Build a Test Tone Generator For Under $20 ■ New Roles for the HR-16 Drumbox

Electronic Musician

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

SYNTH + DRUMS + SEQUENCER: Can one instrument do it all?

EM investigates the M1, D-20 and SQ-80

Become an Atari ST POWER USER

AUDIO FOR VIDEO: I Want My MTC!

REVIEWS: Digidesign Turbosynth • Oberheim Matrix-1000 • The 48 Track PC V. 3.0 Sequencer (IBM) • Groove Tubes and Rocktron Guitar Preamps • ADR 68K Signal Processor • Dr. T's 4-op Ed/Lib (Amiga) • ADA MQ-1 and ART IEQ Programmable EQs • Tascam 238 Syncaset 8-track Cassette Deck

0 76956 14050 3
A Mix Publication

Vision Becomes Reality. The M1 Digital Music Workstation

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

Power To Perform

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

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

Power To Produce

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

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

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

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

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

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

"What separates the M1 from the rest of the pack is sheer sound quality."

Craig Anderton **Electronic Musician** November 1988

KORG®

MUSIC POWER

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

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

Why should a sampled piano respond like a grand?

Expressiveness.

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

Keith Emerson, Keyboardist/Composer

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

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

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

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

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

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

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

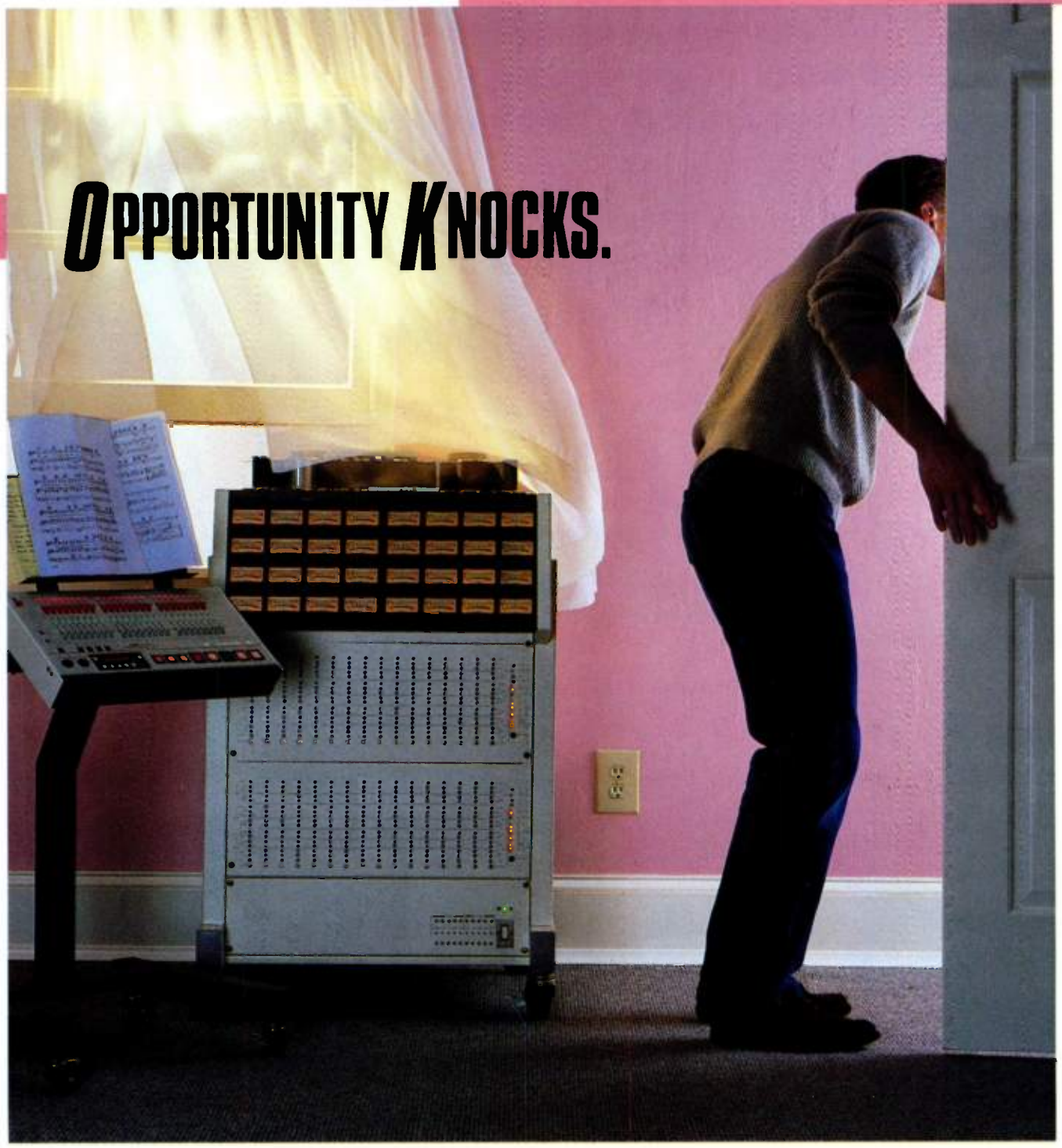
To find out more about the expressive possibilities of the Korg Sampling Grands, see your Authorized Korg Sampling Products Dealer.

KORG® Sampling Products Division

SAMPLING IS ONLY THE BEGINNING

For a free catalog of Korg products, send your name and address, plus $1.00 for postage and handling, to: Korg USA, 89 Frost St., Westbury, NY 11590.

MX-80 32-CHANNEL TAPE RECORDER



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

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

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

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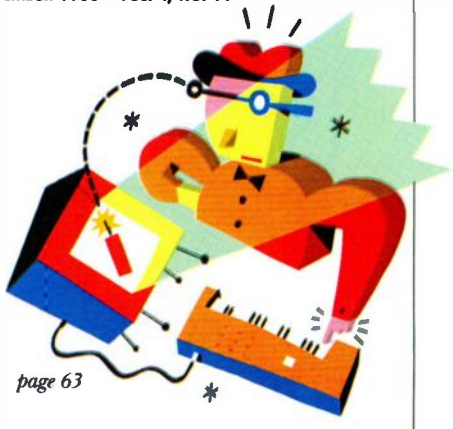
Electronic Musician

A MIX PUBLICATION
NOVEMBER 1988 VOL. 4, NO. 11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Cover: Photo by David Bishop.

Even if your music starts as a piece of junk, your sampling mic better not.

The new Shure SM94 Condenser Mic can make a big improvement in your digital sampling–at a surprisingly affordable price.

If you've made a major investment in a sampling keyboard or drum machine, don't overlook the importance of the microphone you're using. A vocal mic, for example, might "color" instruments you are sampling.

To capture your sample as accurately as possible, we suggest the new SM94. Unlike many popular mics, the SM94 has no high-frequency peaks, accentuated presence boost, or excessive low-end rolloff. This prevents overemphasis of high frequencies on instruments like strings and brass, while allowing you to retain the important low-frequency response essential to capturing the fullness and richness of many live sounds.

And its extremely low handling noise minimizes the introduction of extraneous handling sounds that might otherwise creep into your sample. What's more, the SM94 offers exceptionally high SPL capability–up to 141 dB–all but eliminating distortion on transient peaks.

For convenience, you can power the SM94 with a standard 1.5 volt AA battery, or run it off phantom power from your mixing board.

In addition to offering a unique combination of features not normally found in condenser mics in its price range, the SM94 is built with Shure's legendary emphasis on ruggedness and reliability. Features like a protective steel case, machined grille and tri-point shock mount make it rugged enough to go wherever your inspiration takes you.

And for voice sampling, we suggest the new SM96 with its vocal contoured response and built-in three-stage pop filter. Both these fine microphones can bring a new dimension of realism to your digital sampling.

For more information, write or call: Shure Brothers Inc., 222 Hartrey Avenue, Evanston, IL 60202-3696, (312) 866-2553.

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FOR YOUR INFORMATION

WHAT'S NEW THIS MONTH:

We are busily going through all the reader surveys you sent in to us and expect to have the results tabulated soon. We really appreciate your feedback; most of our decisions about editorial content are based on your suggestions and ideas. In particular, information on articles you especially liked, didn't like, or want to see in the future is invaluable. As always, keep those cards and letters coming—we read 'em all.

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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Direct all editorial, advertising, and other inquiries (except subscriptions—see above) to the main EM business offices: **Electronic Musician**, 6400 Hollis Street #12, Emeryville, CA 94608; tel. (415) 653-3307.

EM BOOKSHELF:

This mail-order distribution service (a.k.a. Mix Bookshelf) offers products (books, instructional tapes, videos, music 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).

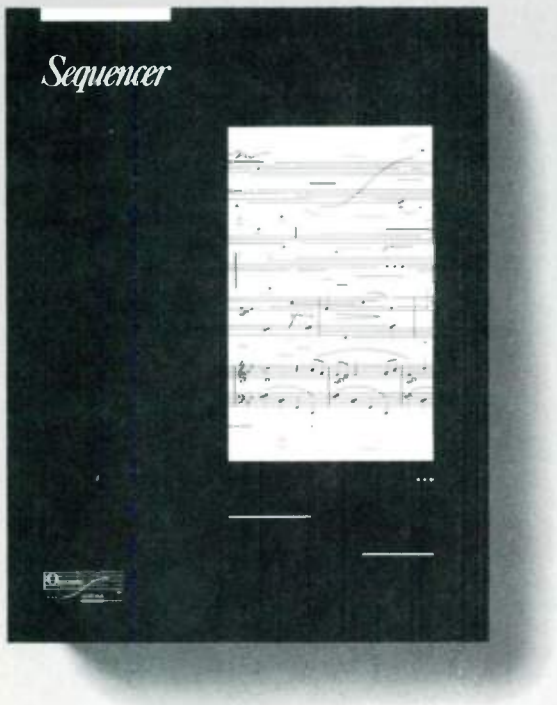
INTERNATIONAL PARTS SPEC:

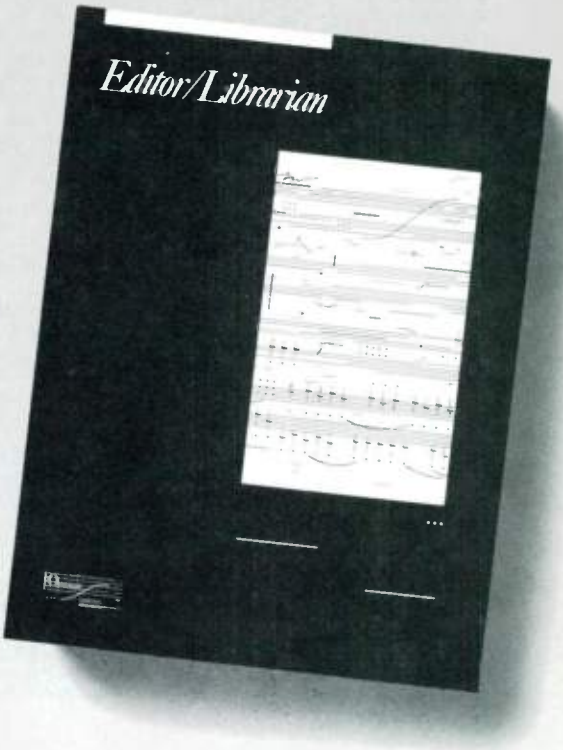
EM specifies parts values following international protocol, thus minimizing decimal points and zeroes. A nanofarad (nF) = 1,000 pF or 0.001 μF. Examples: 2.2kΩ (U.S. nomenclature) = 2k2 (Intl. nomenclature); 4.7 μF (U.S.) = 4μ7 (Intl.); 0.0056 μF (U.S.) = 5n6 (Intl.).

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.

Expand





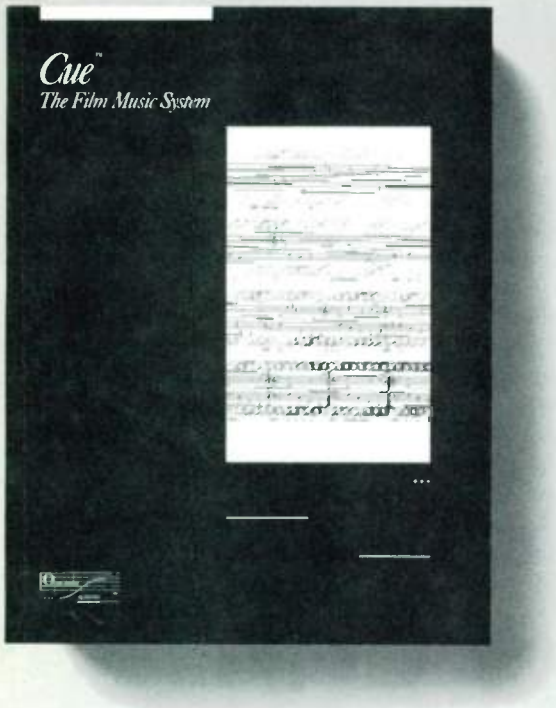
SEQUENCER 2.6—An easy-to-use sequencer for beginners and a powerful tool for creating and performing professional music. It even exports its files to most notation programs, creating an instant link from your keyboard to your score paper. Our Sequencer's low price, recently reduced $100, makes it an unbeatable value, and it is fully upgradable to future versions of the program.

EDITOR/LIBRARIANS—The best patch Editor and Librarian on the market. Allows you complete control over all parameters of a synthesizer or effects unit from the Macintosh screen—and you hear your changes instantly. Supported synthesizers include the CZ, D-10, D-50, DX7II, DX11, K-1, Matrix-1000, MT-32, REV5, SPX90, SQ-80 and TX81Z. Also available as Librarians.

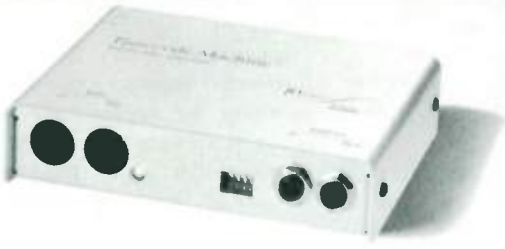
PROFESSIONAL PLUS—A cost effective way to connect your Macintosh to MIDI equipment. Runs with all Macintosh music software, providing your computer with one MIDI IN and three MIDI OUTs, all within a sturdy metal casing. For the Macintosh SE, Plus, II and 512K.

STUDIO PLUS *TWO*—The industry standard Macintosh MIDI interface, used and recommended by professionals for all of their studio work. Provides two MIDI INs and six MIDI OUTs, utilizing either your modem or printer port. "Thru" switches allow you to print or use your modem without disconnecting your MIDI gear. LEDs on the front panel display MIDI activity. For the Macintosh SE, Plus, II and 512K.

ability...



CUE—THE FILM MUSIC SYSTEM—A single package for the film composer or music editor which automates the tasks involved in synchronizing music to picture. Searches tempos, prints cue sheets and spotting notes, triggers sound effects, plays MIDI Files locked to SMPTE. Used by Suzanne Ciani, Bill Conti, Chick Corea, Herbie Hancock, Tom Scott, and Frank Serafine.



TIMECODE MACHINE—The highest-rated SMPTE-to-MIDI converter, the Timecode Machine reads and writes all four formats of SMPTE, converting incoming SMPTE to MIDI Time Code for use in synchronizing to tape. Merges MIDI data, jam syncs, and tolerates imperfect SMPTE—all at an affordable price. Compatible with Performer.

Opcode Systems believes your abilities shouldn't be held back by the tools you use to make music. So, we go on making the ones you use *better*—as your needs grow, so do our products.

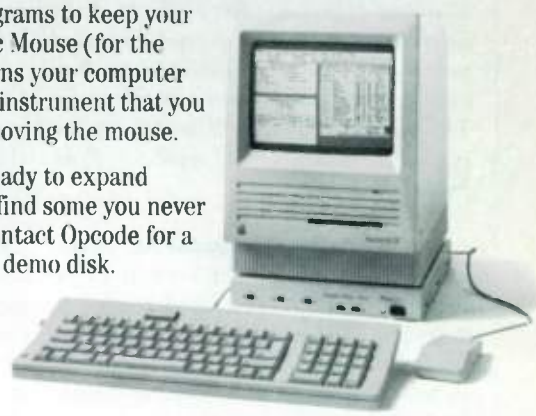
And if you haven't had a chance to work with Opcode yet, it's time to take a listen. What you'll hear is your music—loud and clear, or however you like it.

Our Editor/Librarians allow you to easily customize your synthesizer, graphically manipulating all of its parameters on screen. Or create unheard of possibilities with Patch Factory™—the intelligent random patch generator. And when you need to send information to a full rack of equipment, our "bundling" feature gives you a single command which can send or receive multiple banks at once.

When you want to play your sounds, Opcode's Sequencer is the natural choice for effortless music production. Our current version includes track looping, recordable tempo changes, sequence chaining and MIDI files. Future versions will add graphic editing, list editing, and SMPTE synchronization. And when you need to sync to tape, we've got the Timecode Machine, which everyone is using with great results. If you're into film scoring, you'll find the solution from us too, with CUE™—The Film Music System. It all works together, and you can easily expand your system as you need to.

We also make programs to keep your mind open—Music Mouse (for the Mac or Amiga) turns your computer into an intelligent instrument that you "play" by simply moving the mouse.

So, when you're ready to expand your abilities—or find some you never knew you had—contact Opcode for a free brochure and demo disk.



Opcode systems

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Menlo Park, CA 94025
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WRH

READERS HELPING READERS

A forum for **EM** readers seeking sources, schematics, services, and solutions.

DEBBIE DRECHSLER

Operation Help *is dedicated to helping musicians help each other. If you need technical assistance, a schematic for an old piece of gear, or just want to connect with people having similar interests, send your name, address, phone number (optional), and the nature of your request to: Operation Help, Electronic Musician, 6400 Hollis St. #12, Emeryville, CA 94608. If we print your letter, we'll include your name and address so that our helpful readers can contact you. There is no charge for this service, but we cannot guarantee that all requests will be published.*

Prophet-VS Upgrades: Are there any ROM upgrades after Version 1.1 of the Prophet-VS Vector Synth? Also, is there any kind of retrofit kit to improve the keyboard's aftertouch response? Johnny Scott, Box 4713, Cape Town, 8000, Afrika du Sud.

PG-200 needed: I'm looking for a PG-200 to aid in programming a Roland JX-3P synthesizer. If anyone knows how to find one, please contact me. I would also like to hear from any JX-3P users so we can exchange information about this vintage MIDI-equipped synth. Bill Bays, 2013 Rosalie, Wichita, KS 67207; tel. (316) 683-9292.

Electronic Musician back issues: I would like to purchase the June and September 1985, and February and April 1986 issues of **EM**. Anyone willing to part with these issues, please contact me. Thomas Goodwill, 96 Stewart Avenue, Jamestown, NY 14701.

A/DA Final Phase: I need schematics for the A/DA Final Phase (the version using analog switches for variable resistors, *not* the model using opto-isolators). The factory does not have documentation of older products, and my client can't live without it. I will pay copy and postage cost. Charles R. Fischer, Mescal Music, PO Box 5372, Hercules, CA 94547.

Oberheim OB-1: I need the service manual and any other information about the Oberheim OB-1 monophonic synthesizer. Charlie Tilson, 614 Parker Road, Houston, TX 77076; tel. (713) 697-1247.

EH Small Stone: Whatever happened to Electro-Harmonix? I need a schematic for a Small Stone Phase Shifter, or a way to get in touch with someone who can help. Thanks. Mike Kakos, 28 Mulberry St., Yonkers, NY 10701.

TX7 for the Atari 130XE: My Atari 130XE/Hybrid Arts GenPatch Sys Ex Librarian won't "handshake" with my TX7. Hybrid Arts informed me no TX7 configuration file exists for the 8-bit GenPatch, and due to the waning popularity of the 130XE, they will not write one. Does anyone have a tested TX7 configuration file for the Atari 130XE GenPatch? I will pay a reasonable price for such a file on floppy or type-in format. It could be that I'm not setting up my TX7 properly for the handshake. Does anyone have information regarding the proper front panel machinations required to allow MIDI initiation of the Sys Ex handshake? GenPatch is not equipped to accept bulk dumps that are initiated from the TX7 front panel, and the TX7 manual has been no help in this regard. Mike Tatro, 7826 Arnett St., Downey, CA 90241; tel. (213) 862-4005 (call collect).

Yamaha Electone FX20: I am interested in obtaining any information that will assist me in adding a MIDI interface to this great instrument. Any ideas or tips? Rudy Gutt, 8417 Cottage St., Vienna, VA 22180.

Tangent 1202: Help! I need a user's manual and/or service manual for a Tangent 1202 mixer. Any help would be appreciated. Randy Schimka, 9154 Irvington Ave., San Diego, CA 92123; tel. (619) 576-0225.

Mu-tron Phasor II: I am looking for the schematic for a Mu-tron Phasor II. There are five chips on the board that I can't cross reference; they have the Texas Instruments logo with P624 at the top and 0821 at the bottom. I am 95% sure they are op amps, but it's difficult to be sure without the schematics. Steve Vance, 406 E. Karsh, Farmington, MO 63640.

EMC Performer II: I am working on an EMC Performer II Solid State 150 two-channel amplifier. I am in desperate need of a schematic or correspondence from anyone owning one. John Hau, 45 Bella Colla Lane, Gillette, WY 82716.

Moog Song Producer: Does anyone out there besides myself use the Moog Song Producer interface for the Commodore 64? I'm getting lots of mileage out of it and would love to trade technical info, especially about the "MIDI Command" program. Pete Sprague, 5709 Tanglewood, Bethesda, MD 20817.

Fuzzbox Mania: I collect fuzzboxes and information regarding them. If anyone could send me any information such as history, stories about when they first bought one, design flaws, or schematics, I would greatly appreciate it. Any information on any and all fuzzboxes, from the Fuzzface to ones made in Japan in the '60s that mostly produced pink noise, would make me happy. Chung Lee, 1330 Bennett Dr., Pasadena, CA 91103.

continued on page 129

THE IMPORTANCE OF EXCELLENCE

THE IMPORTANCE OF VALUE

Whether you're a beginner or an experienced pro, you'll value the excellent sound and features of the Kawai K1 multi timbral synthesizer. With 256 digital waveforms that include PCM samples of actual guitar plucks, string loops, drums, and many more, the K1 allows musical possibilities beyond others at a fraction of the cost.

You'll find an inspiring range of dynamic sounds at your fingertips with 96 internal patches (64 single or 32 multi) and hundreds more available on external cards.

MEGAMIDI!! Use a sequencer (like our new Q-80) and play up to eight independent sounds at once. Hookup with patch editors by Opcode Systems, Drumware, and others for computer sound editing and storage.

You don't have to be a computer whiz to use or edit on the K1. Just pick a patch, press EDIT and you're ready to fly!

This backlit LCD window provides a visual reading of all parameters and settings.

Feels great—Sounds great! The K1's 61 note weighted keys is velocity and aftertouch sensitive for a real feel. Up to 16 simultaneous voices can be "zoned" or multi-patched in different keyboard and velocity areas. This means you can single-key stack, split, layer, or overlap sounds at the touch of a button!

Our quadra source joystick lets you adjust in real time the balance between four different sources or rapidly scroll through parameters and waveforms.

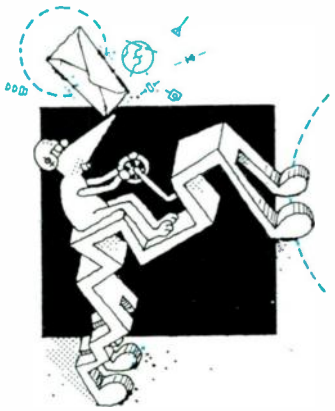
Make your passages soar! Accentuate and highlight by adding real time control of vibrato and effects with the easy-touch modulation and pitch-bend wheels!

At Kawai we're committed to excellence *and* value. Great sound and user friendly, the K1 is the best selling synthesizer under $1000. But don't take our word for it! See and hear the K1 family today—the K1 keyboard, the low profile K1m module, and the *new* K1r rack mount module!

KAWAI

Kawai America Corp., 2055 E. University Dr., P.O. Box 9045, Compton, CA 90224.
In Canada, Kawai Canada Corp., 6400 Shawson Dr., Unit #1, Mississauga, Ontario, Canada L5T 1L8

The software piracy debate continues, while other readers ponder the Rhodes Chroma, live sequencing, and "intelligent" interfaces.



DAVID POWLATTS

DUMB VS. INTELLIGENT INTERFACES

In your response to a reader's letter (July '88 issue), you stated "I don't buy the argument about dumb vs. intelligent MIDI ports. Some of the IBM PC interfaces are fine examples of how an intelligent interface can do a lot of the routine housekeeping required by a program, thus freeing up the CPU to do more interesting and useful tasks (and do them more rapidly)."

While this may have been true back in the 8-bit days of the Apple II and the Commodore 64/128, it is certainly not true today. It is a very common misconception that has been around for a long time and is, in part, due to manufacturer hype.

In the "IBM world," there is currently only one standard—the MPU-401. Roland (and some 401 clone makers) will claim that the 401 is an "intelligent" interface, but "intelligence" is relative and changes with time. If I were developing a sequencer on an Apple II, I would certainly use the 401 in "intelligent" mode, because memory and CPU cycles are in short supply in those machines. But that's the old 8-bit days.

The IBM PC is very different from the Apple II (or Commodore 64/128). There is enough horsepower (cycles and memory) on the PC to allow us to develop our MIDI products using high-level languages. On the other hand, from a programmer's standpoint, the 401 has not changed since the 8-bit days. With the use of high-level (and high-performance) languages, it is now easier to use a dumb interface (or the 401 in "dumb" mode) than it is to use "intelligent" mode. Remember, it's not CPUs that do interesting and useful tasks, it's people. If it takes three weeks to decipher and code for "intelligent" mode and only one week to use "dumb" mode, the MIDI spec, and Pascal, then which is the more intelligent use of time?

It is true that an intelligent interface could free the CPU from housekeeping chores and allow it to perform other tasks quicker. On the other hand, the IBM PC has enough horsepower to outrun a MIDI interface, so the CPU may be able to do its job quicker, but it will only have to hurry up and wait for the MIDI interface. As we move into "turbo" XTs and 80386-based machines, the gap between personal computing horsepower and the MIDI interface widens even further.

A better option is to develop an intelligent program to sit between an application program (such as a sequencer) and a dumb interface (e.g., the 401 or one of its clones in "dumb" mode). This would provide many benefits to software developers. First, it would allow the software developer to concentrate on more interesting and useful tasks. Second, it would work for any interface from any manufacturer as long as that interface provided a "dumb" mode. Third, it would reduce interface costs, because it would need less circuitry and "intelligence" would not have to be built into the interface. Fourth, since it would be software-based, enhancements and corrections could be easily made as opposed to the problems related to putting code in ROMs. However, I don't hold much hope for this, because the market for such a program would be very small. Perhaps the IMA (International MIDI Association) would like to finance such a venture with the result being put into the public domain. Or, maybe **EM**?

