Music Construction Set*.

One feature of the Amplitude Modulator window, a gadget called Extract (a. . .e), is particularly useful for editing sampled instruments. Load a sampled sound into the program, call up Amplitude Modulation, hit Extract, and the program extracts the amplitude envelopes for each of five octaves of the instrument's range. There's no more guessing as to how a piano tone decays with time: Synthia puts it into memory clips a, b, c, d, and e for analysis and modification. You can even modify the extracted envelopes to your satisfaction, strip the old envelopes, and apply the new ones for a more carefully crafted sound.

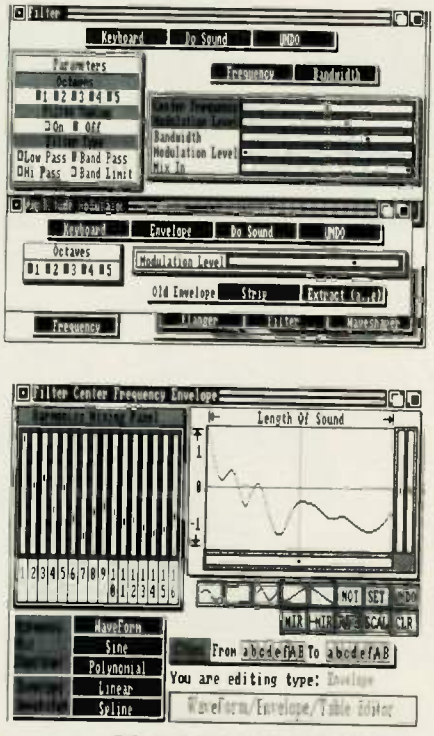


FIG. 2: Synthia's filter window (top) offers four filter types, each of which can be programmed from displays such as the Center Frequency Envelope window (bottom).

SIGNAL PROCESSING

Synthia also includes a good complement of signal processing capabilities. The Amplifier window can modify a sound's volume from zero to four times that of the original, with a level control and envelope gadget that can generate various amounts of controlled distortion similar to what occurs in most percussion instruments. The Reverb window gives you control over delay time, feedback level, filter amount, and mix level. A Flanger window includes an envelope window that controls the effect's level.

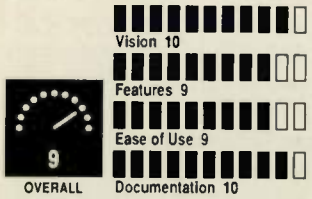
The Spare Sound window is a handy feature for mixing different instruments together. Sliders control the Spare Mixing Level and the Spare Delay Time, which can generate a slight, almost imperceptable delay for a more natural effect.

Synthia's Filter window (**Fig. 2**) simulates four filter types, each with envelope-controllable frequency: low-pass, high-pass, bandpass, and band-reject (more commonly known as notch or band-stop). Remember that since you can process a sound *repeatedly* with Synthia, you can first set this window to be a low-pass filter to roll off some high-frequency content, then change to a bandpass filter to emphasize one portion of the remaining frequencies, and so on, simulating as many filters as necessary.

The last Special Effect window is Waveshaper, whose table is an X-to-Y graph of the input to output transfer function performed on a sound. Fortunately, there is a set of mathematical functions that make the transformation predictable. These are activated by setting the 16 sliders in the Waveform/Envelope/Table window and selecting the Polynomial gadget. This is not as dense as it first sounds: setting slider number one, for example, to maximum and all others to minimum produces the transfer function y = x, which doesn't affect the sound at all. Another function would process a perfect sine wave of constant amplitude to output a sine wave at twice the original frequency. The waveshaper is amplitude sensitive, so putting that sine wave through the Amplitude Modulator before waveshaping it puts out a sound that changes in harmonic content. This kind of nonlinear waveshaping is a synthesis technique widely used in university computer music labs, but it hasn't been available to the average synthesist until now.