I don't mean to sound like I'm bashing Roland, because they make some very good products. However, from my perspective, the 401 is not an intelligent interface, and, based on that same perspective, there are no truly intelligent MIDI interfaces for the IBM world. I think it's wiser to put intelligence in software, not in circuitry.

Gerald Felderman
Florida

REMEMBER THE CHROMA!

After reading your "20 Great Achievements" article (July '88 **EM**), I am once again reminded of the lack of recognition given the Rhodes (ARP) Chroma. When the Chroma appeared on the market in the first half of 1982, it was a giant leap beyond the other keyboards in its class. It had more voices, more filters, more envelopes, more modulation options, more split and layering capabilities, and more LFOs than the competition.

If nothing else, the fact that the Chroma was the only keyboard in its class with a velocity-sensitive keyboard made it superior. Not only did the action feel good due to its weighted wooden keys, but the velocity response was smooth and adjustable, and could be routed to pitch, amplitude, envelope levels, envelope attack and delay time, the filters, and LFO rate and depth, all in positive or negative amounts.

The Chroma had a computer interface that allowed access to eight different sounds at once, making it the first multitimbral keyboard in its class. When MIDI came along, a comprehensive conversion for the Chroma was made available at an affordable price. Further, a polyphonic pressure-sensing kit was eventually made available, making the Chroma one of the few keyboards with that feature.

And if all that weren't enough, the Chroma's price included pedals and an Anvil case, all for over a thousand dollars cheaper than the Roland Jupiter-8 or the Oberheim eight-voice OB-Xa.

After six years, my Chroma (#56) has been everywhere except the repair shop

and still works as well as the day I bought it. And the bottom line: it sounds great! This letter may sound like an advertising campaign, but it's really just the observations of one satisfied owner who has spent tens of thousands of dollars on gear. I can easily say that the Chroma was the best investment I ever made.

Kerry Shacklett
Hawaii

RESPONSE TO "CONCERNED PARENT"

(In the July '88 issue, we ran a letter from a "concerned parent" who objected to "vulgarity" in an article that presented technical information in the context of a spoof on detective stories—hot blondes, hangovers, and all. The letter elicited this response.)

Nice try, concerned parent, but at this stage the public has had a fair enough sample of these sanctimonious antics to see through the fraying veil of your "holy and righteous" pretensions to the underlying psychosis of your philosophies, however sincere you may be about it all. Your predilection to perceive sexual prurience, or some other deadly evil, in virtually everything you see is an artifact of your own mentality, and no fault of the source. The hypocrisy and impossibility of your style of "morality" has been publicly exposed by Jim Bakker, Jimmy Swaggart, and many others less prominent, while the Jello Biafra case demonstrates its conflict with constitutional law.

You can no longer continue the farce of blaming others for your own refusal to adjust to simple realities of nature and the challenges of a free society. Your right to peacefully practice any religion you choose remains inviolate; but the problem of accommodating rigid ideologies to a universe that fails to support or corroborate any of them remains your responsibility, not ours. It is precisely the failure of these beliefs, and not the world's iniquity, that is the sole source of all your fear, frustration, and ultimate futility in this life.

Name withheld on request
Washington

KEYFRETS CLARIFICATIONS

My thanks to the readers who expressed interest in my *KeyFrets* program (August '88 EM). The article listing is correct, but I should have printed the listing in lower case so the zeroes and letters "O" would have been more distinguishable. All program lines past line 12 contain only zeroes. Included is a lowercase listing of lines 1 through 12.

Extra commas or other errors in the data statements cause the program to abort with an error on line 5. As KEYFRETGEN runs, it prints numbers on the screen. If the program aborts before reaching 2908, divide the number by 16 (number of values per line) and add to 100 (first data line number) to find the one that needs repair. If *KeyFrets* does not work at first, get a friend to read the lines to you while you check your typing (preferably from a printout).

Also, I've come up with "KeyPick" for fast strumming styles. This is really just a plastic furniture caster at least two inches in diameter. Glue felt on the rolling surface to protect the keyboard from scratches and excessive noise. Roll the caster up and down the keys for fast strums that would tend to tear the skin off your knuckles. The KeyPick works best with the sustain pedal action reversed (sustain off when pedal is depressed). I will eventually write this feature into *KeyFrets*, but until then, you can use a normally closed footswitch on your controller keyboard to get the same effect.

Here's the lowercase listing for the first 12 lines:

```
1 rem keyfretgen - to generate runnable keyfrets program
2 rem run this program with a formatted disk in drive 8
3 open15,8,15,"i":open9,8,9,"@0:keyfrets,p,w"
4 print#9,chr$(1)chr$(8);:goto10
5 z=val(z$):ifz=0andz$<>"0"thenz=asc(z$)-55
6 return
10 fori=1to2908:readz$:x$=left$(z$,1):z$=right$(z$,1)
11 gosub5:y=z:z$=x$:gosub5:print#9,chr$(y+z*16);:printi
12 nexti:close9:close15:end
```

James Chandler
Tennessee

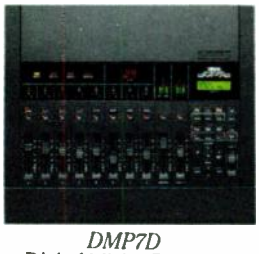
IF YOU CAN'T AFFORD IT, TAKE IT

I see a very distinct lack of perspective on your part in damning those who copy software. I have read all the arguments about how the software developers work so hard and long to come up with useful programs, but the people who might copy a sequencer, librarian, or even a video game are not a threat to the software market as you assert. In most of these cases, the person who might copy software simply can't af-

continued on page 26

It's no surprise who the innovator

Without a doubt, Yamaha is one of the biggest names in the music industry. Our reputation for being on the leading edge of technology is especially amplified in our new line of digital audio products.



DMP7D
Digital Mixing Processor.

Let's start with the DMP7D. Also known as a digital mixing processor. Better known as a landmark in sound technology. From input to output, the DMP7D is fully digital. It's MIDI-controllable. And its applications include mixdown of digital multi-track recordings, digital track bouncing, and CD mastering. In short, it's the ultimate performing and engineering tool.

SPX1000 Signal Processor.

Our latest breakthrough in digital signal processing is the SPX1000. It's packed with 40 professional effects and effect combinations preset in ROM. Another 60 of your own creations can be stored in RAM. In addition to 20 KHz bandwidth on all effects, the SPX1000 boasts a new reverberation algorithm and dramatic new panning effects.

Among digital equalizers, the Yamaha DEQ7 is unequalled. There's both digital and analog I/O.

in digital audio technology is.

It's loaded with 30 different EQ and filter configurations, in stereo.

DEQ7 Digital Equalizer.

And the most unforgettable feature is its 60 user-programmable memory locations.

For clear communication, the FMC1 Format Converter allows direct transfer of Yamaha digital output signals to other standard digital formats. So you eliminate the need for D/A and A/D conversion, while maximizing the sound quality of the final recording. If you need to convert digital to analog, there's the DA202. Or, if you're going from analog to digital, the AD808 will get you there. Either way, you achieve sound that'll please even the most discerning ear.

AD808 Format Converter.

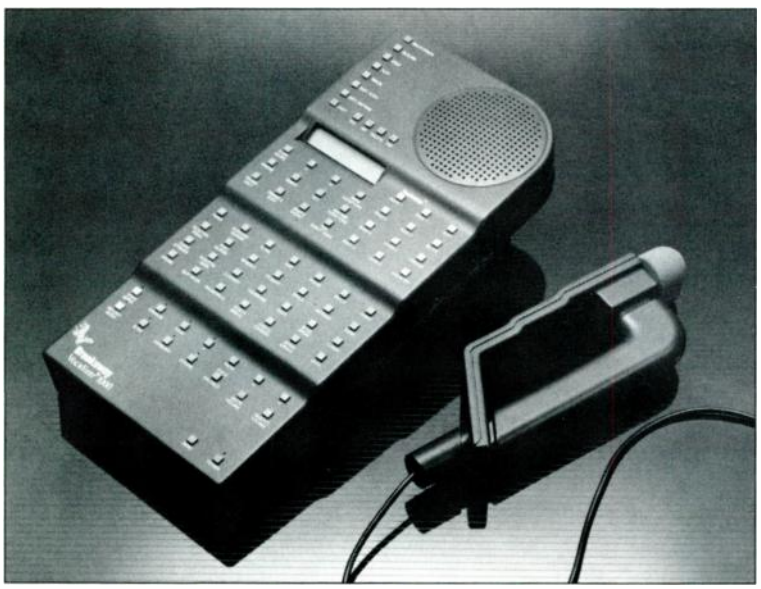
Once again, it's easy to see when it comes to innovation, there's nothing new about the name Yamaha.

Yamaha Corporation of America, Professional Audio Division, P.O. Box 6600, Buena Park, CA 90622. In Canada, Yamaha Canada Music Ltd., 135 Milner Avenue, Scarborough, Ontario M1S 3R1.

YAMAHA®

Engineering Imagination™

MIDI controllers, software, samples, and stands are just part of November's bountiful harvest of new technology.



Breakaway Music Vocalizer 1000

COMPONENTS

The SSM 2120 Dynamic Range Processor IC ($6.50) contains two high-performance Class A VCAs (100 dB dynamic range, 0.01% THD at unity gain) and two precision level detector sidechains in a 22-pin, "skinnydip" package, for use in stereo compression, limiting and gating, companding, and noise reduction. SSM products are available retail through Anchor Electronics, 2040 Walsh Avenue, Santa Clara, CA 95050; tel. (408) 727-3693.

Precision Monolithics, Inc./
SSM Audio Products
2076B Walsh Avenue
Santa Clara, CA 95050
tel. (408) 727-0917

CONTROLLERS

The Vocalizer 1000 ($299) is a human voice-controlled synthesizer that converts the pitch of sounds picked up by its microphone into a MIDI signal and/or one of 28 preset synth sounds including sax, piano, fuzz guitar, marimba, steel drum, "spirit," and "warp." The unit also includes a built-in, multi-track sequencer for recording your compositions or playing along with pre-recorded song sequences included with the Vocalizer 1000.

Breakaway Music Systems
PO Box 5621
San Mateo, CA 94402
tel. (415) 341-8300

The GZ-1000 ($3,995) is an 88-key MIDI controller that incorporates an adjustable, piano-style hammer action for a realistic feel. The unit's MIDI implementation allows the user to transmit many kinds of MIDI controller and System Exclusive messages. An edit footswitch transforms the entire keyboard into a control panel for data entry. A built-in 3.5-inch disk drive can load and save thousands of global MIDI setups. The rear panel includes two merging MIDI inputs, eight Out/Thru jacks, three programmable foot switch jacks, and four programmable MIDI foot pedal jacks. The GZ-1000 weighs 70 pounds.

Keyboard Technologies, Inc.
16137 Sherman Way, Suite 169
Van Nuys, CA 91406
tel. (818) 891-6999

The Akai MX76 ($2,695) is a 76-key, weighted-action master keyboard controller with aftertouch. Other features include four overlapping keyboard regions, each with independent control over key range, MIDI channel, program number, transposition, velocity control, and four programmable footswitches and foot controllers. The MX76 offers five selectable attack velocity curves, tempo and sequence start/stop control over external sequencers, and MIDI merging. All parameters are displayed on a 40-character by eight-line LCD display.

International Music Co.
Box 2344
Ft. Worth, TX 76113
tel. (817) 336-5114

PERIPHERALS

WonUnder Expansion Units ($379) allow the installation of any single MIDI expansion card that is 11 inches or less in length into Toshiba T5100, T3100, T1200, and T1100+ laptop computers.

Keyboard Technologies GZ-1000

AFTERTOUCH™

OFFICIAL NEWS FROM THE YAMAHA USERS GROUP

Software update and new voices announced for TX16W Sampler.

WHEN YAMAHA® INTRODUCED the TX16W Digital Wave Filtering Stereo Sampler, the whole idea of stereo sampling suddenly became more realistic—especially for musicians on a budget.

Now come two major improvements. First, there's been an update to the operating system, called Version 2.1, that streamlines the way samples are created and organized. And second, the TX16W voice library has been expanded to include over 100 disks, giving you a rich and varied selection of sounds.

Here's a quick look at the major enhancements built into the new operating system:

Mapping, the vital process of assembling several samples across the keyboard, is now totally automated. For example, if you sample a C, then an F, then a C one octave up, the TX16W will automatically place those samples in their proper place on the keyboard and name them appropriately. This is made possible by a new feature called Pitch Detection, which can analyze a sample and determine its pitch.

Another new feature, Global Editing, lets you edit parameters such as Attack Time over the entire keyboard range. Ending the tedium of editing individual timbres one at a time.

"Templates" are a new feature that provide for automatic mapping of non-pitched sounds, such as sound effects and drums. And a new Undo function does away with the old "buffer" system, making it easier than ever to change your mind after you enter a command.

The system update affects memory, too. Now it's allocated differently, so you can have 128 timbre locations, as opposed to the previous 64. When memory is fully expanded to six megabytes, that gives you eight banks, 256 performances and 512 waves.

Another improvement is Mono/Poly mode. It gives you enhanced performance when you're using certain controllers, such as the G10 and WX7, that work best when triggering a monophonic sample.

Transferring sounds between disks has been made much easier, too. Now, when you copy a performance, all the components that make up that performance are copied automatically.

NEW VOICES AND IMPROVED SYSTEM SOFTWARE FOR YAMAHA TX16W SAMPLER.

In keeping with Yamaha policy, Operating System 2.1 is being distributed free to all TX16W owners. You can get the update and try out the newly expanded voice library at any authorized Yamaha Digital Musical Instrument dealer.

Hot Tips

Transferring voices from file to file on a DX7IIFD disk without a RAM cartridge.

You can transfer voices, up to two at a time, between files on a DX7IIFD disk without using a RAM cartridge. Here's how: Load the first file (the destination file) into the DX7's internal memory and decide which locations you want to add the voices to. Then load the second file (the source file) into the DX7's internal memory, go into DUAL mode and call up the two voices you want to transfer. Next, load the first file into memory again. The two voices from the second file are in the keyboard's Play/Edit buffer. Now store the two voices to the predetermined locations in the first file and save the file back to disk.

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

YAMAHA

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

THE FIRST SWEEPSTAKES FOR PEOPLE WHO APPRECIATE ALL KINDS OF C NOTES.

There are two kinds of C notes. One comes out of a musical instrument. The other goes into your wallet.

If you're interested in either kind, Technics has something you will definitely appreciate. Our Digital Ensemble Sweepstakes.

The grand prize is $40,000 plus something else that sounds grand. The Technics Digital Ensemble. In addition, we're also giving away 5 digital pianos and 10 electronic keyboards. Or maybe you'll be an instant winner of a great looking Technics jacket, or a T-shirt.

But even if you don't win, you can't lose. Because you'll hear a single instrument capable of filling a room with the sound of a 20-piece orchestra. An instrument that can make even an amateur sound like a professional. And an instrument that sounds like a concert grand piano, but costs as much as $40,000 less.

Of course, we could go on and on about things like split key functions and the fact that it offers one touch play. But we figure by now, you're probably more interested in hearing our Digital Ensemble than reading about it. So ask your local participating Technics dealer for a free demonstration and a game card/entry form.

Whether your interest in C notes is purely musical or financial, it's an experience you'll find extremely rewarding.

Call 1-800-424-7669 for the Technics dealer nearest you.

Technics
The science of sound

WIN $40,000 AND A TECHNICS DIGITAL ENSEMBLE.

OFFICIAL RULES—NO PURCHASE NECESSARY. 1. Game card/entry forms available upon viewing demonstration of a Technics Musical Instrument at participating music stores. Answers to questions on [illegible] game card/entry form may be obtained from salesperson. For name and location of nearest participating store and alternate entry information, call 1-800-424-7669 between [illegible] November 30, 1988 from 8:00 AM - 10:00 PM Eastern Time and ask for Technics operator number 21. 2. To play: Rub off metallic panel on game card/entry form. You win prize indicated. 3rd and 4th Prize Winners, sign and complete winning game card/entry form including T-Shirt or Jacket size (Adult S-M-L-XL) and if applicable, salesperson's name and store name and address and mail via 1st class mail to: TECHNICS WINNER, c/o NATIONAL JUDGING INSTITUTE, INC., 1 Underhill Blvd., Syosset, NY 11791-3484. 3rd and 4th Prize winners are automatically entered in random drawing to award Grand, 1st and 2nd Prizes. Game ends 12/31/88. Prize claims must be received by 12/31/88. 3. Instant Win Prizes and Approximate Retail Value: 1 in 5 Grand Prize ($40,000) Technics Jacket, 1 in 840, 4th Prize ($100) Technics T-Shirt, 1 in 84. Odds of winning any instant Win Prize, 1 in 76. 4. In addition, 1 Grand Prize of $40,000 plus Technics Digital Ensemble along with 5 1st Prizes (Technics Digital Piano) and 10 2nd Prizes (Technics Keyboard) will be awarded in random drawing from all entries received. To enter, complete game card/entry form and mail to: TECHNICS SWEEPSTAKES, P.O. Box 3873, Syosset, NY 11775-3873. Entries must be mailed separately and received by 12/31/88. Drawing conducted from all correct entry forms received by N.J. Inc., whose decisions are final. Winners notified by mail. Unclaimed 3rd and 4th prizes will not be awarded. 5. Any game card forged, altered, defaced, mutilated, tampered with in any way, containing printing or other errors or obtained through other than intended channels is void. If for any reason, the computer awarding game pieces received for any one of the prize levels is greater than the number of pieces established for the level, those prizes in doubt will be awarded in random drawing from all winning game pieces received for that level. All responsibility assumed for late, illegible, mutilated, lost, misdirected or stolen entries or mail. Taxes are winners' responsibility. Prizes not transferable and no substitutions. 1 prize to a winner of sweepstakes prize per individual. Winners may be required to execute an affidavit of eligibility/release. 6. Open to U.S. residents, except employees and their families of MATSUSHITA ELECTRIC CORPORATION OF AMERICA, all dealers, affiliates, subsidiaries, agencies, printers and Don Jagoda Associates, Inc. Void where prohibited. Federal, state and local laws apply. 7. For list of major winners, send a stamped, self-addressed envelope to: TECHNICS LIST, P.O. Box 3880, Syosset, NY 11775-3880.

WRH

• WHAT'S NEW

The unit can be installed in less than 15 minutes, and the manufacturer expects to release a model for Zenith 183 and Epson Equity LT computers in the near future.

Connect Computer Company
9855 West 78th Street
Eden Prairie, MN 55344
(612) 944-0181

Connect Computer WonUnder

PUBLICATIONS

The MIDI 1.0 Detailed Specification, Version 4.0 is now available. The new document contains all the latest addenda to the MIDI spec, including the Sample Dump Standard (and extensions), MIDI Time Code, Registered and Non-registered Parameter Numbers, the MIDI Inquiry Message, and the latest controller and System Exclusive ID number assignments. The document is distributed exclusively through the International MIDI Association and is available for $25 to IMA members and $35 to non-members.

The International MIDI Association
5316 W. 57th St.
Los Angeles, CA 90056
tel. (213) 649-6434

SAMPLES

Essential Percussion ($1,600) is the second volume of the Master Sampler Collection and contains 240 MB of percussion samples on four 60 MB data streamers for the Fairlight Series III. The volume includes a large assortment (437 samples) of orchestral, ethnic, and popular percussion sounds, as well as rhythm guitar and bass sounds. All are pre-tuned and keyboard-mapped for immediate use without pre-production engineering. The package includes *ScoreKeeper*, a Macintosh database/applications program for organizing and auditioning Fairlight sample collections. Other volumes in the series include wind instruments and orchestral stringed instruments, with vocal and keyboard volumes to be released in the near future.

Sound Genesis Corporation
7807 Creekridge Center
Minneapolis, MN 55435
tel. (612) 944-8528

The Orchestral Collection (prices and availability set by dealer) is a new library of sample disks created for the Yamaha TX16W stereo digital wave filtering sampler by the company's R&D facility in London. Two complete 12-disk sets are available, each packaged in its own binder/disk holder with complete documentation. All of the sounds in the collection were sampled in the same acoustic space, facilitating the blending of sounds when creating ensembles. With the release of this new set, over 100 disks are now available for the TX16W.

Yamaha International
Box 6600
Buena Park, CA 90622
tel. (714) 522-9011

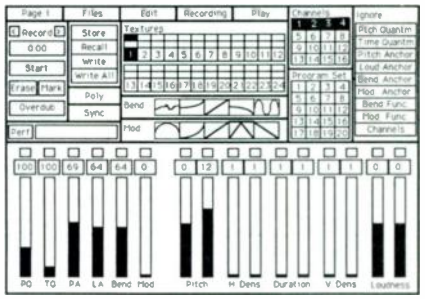
SOFTWARE

Sound Globs (approximately $150), an intelligent instrument program for IBM personal computers, allows users to create, edit, improvise, and perform music, using "textural" parameters such as pitch and time quanta; ranges of density, loudness, and duration; and probability distributions. Features include editable bend, mod, vibrato, and glissando functions; external MIDI control via any MIDI instrument or controller; standard MIDI File output; and a textural parameter editor/librarian.

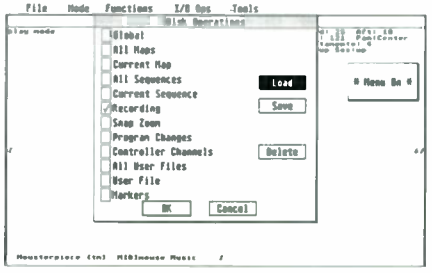
Twelve Tone Systems
Box 226
Watertown, MA 02272
tel. (617) 924-7937

Mousterpiece ($229.95) is a three-dimensional compositional tool that uses the computer mouse as a MIDI controller. Designed for the Atari ST, the program allows the user to create complex, polytimbral compositions in real time, or as sequences to be saved. Features include computer keyboard control of MIDI parameters such as Pitch Bend, Mod Wheel, Aftertouch, Sustain Pedal, and Program Change; the ability to trigger notes with the mouse while sequences are playing; MIDI sequence file load and save (for transferring sequences to/from external sequencers); and extensive mapping control/editing functions.

MIDImouse Music
Box 877
Welches, OR 97067
tel. (503) 622-4034



Twelve Tone Systems Sound Globs



MIDImouse Mousterpiece

The Mac PD Library is a series of public domain music programs available from the Music & Computers Group of the Boston Computer Society. The Li-

POWER TOOLS

For over four years we have designed the most powerful and flexible tools possible so that you can create your own musical statement. They may change the way you think about your music.

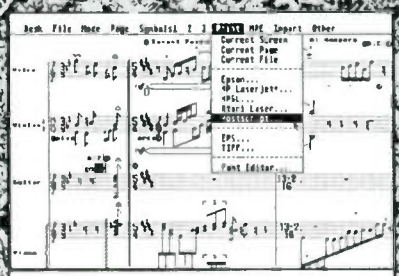
The Keyboard Controlled Sequencer, Level II, Tunesmith, Algorithmic Composer, and Fingers have all shaped the music of numerous creative artists from Elliott Sharp to Jan Hammer. Our Caged Artist and Lilley Freelance editor/librarians give you an intuitive and fast method of shaping and archiving sounds for almost any instrument you own. And if you want to delve into sound shaping at its deepest, Samplemaker will help you create and edit sounds never before heard, as well as transfer samples between the most popular samplers.

For those of you who need music transcribing and scoring for lead sheets or even professional music publishing, the Copyist Levels I, II, or III for Atari, IBM, and Amiga can fill all of your desires. With the Phantom SMPTE Interface for KCS or Level II Atari, you can synchronize your sequenced performances to audio or video tape in the most efficient possible manner.

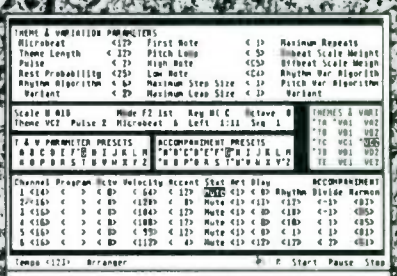
Our innovative Multi Program Environment for the Atari ST computers gives you the power of a digital workstation at a very low price. Products such as

Level II

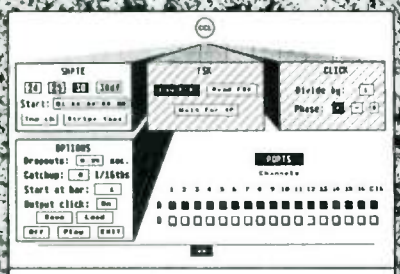
Samplemaker



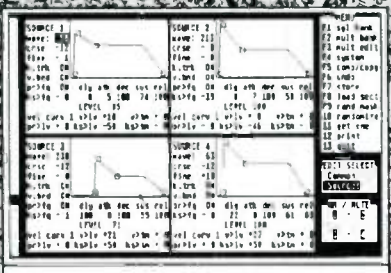
Copyist III



Tunesmith



the Phantom



Kawai K-1

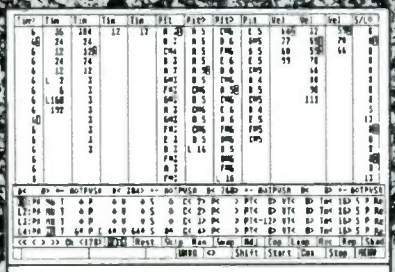
Intelligent Music's M will be supporting MPE in the near future. Multifinder support on the Macintosh and full multitasking ability on the Amiga give a similar power on these computers.

Dr. T's products are available for Atari ST/ Mega, Macintosh, Amiga, IBM PC, Commodore 64 and 128, and Apple II computers. Our sequencers are fully file compatible between computers and support industry standard MIDI files. The Amiga MRS, KCS, and Level II support the Internal Amiga samples.

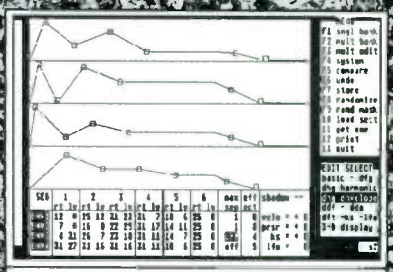
Dr. T's products are available worldwide, wherever fine music products are sold.

Dr.T's
MUSIC SOFTWARE
220 Boylston Street
Chestnut Hill, MA. 02167
U.S.A.

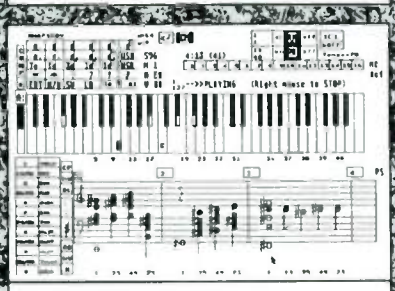
(617) 244-6954
FAX (617) 244-5243



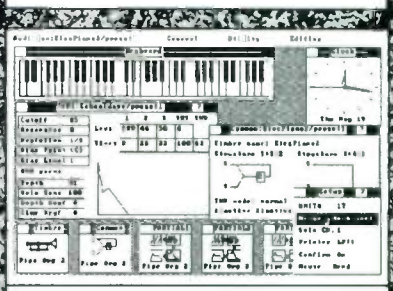
Fingers



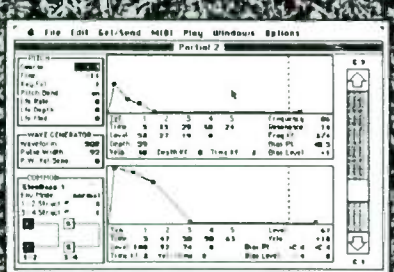
Kawai K-5



KEYS!



MT-32



Roland D-110

brary includes contributions from leading music software designers such as Laurie Spiegel, creator of *Music Mouse*; Jim Romeo, developer of *Perceive*; and David Zicarelli, who has written programs for Opcode and Intelligent Music; as well as demos and applications from many prominent software companies. Disks are available to BCS members for $5 (nonmembers $10), and the Library is being distributed on single-sided, 400K disks to ensure compatibility with all Macintosh computers. New compilation disks will be issued on a monthly basis.

The Boston Computer Society
One Center Plaza
Boston, MA 02108
tel. (617) 367-8080

This Disk Storage/Retrieval Program ($29.95) for Atari ST computers is designed to accept sequence data from the Alesis HR-16 drum machine. The program allows users to create and store an unlimited number of patterns that can be loaded in whole or in part into the HR-16 from the disk.

Player Software
199 N. El Camino Real
Suite F323
Encinitas, CA 92024
tel. (619) 753-1498

STANDS

The Ace X-Type ($48.95) is a single keyboard stand featuring a six-position height-adjustment clutch, steel legs and braces, and thick rubber end grips for stability on smooth floors and keyboard surfaces. The unit accommodates most standard-sized keyboards and is available in black and brushed aluminum finishes.

Ace Products Enterprises, Inc.
50 S. Center St., Bldg. 24
Orange, NJ 07050
tel. (201) 674-7017

The Deltex Column ($129.99) is a double-tiered stand that can support keyboards weighing up to 50 pounds each. According to the manufacturer, Deltex can be set up without tools in 45 seconds, and the stand includes a cord clip feature that conceals cords for a cleaner stage appearance. An optional tote bag is available for protecting the unit's black anodized finish.

Ultimate Support Systems
Box 470
Ft. Collins, CO 80522
tel. (303) 493-4488

Ultimate Support Deltex Column

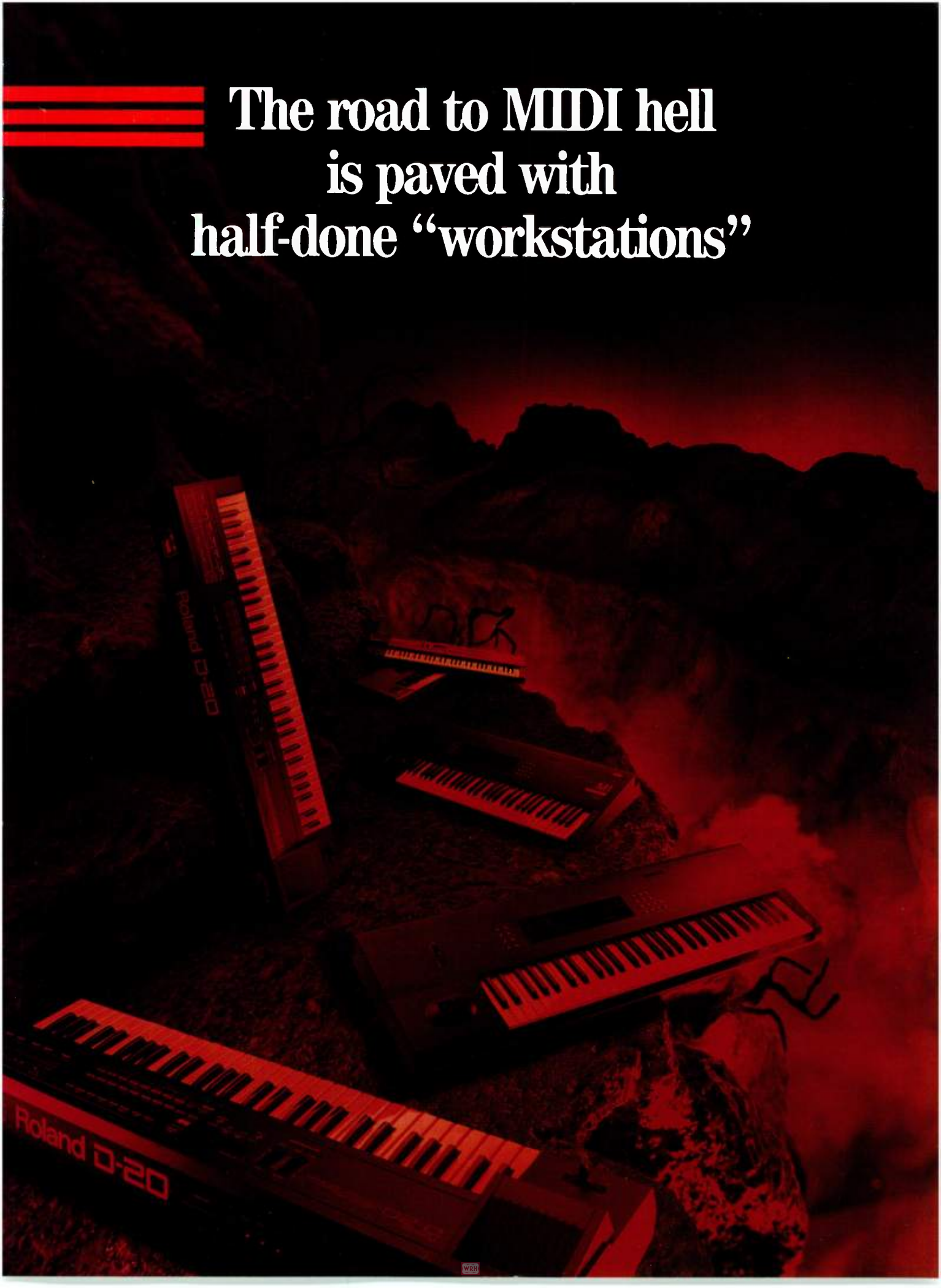
CALENDAR

Sony Video Institute will be conducting a series of seminars across the USA for the video professional. Those of specific interest to audio professionals are "Audio 1—Audio for Video Production" (November 28 and 29; Hollywood, CA; $595), "Audio 2—Post-production Audio for Video (November 30, December 1 and 2; Hollywood, CA; $775), and "Audio 3—Advanced Post-production Audio for Video" (December 6 and 7; Hollywood, CA; $795). Write or call for more information and a complete schedule of workshop dates, locations, and prices.

Sony Institute of Applied
Video Technology
2021 North Western Avenue
PO Box 29906
Los Angeles, CA 90029
tel. (213) 462-1982

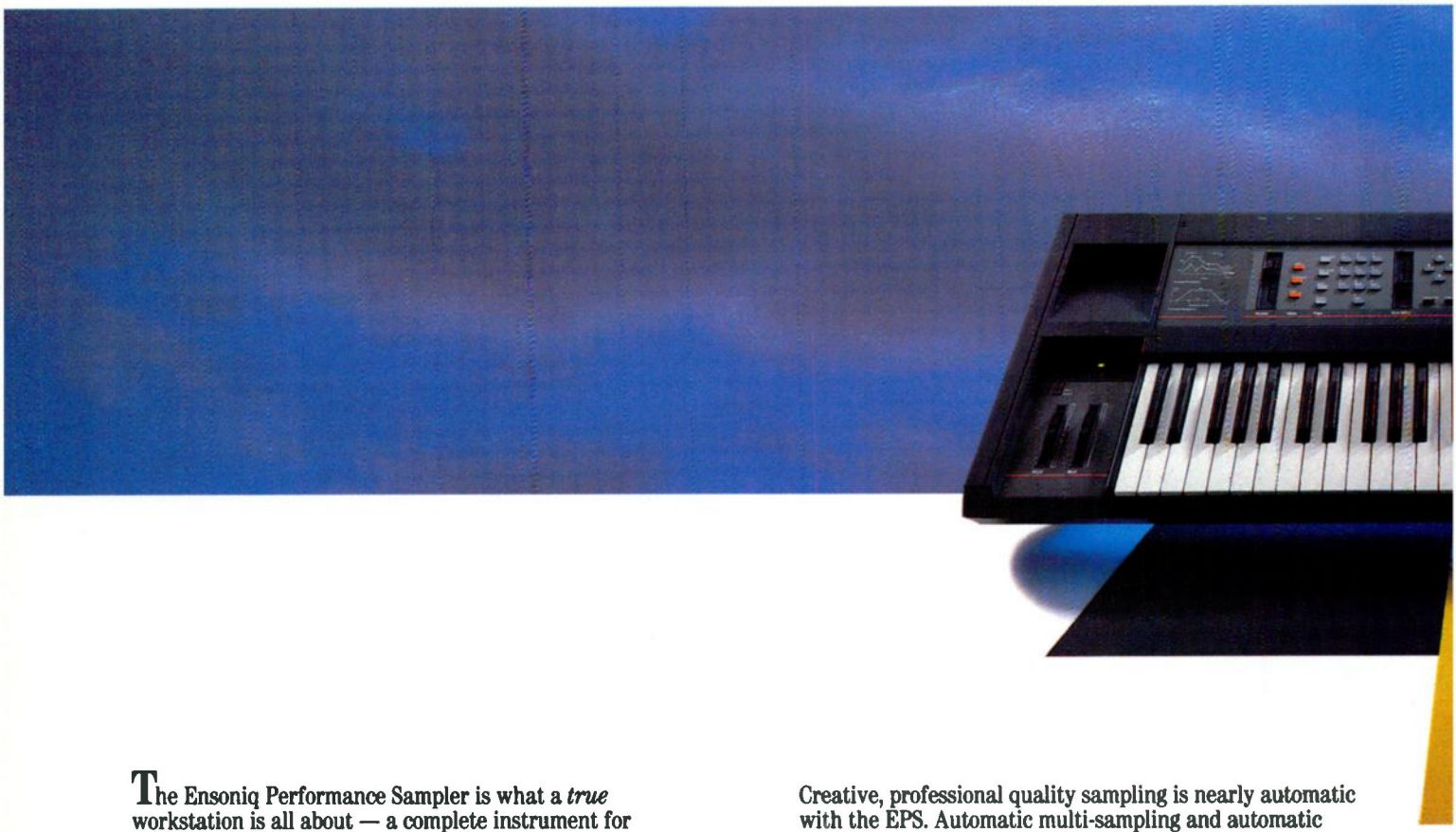
All prices are suggested retail prices as supplied by the manufacturers. All prices and specifications are subject to change without notice. Inclusion of product information and manufacturers in this magazine does not necessarily constitute a recommendation by Electronic Musician *magazine or its staff;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

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



The Ensoniq EPS . . .

where sampling, recording, mixing and contro



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.

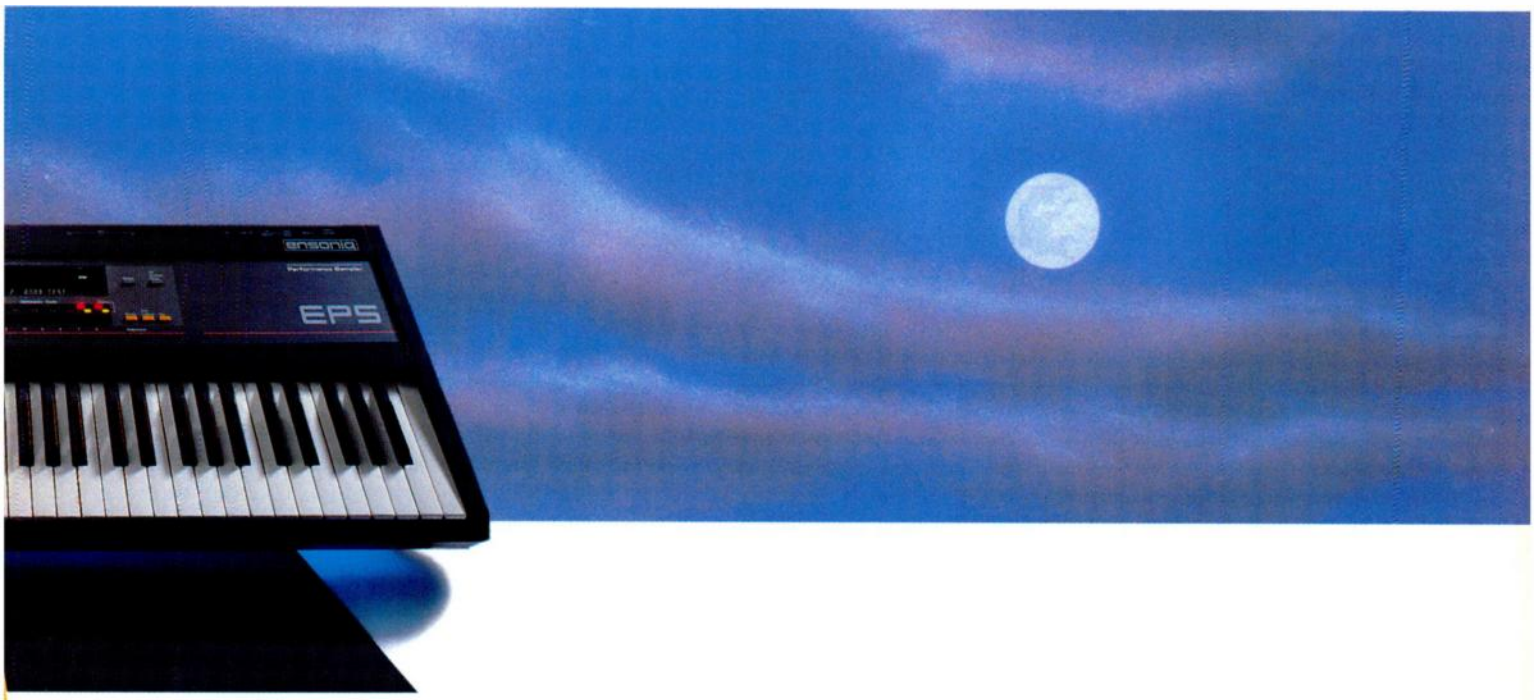
Creative, professional quality sampling is nearly automatic with the EPS. Automatic multi-sampling and automatic volume smoothing make it simple to map complicated sounds across the keyboard. Internal sample rate conversion helps you manage the memory. There's even a choice of 5 different types of crossfade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

The EPS handles all the MIDI modes with ease — especially the powerful Multi Mode that gives you simultaneous 8-channel MIDI communication. The EPS lets you instantly split, stack and transpose up to 8 separate MIDI instruments. This flexibility and the ability to save and load Sys Ex data make the EPS an ideal central controller for any studio.

Expand your EPS memory and outputs
The Ensoniq ME-1A memory expander doubles the internal memory and permits installation of an optional SCSI port. Connect a SCSI hard disk for blink-of-an-eye access (256Kbytes in under a second) to hundreds of sounds. Or connect the EPS directly to a computer to unleash the power of sound development programs like Alchemy, Turbosynth and Sound Designer.

Using external mixers or signal processors to their fullest is easy with the OEX-8 output expander. It gives the EPS 10 discrete and fully-programmable outputs. The OEX lets each instrument be assigned to its own output jack, no matter how many voices it uses.

The technology that performs for you
At Ensoniq, innovative technology and product quality are founding principles. The industry chose Ensoniq as the Most Innovative Keyboards for the past two years running. The EPS continues the tradition. Sample an EPS for yourself and see what its advanced technology can do for your music. Only at your Authorized Ensoniq Dealer.

For more information and the name of your nearest Ensoniq dealer, call toll free: **1-800-553-5151.**

ensoniq®
THE TECHNOLOGY THAT PERFORMS

ford to shell out $300 or more for it, and if they don't get a bootleg, they would just live without it.

What I mean by perspective is that it's possible you've been a big dog for so long you forgot what it was like to be a little dog. Remember playing club dates for $40 a night? Remember wondering if you even had enough gas in your junker car to get to the gig? Remember having the doors slammed in your face when you shopped tapes? We can't all be editors of a national trade publication and have everybody send us beta test copies of everything new. We "little dogs" have to save the pennies to buy all this new gear that you "big dogs" get free for endorsement compensation. Here in my area (like most others), there are five times as many bands as venues, and the competition is fierce. I've been out club-hopping on nights off and heard some of the really awful groups that get bookings, and every time I hear one of them I think about ads like your "if you copy software you are a slimeball" (*It didn't say that—Ed.*) promotion and wish I could fly you in so you could see how the other half lives.

I also refuse to wait tables or slice salami at the convenience store and wait for a label to realize they can't live without me. I am a musician, full-time, all day, every day. And the software manufacturers who put the big-dollar price tag on their stuff bring the piracy on themselves by gouging club players like myself for their product. Personally speaking, I *bought* my sequencer and MIDI interface —the only problem was deciding whether to skip the rent that month or not eat. This attitude has even begun to affect your magazine, as slowly those of us who can't afford to upgrade to the big-buck IBM systems are being eased out of your plans. I'm really sorry, Craig, but I am stuck with my Commodore 64 and Sonus software until somebody leaves me a lot of money or I hit a lottery. I'm sorry that I'm not a big-leaguer with a Mac or an IBM. I'd love to have one, but until I do, does that mean **EM** will ignore me? It's also obvious from software ads that the C-64 people are soon to be out of luck because all the software now is Macintosh or MS-DOS.

I may speak for many when I say that your comments and your value judgments with regard to "what kind of person copies software" are unjust and lack the empathy that I would expect from someone who allegedly has come up through the ranks as we all must. Not everybody has a rich daddy to buy them toys. Some of us have to earn our keep.

I invite any and all to respond, particularly software developers and local-level musicians like myself. This is a topic that I love to debate and am curious to see if I am alone in my opinions.

Eddie Anthony
PO Box 91
Wickliffe, OH 44092

Eddie—If I receive a review copy of software that I want to keep for my own use, I buy *it. Regarding endorsements, the only company that has permission to use my personal endorsement (not just a quote from a review) is Paul Reed Smith guitars, and I paid for my PRS guitar. You are wrong in assuming that I don't have to buy (and save up for) equipment and software; I do.*

Concerning remembering my roots, I want to see struggling software companies rewarded financially exactly because I do *remember what it was like to be struggling. I buy records instead of taping them because I know how tough it is to try to make a living from playing music. In addition to covering high-end gear,* **EM** *publishes do-it-yourself projects, free software, and articles on how to get the most out of "dinosaur" gear precisely because* all *the editors working here remember very well what it was like to be frustrated by a lack of cash, and the relief these kinds of articles can bring.*

Regarding how the money to buy software came into my life, the answer's pretty basic: I work—no inheritances, no lottery, no rich daddy (I do owe a tremendous debt to my father, but it's not a financial one).

We all make trade-offs in life. One of the benefits of pursuing a career with the press is that you sometimes get to review new software and other goodies. In your career, you get to play music all the time. You shouldn't resent those whose jobs have a different set of fringe benefits from yours; either appreciate what your job does *offer you and quit complaining, or change jobs.*

Regarding C-64 coverage, we've published a lot of do-it-yourself software for that computer, since so many of our readers own one (even if they also own something else). Check out "KeyFrets" in the August '88 issue—it's great C-64 software with no commercial equivalent, and you can type it in for free.

Concerning software prices, software developers put a "big" price tag on software because it is expensive and time-consuming to develop and debug (try writing a sequencer program sometime), and the market is very small. Companies aren't going to lower their prices as long as people steal software; otherwise, they run the risk of going out of business. If consumers support these companies, they can afford *to take a gamble and lower their prices.*

You say you're "stuck" with a C-64 and Sonus sequencer (my sequencing combination of choice prior to about two years ago) until somebody leaves you a lot of money or you hit the lottery. Have you considered working *for what you want? Maybe you* should *get a part-time job waiting tables, or working at a convenience, record, or hi-fi store. During those times when I couldn't support myself in my chosen profession of music, or buy the gear I felt I needed, I did everything from fixing transistor radios, to working behind the counter at Radio Shack, to doing incredibly tedious paste-up work. You do what you gotta do. (By the way, the last musician I worked with who was "stuck" with a C-64 and Sonus sequencer managed to cut a best-selling album for a national label with that setup; don't sell your system short.)*

It's unfortunate that being a full-time musician does not currently provide you with the income or lifestyle you would like, but that's hardly the fault of software writers, so don't take out your financial problems on them. No one's holding a gun to your head; you *decided to play in a tough, competitive, low-paying game, which I* know *is not easy—I still play it myself. Your problems are not due to a magazine's editorial stance or to software developers. Rather, you'll just have to accept that it is very, very difficult to make a good living by playing music full time. This is a problem faced by* all *freelancers, not just musicians, so don't feel singled out.*

Curiously, although you defend those who steal software, you state that you did indeed pay for your sequencer and MIDI interface. Just think if everyone followed your example and paid for their software: copy protection would be a dead issue, program crashes would be far less frequent, and software would appear on the market sooner and cost much less. We'd sure like to see all these things happen, which is why we started the "stealing software is wrong" campaign. If you have a better way to end copy protection and lower software prices, tell us.

CORRECTION

In our September "What's New" column, we inadvertently listed the wrong distributor of Big Band, *a remarkable new algorithmic composition program for the Atari ST and Commodore Amiga computers. Developed by the French software company Digigram, the program is available from the Imagine Music Group, 751A South Kellogg Ave., Santa Barbara, CA 93117; tel. (805) 683-3340.* ■

Sample an EPS... the complete workstation. See your Ensoniq dealer for a free two-day road test

Take an Ensoniq Performance Sampler home for a free two day road test, compliments of your participating Ensoniq dealer. See for yourself how the EPS, with its advanced sampling, recording, mixing and control features can put you on the fast track to creative freedom.

You'll discover an instrument that can do nearly anything with sound — better, faster and with more expression than any other keyboard you've used. The EPS Sound Library sparkles with realism and character. "Expert system" auto-looping simplifies sampling. The on-board sequencer is so advanced, it's like having an automated 8-channel mixer and 16-track recorder built right into your instrument.

Ask your authorized Ensoniq dealer for an EPS Road Test. He'll send you home with a fully-equipped demo unit and an Audio Tour Package that will show you how the EPS can help you make better music. For more information and the name of your nearest authorized Ensoniq dealer call toll free: **1-800-553-5151.**

ENSONIQ EPS ROAD TEST

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THE TECHNOLOGY THAT PERFORMS

FINALLY, 8 TRACKS IN THE PALM OF YOUR HAND.

Others have tried. But 8-track capability on a standard audio cassette remained elusive. Until now.

Introducing the remarkable new 238 Syncaset® from Tascam, the company that invented portable, multi-track recording.

If you've been working with a 4-track for pre-production composing or demos, the 238 doubles your capacity right now. Running at 3¾ ips, and taking advantage of Tascam's proprietary head technology, the rack-mountable 238 gives you sound you won't believe was recorded on a standard audio cassette.

But the 238 doesn't stop there. It's fully synchronizable with MIDI/SMPTE time codes, it's got a serial port for computer interfacing and it's designed with open architecture for software upgrades.

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

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

TASCAM

THE ATARI ST POWER USER, PART 1: THE HARDWARE

Get the most musical muscle possible from your Atari ST with this two-part **EM** special. This month: power hardware.

By Jim Johnson

Atari's new Mega 4 PC.

If an Atari ST is your primary musical instrument, you probably feel a little frustrated when you read all the neat things written about the Macintosh, another favorite of musicians. After all, the ST's hardware is *supposed* to be inherently more powerful than the Mac's, and the ST is *supposed* to be much easier to program, so why does no one write articles about pushing the ST to its limits?

There are two reasons for this. One is reputation. The Macintosh is an established machine—lately, even respected in business circles—so it gets a lot of coverage. The other reason is a little more important and is something you won't see mentioned very often in the Atari press (which tends to ignore problems in the ST series in favor of intense whining about the proliferation of Macintoshes and computers in various shades of blue). The ST is simply not as standardized nor as well-supported as the Macintosh. While Apple (the Mac's manufacturer) bends over backward to get its high-paying customers all kinds of SoftWidgets to increase their productivity, some aspects of the ST's operating system (not to mention Atari's user support) almost seem designed to make life tougher for the user.

So, what's a musician to do? Live with the inefficiency of the ST, while Macintosh owners gloat over their computer's ability to do everything but walk the dog? Fortunately, though it's not necessarily simple to create a *Power ST* system, it's definitely possible. But before I show you how, let's talk about why it's not as easy as it is with the Macintosh.

THE ROADBLOCKS

As Atari worked to release the ST, it was in an intense race with Commodore, which was preparing to release a similar machine called the Amiga. Atari was also in a patent infringement lawsuit regarding GEM (Graphics Environment Manager), its user interface. The result was a late release of a GEM that was terribly slow and contained some nasty bugs.

There's more to this than bugs, though. While the Macintosh forces programmers to use a single user interface, the ST lets programmers create programs entirely based on GEM or design an interface completely from scratch. (They can even write programs that use a set of typed commands—called a *command line interface*—as used by IBM personal computers.) Some programmers decided to live with GEM and its quirks; others rewrote portions of GEM to be more conducive to real-time programs such as sequencers. Still others elected to write their own user interfaces from scratch. This last approach, creating a new user interface to meet the needs of a particular program, is ideal for a programmer but a real problem for the user, who could be forced to learn a whole new user interface for each program.

So while Macintosh programs are all written the same way according to standards set down by the manufacturer, ST programs are written using a mishmash of "better ideas," some of which truly are, and some of which are simply an excuse for a programmer's laziness. Consequently, while Macintosh programs fit together like Lego pieces, ST software—music, word processors, databases, telecom programs, and even games—is more like a toybox full of mismatched parts. But as any child knows, you can still have a lot of fun with toys that don't work together.

Though there are many mutually incompatible programs out there, there also appear to be enough monkeys with enough STs and time on their hands to have produced, if not the complete works of Shakespeare, at least a way around most of the problems in this system. I've found a number of auxiliary programs (most of them public domain, and therefore accessible to anyone with a modem or user's group membership) that ease the incompatibility and fulfill the promise implied by the ST's hardware. Next

month's article will cover these programs in depth, but prior to the software, the Power ST system needs hardware.