Product Summary

PRODUCT:
Synthia
TYPE:
Software synthesizer
HARDWARE REQUIREMENTS:
Amiga 500, 1000 or 2000 computer; optional MIDI interface (Channel 1)
PRICE:
$99.99
MANUFACTURER:
The Other Guys
55 North Main, Suite 301D
PO Box H
Logan, UT 84321
tel. (800) 942-9402
or (801) 753-7620



Of the Special Effects windows, all but the Waveshaper provide a wealth of options for modifying digitized instruments. The point to remember is that, unlike a hardware synthesizer, there is *no limit* to the number of oscillators, filters, amplifiers, etc., per voice. Synthia performs its operations one at a time in a series path that can be as long as you desire. With the Spare Sound window, endless parallel mixing can be achieved. A single instrument can be constructed from dozens of oscillators, filters, and amplifiers. A few examples will give an idea of what kind of power this gives you.

Since the Additive synthesizer has only amplitude envelope control of the individual harmonics, you might assume that individual harmonic detuning is not possible. This is not quite true. By selectively using the synthesizer's Frequency Envelope and Mix controls, any set of the 16 harmonics can be assigned one frequency envelope, created as a sound file, mixed with another set of harmonics with another frequency envelope, and so on.

The Reverb window doesn't provide the "room simulations" we've come to expect from digital reverb units, but rather, works like an echo unit with a filter-level control. To create concert hall simulations, for example, merely change the

continued on page 137

The MIDI Reference Series

Dedicated MIDIphiles with MIDI Files on the brain may find these three books to be invaluable references.

By David B. Doty

CR KING

The MIDI Reference Series
by Steve De Furia and Joe Scacciaferro

Prolific MIDI authors Steve De Furia and Joe Scacciaferro (*The MIDI Book*, *The Sampling Book*, *Secrets of Analog and Digital Synthesis*), in what is not so much an act of creation as one of collection and organization, have gathered the facts about hundreds of devices from dozens of manufacturers into three large-format, paperback volumes. They are filled with a multitude of technical details that will cross the eyes of all but the most dedicated MIDIphiles. Not everyone needs this wealth of information (indeed, some of us would pay dearly to avoid the necessity of becoming acquainted with it), but for those who do, I know of no other source that provides it in such a compact and convenient format.

The first volume, *The MIDI Resource Book* (148 pp., $17.95), is a miscellaneous assortment of MIDI-related information. There are copies of the MIDI 1.0 Specification, the MIDI Sample Dump Standard, and the MIDI Time Code Specification, as well as manufacturers' I.D. codes and controller definitions. A substantial section of the book is devoted to the System Exclusive data formats and handshake protocols used by a number of major manufacturers. Also included are notes on reading a MIDI implementation chart and tables for converting data between hex, decimal, and binary formats. *The MIDI Resource Book* concludes with a number of lists, including instrument manufacturers, electronic bulletin boards, education sources, and books and periodicals.

The MIDI Resource Book is the weakest of the three volumes in the series. Much of the data it contains has been published previously in works that are likely to be found in the library of any serious MIDI user. While it is handy to have it collected in a single volume, $17.95 seems a rather exorbitant price for this somewhat haphazard assembly.

The second volume of the series, *The MIDI Implementation Book* (216 pp., $19.95), includes standardized MIDI implementation charts for 226 different devices from 38 different manufacturers. (A device's MIDI implementation comprises the MIDI messages which that device transmits and recognizes.) The book is organized by instrument type (e.g., digital synthesizers, hybrid synthesizers, samplers, etc.) and is cross-referenced by manufacturer. The listings also indicate whether an instrument is covered in *The MIDI System Exclusive Book*. The book includes not only the common keyboard instruments, drum machines, and sequencers, but also less familiar devices such as control voltage converters, data processors, sync boxes, and lighting controllers. There are even a few software sequencers listed, although listing sequencer features in a format designed to show the MIDI implementation of a hardware device doesn't reveal what one really needs to know about the sequencer.

The third and final volume, *The MIDI System Exclusive Book* (360 pp., $29.95), is just what its name indicates: a collection of the System Exclusive messages transmitted and recognized by a variety of synthesizers, samplers, drum machines, and other MIDI devices. For those who aren't familiar with this aspect of the MIDI standard, System Exclusive messages are used to represent information that is specific to one particular device or manufacturer's family of devices and would therefore be meaningless to any instrument other than those for which they are intended.