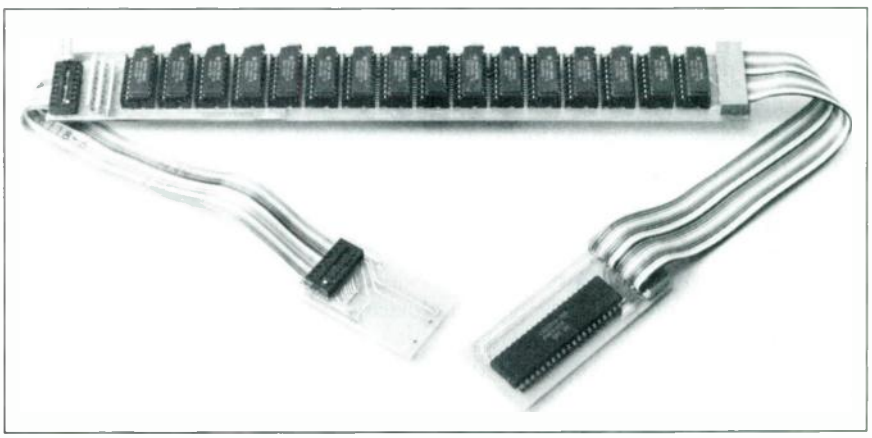
MEMORY GOOD, MORE MEMORY BETTER

Atari has released a number of versions of the ST, from the original 520 on up to the new 4-megabyte Mega machines. While it may seem extreme, especially from one who swore by the Commodore 64 just a few years ago, I believe that an ST with less than one megabyte of RAM is not a suitable machine for a power system. Only a few programs require the full meg, of course, but desk accessories and memory-resident AUTO folder programs eat memory like popcorn, and with the new multi-program musical "workstation" environments, even one megabyte can be fairly limiting. Fortunately, a number of RAM upgrade kits are available that put up to 2.5 MB in the 520 or up to 4 MB in a 1040. See the "Hardware Manufacturers" sidebar for a list of some of the more popular of these kits.

Supra Corp.'s 10 MB floppy and 60 MB external hard drives for the ST.

No serious ST user should be without a hard disk. Atari's 20-megabyte hard drive is adequate for starters, and Supra also makes a highly respected 20-megabyte drive. I use the Atari drive in spite of its substantially larger size. Its drive mechanism can easily and inexpensively be replaced with a 40-megabyte (or larger) drive. The Winter '87 edition of *STart* magazine gave complete instructions on how to do this; I've seen a local computer store advertising the conversion for $299 including all parts, and if you're willing to take out an ad in the classifieds to sell your old 20-megabyte drive mechanism, the cost can drop to below $200, if you do it yourself. It's also possible to "roll your own" hard drive using standard IBM-compatible hard drive mechanisms along with a small conversion board manufactured by companies like Supra and ICD. The July '88 issue of *ST Log* has a fairly entertaining article on building an ST hard drive from IBM components. ST hard drives are not SCSI compatible, so you won't be able to use any of the many inexpensive SCSI drives on the market, but some drives for the ST do have SCSI adapter ports that allow you to connect SCSI drives for more storage.

If you're a true memory pig, hard drives are available from Supra and others in capacities up to 250 megabytes. Hardcore sampling enthusiasts especially should seriously consider a disk this big. Astra recently announced a rack-mount hard drive (in 60- and 120-megabyte configurations) for the ST that's designed with MIDI musicians in mind. There are a few limitations to using enormous hard drives with the ST, though. Thanks to a bug in the ST's operating system, no logical drive can be larger than 16 megabytes. This means that larger physical drives must be "partitioned" into smaller logical drives. The ST allows the use of up to 16 logical drives, though Atari has reserved the last



EZ RAM II, a solderless .5 MB to 2.5 MB upgrade for the Atari from Terrific Corp.

eight of them for expansion. This means that if you follow Atari's recommendations, and if you have a single floppy drive, you can access a maximum of only 112 megabytes. Still, many hard drive vendors supply drives with all 15 partitions in use, and there's no real reason not to go all the way if you must. The only disad-

HARDWARE MANUFACTURERS

Astra Systems
(Hard drives)
2500 S. Fairview (Unit L)
Santa Ana, CA 92704
tel. (714) 549-2141

ICD
(Hard drives and interfaces)
1220 Rock Street
Rockford, IL 61101-1437
tel. (815) 968-2228

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

4 Megabyte Computers
(Accelerator boards)
109 W. Bay Area
Webster, TX 77598
tel. (713) 338-2231

Navarone Industries, Inc.
(Clock cartridges)
454 Kenneth Avenue
Campbell, CA 95008
tel. (408) 378-8177

Supra Corporation
(Hard drives, interfaces, modems)
1133 Commercial Way
Albany, OR 97321
tel. (503) 967-9075

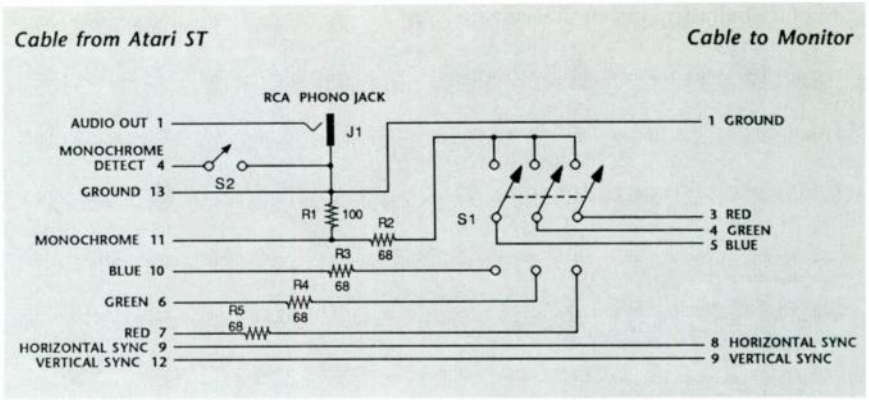
Tech-Specialties Company
(Hard drive kits, memory expansions)
1022 Hodgkins
Houston, TX 77032
tel. (713) 590-2068

Terrific Corporation
(Memory upgrades, clocks)
17 St. Mary's Court
Brookline, MA 02146
tel. (617) 232-2317

vantage is that you won't be able to make use of the new high-speed washing machine attachment or whatever it is Atari has in mind for these logical drives.

MODEM: THE KEY TO FREE PROGRAMS

Modems, which allow a computer to transfer data via phone lines, are common power items. The best of the many benefits of a modem is access to the vast libraries of public domain programs found on the various subscription information services such as CompuServe, Delphi, and GEnie. The next best reason is the auto-



Designed by Michael P. Odegard, this monitor interface allows an Atari ST to drive multi-sync monitors such as the Sony CPD-1302. All resistors (R1, 100 ohms; R2-5, 68 ohms) are 0.5W/5%, Switch 2 is TPDT, and J1 audio out is a ¼-inch or RCA jack.

dialer utility that lets you dial any phone number on your list at the touch of a button. Atari's 1200 Baud modem lists for $99, and Hayes-compatible 1200 Baud modems that cost even less populate the classifieds. So if you've invested thousands of dollars in synths, samplers, and computers, there's no excuse for not getting a modem. One caution, though: don't let anyone tell you that a 300 Baud modem is adequate or that a 2400 Baud device is necessary. 1200 Baud is the current standard; 300 is much too slow, and the surcharges most services tack on for 2400 access can wipe out any benefits that the higher speed brings. This will change with time, so if you're reading this in a back issue some time in the early '90s, disregard that comment.

WANNA ROCK? GET A CLOCK

One absolutely essential, but easily overlooked, piece of hardware in a power system is the battery-backed clock. The Mega machines have a built-in clock, but 520 and 1040 owners need to buy either a clock cartridge (which plugs into the ST's seldom-used cartridge port) or an internal clock chip, at about $39. Why is the clock necessary? Just wait until you back up your hard disk with the time set incorrectly, and you'll never ask that question again. The ST, like most other computers, "time stamps" each file when it is created or updated, and if the dates on your hard drive files are incorrect, you may end up backing up files more often than you need to—or even worse, not backing them up *enough*. Some hard drives and memory enhancements for the ST con-

100% Real.

It's true. Nothing sounds like the Alesis HR-16 Digital Drum Machine. Except real drums.

16 Bit technology. Incomparable 20kHz frequency response. No wonder the music press calls the HR-16 "staggeringly realistic".* There's plenty of kicks, snares, toms, hi-hats, cymbals... and a bunch of percussion and rhythm toys. 49 sounds altogether. All tuneable and touch sensitive. Each one unique and dripping with personality. Record-quality sounds. 100% real. And, you can combine them endlessly.

Own a drum machine already? Put it in the drum machine museum. Permanently. The HR-16 is the one you wish you had anyway. And it's so affordable you can buy two. You know you want real drums. So go ahead, get the Alesis HR-16. The industry standard. The 100% real choice.

*David Crigger in Home and Studio Recording

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tain battery-backed clocks that will do this job without an additional purchase.

MAXIMUM ACCELERATION

A few upcoming hardware enhancements promise to push the ST to the front of the computer power race. An accelerator board that doubles the ST's clock rate (the speed at which it does its calculations) should increase the operating speed about 70%. Another will let the ST access up to *15 megabytes* of RAM. When accelerator boards actually make it to the market, rest assured one will find its way into my system, and an evaluation of it will find its way into **EM**.

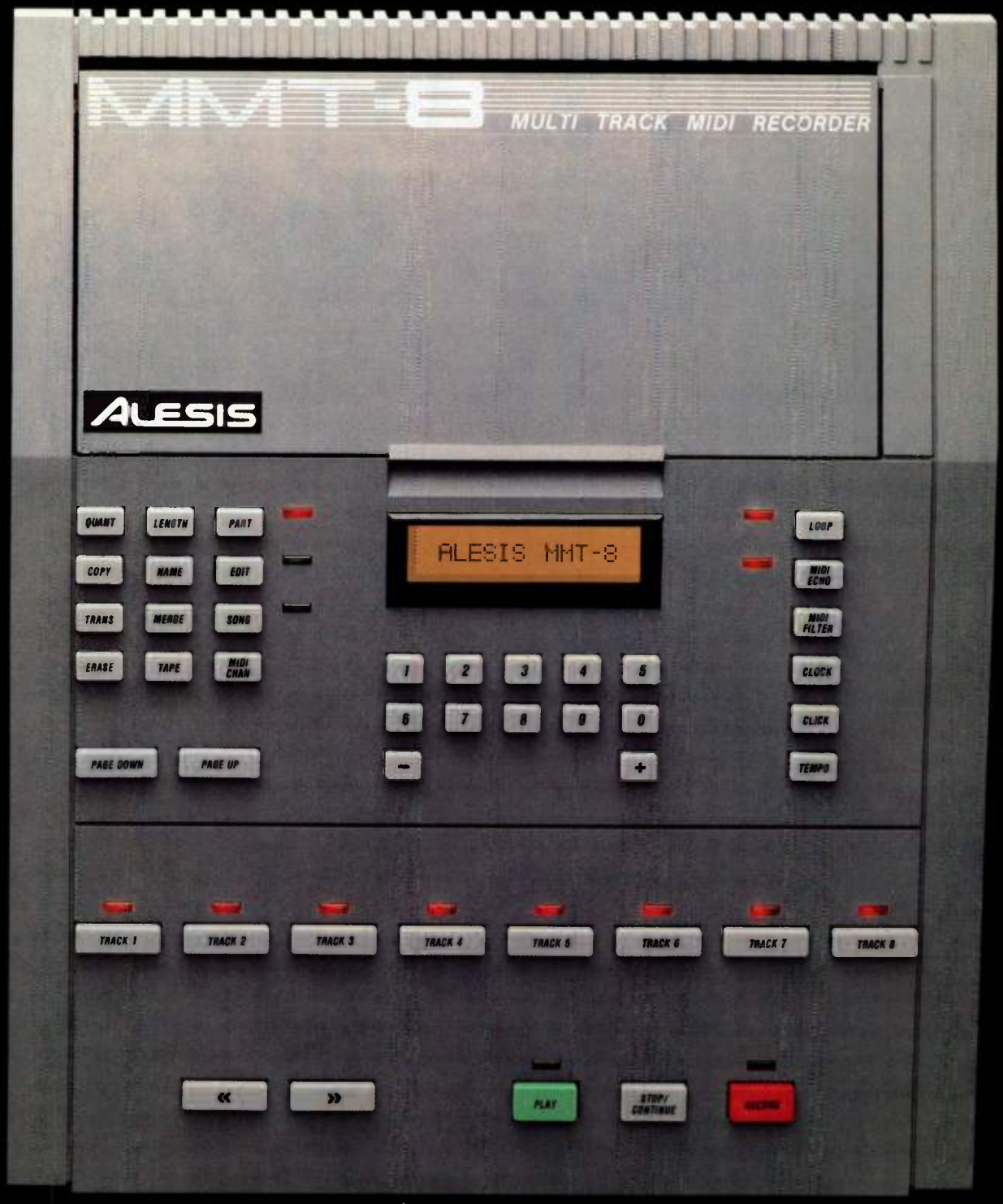
If you've invested thousands of dollars in synths, samplers, and computers, there's no excuse for not getting a modem.

THE POWER MONITOR

The final element in a power system is the monitor: use either an Atari monochrome monitor or a multi-sync monitor (such as those made by NEC and Mitsubishi) and adapter board. I suffered with a color monitor for about a year before I broke down and got a monochrome monitor. The colors are great for games and other trivial applications, but if you're doing serious work at the computer, your eyes will be much happier with a nice, crisp, monochrome display. The ST won't drive multi-sync monitors directly, but the necessary interface circuitry consists of just a few resistors. If you're handy with a soldering iron (or know someone who is), you'll be able to enjoy both color and monochrome displays without the problems of using two monitors.

(That's the basis: a select list of the hardware that will prepare your ST to become the musical assistant you've always wished for. Next month, we'll cover the other side of the power user coin: the software.—Ed.)

Jim Johnson *learned to play synthesizer in the wilds of Kodiak, Alaska. While he misses the trees and snow, he finds Arizona more conducive to earning a living.*



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Sixty-four different effects combinations that is—and all of them available at the touch of a pedal. The new BOSS ME-5 provides guitarists with incredible power—five different effects: Compressor, Overdrive/Distortion, Equalizer, Chorus/Flanger and Digital Reverb/Delay—all in one compact programmable unit under foot pedal or MIDI control.

With the ME-5 you can custom-create 64 different program settings using any combination of effects plus different control settings for each effect. Then, in live performance, each program can be called up simply by pressing a foot pedal-switch. In addition, the ME-5 is equipped with MIDI, allowing it to perform automatic program changes when connected to a MIDI sequencer.

LED's light up to show which effects are on with each program, and an effect can be turned on or off just by pressing its pedal.

The built-in noise suppressor in the ME-5 eliminates line noise, even when you're using high-distortion settings, perfect even for high performance applications like studio recording. Other unique convenience features on the ME-5 include Tuner Out and Headphone Out jacks, as well as a jack to connect an EV-5 Expression Pedal to vary the output of the flanger or chorus.

Finally, true to our ever-creative nature, BOSS has brought out the ME-5 at an unbelievably low price, just $825.* And that's a lot less than you'd ever pay for five quality effects alone, not to mention the program memory. So go down to your BOSS dealer and test drive the ME-5. Push down on a pedal and see how it feels to zoom from 0 to 64. BOSS Products, 7200 Dominion Circle, Los Angeles, CA 90040 (213) 685-5141.

*Suggested Retail Price

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CREATIVITY IN SOUND DESIGN

MIDI/CV Conversion with the Vesta Fire MDI-1

If you'd like to use your warm-sounding, pre-MIDI, analog synthesizer with your MIDI sequencer or keyboards, here's how.

John J. Volanski

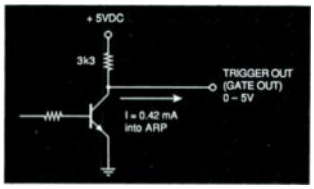

FIG. 1: MDI-1 Gate output stage.

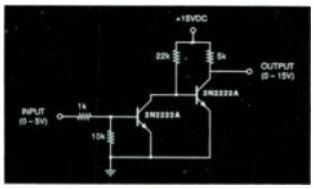

FIG. 2: Level-shifting circuit.

Many of us have hung on to at least one favorite analog synth depite being deluged with the wave of ever-evolving digital synthesizers introduced over the last few years. (If you don't have a pre-MIDI analog synth, you can often pick one up for a veritable song and dance in **EM**'s classifieds or from the listings in your local "shopper's gazette.")

In order to integrate a synthesizer that's based on control voltages rather than MIDI into a MIDI system, we need one of those mystical black boxes that will convert MIDI data into the analog format CV (Control Voltage) and Gate signals required by most pre-MIDI synthesizers. Control voltages are used in analog synthesizers to control various parameters, such as frequency and amplitude, in a linear or exponential manner. Gate signals determine when a parameter is activated and the duration of activity. For a functional description of typical pre-MIDI analog synthesizers, control voltages, and gate signals, see the first chapter in *MIDI For Musicians*, by Craig Anderton (available from EM Bookshelf; see page 6 of this issue for details).

I purchased the Vesta Fire MDI-1 MIDI-to-CV/Gate interface converter for about $150 from MIDCO, International, the United States distribution and service point for Vesta Fire equipment. (MIDCO, International, PO Box 748, Effingham, IL 62401; tel. [217] 342-9211 or [800] 637-9705. Contact Larry Morton, Vesta Fire Product Manager.) My intent was to connect an old ARP Odyssey to my Yamaha DX11 synthesizer using the MDI-1 as the interface.

The MDI-1's metal case is black (which makes it a bona fide "black box"), so I figured I was on the right track. I connected the MDI-1 between the DX11 and the Odyssey, connected the Odyssey to my mixer, powered up all the equipment, hit a note on the DX11, and. . . nothing came out of the ARP. Had I just wasted $150?

ABOUT THE MDI-1

The Vesta Fire MDI-1 was designed to interface between a MIDI synthesizer and the Vesta Fire DIG-420 (a digital delay/sampler that allows the pitch of the sampled sound to be altered in three octaves via a CV/Gate synthesizer). The MDI-1 is a handy little unit. It has the following modes of operation:

1. MIDI Initialize: By hitting just one note on your MIDI synth, this mode automatically determines the MIDI channel, MIDI mode, and highest MIDI note (called the base note) you will be using when controlling your CV/Gate synthesizer. (Note that the MDI-1 operates within only a sliding, three-octave window. You must tell it what the highest note of that window will be.)

2. MIDI Play: This allows a CV/Gate-equipped synthesizer to be played via MIDI. This is the main mode used when slaving a CV/Gate synth to a MIDI master. The voltage provided by the MDI-1's CV output can be trimmed approximately ±0.1V with a tuning control, thus controlling the analog synth's pitch. There is also a volts/octave potentiometer that adjusts the scaling of the CV output.

3. MIDI Record: This mode causes the Vesta Fire DIG-420 to start sampling when it receives a MIDI Note On signal.

4. Trigger In Record: This mode causes the Vesta Fire DIG-420 to start sampling when triggered by a signal connected to the MDI-1's Trigger In jack.

5. Trigger Out Polarity: This lets you change the Gate Out polarity from positive-going to negative-going. (Your analog synth may require a negative-going gate instead of the more standard positive-going type; this mode will accommodate it.)

Modes 1, 2, and 5 have fairly obvious uses, as described in this article. Mode 3 appears to be useful only in conjunction with the DIG-420. Mode 4 can be used to drive a MIDI drum machine via older

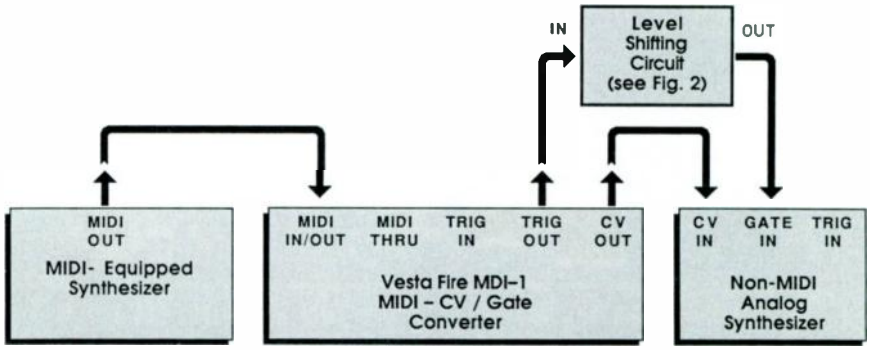

FIG. 3: System interconnection.

● MIDI TO CV

synthesizers, sequencers, or drum machines that provide trigger outs (don't throw that old equipment away!). In this mode, the MDI-1 will transmit a MIDI Note On/Off of the base note selected in Mode 1 for each trigger that appears at its trigger input jack.

UNDER THE HOOD

In the lab, I collaborated with a fellow electrical engineer/musician, Bob Bockstahler, to take the enclosures off the MDI-1 and the Odyssey and reconnect the cabling between them. We powered up the units and probed the MDI-1's CV output with an oscilloscope. It seemed fine: the voltage was increasing or decreasing in accordance with the notes being played on the DX11. But when we probed the MDI-1's Gate signal, we found that the Odyssey would not trigger unless the triggering signal's amplitude exceeded 4.4 volts. Bad news in MIDI-land: the Odyssey's Gate input was presenting too much of a load to the MDI-1's output circuitry, which was not powerful enough to handle the load without sagging slightly. (Note: the MDI-1 calls one of its outputs a "trigger out"; it's actually a Gate Out type of signal as far as any ARP synthesizer is concerned.) **Fig. 1** shows the MDI-1's existing Gate output circuitry.

To increase its available output, we needed a level-shifting circuit to boost the gate comfortably above the Odyssey's 4.4-volt trigger threshold. The level-shifting circuit in **Fig. 2** takes the 0- to 5-volt MDI-1 Gate signal and transforms it into a 0- to 15-volt trigger. The Odyssey's Gate circuitry won't ignore that! (This will not harm the Odyssey, as its analog circuitry operates from an on-board ±15 VDC power supply. *Do not* use this level-shifting circuit to drive TTL-type components unless you want to let the smoke out of them; the stock output will probably work satisfactorily.) You could probably accomplish the same effect using an op amp for level shifting (amplification), but the two-transistor circuit given above is cheap and simple.

We hooked up all the equipment as shown in **Fig. 3**, applied power, and this time experienced success. A quick check with the oscilloscope showed that the Odyssey was pulling the level-shifting circuit output down to 10.0 volts, which means the Odyssey was drawing about 1 mA into its Gate input (calculated by observing a 5-volt drop across the 5k resistor in the output collector leg of the level-shifting circuit). This was still well

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above the magic 4.4-volt threshold, and all was well.

Now for the finishing touches. I installed the level-shifting circuit inside the ARP Odyssey, since the ARP's warranty is long gone (and so is ARP, for that matter). The installed circuit is powered by +15 VDC from the Odyssey's on-board power supply. Make sure you use the correct power supply voltage, as -15 volts will ren-

My intent was to connect an old ARP Odyssey to my Yamaha DX11 synthesizer using the MDI-1 as the interface.

der the circuit inoperable. The beauty of the level-shifting circuit is that it is transparent to the user and to any other 5-volt, trigger-out units you might connect to the Odyssey.

The circuit has no critical parts in it. I built it on a 1.5-inch, square piece of perf board and mounted it on a single standoff near the Gate Input jack inside the Odyssey. You should be able to scrounge the circuit components from your junk box, as I did. If not, you can buy all the circuit components you need from Radio Shack (except for the MDI-1, of course) for about $2.50.

The MDI-1 provides a simple, easy way to bring the thundering bass of a Minimoog, the delicate growl of an ARP Odyssey, or the extensive cross-modulation capabilities of Korg's Mono/Poly into a current MIDI system. However, the MDI-1 is not compatible with synthesizer oscillators that require linear control voltage scales, such as early PAiA, Korg, and some Yamaha units. Fortunately, these are far less common than the exponential types accommodated by the MDI-1.

John J. Volanski *has an MBA and a BSEE and works as an engineering manager at Ball Systems' Engineering Division in San Diego. His home studio includes a DX11/TX81Z/RX17 combination driving an ARP Odyssey through a Vesta Fire MDI-1 MIDI/CV converter.*

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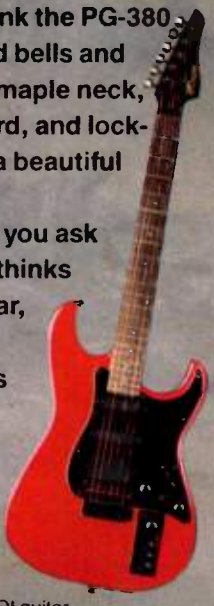
Which probably says it best.



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CREATIVITY

RECORDING *and the* CONSCIOUS MIND

This article might skirt the borders of metaphysics. Then again, so might music.

BART DE HAAS

Before entering the world of computers, I spent 27-odd years (27 is an odd number, but the years were odd as well) in recording studios as an artist, musician, and, finally, a record producer. During those years I became intrigued by the relationship between a musician's state of mind and how this affects the musician's performance. I observed enough consistency in these effects to catalog them in a somewhat scientific manner, and when I started producing records, I used this knowledge to enhance the productions. For both the philosophical and the practical consideration of **EM** readers, I'd like to describe what I learned (which has become even more important to remember in these days of computer-aided music-making). Let's start with a few hypotheses:

1. Engaging in thinking at the moment of creating and the act of creating itself seem to be mutually exclusive.

2. Music originates from a source other than the musician. The musician is a receiver instead of an originator.

3. The role of music is to be a framework for expressing emotions that exist in this world.

TO THINK OR NOT TO THINK . . .

It sounded like it should be music, but it wasn't.

There is a principle in computers called Direct Memory Access (DMA), in which a peripheral device (like a disk drive) can tap directly into the computer's main memory without being slowed down by

By Michael Stewart

having to go through the main processors. I believe that when we are consciously thinking, it interrupts our natural DMA and impedes access to our main memory and to the music.

Have you ever tried to remember a name but couldn't? Then, a couple minutes after you gave up trying to remember consciously, the name "popped" into your mind? From what I've observed, the more a musician (including myself) *thinks* about what he or she is playing, the less like music the music sounds. I have seen countless situations where a player would be *trying* very hard to overdub a part, and it just wasn't happening. The music would feel contrived and disjointed, as if the track were separate from the overdub, and there was no *musical* relationship between the two, just a temporal one. The musician might even *know* that the music was not happening and be frustrated as well.

I believe the root of this problem occurs when a musician is *thinking* and not *listening*. As a producer, when I felt that happening, I would stop the musician and ask what he ate for breakfast (he would usually give me a look like I had a petunia growing out of my head). Then I'd say, "Stop thinking about what you're playing. Just *listen* to the overall sound. It's easy." Invariably, this would work. The part he was overdubbing locked in with what had already been recorded and felt like part of the whole. Somehow, when the musician stopped thinking, what he played turned into music.

By not thinking, the musician (receiver) encouraged the equivalent of Direct Memory Access. He let the music he heard on the tape enter his "subconscious" (for lack of a better term) unimpeded, where it evoked musical passages of a similar feeling. By *just listening* to the music already on tape, he could tap into its context and simply interact with it. His subconscious naturally came up with music that fit. In other words, the music was playing *him*.

THE STATUE OF LIBERTY PLAY

Another way to encourage musicality is *misdirection*. This trick works especially well when artists are overdubbing vocals.

During the course of recording Billy Joel's *Piano Man*, most of the vocals were recorded "live" with the rhythm track, but there were one or two vocals that didn't get recorded that way. We tried overdubbing a few passes, but it felt like apples and oranges. I asked the engineer to set a Fender Rhodes piano up on some chairs so Billy could *play* his part as he sang his vocal. I didn't record the Rhodes or really even care what Billy played. The result I *did* care about was that Billy's vocals locked into the prerecorded tracks and lost their self-consciousness and rigidity. Billy was very pleased, and so was I.

By giving his conscious mind something to do—playing the piano—Billy was able to access the memory of the rhythm track and, more important, the memory of the *emotion* that prompted the song in the first place. What he was trying to do ceased to be the job of "Doing The Overdub" and became "singing and playing the song," a completely natural occurrence. His beloved little consciousness, instead of looking over his shoulder and giving him a constant stream of judgments (you're flat, here comes that weird part, etc.) was misdirected and allowed Billy to "tune in" (or "be in touch with") his music. The conscious mind isn't a bad thing. It just doesn't always know its place—it's sort of like an overzealous assistant.

MENTAL RESIDUE

There's an important dynamic between producers and artists. When a producer's ideas are reflected and modified by the natural experience of the musician, music is the result. When the producer's ideas are just followed blindly or dutifully, the music sounds—well, dutiful, not musical.

One of the ways I tried to generate this reflection and modification was to use a tool I called "the canceled suggestion." If a singer was singing too much on top of the beat, I'd say "Hey, lay back a little." Usually the next performance was definitely laid back, but stiff and unmusical; the singer was doing what he or she *thought* I wanted.

But then I'd say, "Aw, forget it. I didn't know what I was talking about." This self-deprecating erasure had an immediate effect on the singer. The next performance would be a little laid back, but just right, performed loosely and in the style of the singer. It seemed as if just enough residue of the original suggestion was left, and the singer *interpreted* the suggestion instead of consciously invoking it. Or perhaps the suggestion was placed in some deeper part of the brain, and when the conscious was relaxed, a more instinctive version of the suggestion appeared. I used to bet lunch money with my engineer that this mental residue technique would work. I ate well.

Version two of the canceled suggestion can be used when the artist keeps getting hung up and stopping at a certain section. After a while I'd say, "No matter what happens, this time keep going after that section." Nine times out of ten, the artist not only went on, but hit the problem note without difficulty. I suspect that on approaching the trouble spot, the musician's consciousness focused on what was coming *next* and left the poor singer alone, allowing the note to come out just fine.

FIRST IMPRESSIONS: CATCH IT UNAWARES

I noticed that if players who never heard a song before could look at a chart and listen to the song performed as intended from top to bottom, it was possible to play the tune with the right feeling from the start. If running the tune down was a stop-and-start affair, filled with changes and arguments, matters were quite different. By the time the dust settled, the spirit of the song was uncapturable, and I

The most successful music I was involved with was the least contrived.

wound up splicing a take together. This is another example of Direct Memory Access: set the stage for a clear path and execute a transfer. When you're setting your recording levels, for example, don't ask the band to play the song you're going to record. You'll be able to sneak up on the first-time performance of the animal you're really after and capture it unawares. If that's impossible in one shot, remember, a break can do more than many words or many takes. Good producers feel when the "peak" has occurred and will take a break. After ten minutes outside, the next performance will be as close to a first impression as you can get.

COMPUTER MUSIC AND THE MIND

There is a necessary amount of electronic gobbledygook involved in the process of recording, and now that computers are involved, there is even more. To help keep the DMA paths clear, get all the techno-stuff (patches, headphone mixes, buzzes, programming) out of the way before the creative phase begins. With computer-oriented devices, there is usually no way to separate programming completely from creating, but remember, although a setup process is fine, when it's time for a take, the fewer button pushes the better.

Even in the world of computer programming, I experience the intuition effect. I'll often find a bug that appears to make no sense, but I'll try changing one thing or another in the hopes of fixing it, even though I haven't been able to isolate the exact cause of the problem. If my fix works, not wanting to trust mumbo-jumbo electronics, I usually feel compelled to justify the result by analyzing what happened.

However, I am now learning to trust the mumbo-jumbo, because it consistently delivers. I'll run across a problem, gather information about it (get it predictable), and go to bed. While brushing my teeth, the answer comes. If this sounds hokey,

like I'm saying, "Go with the force, Luke," so be it. It works for me.

COMPOSING—LET THE SONG SING YOU

I've already alluded to another manifestation of mind in music that has more to do with composing than with performing or recording: where does the music come from? Does the composer literally *create* it out of nothing, or does the process involve tapping some source where the music already exists?

In an interview with Barbara Walters, Lionel Richie said, "Sometimes I'll be singing in the shower and realize this is not something I heard on the radio." Michael Jackson said that the songs aren't his; they come *through* him. Paul McCartney was quoted as saying he likes the engineer to capture his vocal while he is still exploring. Kenny Rankin would sing absolutely magically on the first two takes, then go downhill; we had to capture the magic before he started to imitate himself. One of the all-time great tunes, Percy Sledge's "When a Man Loves a Woman," was written as it was sung, live on stage, performed once.

When it's time for a take, the fewer button pushes the better.

Just write, and leave the blanks. Put it away, then look at it fresh. The most successful music I was involved with was the least contrived. I believe that people respond to *the source*, applaud the artist who reveals the soul, and like hearing the spirit of the music.

MUTUALITY AND SYNERGY

Many times I've found that live vocals recorded at the same time as the rhythm track (as opposed to being overdubbed *after* the rhythm had been recorded) were of superior quality. Music is synergistic: the whole is better than the sum of the parts. When the singer sings the song while the musicians play it, they're all listening to each other and reflecting emotion. While the convenience, surety, and flexibility of multi-track recording is unquestionable, there is still quite a bit to be said for interaction. The questions this implies specifically address those of us making music with contemporary technological toys: Can we achieve this synergy and reflective soul in computer music? Could a new generation of computer devices help us *get away* from doing things in pieces? Could we sample the intensity of a singer or soloist and send MIDI velocity messages to the instruments to let them respond to the vocal the way live musicians would?

It's always been a good trick to get the music out of wherever it lives and on tape. The ways we record now and in the future will probably require additional new techniques. The important point is to remember that we're going for the *music*, not just *sounds* on tape.

Michael Stewart *is a tour veteran and L.A. session guitarist turned producer with over 20 production credits, including three albums by Kenny Rankin and Billy Joel's* Piano Man. *He designed the Human Clock, SMPTE City, and Feel Factory. He's also done real-time programming with Julius Smith and Phil Gossett at Stanford University's Center for Computer Research in Music and Acoustics (CCRMA).*

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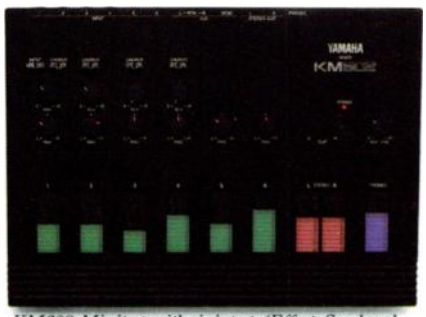

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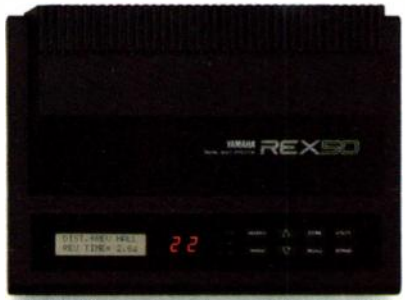

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MUSIC WORKSTATIONS:

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MIDI is not without its limitations. By the time all the modules of a MIDI system are completely hooked up, disks booted, channel assignments set, and so on, the muse may have gotten bored and gone elsewhere. ■ In general, the limitations of any system set the stage for its antithesis. In this case, the modular approach of MIDI is lately being countered by all-in-one "workstations" that combine synthesized or sampled sounds, drums, signal processors, sequencer, and keyboard in one simple, (theoretically) easy-to-use, and cost-effective package. ■ The concept of a music *system* is, of course, not new. Synclavier, Fairlight, WaveFrame, and E-mu offer complete, integrated workstations, but with price tags from five figures on up, most musicians can't take advantage of this technology. What *is* new is the growing number of workstations in the $2,000 price range, within financial reach of a much greater number of musicians. ■ This is not unique. With a lot of high-tech gear—specifically, computers, hi-fi setups, and electronic musical instruments—there is a typical cycle of product development. Initially, products are made to be as versatile as possible, which implies modularity (consider Moog's and ARP's modular synthesizers, component hi-fi, and early S-100 personal computers with their motherboards and card slots). But consumers often find the modular approach confusing and expensive, so as a field matures, manufacturers tend to integrate these modules into easy-to-use packages. Modular Moogs gave way to compact keyboard units; hi-fis turned into integrated receivers; and Apple's Macintosh represents the epitome of the non-modular computer. ■ But an integrated unit is necessarily more limited than a modular one, and as end users look for more power, the cycle starts over again. In the music business, MIDI brought about a renaissance in modularity—sequencers plugging into drum machines plugging into rack-mount expander modules, all driven by a controller of some kind. Look at a typical Mac setup today, and you'll see MIDI interfaces, hard disks, memory expanders, accelerator cards, and a variety of other modules trying to turn a closed system into an open one. Enter the all-in-one music "workstation." ■ Can a workstation that costs less than a simple keyboard did just a few years ago really do *everything*? Let's take a look at the Korg M1, Roland D-20, and Ensoniq SQ-80 to see how they stack up both to the ideal, and to each other—not in every detail, but to get an overview to help you decide which instrument merits further investigation for your own particular requirements. (For more information on the SQ-80, see the review in the March '88 **EM**; for more information about Roland's L/A synthesis-based products, see the May '88 issue.)

By Craig Anderton


Roland
D-20
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THE IDEAL

An ideal workstation would contain a huge number of on-board sounds forming a palette for creating music. An expressive keyboard with velocity, aftertouch, various modulation controllers, and pedals is also important in the quest for obtaining expressiveness from these sounds. Since most popular music uses some form of percussion, a wide variety of drums and percussion—from delicate cabasas to thundering, gated kick drums—is also required.

You want a sequencer whose operating system doesn't get in the way. It should be almost as easy to use as a tape recorder, though its capabilities would far exceed what can be done with tape (tracks could be quantized, cut-and-pasted, and so on). Ideally, the sequencer would be so powerful it could serve as the main sequencer in a MIDI system once you (inevitably) outgrow your workstation and start expanding with additional sound modules and possibly controllers (MIDI wind, guitar, or percussion). In fact, the more suited a workstation is to future expansion, the better.

Mixing (of sequencer tracks) and signal processing should also be part of the workstation. At a minimum, reverb provides some ambience, but if we're really going to have an all-in-one unit, then equalization, distortion, and other processors are helpful.

Finally, there's the matter of storage. You should be able to save your work easily, inexpensively, and reliably, as well as load in new sounds in case you tire of the existing palette. This implies a disk drive, or at least some form of saving and loading via MIDI System Exclusive data.

THE REAL

As you might expect from a "budget" workstation, neither the D-20, the M1, nor the SQ-80 can be all things to all people. Yet depending on your application, one will probably cover most of your desires. As always, a "good" piece of equipment is one that meets your needs; a "bad" piece of equipment doesn't.

The D-20 uses *L/A synthesis*, which grafts sampled attack transients onto sustained loops (synthesized or sampled, but usually consisting of only a few cycles). The rationale is that while a synthesized sawtooth wave can give a reasonably convincing string sound all by itself, when mixed with the sampled scrape of a bow during its attack phase, the sound becomes much more realistic. The D-20, neither as clean nor quiet as the D-50 (Roland's flagship L/A synth), compares sonically with the Roland MT-32.

The Roland D-20 is very "consumer-oriented." It is as if one of those little Casio toys with drum sounds and a mini-sequencer went into a phone booth and came out as Superman.

The goal of L/A synthesis is to offer both the brightness associated with digital (read "FM synthesis") sounds and the warmth traditionally associated with analog synthesis. In an ensemble context, the D-20 exhibits good sound quality that comes very close to meeting those goals. It includes 43 sampled attack transients, 38 sustained loops, 17 decay sounds, and dozens of effects sounds (repeating effects or repeating combinations of effects—sound effects, atonal tinklings, etc.). This is a pretty varied repertoire, but it's all you get; there is no way to feed additional samples into the D-20. You *can* assemble the existing samples and loops into *Tones*, however, in a great variety of permutations and combinations.

The SQ-80 uses a similar approach (Ensoniq calls it *cross-wave* synthesis) that includes 75 different waveforms. Like the D-20, you cannot load in new waveforms. Unlike the D-20, where sampled waveforms are usually "stretched" over the entire keyboard, the SQ-80 includes several multi-sampled sounds, which helps create realistic piano and vocal patches. Overall, the sound quality is a bit dirty, but for those raised on analog synthesis, the SQ-80 represents quite an advance over that technology while retaining many of the characteristics that make analog synthesis appealing.

The M1 also uses sampled transients and loops (99 waveforms total), but devotes *four megabytes* of ROM to these samples—more than the D-20 and eight times more than the SQ-80. Many of the sounds

are multi-sampled (the piano is particularly impressive), and the selection also includes quite a few of the waveforms used in the Korg DW series of synthesizers. Overall, the selection and quality of sounds is excellent; furthermore, additional waveforms can be provided on a memory card. Whether this feature will be well-supported remains to be seen, but the potential is there for the M1 to be more of a sonic chameleon than either the D-20 or SQ-80.

One subjective observation is that the M1 seems very well-suited to new age, soundtrack, and similar types of music that demand clarity; its sounds are relatively "polite." The D-20 can be polite, but there's also an edge (possibly due to the somewhat lower fidelity) that works well for fusion and rock. I find the SQ-80's grittiness tends to "cut" a bit, which makes it right at home with rock and pop music, although there are many "ethereal" waveforms that work well for other styles, too.

SOUND EDITING

It seems most synths these days have more similarities than differences, and these three are no exception. Editing is done on a page basis, more complex sounds use up more voices, and so on. Notable differences are the SQ-80's three oscillators (with hard sync), available for each of the eight voices; each oscillator is capable of being set to its own wave. This allows for some very complex effects. The D-20 has 32 "partials" (basic sound elements) available, but that gives 32 voices only if your taste in patches runs to the extremely simplistic. Some of the more interesting patches use up to four partials, which gives eight voices total. The M1 has 16 oscillators; for single-oscillator sounds, 16 voices are available, for dual-oscillator sounds, eight voices.

The SQ-80 has standard analog filtering with frequency and resonance controls. The D-20 uses digital filters, also with frequency and resonance controls, for its synthesized waveforms (the sampled material cannot be filtered). The M1 uses digital filtering that is clean but lacks a resonance control. In all cases the envelopes are fairly straightforward, but the SQ-80's envelopes are a bit more sophisticated. All three machines let you assign different sounds to different MIDI channels when used as an expander unit.

The M1 has one extra feature that all synthesizers should have: editing "macros" for quick touching up of patches. While playing, you can easily adjust eight different parameters (balance between two oscillators, filter cutoff, level, keyboard tracking, velocity sensitivity, attack time, release time, and effect balance). These are probably the most important parameters for live use; what's more, adjusting attack time changes the attack times for all envelopes. This is a very useful feature.

If you want to get into serious D-20 programming, Roland offers the PG-10 programmer, a plug-in, external unit that greatly speeds up the programming process. Roland's commitment to providing programming accessories for their keyboards is commendable. In case you're not that much into programming, there is already a huge "instant library" of sounds available for the SQ-80, since it is compatible with ESQ-1 sounds.

THE KEYBOARD

Keyboard "feel" is a very subjective matter, but how the keyboard functions is much more quantifiable. The D-20's keyboard seems a little tight and generates velocity but not aftertouch. The M1 generates both velocity and aftertouch and

To my way of thinking, the Korg M1 is more a superb synthesizer than a "workstation."

seems a little looser to play. The SQ-80 is the only keyboard of the lot that generates velocity *and* polyphonic aftertouch as well as standard channel aftertouch. The trade-off is a "clack" that happens when a key hits the bottom of its travel; this is the dividing point at which velocity response ends and aftertouch begins. Some players really dislike the SQ-80 keyboard because of the clack and the light feel. (Ensoniq says a redesigned keyboard with less clack will be released in the fall.) I am among those who enjoy using the keyboard, because—feel notwithstanding—I can wring more expression out of it than any other keyboard I've played. Maybe one of the reasons I'm partial to it is my background as a guitarist; I'm *used* to pressing on things and getting a response.

DRUM SOUNDS

The D-20 includes 63 drum sounds; the M1, 44; and the SQ-80, five. The D-20's drums are considerably more aggressive than those in the MT-32 and include some wonderfully rude gated sounds and lots of percussion. The M1 has an even more varied selection, with a somewhat better sound quality. However, sound quality is subjective—witness the engineers who like to record snare drums at a high level on tape to get a hint of distortion and "crunch." I've used the D-20 drum sounds on studio sessions, and aside from the hi-hat, you would never guess they came from a "bargain" unit. The SQ-80's drums are by far the weakest of the lot, since the selection is very limited (no percussion) and the drum sounds are pretty much applicable only to pop/rock music. They're acceptable for getting ideas down quickly into the internal sequencer, but for full-blown productions, you'll probably need a drum machine that you can sync up to the SQ-80.

Speaking of getting ideas down quickly, the D-20 includes not just a sequencer, but a drum machine. There are 32 preset drum patterns, and you can make 32 patterns of your own (from one to eight beats long). These patterns can be assembled into songs and run as a rhythm track independent of the sequencer. However, drums can also be played on a sequencer track, which can provide fills and variations that would be difficult to do within the constraints of having only 64 relatively short patterns. The on-board rhythm machine is a good idea for two reasons: you can create drum parts pretty fast, and the timing is always right on the money—something that may not be possible if you've loaded up the sequencer with lots of data and recorded the drums as part of a sequence. Unfortunately, on the downbeat the drum machine's metronome click delivers a high, bell-like pitched sound, tuned to A (try playing in the key of C# if you dare). However, in most cases you'll record the drum part first, at which point you can turn off the metronome while recording the rest of the tracks. A couple of good points are that you can change quantization rates, as well as erase individual drum events, as you record.

OPERATING SYSTEM AND MANUAL

The operating system defines how you relate to the instrument and how fast you

can get around various functions. The manual's task is to document the operating system, so all things being equal, the better the operating system, the clearer the manual. I found the SQ-80 to be logical and easy to use, partially because of the fluorescent display that shows a lot more than your average LCD, and also because the functions and buttons are logically laid out. The D-20 was the most cryptic of the bunch (for example, to adjust the rhythm unit level, you press the Tempo and Lower buttons—not very intuitive). The M1's synthesizer section arranges its functions very clearly, and I had no trouble finding my way around. The one complication is that some functions have multiple sub-menus (the sequencer has 32), so it may take a lot of button presses to get where you want. Luckily, there are shortcuts to get you to pages deep within the sub-menus; these can be memorized (or found on the handy plastic reference card included with the unit).

Manuals are always controversial. There have traditionally been a lot of complaints about manuals from Japanese companies, but the good news is that both Roland and Korg have made a sincere effort to upgrade the quality and readability of their manuals. There's plenty of information, and both Korg and Roland include lots of little reference sheets, cards, and goodies to help you along. The bad news is that they still have a way to go before you can get through their manuals without doing a fair amount of head-scratching, especially in the case of the D-20. However, the supplemental information on L/A synthesis is very helpful, and Roland is definitely taking steps to improve their reputation *vis-a-vis* manuals. I would encourage them to continue in that direction.

The SQ-80's manual, while it could stand to be a bit more tightly edited, is well laid out, "friendly" (you get the impression it was written by someone who *really wants you to understand* the instrument), educational, and comprehensive. One very good sign is that all three manuals include full System Exclusive documentation. When will *all* companies follow suit?

SIGNAL PROCESSING

The D-20 has a built-in reverb that offers three echo effects (one stereo panned), five reverb algorithms, and variable reverb level and time. This really helps warm up the sounds and fills in some of the cracks between attack transients and

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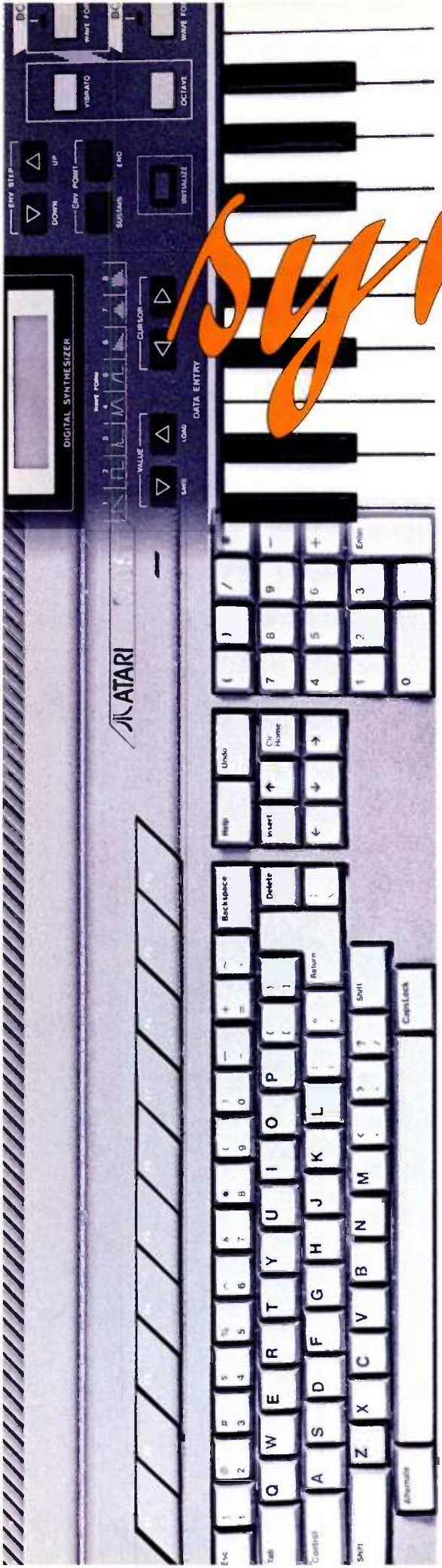

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sustained loops. The SQ-80 has no signal processing to speak of, save second release parameters in the envelope generators that create pseudo-reverb effects by providing a long, low-level release. While this may sound pretty elementary, in practice it can be surprisingly effective. Still, the D-20 is obviously much more flexible, and it's less time-consuming to punch up a reverb sound than to fool around with envelopes.

The M1's signal processing runs circles around both the D-20 and the SQ-80 by offering reverb, delay, distortion, chorus, flanging, phase shifting, tremolo, and primitive equalization. What's more, the signal processors can be arranged in various configurations, including sending the results to four outputs (complete with panning). The effects are much more than gimmicks; they can be integral to a patch's overall sound, and they minimize the need to cart around a bunch of signal processors should you take the keyboard on the road. In MIDI studios, where virtual tracks require lots of signal processors, built-in signal processing is a welcome trend.

THE SEQUENCER

All three sequencers share some impressive features: Song Pointer (except for the D-20), dynamic allocation of synth voices, the ability to sequence external MIDI devices, eight tracks, punch-in/out, transposition, and so on. Still, of the three units, the SQ-80's sequencer is the most powerful. It stores 60 separate sequences, chainable into 20 songs (i.e., drum machine-style sequencing), with a maximum capacity of 20,000 notes. Unlike the D-20, quantization is non-destructive; other functions let you copy, add bars, delete bars, remove controller data, and so on. Step edit mode is also available.

The M1's sequencer is also very powerful and offers many of the same features as the SQ-80. You can record in real time, step time, or pattern (drum machine-style) mode, but the last is difficult to use since you can monitor only one track—the track you're playing—at a time. There are two major problems: it seems more difficult to use than the SQ-80's sequencer, and—far more serious—the maximum capacity is 4,400 notes when the M1 is loaded with 100 patches. You can cut the number of patches in half to gain 7,700 notes, but since the point of a "workstation" is to have lots of available sounds *and* sequencing, this is like putting a half-gallon of gas in a high-performance sports car. When I asked a Korg representative why the M1 sounded so great, yet had so little sequencing storage, he said the M1's sequencer is intended to be more of a scratch pad, and the M1 is best used as a multi-timbral expander unit with the accompanying S1 sequencer. That's all well and good, but requiring an external sequencer raises the system price considerably and mitigates the advantages of having "everything" in one box. The M1 *will* record on all tracks at once, so if you have a sequence prepared, it's easy to dump it to the M1 (this is also great for MIDI guitarists who work a lot in Mono mode).

The D-20's sequencer seems optimized for speed. It's easy to lay down multiple tracks in quick succession, although this is partly because the sequencer is a linear, tape simulation-type device: you can't hold multiple sequences in memory, do drum machine-style sequence programming, or go into step time. Quantization cannot be undone, and worst of all, there is no track copy feature so that you can quantize a copy and leave the original intact. The storage is decent—16,000

events total—and you can re-record from any point, overdub (overdubbed data can be undone), remove or add pan/controller/volume data, erase Program Change messages, and more. While it's not the world's greatest sequencer, it's not a bad one either, and it's fast and relatively convenient to use once you figure out the protocol.

STORAGE

Both the D-20 and SQ-80 include an internal, 3.5-inch disk drive for storing sequences and sounds; with the M1, data must be saved to those costly little RAM cards or via MIDI System Exclusive data, which implies an additional MIDI Sys Ex storage device. The D-20 offers 128 patches and an additional 128 on RAM or ROM cards for instant access to 256 patches when playing live. The one "gotcha" is that the sequencer cannot easily access the card patches, so you need to bring the patches you want to sequence into internal memory. The M1 stores 100 patches (and 100 "combination" patches, where different sounds are assigned to different channels *a la* Oberheim Xpander; the D-20 and SQ-80 offer similar capabilities). The SQ-80 stores 40 patches on board and accesses another 80 via plug-in cartridge. While 120 patches is a reasonable amount, Ensoniq should have spent the extra memory chip or two necessary to store at least 128 patches on board. The trend is toward including more sounds on board, but the SQ-80 is not a part of that trend.