The MIDI System Exclusive Book contains the System Exclusive data from 131 instruments made by 16 manufacturers. In a mirror reverse of *The MIDI Implementation Book*, the entries are organized alphabetically by manufacturer and cross-referenced by instrument type. Where a common data format is used for a number of instruments from a single manufacturer,

e.g., the Casio CZ series or the Yamaha DX series, this format is explained before the entries for specific instruments are presented. While the authors have attempted to maintain a consistent format throughout the book, the amount and type of information provided varies greatly from manufacturer to manufacturer.

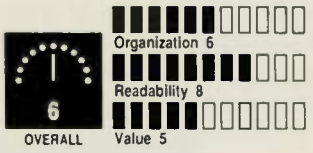
The MIDI Reference Series shares one shortcoming with all books on electronic music: it doesn't include the most recent instruments to hit the streets. You won't find any information in these pages on the Yamaha DX7II and TX81Z or the Roland D-50, for example. The authors indicate in the introduction that they intend to release updated volumes as MIDI products evolve, but it will be an uphill battle to keep up with the flood of new products appearing on the market each month.

As I said before, The MIDI Reference Series is clearly not for everyone. If you use two or three MIDI-equipped instruments and a couple of off-the-shelf computer programs, and the manuals supplied with your instruments are reasonably well-written, you can probably get along without The MIDI Reference Series. Besides, if you are not already well-versed in the inner workings of MIDI, you will find these volumes rough going. I definitely would not describe them as particularly "user friendly." These remarks are not really meant as criticisms, though. The MIDI Reference Series was not written for the novice or the casual user, but for the serious MIDI enthusiast and the technical professional. If you develop MIDI software or hardware, integrate MIDI systems for others, manage a MIDI-oriented studio, or perform on an elaborate MIDI setup, you will probably find these books, especially the System Exclusive and Implementation volumes, indispensable. Service facilities, music-store keyboard departments, and technicians with touring acts will also find The MIDI Reference Series beneficial.

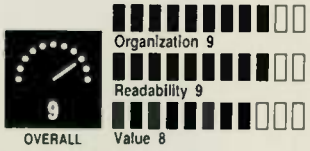
(These three books are available from EM Bookshelf; see "For Your Information" in this issue for details.)

Among other things, **David B. Doty** *is the editor of* 1/1, *the journal of the Just Intonation Network. Contact the Just Intonation Network, 535 Stevenson St., San Francisco, CA 94103 for more information.*

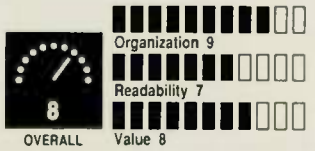
The MIDI Resource Book



The MIDI Implementation Book



The MIDI System Exclusive Book



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THE THEORY OF EVOLUTION

Musical evolution, not technological evolution, is what makes us want to listen to music. Yet sometimes each form of evolution helps the other.

By Robert Carlberg

One of the pleasures of doing something for a long time is the sense of perspective it gives you. This is true of living in one place, being in one relationship, working at one job, or enjoying one pastime.

For the last 20 years or so my pastime has been electronic music. In that time, I've seen it change radically as technology improved and became accessible to normal musicians. It has gone from a near-zero market share to a major force in the industry, under its current euphemism, "new age music." Personalities such as Bob Moog, Alan Pearlman, Donald Buchla, and Tom Oberheim have given way to faceless, multinational corporations. And the technique of electronic music has gone from processing waveforms with modules interconnected by patch cords to something a lot less intuitive. Today's electronic musician has to know about operators, floppies, and librarians, and be able to converse using nothing but acronyms.

In the eight years I've been reviewing for **EM** (and its predecessor, *Polyphony*), it has been my pleasure to observe the development of a number of electronic musicians. The advance of technology is all very interesting, full of fits and starts, failed dreams, and great leaps forward, but it is the artists, the souls crouched over their darkened keyboards at 3 a.m., who control the history of music. It is they who decide what is "musically useful" (whatever that means) and, in so doing, send the manufacturers scurrying back to their drawing boards. Electronic music does not evolve because of new technology; if nobody plays with it (the technology) and plays it well, *and* sells the result, then it dies on the vine. Human history is littered with great ideas that never became fashionable. The only time they ever become important is in retrospect, when the idea catches on much later.