SUMMARY

There is much more that could be said about each individual unit, but we've just about run out of space. Here's my take on which is best in various contexts.

What separates the M1 from the rest of the pack is sheer sound quality: clean, clear, and very well-defined. To my way of thinking, this unit is more a superb synthesizer than a "workstation"; the minimal sequencer storage and lack of a disk drive seem to confirm this. If you're primarily interested in an excellent-sounding instrument with easy sound editing, great looks (it wouldn't be out of place in your living room), and potential for system expansion via other Korg products like the S1 sequencer and additional RAM/ROM sample cards, this is probably your best bet. Korg doesn't announce list prices any more, so I'll make one up: $2,426.03. You may be able to find it for much more or much less. (I hope that Korg soon rescinds this no-list-price policy; you can't evaluate a unit's cost-effectiveness if you don't know the cost. Until Korg does announce prices, I have no choice but to give a 0 rating for cost-effectiveness, since we don't know what the cost is.) Good and bad fine points: microtonal tunings are possible, but the modulation controller is a fragile, small joystick that is somewhat difficult to manipulate with a high degree of accuracy.

Of the three keyboards reviewed here, the Roland D-20 is the smallest, lightest, and least expensive ($1,795 list). Its strength is being a fine all-around unit. While it doesn't dominate in any particular category (although it does provide a lot of storage), it delivers what it sets out to do. If you need a good keyboard with good sounds, and might want to take the thing back to your hotel room after a gig to work out a song or two, this is a good choice. The separate drum unit is a nice touch, the drum sounds are excellent, you can save stuff to disk, and the sequencer is fairly easy to use once you get the hang of the operating system. However, the lack of aftertouch concerns me (it doesn't

The polyphonic aftertouch is an excellent argument for making the Ensoniq SQ-80 a master keyboard.

respond to external aftertouch either). I see the D-20 as the most "consumer-oriented" of the lot. It is as if one of those little Casio toys with drum sounds and a mini-sequencer went into a phone booth and came out as Superman.

The SQ-80 ($1,895) has a lot of features that make it a fine workstation, but it excels as part of a more complete MIDI setup. The polyphonic aftertouch is an excellent argument for making the SQ-80 a master keyboard. Another system-oriented feature is that the disk drive can save and load MIDI System Exclusive data, eliminating the need to carry around dedicated librarian software to gigs (assuming your gear can initiate data dumping and loading from the front panel). The sequencer is fast and easy for working out tunes, but it can also sync to a main sequencer and be dedicated to recording memory-hungry polyphonic aftertouch generated by the SQ-80, while the main sequencer drives other instruments in the setup. The main reservation I have is sound quality; while acceptable, it's nothing spectacular. Having access to only 120 sounds at a time is also a bit of a limitation in a workstation context. But as a master keyboard instrument for a MIDI system that contains other sound-generating devices, the SQ-80 is arguably the best choice.

We can expect to see more and better workstation products introduced in the years ahead. But don't be too influenced by the hype and excitement; remember that several dedicated instruments, hooked up into a system, will always provide more flexibility and easier upgrading than an all-in-one unit. Then again, the workstation will usually be the quickest way to record a complete musical thought with a minimum of setup time. Each approach has its merits. Hopefully this article has clarified the issues so you can decide which approach will work best for you. ■

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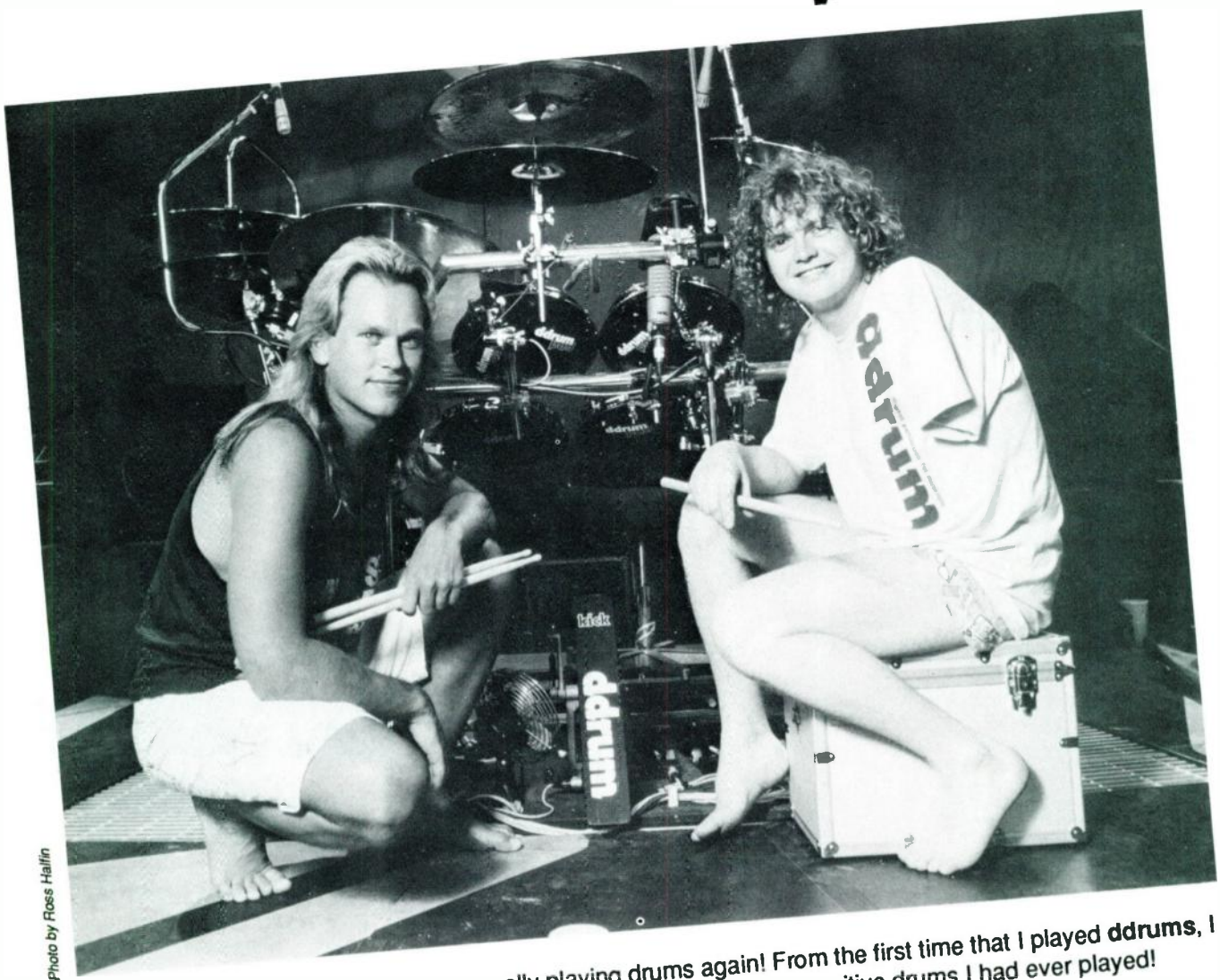

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By Lachlan Westfall

Is MIDI Time Code the key that will lock sound to picture? Some people think it will do that and more.

I Want My MTC!

● Control of events in real time is the essence of MIDI's strength. Because of this, the role of MIDI synthesizers and digital samplers in film and video post-production (which is all about matching up sounds to the times of events that occur on screen) has taken on ever-increasing importance. MIDI instruments no longer just play music, but generate anything from thunder crashes to bits of dialog.

In response to the flourishing of MIDI devices in video studios, and to create a standard interface between MIDI and the film and video industry's synchronization standard (SMPTE/ EBU Time Code), MIDI Time Code (MTC) has been added to the MIDI specification. We'll explore what MTC is, as well as its far-reaching ramifications.

Although both MIDI and SMPTE can help synchronize devices, they are very different communications protocols. MIDI communicates real-time performance information as digital messages, including a 24 pulses-per-quarter-note synchronization scheme. All timing is based on musically related rhythmic values (quarter notes) and not absolute time (minutes and seconds). Although changing the tempo alters the duration of a piece—for example, given an equal number of measures, increasing the tempo will shorten the piece—all timing relationships are preserved. In other words, if you double the tempo of a piece in 4/4, then a quarter note will take half as much absolute time, but will still last exactly one quarter of a measure.

J. OTTO SIEBOLD

SMPTE, on the other hand, encodes digital timing information into an audio signal that is subsequently recorded on tape. This audio signal identifies individual points in time on film, video, or audio tape by representing the passage of time in hours, minutes, seconds, and fractions of seconds, expressed in *frames*. (See "Synchronization in the Home Studio: A Time Code Primer" in the August '88 **EM**.)

To synchronize a MIDI sequencer with SMPTE, one currently popular method is to use a device such as Roland's SBX-80, which reads the SMPTE Time Code from a master source (a videotape, for example) and translates this into MIDI Song Position Pointer messages. The sequencer locates itself to video based on the Song Pointer data, all the devices play back in synchronization, audio matches video, and everyone's happy.

To do this, the sync device requires a *tempo map* that associates MIDI timing data with SMPTE times. This direct MIDI/SMPTE relationship also lets the composers or music editors identify points in the film in their own terms, i.e., relative to the musical score.

Today's sequencer software makes it easy to compose music for film or video as described, but if you want to get other sounds—effects or dialog—from your MIDI studio, it's pretty cumbersome to reference all the gunshots, footsteps, or punches by their musical position in a bar of music. The answer is MTC.

NOT JUST SEQUENCERS

The major job of MTC is to communicate SMPTE Time Code data over MIDI so that MIDI devices can perform some operation at a particular SMPTE time. A sequencer-like program such as Digidesign's *Q-Sheet*, synched via MTC, is well-suited to audio for video applications because it uses SMPTE as a timing reference. So if a door slams on the video at SMPTE time 01:20:12:04 (1 hour, 20 minutes, 12 seconds and 4 frames), thanks to MTC this information appears over MIDI and can be used to trigger the door slam sample. This is naturally quite a bit easier than figuring out which sixteenth note in which bar at which tempo corresponds to SMPTE time 01:20:12:04. Since you're not really composing musical phrases, but creating lists of events, it makes sense to reference these to the SMPTE times displayed directly on the videotape.

While this helps to a certain extent in initially laying down sound effects, MTC is practically indispensable during editing. If the film editor suddenly comes in and says, "We've taken out ten frames here and inserted 50 over here," it is much more efficient to move groups of sound events by a number of SMPTE frames (usually implemented with a simple offset command) than to find their new locations based on calculating where measures and beats fall.

By tying visual events with MIDI events, a MIDI sequencer/digital sampler combination creates a very flexible sound effects trigger: first determine where to place the sounds in time, then trigger MIDI Note On messages at the appropriate times.

FINDING A COMMON GROUND

Using a MIDI sequencer to add both music *and* sound effects creates a difficult choice. If you use standard SMPTE/MIDI synchronizers, you have to reference the

sound effects by their musical position (measures and beats) and face the problems of placement and, later, editing. Use MTC and you lose the ability to sequence music in a natural way; just as you don't want to identify non-musical events in musical terms, constructing a musical cue by defining the SMPTE times of each note would be ridiculous. While some programs have a limited ability to integrate both (Q-Sheet can store a MIDI File sequence and play it at a specific time and tempo), no sequencer I know of as of this writing can be synchronized via MTC.

For now, the potential MIDI film composer has two choices. One is to record the music on tape with a sequencing program synchronized via MIDI sync, then later record the sound effects on tape with another sequencer synched to MTC. The second is to trigger the sound effects with the program synched to MTC and simultaneously send out MIDI timing data to a second sequencer playing the musical cues to tape.

While using two different sequencing programs may seem a bit complex, laying down music and sound effects is usually done at different times in the development of a film, and each method, MIDI sync and MTC, provides an efficient way of accomplishing each chore. The necessity of using two different sequencers *is* an extra expense, however.

MTC FOR STUDIO CONTROL

MTC can make addressing certain non-musical events more efficient, but sound effects are only one application. Virtually any event that occurs in the recording studio could be correlated to visual events via SMPTE and MIDI controller data: adjusting signal processors or mixing console faders and switches; setting videotape recorders to begin playback at certain times or audio decks to punch in and out; or having video switchers choose from a number of input signals. The common thread is that they all receive MTC telling them when to perform their functions. One possible application would be automated punching, which would be invaluable when one person is trying to be both performer and engineer: the tape recorder would punch in at one time, punch out at another, then go into rewind five seconds after punching out, all in accordance to MTC data received at its MIDI input.

MANAGING EVENT LISTS

To understand why we want to manage an event list, we need to understand what an event list is.

Picture an A/V post-production studio: synthesizers, sequencers, audio and videotape recorders, mixers, and all the rest hooked up via MTC. Each receives a list via MTC that tells it cue points (which may trigger changes in mixer settings, punch the recorder in or out, trigger sounds on a synthesizer or sampler, and so on). All these cue points are communicated by the same language: MTC messages. If we're going to standardize matters so that a list of events could be read by all MTC devices, we need to program the event lists in the same way, and that's where *MTC Cueing* comes in.

MTC Cueing uses a *MIDI Non-Real Time Universal System Exclusive* message to communicate a list of events and their corresponding MTC times (called an *event list*) to a device that can store the list. The

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times in the event list can be offset (shifted in time), and the event list can be requested and received over MIDI.

Creating an event list would typically be handled by a software program that would let the user edit the event lists for a number of devices simultaneously, then download the lists to each device. The MTC Cueing message provides for the addressing of up to 127 different instruments and includes a number of undefined event types for future expansion.

To do all this, of course, these receiving devices will need intelligence, both to perform the events when they receive the MTC messages and to store their own event lists.

MAKING THIS REALITY

As exciting as all this may sound, the wait for MTC to take hold in the studio and among manufcturers is still on. The absence of a standard MIDI sequencer capable of synching to MTC is one problem, as is the fact that audio and videotape recorder makers haven't yet embraced the specification fully (although Tascam's MIDiiZER may be the first device to offer direct control of an audio tape recorder by MTC). A few sampling devices—Sequential's Studio 440, the Akai/Linn sampler, and E-mu's Emulator III—can synchronize to MTC and trigger their samples at predetermined times; J.L. Cooper's PPS-1 (reviewed in the February '88 **EM**) and Opcode's Time Machine translate SMPTE to MTC; and a couple of software packages—Digidesign's Q-Sheet (reviewed May '88) and Opcode's *Cue* (reviewed October '88)—can read MTC and send out appropriate MIDI triggers. That may not be too extensive a list, but it's a good start. Although MTC's usefulness is limited right now, that situation shouldn't last long. All too often we use a communications protocol and ultimately wish it could do more; this was true of MIDI at first. Adding MTC to MIDI gives us both an expanding communications standard and the need to wait for the devices that can use it. The solution lies in getting manufacturers to realize that the groundwork—the most difficult part—has been done. MTC is here to be used.

So how about it? I Want My MTC! I Want My MTC! *I Want My MTC!*

Lachlan Westfall *is a Los Angeles-based musician, freelance writer, and Macintosh fanatic. He is president of the IMA, and currently, the secretary of the MMA.*

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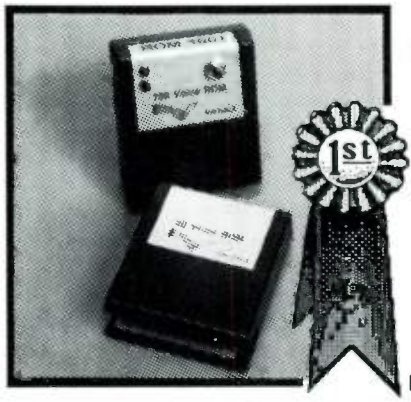

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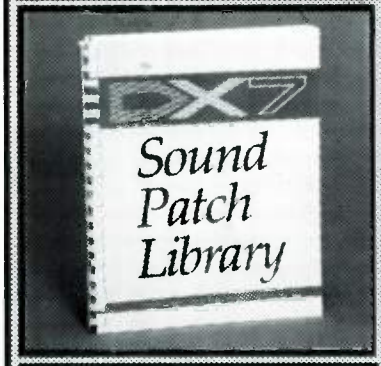

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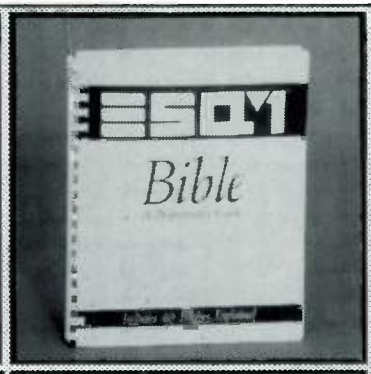

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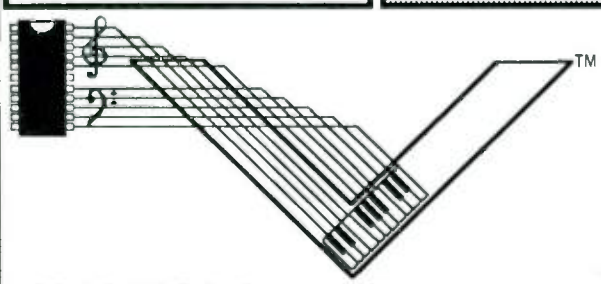

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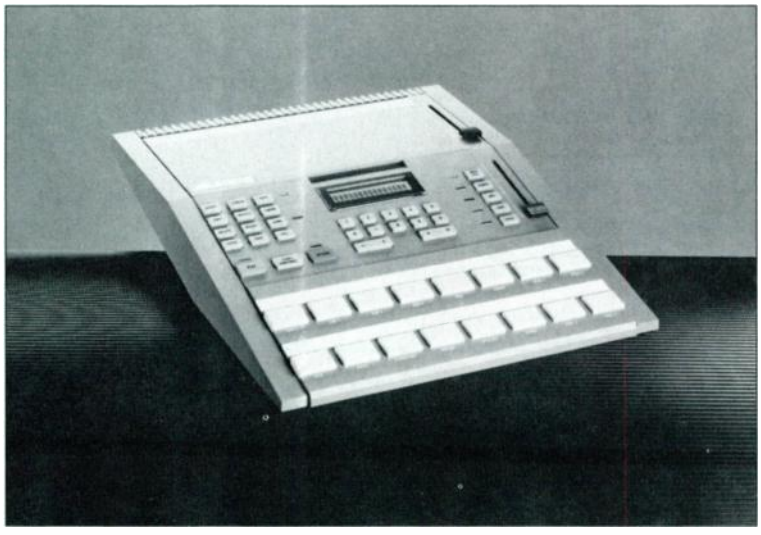
USING THE ALESIS HR-16 AS AN EXPANDER MODULE

Sure, it's a drum machine—but the HR-16 also makes a great expander module if you know a few crucial tricks about applying it.

By Craig Anderton



Although the HR-16 is advertised as a drum machine, the clever user can use it to fill other roles, too. Its 49 sounds are very high-quality and can be tuned from 12 semitones flat to almost seven semitones sharp. Combine this sound quality and the HR-16's price—most definitely right—and you'll find the unit can serve very well as a general purpose, drum-sound expander module.

PATTERNS AND KITS

Each of the HR-16's 100 Patterns can store voice, tuning, level, and pan assignments for all 16 pads. Therefore, you can recall each Pattern as a separate drum "kit," either through the HR-16's number buttons or via MIDI Program Change commands. "Sound stacking," another bonus, assigns different pads to the same MIDI note, so one note can trigger more than one drum sound. Use these features to stack four different snares together, all with different tunings, and you end up with a monster snare drum.

While flexibility like this is fine, it can also get a little confusing, so whenever possible, use consistent kit assignments. For example, if you frequently double the kick or snare, assign the doubled sounds consistently to two particular pads, Percussion 1 and 2, for example. Keeping patch sheets of your kits' parameters can help in minimizing confusion (see **Fig. 1**).

SETTING THE MIDI CHANNEL

Before using the HR-16 as an expander module, its parameters must be properly set. The HR-16 can receive in Omni mode (MIDI Mode 1) or Poly mode (MIDI Mode 3). In Omni mode, the machine receives data appearing on any of the 16 MIDI channels. In the more commonly used Poly mode, you set the HR-16 to both transmit and receive over any *one* of the 16 MIDI channels.

Omni mode is useful when the HR-16 is being driven from an external MIDI controller dedicated to playing the HR-16 (MIDI drum pads, MIDI rhythm controller, etc.), since you need not set the external controller's transmit channel; the HR-16 reacts to whatever comes in, regardless of channel assignment.

When MIDI drives several instruments—e.g., when a sequencer sends out data over several channels to different instruments, including drums—use Poly mode so the HR-16 tunes in only to the channel containing drum data, rejecting channels containing bass, lead, rhythm, etc.

To set the MIDI channel, press the MIDI/Util button and select Page 1 of the MIDI/Util menu. Choose the desired MIDI channel with the number or +/- buttons (entering 00 selects Omni mode). The MIDI channel setting is *non-volatile*, meaning it will remain as set, even if you turn off the power, until you change it; the default is Omni.

RECEIVING MIDI DRUM NOTES

A sequencer or drum controller generates a unique MIDI note for each drum event or pad hit. Feeding these to the HR-16's MIDI In triggers its drum sounds (assigned to particular MIDI note numbers), but first you must set the HR-16 to receive MIDI note events. Select Page 2 of the MIDI/Util menu and use the +/- buttons to select On. The Receive MIDI Drums setting is non-volatile.

You will probably want to set Transmit MIDI Drum Notes to Off, since the HR-16 will be receiving, not transmitting, data. Select Page 3 of the MIDI/Util menu and use the +/- buttons to select Off. This, too, is non-volatile.

ASSIGNING MIDI NOTE NUMBERS

You can set each pad to respond to a unique MIDI note number generated, for instance, by a sequencer or other controller. The default note assignments are listed in the manual; to change them, select Page 4 of the MIDI/Util menu (when selecting MIDI/Util pages, the MIDI/Util LED must be on). The LCD's lower line will show the currently selected drum pad name and the MIDI note number and key name assigned to it. Press the drum pad to which you want to assign a note

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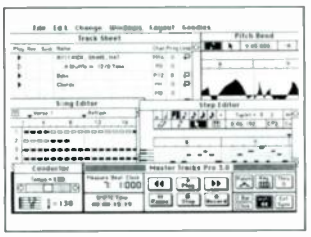

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number and choose the desired note assignment with the number or +/- buttons. If you use the number buttons, you must enter a three-digit number, so enter leading zeroes if necessary.

Incidentally, MIDI note assignments are not stored with each Pattern, but are global settings that affect every Pattern. The note assignments are non-volatile.

TO ECHO OR NOT TO ECHO

MIDI echo has nothing to do with delay-type effects, but rather, whether the HR-16's MIDI Out will "echo" what appears at the MIDI In. This is useful if you want to drive another expander module along with the HR-16. Simply patch the HR-16's MIDI Out to the second drum machine's MIDI In, then set MIDI Echo to On by selecting Page 5 of the MIDI/Util menu and choosing On with the +/- buttons.

SELECT PATTERNS VIA PROGRAM CHANGE COMMANDS

You can select each Pattern via MIDI Program Change commands. The main purpose of this is to call up different "kits" from drum pad controllers or a sequencer (Program Change commands will be ignored while a Pattern or Song is playing). MIDI programs 00 through 99 select Patterns 00-99, and MIDI programs 100-127 select Patterns 00 through 27. To enable this function, select Page 6 of the MIDI/Util menu and choose On with the +/- buttons.

You do not want the HR-16 to respond to MIDI timing data when it's serving as an expander module.

INHIBIT MIDI TIMING DATA

When you're using the HR-16 as an expander module, you don't want it to respond to MIDI timing data, since it will start playing a Pattern when it receives a Start command. To prevent this, select Page 7 of the MIDI/Util menu, and use the +/- buttons or number buttons (3=Tape Sync) to select the Tape Sync option.

The HR-16 is all set up and ready to go. You can keep your old drum machine and still get a bunch of new, high-quality drum sounds without mortgaging the farm. Feel free to fool around with the tuning, mix, and level to get the drum sounds you want. We're not finished yet, though.

SOUND STACKING TIPS

Many pros create thick, powerful drum sounds by doubling one drum with another: doubling a snare with a tom adds depth and "resonance." To "stack" two pads into one combined sound, assign two pads (each with its own voice assignment) to the same note number. You're not even limited to assigning two pads to the same note number: trigger all the pads from one MIDI note if you so desire.

The stacked sounds can be further modified with the Voice, Tune, and Mix functions. One of my favorite combinations is to stack timbale with a snare, but with the timbale mixed a bit lower so that the snare has a "ring," but is not overpowered.

The EM HR-16 Patch Sheet

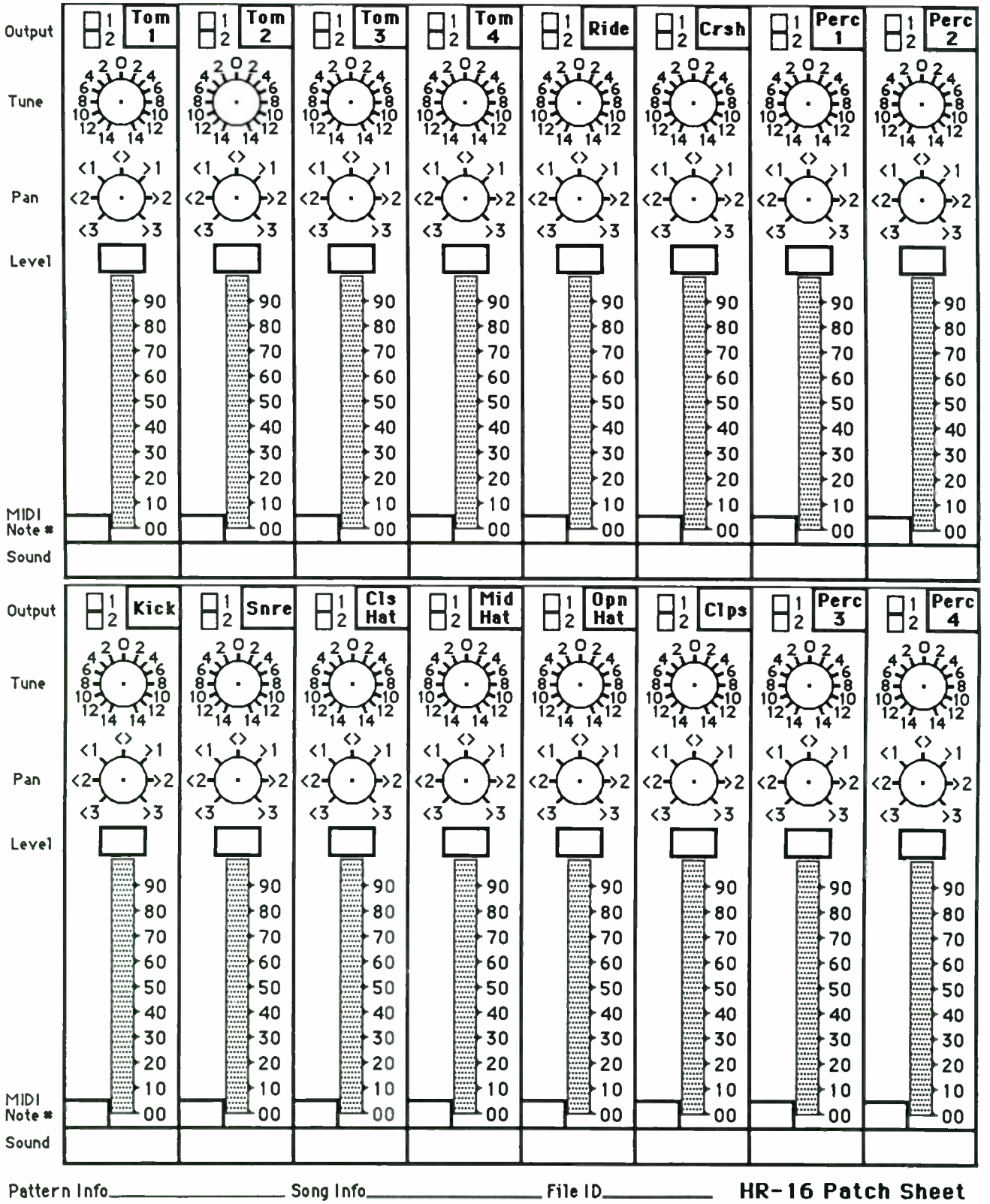


FIG. 1 *(Permission to copy this page for non-commercial use is granted, providing the following information appears on the photocopy: © 1988, Electronic Musician, 6400 Hollis St. #12, Emeryville, CA 94608.)*

● DRUM EXPANDER

Changing tunings can also be very effective. For example, tuning a lower-pitched tom and higher-pitched tom to the same pitch creates a strong, unison-type of effect. This also works well with kick drums.

COPYING KIT PARAMETERS FROM ONE PATTERN TO ANOTHER

This is one of the most confusing aspects of the HR-16's operation. If a Pattern is close to what you want, it's often easier to copy its assignments than to program a new Pattern from scratch. While there are several ways to skin this particular cat (none of them obvious), here's the simplest (although not the one with the fewest keystrokes).

Suppose you want to transfer drum assignments from source Pattern 10 to destination Pattern 70 (the destination Pattern *must be empty*). Here's how:

1. Select Pattern 10, then press and hold Copy.
2. Select Pattern 70, and while continuing to hold Copy, press Record. Pattern 10 has now been copied to Pattern 70; the display shows Pattern 10.
3. Select Pattern 70, then press and hold Erase.
4. Tap each drum pad button; the display will indicate that each drum part is being erased. Pattern 70 is now the same length as Pattern 10 and contains the same Voice, Tune, and Mix assignments, but contains no drum parts, since they've all been erased.
5. We're not done yet: the configuration still needs to be stored. Before selecting another Pattern, record at least one note in Pattern 70 or set the Pattern length to something other than 008 beats (the default); you might as well set this to 001 beat. After having done either one, the assignments from the first Pattern you selected will be recorded into the copied Pattern. Note that if don't record a note or change the length, the HR-16 will assume the Pattern is empty and will revert to the default Voice, Tune, and Mix assignments the next time it is selected.

KEEPING RECORDS OF YOUR KITS

The HR-16 patch sheet (**Fig. 1**) is a convenient way to keep a record of your drum kit setups (as well as Pattern data if you're using the HR-16 as a drum machine). As opposed to being a simple list of numbers, the patch sheet is arranged like a mixer to give an instant visual indication of settings. Here are some tips on how to fill it in:

Copying kit parameters is one of the most confusing aspects of the HR-16's operation.

Output Assignment: Check the appropriate box, 1 or 2.

Tune: Draw a line to indicate the tune setting. If you prefer to enter a number, white out the small dot at the center of each dial prior to photocopying the sheet, and write the number in the dial's circle.

Pan: Again, draw a line to indicate the pan setting. If you prefer to enter a number, follow the same procedure described above.

Level: There are two ways to indicate level. The simplest is to enter the appropriate level number in the box at the top of the level "meter." If you'd like to see all level settings at a glance, blacken in the level "meter" up to the appropriate point.

MIDI Note Number: Although this is a global setting, it's handy to have this information available at a glance if you're using the HR-16 as a drum sound expander.

Sound: Fill in the drum sound assigned to the pad.

Pattern Info: Write in the Pattern number and, if desired, a description of the Pattern's function (chorus, verse, etc.).

Song Info: Fill in the Song number and/or name that uses the Pattern if you're using the HR-16 as a drum machine.

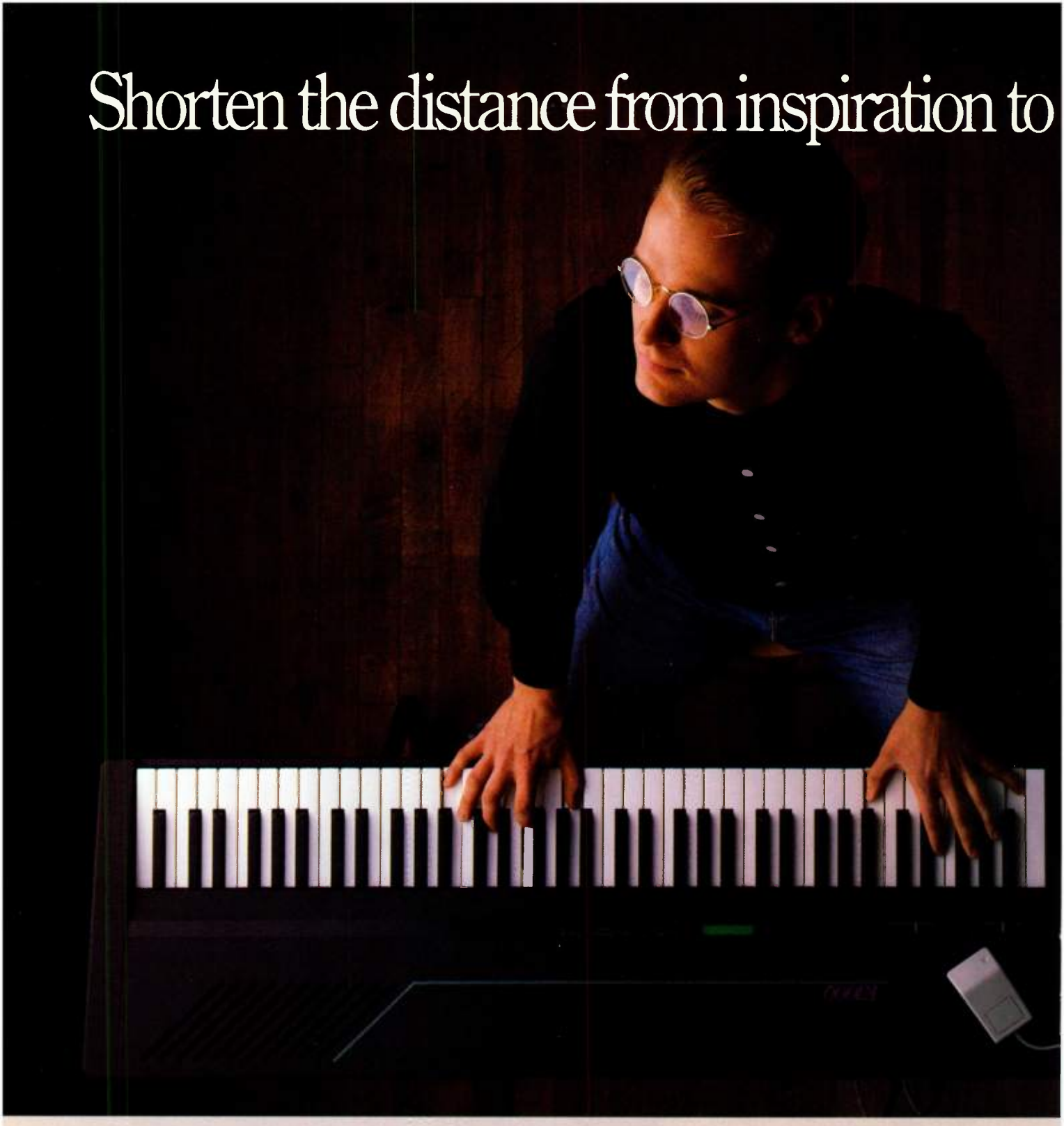
File ID: As you save your data to cassette or MIDI System Exclusive storage devices, it is important to identify each group of data for later retrieval.

THAT'S ALL, FOLKS

If you're into sequencers or drum pad controllers, check out what the HR-16 has to offer. Even if you never use it as a drum machine per se, its expander module functions are very impressive.

Craig Anderton *hopes to do something really bizarre soon so that he can spice up his bio a bit. Meanwhile, he continues to produce and mix music, play with the band Transmitter, edit this magazine, and write books—the latest being a guide to the HR-16 and MMT-8.*

Shorten the distance from inspiration to



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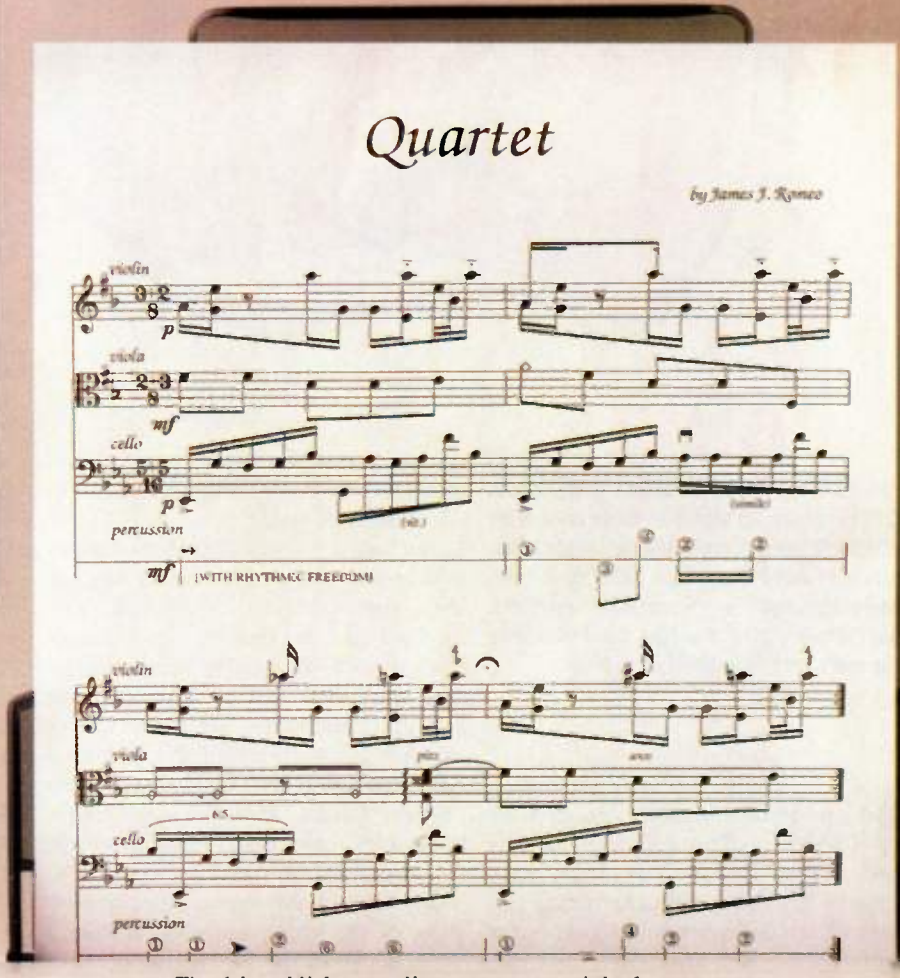

Finale's publisher-quality scores are a sight for sore eyes.

QUESTIONS AND ANSWERS: Silicon Soaps?

This month, Alan provides the straight scoop on noisy resistors, sockets, Sequential servicing, and optocoupling components; and the 400-foot MIDI cable quest continues.

By Alan Gary Campbell

RICK BISACCIA

Q. I've heard that carbon resistors are noise-producing components. Can I improve the signal-to-noise ratio of my effects devices by replacing the carbon resistors with metal-film types? Some do-it-yourself projects call for 1% metal-film resistors, but these are hard to obtain. Can I substitute the more readily available 2% kind?

A. Carbon-composition and carbon-film resistors can produce low-level thermal noise when passing direct current, and, to some extent, when passing high duty-cycle alternating current. (Thankfully, carbon-comp types, the worse of the two, are all but obsolete.) Quality audio processors use metal-film resistors, which are much quieter, not to mention more stable.

But before you desolder all the carbon resistors in every effects device in your rig, consider that resistors are only a part of the total noise picture. If you change the resistors, but leave in noisy op amps and transistors and inadequate power supply components, you won't detect much of an improvement. (Note: op amp substitution was discussed in the June '88 "Service Clinic.") However, upgrading is a complex topic; a thorough grounding in electronics is your best bet. Let's face it, you could probably improve the performance of everything you own, at least a little, but you'd quickly reach a point of diminishing returns given the excellent performance that many recent devices offer.

With regard to 1% metal-film resistors, a few circuits require the odd values and close tolerance of these and are usually so indicated. But in most designs, 1% resistors are specified simply to insure the use of metal-film resistors, previously the only temperature-stable types available (an important characteristic for resistors in analog synth oscillator, filter, and keyboard control-voltage circuits, for example).

Consider the unity-gain inverter in **Fig. 1**. As a first approximation, if the input and feedback resistors are the same and don't drift with temperature, then the circuit provides nearly exact unity gain; the absolute value of the resistors is not critical. You could simply match 2% or even 5% values with a DVM and get the same results; and wider-tolerance types are cheaper.

You can get blister-packed, 2%, metal-film resistors from your nearest RCA SK-series component dealer, though they're a bit pricey; Radio Shack has a 50-piece, 1%, ¼-watt assortment, catalog number 271-308. You can order 1% metal-film resistors from Digi-Key Corporation, PO Box 677, Thief River Falls, MN 56701; tel. (800) 344-4539; and Mouser Electronics, Box 839, Mansfield, TX 76063; tel. (800) 992-9943 or (817) 483-4422 (catalog requests only). Write or call for catalogs and ordering info.

An aside: metal-*oxide* resistors do not directly substitute for metal-film types; for one thing, their temperature coefficient of resistance is twice as great.

Q. I've heard that modifying a strap-on keyboard to receive phantom power over MIDI is not a good idea, since if batteries are accidentally left in the unit, they could explode when the phantom power attempts to "charge" them. Is there a way around this?

A. When the mod is installed, a forward-biased diode should be added in series with the battery output. This will prevent the phantom supply from forcing current back through the batteries. Similarly, another forward-biased diode should be installed in series with the phantom power supply output, to prevent the batteries from forcing current back through it. For supply currents up to one amp, 1N4001 silicon rectifier diodes (Radio Shack catalog number 276-1101) should work.

Q. Where can I get parts and service information for my Sequential Circuits ____ ____? (Fill in the blanks.)

A. Not from Sequential. In January 1988, Yamaha Corporation of America purchased the assets of Sequential Circuits, Inc., and subsequently decided that they would no longer manufacture a Sequential Circuits product line; only the research and development departments will remain in operation.

But all is not lost. Yamaha has contracted National Service Concepts to provide parts, service manuals, MIDI retrofits, technical assistance, and warranty service for Sequential products. Contact: National Service Concepts, Inc., 1405 Pioneer Avenue, Brea, CA 92621; tel. (213) 690-9089 or (714) 992-4715.

Q. The display on my Prophet-5 flickers, and the unit sometimes "locks up." I can clear this by jiggling the Filter Cutoff pot. Is the pot defective or worn out?

A. If the display merely flickers continuously, as if you were repeatedly pressing a switch or turning a pot, open the unit (refer to the Prophet service manual) and clean the pot with Radio Shack's TV Tuner & Control Cleaner & Lubricant, catalog number 64-2315; spray just a little into the pot and rotate the shaft a few times. Inspect the solder joints at the pot leads and resolder any that are suspect. If that doesn't fix it, try replacing the 4051 that multiplexes the Cutoff pot—U202 on PCB2—and/or replacing the pot.

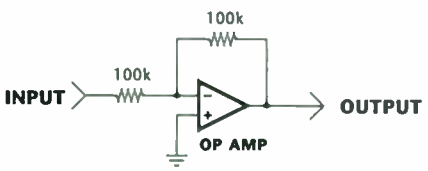

FIG. 1: Unity Gain Inverter

In most designs, 1% resistors are specified simply to insure the use of metal-film resistors.

Service note for Prophet-5s, especially those with MIDI retrofits: If the unit locks up after it's been on for awhile, measure the +5-volt digital supply at the CPU board. If it's marginal or low, add the power supply mod detailed in the November '87 "Service Clinic."

Q. Can I use the TIL111-type optocouplers found in Radio Shack's assortment for MIDI applications?

Q. I've seen some recent equipment using the Sharp PC910 opto-isolator at the MIDI Input, instead of the more common PC900. What's the difference between the two? Is the PC910 preferable for do-it-yourself projects?

A. The Texas Instruments TIL111 can be used in MIDI Input circuits, though it has somewhat greater input capacitance and propagation delay than the commonly recommended 6N138 and PC900 types. In most do-it-yourself applications, this is no big deal, but it might preclude extra-long cable runs to the input.

The problem with the Radio Shack Archer-Pak™ Optocoupler Assortment (catalog number 276-139) is that it contains *three* opto ICs—one transistor-output type, one Darlington-output type, and one "other" type—yet the parts are often house-marked chips that can't readily be identified or cross-referenced. Which is which? Further, do the "TIL111-type" ICs that are included really meet TIL111 specs? Will Sheila elope with Harry? Was the baby abducted by aliens? Tune in tomorrow for *Silicon Soaps*.

On to the PC910 OPIC Photocoupler (OPIC for "OPtical IC," Sharp's buzzword). It has less propagation delay than the PC900 and has a Chip Enable input (the PC900 doesn't); but it doesn't have an internal voltage regulator (the PC900 does) and requires a +5-volt supply. Furthermore, it's in an 8-pin DIP—the PC900 is 6-pin—and the pinouts are dissimilar. There's no compelling reason to use it in do-it-yourself circuits: the PC900 works

fine and is cheaper and more readily available; an Enable function can be added by wiring an AND gate in series with the output. (You can order PC900s from the EM Bookshelf for $3 each, postpaid.)

Optonotes: Just about any TTL-compatible optocoupler can be used for MIDI, if it's fast enough; the TIL114, TIL116, and TIL117 will all substitute for the TIL111. A TIL111-type 6-pin DIP IC will easily fit in an 8-pin socket. Hewlett-Packard cautions that the HP 6N138 Optocoupler is a static-sensitive device and should receive standard ESD protection: shipping and storage in conductive foam, handling and installation only at static-controlled workstations, etc. Did you know that? I didn't.

Q. Some manufacturers incorporate IC sockets in their gear, but many don't. Is this just to cut costs, or are sockets really unreliable? Are gold-plated contacts necessary for reliability?

Q. Should I use IC sockets on my projects, and if so, which kind?

Q. I purchased a bunch of surplus wire-wrap type IC sockets. Can these also be used with soldered circuitry?

Q. I need to replace the MSM5232 Divider IC, a 42-pin VSLI chip, in my Korg Poly-800, but nobody seems to make a socket this size. Where can I find one?

A. Okay, here's the straight poop on sockets. It *is* true that an electronic device incorporating sockets is slightly less reliable than an equivalent device incorporating soldered-in components. This is especially true for equipment containing socketed low-current, analog ICs, which are sensitive to non-ohmic, contact oxidation problems. Nevertheless, sockets can simplify equipment troubleshooting and service: removing one or two socketed ICs can isolate related passive components without desoldering or trace cutting, and you can readily evaluate suspect ICs by substitution (read: get desperate and swap every chip on the board).

Furthermore, when you desolder a defective or suspect IC during service, it is highly advisable to install a socket at the location. Printed circuit boards in consumer gear are often not the best quality, and should a *replacement* IC require removal, due to recurrent system problems or Infant Failure mode (product reliability was discussed in the October '86 "Service Clinic"), the PC traces might not be able to stand the heat of desoldering a second time. Sockets can also be useful in do-it-yourself designs, which are by nature experimental: If you blow the tops off of half the chips, you can simply plug in new ones until you get it right. Some people use up whole rails this way. And you thought electronics was *boring*.

When you desolder a defective or suspect IC during service, it is highly advisable to install a socket at the location.

But which sockets to use? Sockets with low-quality plating or poor contact design can result in nonworking equipment, and inexpensive sockets have an annoying tendency to wick up solder, becoming permanently plugged. Avoid cheap sockets if at all possible. Try AMP brand DIP sockets, available from most electronics supply houses and distributors. AMP manufactures a wide range of DIP socket types. Dual-leaf contact sockets are available in closed- and open-frame designs, with true closed bottoms, and with or without retention-form tails (i.e., "kinks" in the pins that help to hold the socket in place during soldering); single-leaf contact sockets are open-frame, with anti-wicking forms, and are available with or without retention-form tails. The dual-leaf sockets are the most reliable and resistant to wicking; but the single-leaf sockets are also very reliable, and less expensive.

Should you spring for sockets with gold-plated contacts? It's true that, other factors being equal, they offer the highest possible reliability, but at what price? If you're repairing Michael Jackson's Minimoog, consider them. But good-quality sockets with tin-plated contacts are *very* reliable, and off-brand sockets are not necessarily more reliable just because they have gold-plate contacts. Stick with major brands.

You *can* solder to those surplus wire-wrap sockets, provided that the plating is not oxidized. If it is, save them for wire-wrap only.

My MIDI Cable's Longer Than Yours—

Unless yours is 400 feet. Not content to leave well enough alone (see the sidebar "MIDI cables —100 Foot Plus!" in the September '88 "Service Clinic"), I asked Ron Wirth at Conquest Sound to make a custom, extra-long MIDI cable to test at the June NAMM show. My calculations indicated that we could expect success with cable lengths in excess of 500 feet, but Ron was skeptical.

We convinced the folks at the Casio exhibit to help with the test. Conquest provided a 300-foot cable, and I tacked a 100-footer onto it with a Micro-W MIDI Cable Extender (reviewed in the September '87 **EM**). We hooked the combination up to a Casio MG-500 MIDI Guitar that I had modified to receive phantom DC power via the MIDI cable, and sent Casio guitar clinician Pat Cerello down the concourse, spooling out the cable as he went. It worked great, phantom power and all, but it was pretty bizarre to watch a "miniature" guitarist play an FZ-1 Grand Piano sample from 400 feet away!

All this proves is that if you can afford expensive cable material, you can send MIDI for some distance with a conventional interface—not exactly an earth-shattering engineering discovery. Still, some folks have taken the recommended 50-foot MIDI-cable length as some sort of cosmic limit. I'm trying for 600 feet. —*AGC*

Forty-two-pin sockets? I don't think so. You could use some of the old Molex™ do-it-yourself socket-pin strips, but they're not very reliable. You may have to solder the VLSI IC in place and hold your breath when you throw the switch.

ADAPTER RECALL

Radio Shack Foreign Travel Outlet Adapters, catalog number 273-1405A, purchased between January 1 and May 20, 1988, may be defective and pose a shock hazard. Check your travel bag and return any suspect adapters to the nearest Radio Shack for replacement.

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

ONE-CHIP PROJECT: BUILD A TEST TONE GENERATOR

It's simple, it's inexpensive, it's extremely useful, and you can put this versatile circuit together in an evening.

By Erik Lee Hayes

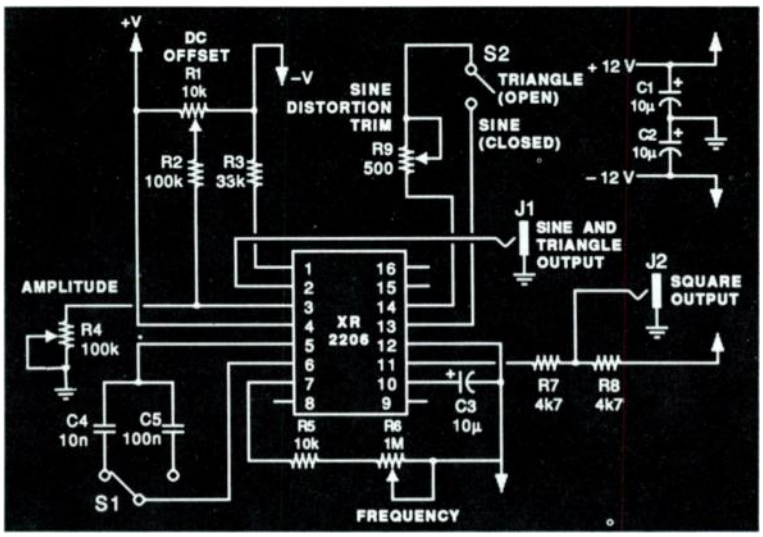

FIG. 1: Test tone generator schematic.

How would you like to add test tones to the beginning of your recordings (to easily calibrate to 0 VU when playing tapes on different tape decks), run frequency response checks on your speakers and tape decks, and make funny noises in the dark? Whatever your pleasure, the circuit you need—technically called a *function generator*—is usually a piece of expensive lab gear, but this article will show you how to build one yourself for under $20. Due to its simplicity and usefulness, this project is particularly appropriate for those just getting involved with electronic construction. (You don't have to understand electronics theory in order to build and use it. For more information on do-it-yourself projects, see page 6.)

The main component in this circuit is a result of the boom in analog integrated circuit technology that occurred during the '70s; the Exar XR2206 (manufactured by Exar Integrated Systems, 750 Palomar Ave., Sunnyvale, CA 94088-3575, and available from Jameco; see parts list) needs only a handful of parts to serve as a full-fledged function generator that generates sine, triangle, and square waves. The circuit (**Fig. 1**) implements the basic functions, while the section on modifications describes how to add on to the basic circuit.

The XR2206 uses an integrated voltage-controlled oscillator, current switches, and waveform shaper to create its output. An external capacitor sets the timing and is discharged through an internal bypass transistor. We won't get into specifics as to what's in the chip, but Exar sends out data sheets if requests are received on company letterhead.