The history of electronic music, then, consists not of the great innovations in musical instrument design, but in the evolution, both collectively and individually, of the artists who use these instruments.

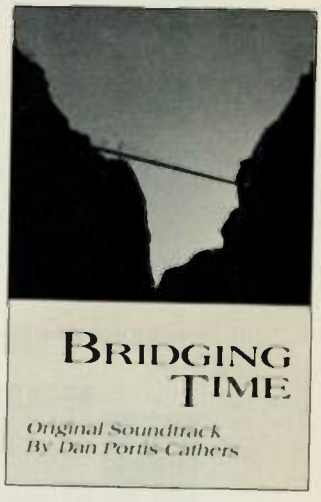
When Ricky Starbuster sent his debut tape to *Polyphony* in April 1983, it was accompanied by a letter that said, in part, "I hope to eventually make a career in this stuff (either that or starve to death)." He seemed to have a better-than-ever chance of fulfilling his wish, since each of the thirty songs on *Starburst* was full of imagination, and each was as different from the last as the next. It was so bursting with ideas and vitality that it earned my "Debut of the Year" award.

His letters (and tapes) over the intervening years revealed a series of ups and downs and illustrated the difficulty of making a living at it. When I stopped hearing from him in 1986, I began to wonder if perhaps the other alternative had nabbed him.

Late this summer, a tape arrived in the mail from a **Rick Hauser**, entitled *Ocean Sand*. At first, I didn't make the connection, but when I put it on, the music and the copyright to Starbuster Productions gave it away. Hauser, now married and expecting his first child, has matured considerably in the last five-and-a-half years. "My wife thinks 'Starbuster' is a stupid name, but who ever said I was serious?" he writes. "To me, a name is irrelevant—it's the music that counts!"

Starbuster's, I mean Hauser's, studio has matured also, with the addition of an E-mu Emax sampler to his Sequential Prophet-5 and DrumTraks. He uses the sampler not only for factory and original samples (including a great "squeezed cat"—it's mild; Hauser says the "cat just hated people!"), but also for most of the drum parts, played from the Emax keyboard. "By hand gives a better feel, I think, and gives you the 'touch sensitivity' where you actually need it," he declares.

He has also largely outgrown the A-B-A-B-A-B structures he used to use, favoring a much more open development with less repetition. As was always the case before, his tracks are all over the map, stylistically ("whatever comes into my head on a given day"), ranging from a lovely waltz for synthesized string orchestra to the clanging church bells and unhappy cat. In between, he touches on



Vangelis-like, minor-mode themes, sampled orchestral tuttis, and rousing jazz/rock numbers. It is every bit as bursting with ideas as his debut, except now his ideas are much broader.

Perhaps most important of all, he's downsized his expectations somewhat.

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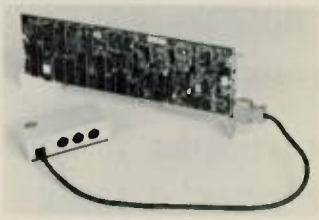

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● MUSIC RE:VIEWS

"Maybe I'll market this one a bit better than the others and hit up a few small record companies. There is really no money in doing it yourself with cassettes, as you well know, and it wouldn't be worth the trouble and expense if it wasn't for all the fun."

In the years that he was woodshedding and analyzing other career options, electronic music has itself grown up from the ugly duckling to the goose with the golden egg. Hauser just might find, if the right people hear his stuff, that making some money with his music is not out of reason anymore. *Ocean Sand* can be purchased for $12 postpaid from Starbuster Productions, PO Box 5224, Springfield, VA 22150.

The single biggest change in electronic music since the days when synthesizers had names instead of numbers has been the increasing reliance on computers. The first album to demonstrate the synthesizer's potential, *Switched-On Bach*, did so with a lot of laborious editing, patching and keyboard-playing. Now we have computers to edit, program, and remember the notes, moving the artist one step further from the hands-on experience of coaxing sounds out of an instrument by using one's physical ability.

The artist will always be in the loop, at the center, but the keyboard synthesizer might not. Witness the debut album by composer/filmmaker/author/illustrator **Tore Bahnson**, *Machine*.

Not only was his Commodore Amiga used to play, edit, and mix the music (as well as illustrate the cover!), but it was also entirely performed on the computer's own sound chip. No synthesizers, drum machines, or multi-track recorders were used at all. The final mix was fed directly to a DAT in real time.

Granted, his Amiga was tricked out with all the options. Actually, two Amigas, a 1000 and a 2000, both with 2-megabyte expansion RAMs, were linked through MIDI (dig those crazy acronyms!). "A host of software" was used, including "nearly all commercial sound and music programs" on the market. His main tools became *Deluxe Music Construction Set* from Electronic Arts, *Soundscape Pro MIDI Studio* from Mimetics, *Sonix* from Aegis Development, and sampling through the Creative Sound Systems sampler.

None of which would be more than a salesman's dream without some skill at composing, which luckily Bahnson has in spades. The 12 tracks are consistently friendly jazz/rock fusion, whether exploring some very Froese-like electric guitar passages (without the guitar) or creating a

TEN BEST SO FAR

1. Richard Burmer *Bhakti Point* (April)
2. Djam Karet
   The Ritual Continues (March)
3. Mark Isham *Castalia* (September)
4. Peter Buffett
   The Waiting (September)
5. Giles Reaves
   Nothing Is Lost (November)
6. James Newton Howard
   Promised Land (June)
7. William Orbit
   Strange Cargo (November)
8. Latitude *Latitude* (May)
9. David Arkenstone
   Valley In The Clouds (April)
10. Patrick O'Hearn
    Rivers Gonna Rise (September)

spirited islands jam with sampled steel drum. In fact, the quality of the samples is amazing, sounding closer to a Fairlight Series II (the older, 8-bit model) though the overall cost was nearer a Mirage.

Listening to the tape, it's easy to forget—even difficult to remember—that it was all created inside a computer. *Machine* is available for $6 (U.S.) from Commodore Data A/S, Jens Juulsvej 42, DK-8260 Viby J, Denmark; tel. 6 28 55 88.

The steel drums on **Dale Meyer**'s debut tape, *You Always Remember The First One* ($8, postage paid, from: PO Box 2716, Scottsdale AZ 85252), are real, but most everything else you hear was triggered from a Simmons Silicon Mallet controller. Like Tom Collier (reviewed May '88), Meyer is a vibist (also drummer) by training, so his access to electronic technology was limited before MIDI mallet controllers. He triggers the drums (from Linn and Alesis memories) with practice pads and transducers plugged into a Casio DX-1 MIDI Converter, and recorded using a Macintosh and Southworth's *Total Music* sequencer. Other synthesizers and modules (DX7, TX812, Matrix-6, Midi Bass, S-10, and S-50) were used, as well as real sax, guitar, and congas on selected tracks. There is a lot of vibes phrasing, though certainly without reading the cover you'd never guess the origin. Like Collier, Meyer has a jazz orientation, updated and translated by today's electronic technology.

The Royal Gorge Canyon in Colorado, through which flows the Arkansas River, is the subject of a 22-projector, multimedia presentation at the visitor's center. The soundtrack for that production, entitled *Bridging Time*, is by **Dan Portis-Cathers**. Now Portis-Cathers has released his soundtrack on cassette, under the same title, for $8 postpaid (316 S. Center, Newberg, OR

97132). The 20-minute program is repeated on each side, side one with sound effects (mostly wind and water) recorded inside the canyon by Diane Kelsay. For his part, Portis-Cathers lays out four very beautiful, ethereal tunes, full of the mystery and majesty that any natural wonder instills. He uses an Emulator II and acoustic guitar.

Dan's world-fusion ensemble was reviewed here two years ago, December 1986. *Bridging Time* also includes some ethnic music influences, such as sampled sitar, as well as an obvious reverence for nature. Portis-Cathers is a friend of Gregory Alan Taylor, reviewed this September, and mentions the review in his letter accompanying *Bridging Time*. "I'm sure there are many reasons," he says, "why people choose to draw on other ethnic traditions, as both Greg and I do in different ways. One reason might be to encourage an attitude of connectedness with other cultures and traditions of thought. I'm essentially a middle-class WASP. . . yet I believe a basic struggle to overcome that very fact, to broaden our vision of relating to people, to reach across boundaries of race, religion, and even time is an important contributing attitude in the creation of 'large music.' My wife and I sometimes talk about people in terms of how large their world is. Do they have concerns for the world as a whole or only for their family cubicle? Do they care about what happens to people they will never meet, to people who may not even exist yet? There are many ways to express one's world concerns; one way is certainly through music. I would hope that is what my music will be about."

As we enter this Christmas season, reflect a moment on these words. Whether used to express an unquenchable creativity, to gain access to the sounds of musical instruments you can't play, or to express reverence for our connectedness, technology has enlarged the worlds of these four musicians. It is the cleverness of the instrument designers who have made these advances possible, but it is the personal evolution of each artist alone that determines the size of his or her world.

The farther you can see, the wider will be your perspective.

Records, tapes, and CDs for review should be put in a sleigh pulled by eight, tiny reindeer, and stuffed down the chimney at PO Box 16211, Seattle, WA 98116. On the night before Christmas, not a computer will be stirring, not even a mouse.

Index of Electronic Musician Articles in 1988

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* denotes a First Take review

Features and Applications

continued on page 132

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- **T**op sequencers for IBM-compatibles compared: EM gives you the rundown on an assortment of sequencers to help you choose the one best suited to your needs.
- **C**reating Music, Part II: Exploring the structure and style of songs.

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SOFTWARE & PATCHES

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delay amount several times in succession until the echoes merge together.

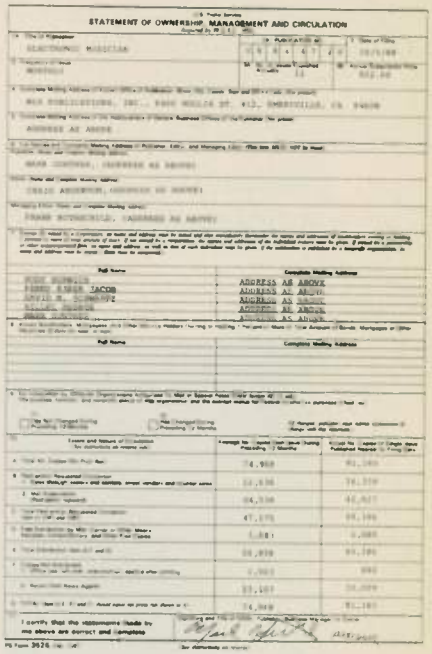
SUMMARY

My single criticism of Synthia is that setting a loop can be a frustrating, almost random task with no seeming solution. Many keyboard samplers suffer from this same deficiency, but software fixes are becoming available. Synthia apparently uses a zero crossing algorithm, which is sufficient for simple sounds, but in cases where the timbre of the sound changes drastically over its duration, more sophisticated processing is needed. Except for stuck notes (quickly fixed by pressing any four keys) that occur if you manipulate screen gadgets while playing the computer keyboard, the program seems bug-free. Two other fine points: the manual is very good, and the program is not copy-protected.

Synthia is like a synthesist's dream come true. The most exciting news is that programmer Bob Dayley is working on a version for professional keyboard samplers, initially the Ensoniq Mirage and Korg DSS-1, in simultaneous Amiga and Macintosh versions. This deluxe version will add visual aids and looping utilities. I expect that with such a program designed for CD-quality, 16-bit audio, keyboardists may never need anything more than a multi-voice sampler for all of their synthesized instruments. Meanwhile, if you own an Amiga, this program will let you pull a lot of sounds out of it.

There is no limit to the number of oscillators, filters, and amplifiers per voice.

John Loffink *formerly published* Surface Noise, *a magazine devoted to new musics, including electronic music. After returning to school, he earned a BSEE with high honors from the Florida Institute of Technology; he now works in NASA's Special Projects Lab at the Kennedy Space Center.*


STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

ADVERTISER INDEX

LEND ME YOUR EARS...

The most important piece of musical equipment you own is not a synthesizer, amplifier, guitar, or tape recorder.

By Craig Anderton

I was at a recording session recently where there was a persistent, high-frequency sound on one of the tape tracks. I thought it might be a 15 to 20 kHz clock feedthrough from a delay or reverb, but it was so faint it was very hard to pin down. Everyone there thought I was crazy; they didn't hear it at all. Eventually, I figured that maybe I was just hearing things like the TV monitor that was installed in the studio or noise from a power supply transformer.

When I got home and played a cassette from the session, the tone was, in fact, there—barely audible, but there. So I wasn't crazy after all (well, at least not about whether the tone existed or not), but that started me thinking about all the engineers and musicians I've met whose hearing has been damaged to some degree from the constant exposure to dangerously high sound pressure levels.

Back when I made my living on the road, I would often play venues that were large enough to require a lot of amplification if you wanted to reach the back rows. Part of my pre-show ritual was to tune my guitars and synths, but I also put cotton in my ears. I found that playing loud gigs would negatively affect my hearing for a couple of days afterward, and considering my total infatuation with music, not having things sound right for a couple of days was completely unacceptable. Even though cotton isn't a particularly efficient ear protector, it was better than nothing and at least toned down the really obnoxious high frequencies. I don't feel the on-stage sound suffered; it was easy to compensate for the decreased treble, in much the same way that home recording buffs with deficient acoustics know how to mix to compensate for those deficiencies.

Yet other musicians thought I was a real wimp for not being able to "take" sound pressure levels that flirted with the threshold of pain. Well, so be it. For me, music is supposed to be *pleasurable*, not a way to prove how much abuse your body can or cannot take. Today, I'm very grateful I can still hear up to 20 kHz, and I attribute a lot of that to wearing cotton in my ears during the decade or so I spent much of my time on stage.

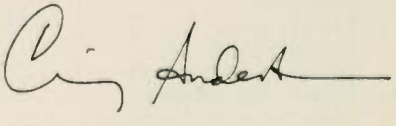
When working in the studio, I've always asked that the monitor levels be turned way down when mixing and recording (except to check for glitches in the sound, of course, and for "reality checking"). This keeps ear fatigue to a minimum and prevents the situation where you listen to a tape the next day and realize that it doesn't sound *at all* like it sounded in the studio. Besides, I've always found that if you can make a tune sound good at low levels, it will sound *great* at high volumes. Sure, treat yourself every now and then and crank it up, but keep the volume down as much as possible. Even in your daily life, guard your ears; I always wear earplugs when drilling, hammering, or doing other noisy chores.

If you do experience hearing problems, take care of them right away. I work with a very talented piano player named Spencer Brewer, and one time he started having problems with the hearing in one ear. Through sheer coincidence, he came to a party that Mix Publications sponsored at the NAMM show and ended up talking with Penny Jacob, **EM**'s former publisher. She happened to be talking with a representative from the House Ear Institute (an organization that Mix Publications has contributed to for the last three years out of the proceeds from their TEC Awards ceremonies). As it turned out, Spencer's problem was serious; although he couldn't reverse any previous damage, further deterioration was arrested, and his hearing was saved just in time. Had it not been for that chance meeting, and Penny's encouragement to seek help, he would almost surely be deaf in one ear today.

We often take hearing for granted; those who go deaf do not. Fortunately, progress is being made. Some of the most satisfying stories out of the House Ear Institute's research are those cases where someone who had been deaf all his or her life was, through advanced medical techniques, able to hear. Imagine living in a world without sound and then experiencing Beethoven. It must be overwhelmingly beautiful, the total opposite of what Beethoven himself surely felt as he realized that one of life's greatest gifts was slipping away from him.

This is the time of year when people traditionally count their blessings and exchange presents in a spirit of friendship and giving. If you can hear, you already have a remarkable gift; take care of that gift. Paradise lost is seldom regained.

(If you are interested in helping deafness research, contributions can be sent to the House Ear Institute, 256 South Lake St., Los Angeles, CA 90057; tel. [213] 483-4431.)



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