The external capacitor, the value of which determines the overall frequency range, is the heart of the oscillator. The circuit switches between two capacitors for low and high frequencies. The external capacitor can be varied to cover a different frequency range, but note that the chip does have lower and upper frequency limits (0.01 Hz and 1 MHz respectively). All the external resistors simply provide feedback for the internal amplifiers and voltage reference levels for the internal transistors. Manipulating these values with potentiometers varies the frequency, amplitude, DC offset, and waveform shape.

CONSTRUCTION

Take your time and enjoy building this project. When constructing the circuit, please keep it neat: no layering of resistors or capacitors. Extraneous noise and oscillations can occur if wire lengths are unnecessarily long. Constructing the circuit on a printed circuit board is preferred, but wire-wrapping the circuit will work just as well. Use 60/40 rosin-core solder made specifically for electronics, and install an IC socket so you don't have to worry about overheating the IC through soldering.

Hopefully you have been an avid **EM** reader and saw the articles on power supplies in the November '87 and September '88 issues. The power supply should be

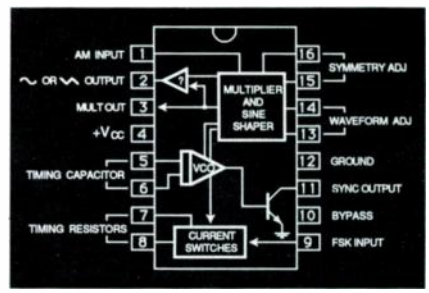

FIG. 2: Pinout for the XR2206 monolithic function generator.

well-filtered with capacitors to prevent any 60 Hz ripple from showing up in the output. Check the chip's orientation in the socket (the dot or notch indicates pin 1; refer to the pinout) before you apply power to the circuit, and good luck. All the components can be acquired from

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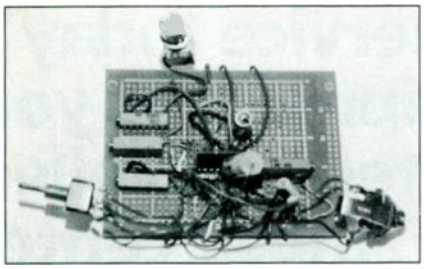

HENRY L. JONES

The EM test tone generator.

any of the companies listed at the end of the parts list.

USING THE FUNCTION GENERATOR

Apply power, close S2, and if you don't see any smoke or smell burning silicon, play with the pots to check out their functions. (If you do smell something burning, of course, turn off the power *immediately* and check your wiring—and expect that you may have damaged some of your components.) R6 sweeps the frequency over a wide range (note that rotating the potentiometer knob clockwise will either increase or decrease the frequency, depending on which of the two outer terminals connects to the wiper terminal). If at first you don't hear an output from your speaker, don't panic. You may have the frequency too high or too low for an audible output, or one of the other pots may not be set correctly.

R4 determines the overall output level; although the XR2206 doesn't put out a tremendously hot signal, it's adequate for most purposes. Now set the amplitude to minimum and trim R1 for zero output voltage at pin 2. R9 varies the waveform shape, hence the amount of distortion. You'll probably need an oscilloscope to trim this, since any changes are not all that audible. Now open up S2. The sine

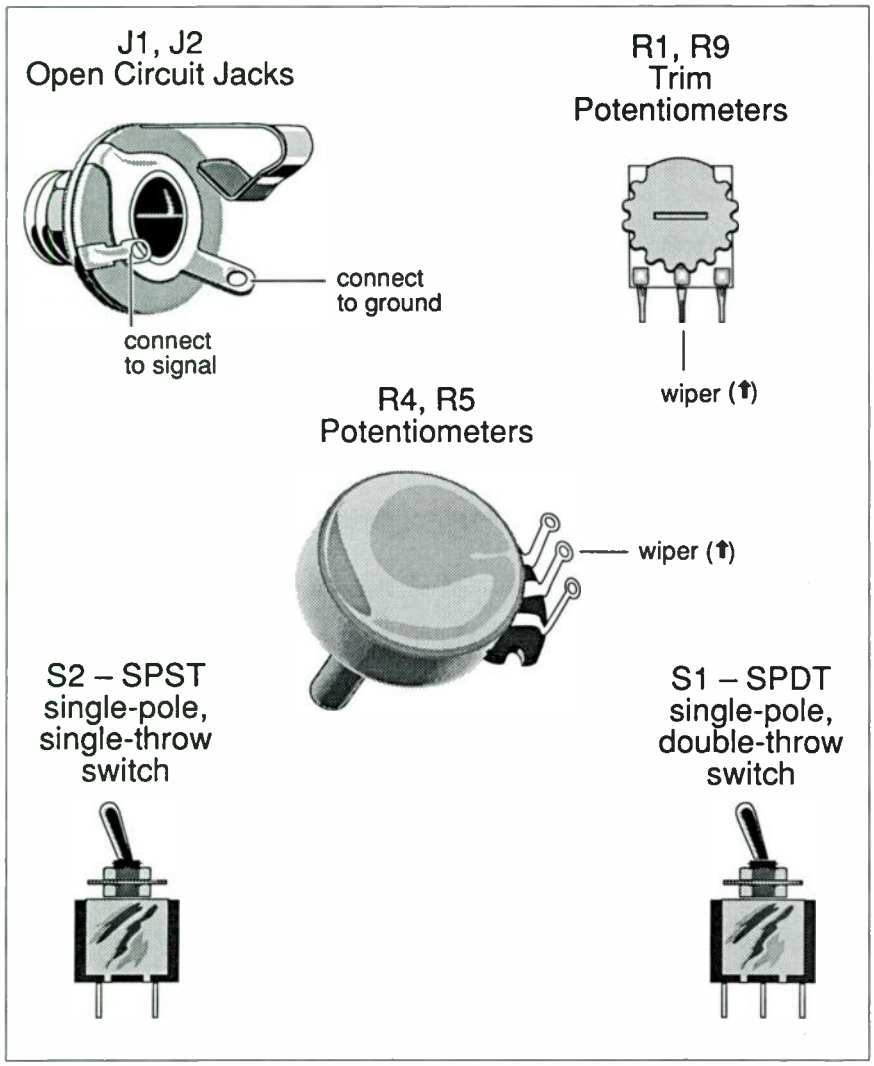

FIG. 3: Various electronic parts.

XR2206 TECH NOTES

The formula for the frequency of oscillation is F (Hz) = 1/RC, where R = R6 + R5, and C = C4 or C5. For many applications, making C4 equal to 50n (0.05 μF) and C5 equal to 5n (0.005 μF) will cover the most useful sections of the audio range.

R (Ohms)	C (Farads)	F (Hertz)
1M	100n	10
1M	50n	20
1M	10n	100
1M	5n	200
10k	100n	1k
10k	50n	2k
10k	10n	10k
10k	5n	20k

The maximum output level is proportional to R4. The sine wave amplitude increases by approximately 60 mV peak-to-peak per 1,000Ω of R4; for example, if R4 = 25k, then the output will be about (25 × 0.06V) or 1.5V peak-to-peak.

Sine wave distortion in an untrimmed XR2206 is typically around 2.5%. Adjusting R9 can bring this down further, but adding a 25k pot between pins 15 and 16, with the wiper attached to the negative supply, can trim the sine distortion to around 0.5%. The trim procedure is to set the 25k pot at its midpoint and adjust R9 for lowest distortion. Then adjust the 25k pot until the distortion reaches absolute minimum. The 25k pot can also serve as a duty cycle control.

The XR2206 can be frequency-shift keyed between two frequencies. R5 and R6 establish one frequency, which is selected by leaving pin 9 open or grounded. Adding another resistor/potentiometer combination identical to R5 + R6 between pin 8 and the negative power supply sets the second frequency, which is selected by connecting pin 9 to the negative power supply.

Finally, if possible use a reverse audio taper potentiometer for R6. Unfortunately, these can be hard to find; you can use a standard audio taper potentiometer, wired in reverse, although this means that rotating the control clockwise will *lower*, not raise, the oscillator frequency. —*Craig Anderton*

output changes to a triangle output whose peak-to-peak voltage is a little over twice as much as the sine wave. Also check the square wave output to confirm that it is working properly. Note that an oscillator such as this is the heart of many analog synthesizers, so you may want to apply this circuit to musical applications as well as testing.

A function generator is usually a piece of expensive lab gear, but this article will show you how to build one yourself for under $20.

MODIFICATIONS

There are a few modifications that are worth trying with this circuit. You can amplitude-modulate the chip over about a 55 dB range by varying the DC level on pin 1; try varying this from -4 to +4 volts. Pin 1's impedance is about 100k.

A ramp generator can be made if you attach two 1k resistors, one each to pins 7 and 8, connect the free resistor ends to the outside terminals of a 100k pot, and connect the pot wiper to the negative supply.

EXEUNT

I hope you enjoy this project, as it is a simple introduction to circuit building. Find new uses for it and experiment as you please. A function generator is now within the reach of the average person's budget—a little effort, and it's yours.

Acknowledgement: Thanks to Professor Theodore Fahlsing for introducing me to the XR2206.

PARTS LIST

RESISTORS (¼ watt, 5% tolerance)

R1	10k trim potentiometer
R2	100k
R3	33k
R4	100k potentiometer
R5	10k
R6	1M potentiometer (reverse audio taper, if possible—see sidebar)
R7, R8	4k7 (4.7k)
R9	500Ω trim potentiometer (sine distortion trim)

CAPACITORS (15 VDC or greater)

C1-C3	10μ (10 μF)
C4	10n (0.01 μF)
C5	100n (0.1 μF)

SEMICONDUCTORS

IC1	Exar XR2206

MISCELLANEOUS

J1, J2	open circuit jacks
S1	SPDT switch
S2	SPST switch

16-pin IC socket

(See page 6 for International Parts Specification information.)

PARTS SOURCES

Jameco Electronics
1355 Shoreway Road
Belmont, CA 94002
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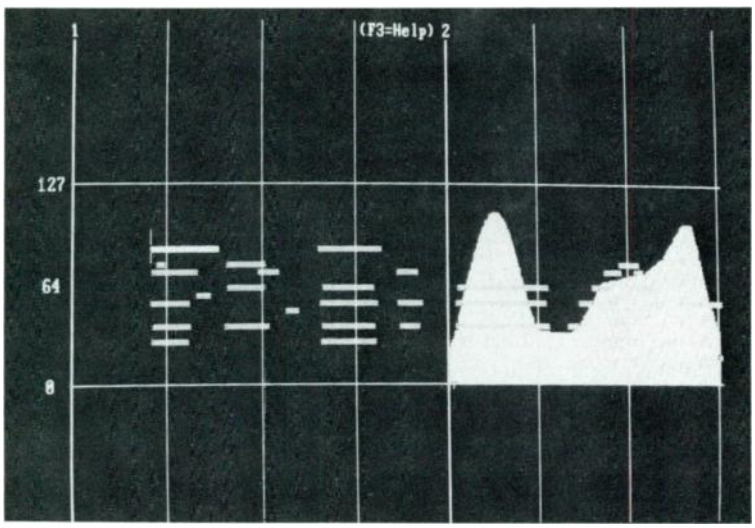
HENRY L JONES

Erik Lee Hayes *attends Purdue University for Electrical Engineering Technology, is a student member of AES and IEEE, and is vice president of Purdue's Association of Electrical Technicians. His goal is to become an engineer at Paisley Park Studios and teach audio professionally; he seeks an internship with an audio company for practical experience in the field.*

FIRST TAKE: Capsule Comments

This month, **EM**'s First Take section compares a couple of guitar preamps, looks at an Amiga patch editor, and puts a PC sequencer through its paces.



Notes and continuous controller data can be displayed simultaneously.

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

48 Track PC Version 3.0, $259

By Carter Scholz

Robert Keller's *48 Track PC* is an excellent mid-price IBM sequencer that, in addition to a solid implementation of all the standard functions one expects from a top-of-the-line sequencer, offers several unique features. In every area of operation, 48 Track PC gives you a little bit—sometimes a lot—more than average.

Most IBM programs utilize the Roland MPU-401 interface's 192 pulses-per-quarter-note (ppqn) clock, but Keller takes advantage of the IBM's faster internal clock. Hence, the salient difference between 48 Track PC and other IBM sequencers is its superb timing resolution: 600 ppqn. Other sequencers I've tested skew time noticeably when you play several simultaneous tracks of 32nd notes, but 48 Track PC's timing remained rock solid with as many as 32 tracks. Most sequencers create crescendi and diminuendi by imposing a straight-line ramp between a starting and an ending value, but Keller also lets you scale a group of existing values *by a percentage*, retaining the original performance's velocity nuances. Percentage scaling works on other parameters too: note duration, controllers, pitch wheel, and overall tempo; and the percentage curve can be either linear or exponential. As if that's not enough, you can also edit velocities in real time, as the sequence plays, with your synth's pitch wheel.

48 Track PC can adjust timing very flexibly. A "smart" quantizing option moves notes not *onto* the beat, but halfway there, so you can tighten a rhythm without making it mechanical. *Perfect legato* can smooth the phrasing of monophonic lines by moving Note Offs to coincide precisely with the time of the next Note Ons. During playback you can manually quantize to taps on the space bar, or edit the tempo with the pitch wheel or +/- keys.

48 Track PC syncs to other devices with MIDI clocks and Song Position Pointer. Although it doesn't read SMPTE time code, the program lets you mark hit points in a sequence by measure and beat number, time in hours, minutes, seconds, and tenths, or any of the SMPTE frame rates. You can shrink or stretch sections of a piece by using the markers to indicate exactly how much time the section should occupy, and you can sync directly to film if you have a SMPTE/MIDI sync converter (Fostex 4050, Roland SBX-80, etc.).

Owners of Hercules, CGA, or EGA displays can use the graphic editor, which displays a piano-roll representation of your music. (Otherwise, event editing uses a note list.) A very good feature is that *six octaves* of pitch are visible at once. A zoom control lets you set the rhythmic resolution, and a graphics window displays *any* continuous controller (including the non-standard ones on your oddball synth); you can use the mouse to draw a new curve of values. You can also draw a *rubato* curve that will rush and lag

DSP is on the front panel.
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who's looking for more bang for their
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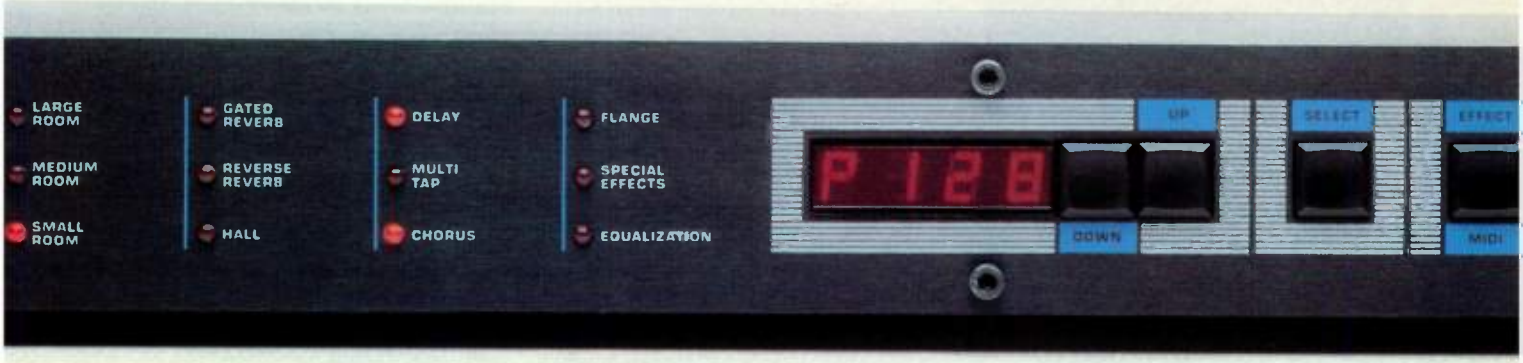
box.
Look for it to be quit ...pular. Wh
...ows. In a year ...

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

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

—Jock Baird *Musician*[2]
April, 1988

The DSP-128 is playing to rave reviews.



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

Fully programmable.

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

MIDI continuous control.

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

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

3 effects at once.

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

90 dB S/N ratio.

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

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

Check out the DSP-128 at your DigiTech dealer.

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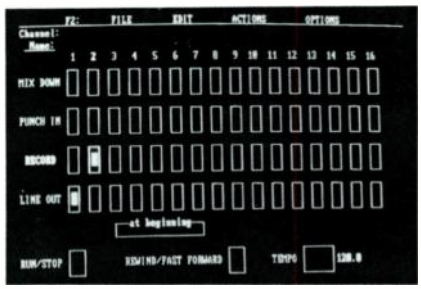
Start at the top.

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

notes by a variable time up to one eighth note. Neat.

Not so good is the lack of a command menu on the graphics screen and the inability to do region-selecting or editing from this screen. For that, you have to return to the track screen, defeating some of the reason for a graphic note editor.

Twelve sequences can be in memory at once, and cut-and-paste works between different sequences. Sequences can be linked using simple algebraic commands: 2*AB = C will create a new sequence, C, that consists of A repeated twice, followed by B. There's no limit to how many sequences you can link, except that the resultant sequence must fit into memory (though the source sequences can be on disk).



Main screen in 48 Track PC.

You can record, edit, and play back System Exclusive data, which should light up the eyes of experimenters (this is the only IBM sequencer I know of that lets you do so). Also on the list of hacker-type goodies is the ability to store sequences as straight, easy-to-edit ASCII files.

The user interface needs improvement in two areas. When you push the mouse pointer to one side of the screen, it wraps to the other side. This makes pulling down a menu an exercise in agility (if you overshoot the menu bar, you wind up at the bottom of the screen) and complicates other fundamental tasks. Fortunately, you don't have to use the mouse, and the cursor keys work very well.

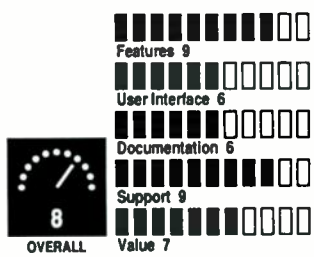
The other weak point is the graphic editor, a recent addition. Moving forward and backward in a piece is far slower and more laborious than it should be. You basically have to do it a note at a time, although there's a command to go directly to any measure number. What's needed is a way to page forward and back in large chunks (this applies to the non-graphic note list as well). Another inconvenience: though you can delete and move notes, you can't insert them in the edit window. Likewise, using the mouse to edit continuous controllers, you can only change existing controller events; you can't create or extend them. The group edit commands are available only from the main track screen, so you can't use them in the graphic editor—and you should be able to. In short, this interface has the potential to be the best available on the PC, but its current implementation is disappointing.

Finally, the documentation could use an overhaul, especially the index. 48 Track PC's working screens are pleasantly clean and uncluttered, but this luxury, and the inadequacy of the terse on-line help, demand additional guidance through the program's myriad features.

When I spoke to Keller, none of these points came as a surprise: he had already fixed them or had them on his list. He set no dates, but in the past has sent out minor upgrades monthly. Depending upon the number of new features (he often incorporates user suggestions), upgrade fees have ranged from free to $25. Keller is a one-man business and can be directly and immediately responsive to his users. Calling several times during business hours (noon to 4 p.m. PST), I never once got a busy signal or an answering machine; Keller himself always answered the phone.

Despite some rough edges, 48 Track PC offers strong competition to the more established IBM sequencers and has features that could make it a must-have for some people. Give this one a close look.

Carter Scholz *is a writer, musician, programmer, and consultant. He lives in Berkeley, California.*



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Korg DS-8 Ed/Lib.
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Matrix 6 Ed/Lib.
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IBM

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

CLUB MIDI
Prolib Librarian

TURTLE BEACH
Sample Vision

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Ensoniq ESQ-Apade Ed/Lib.
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
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Groove Tubes Studio Series Tube Preamp for Guitar ($1,000); Rocktron G.A.P. 1 Guitar Preamp ($349)

By Craig Anderton

Guitar preamps come in many different flavors, and these two units represent very different, yet highly effective, approaches.

The Studio Tube Preamp for Guitar (STP-G) is an all-tube, 2U, rack-mount device (although three transformer cans stick up several inches higher, so the unit uses up more than two rack spaces). Along with the front panel ¼-inch phone input jack, controls include Gain (with associated in/out switch); Preamp Level with pull switch for pad (attenuation); Presence (which boosts the upper midrange); and Master Volume. The tone control section includes Treble (pull for bright), Midrange (pull for boost, with the frequency determined by a five-position rotary switch), and Bass. The EQ design seems to have been chosen more for tonal quality than versatility; its sound reminds me of a vintage Pultec equalizer. There's also a Standby switch, since turning tubes on and off frequently or running them at full power will reduce their operating life; when the band wants to take a break, the amp can run at reduced power consumption, thus extending the life of the tubes.

The rear panel includes the power switch and fuse post; captive three-conductor AC line cord; a ¼-inch phone, Line Out jack with Line Level control; Speaker output (this "preamp" has a pair of 6V6 matched output tubes that can deliver 32 watts into 8 ohms!); and Emulator output. The Emulator circuit is an electro-mechanical affair that simulates the effect of loading the power amp with a loudspeaker (a 12-inch Celestion, according to the company); the resulting sound has a smooth, warm quality with a hint of resonance. A front panel control sets the Emulator output level. (Although the manual recommends using the Line Out exclusively to feed slave guitar amps since it would be too "sterile"-sounding to feed into a mixer by itself, I nonetheless got some good effects by mixing the Line and Emulator outputs in stereo and throwing the line signal out of phase.)

Groove Tubes Studio Series Tube Preamp.

The STP-G is beautifully self-contained—you don't really need any external compression, preamping, or EQ to enrich the sound—and would appear to be equally at home on stage or in the studio. It can also add a lot of warmth to synthesized timbres—try sticking your DX Hammond patch through this baby for a very pleasant surprise. The sound quality is excellent; overall, as the price tag would indicate, this is a deluxe, pro-level unit. If

you've got the bucks, the STP-G really delivers. (*At press time, Groove Tubes announced that the STP-G's Emulator circuitry will be available in the near future as a self-contained unit.—Ed.*)

Groove Tubes makes another preamp, the STP-MI ($900), designed primarily as a clean mic preamp for vocals as well as musical instruments. However, when used strictly as a guitar preamp, it does not offer the wide range of sounds of the STP-G. The STP-MI would most certainly be handy to have around the studio for "warming up" sound sources recorded via microphone, but for an extra $100 the STP-G is far more satisfying when used solely for guitar preamp applications.

Rocktron's all solid-state Guitar Audio Processor 1 (G.A.P. 1) seems designed specifically for the stage. There are five main front panel "modules": Pre EQ, AGX Distortion, Post EQ, Hush, and Output.

As a big fan of pre-distortion EQ, I was pleased by the G.A.P. 1's implementation. Controls include Bass, Treble, and Mid-range (the latter works with an adjustable

Rocktron G.A.P. 1.

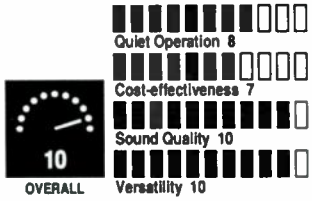
Frequency control and two-position Bandwidth switch).

The distortion circuit includes two Gain control presets, switched with either a front panel switch or footswitch plugged into an associated rear panel stereo jack. (This footswitch can be a two-button unit, with one switching between the two Gain controls and the other providing the distortion Bypass function.) An LED glows next to the active control; I would prefer to see two different colors, however, to make it easier to see which control is selected. The AGX function causes the distortion stage's gain to track your dynamics, so that as your playing level drops below the threshold set by the AGX Threshold control, the gain diminishes. This reduces hum and noise; as soon as you start picking harder, the full gain returns. This isn't really like a noise gate, because the signal doesn't cut off so much as it gets less fuzzy at low levels, and then just fades away. One caution: the Threshold adjustment is very critical, so experiment. I found that setting the Threshold just counter-clockwise of where the Threshold LED came on gave the best results for me, but this contradicts the instructions in the manual.

The post-EQ tone controls are pretty standard—Bass and Treble, ±15 dB. These are followed by one of Rocktron's highly effective "Hush" circuits; this single-ended noise reduction system silences any residual noise. You can use the Hush instead of, or in conjunction with, the AGX stage's noise-reducing properties; like the AGX, the Hush has a Threshold control. Finally, there's an Output control (with In/Out switch and associated LED). Note that there is no on-off switch.

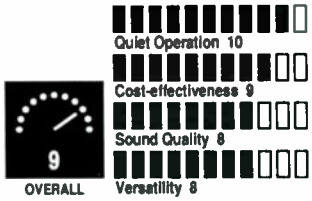
The rear panel includes unbalanced,

¼-inch input and output jacks along with a footswitch jack, but there's also a cutout for another jack, neatly concealed by a little plastic cover. I don't know whether Rocktron added this on purpose or made a mistake, but it's just the ticket for solder hackers who want to do a little customizing. The unit seems well-built, and Rocktron is obviously confident of its quality—the warranty extends three years from date of purchase and is not limited to the original owner. The manual is good, too.



Groove Tubes
13994 Simshaw Ave.
Sylmar, CA 91342
tel. (818) 362-1551

So what's the bottom line? The G.A.P. 1 is cost-effective, quiet, rugged, offers a lot of tonal options, and seems most suited to onstage use by rock-oriented musicians. The Tube Preamp for Guitar justifies its comparatively high price not only by re-creating *that* legendary tube amp sound, but by seeming to be equally at home with jazz and country timbres as well as rock and blues. Both boxes fill their assigned niches very well; they're well-designed and a pleasure to use.



Rocktron
1633 Star Batt Drive
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tel. (313) 853-5937

Dr. T's 4-Op Deluxe Editor/Librarian for the Amiga and Yamaha TX81Z, FB-01, DX100/27/21 ($149)

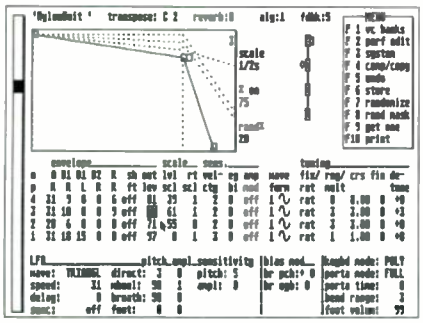
By Tim Tully

Being able to save, load, and edit your synthesizers without quitting your sequencing program is a pretty attractive concept. Courtesy of the Commodore Amiga's multi-tasking operating system, that's just what Dr. T's FM synth editor/librarian does.

Designed to work with the five Yamaha four-operator tone modules, this package has bushels of functions that range from the necessary basics to the the kinds you may only use only occasionally, but you're glad they're there when you need them. In addition to moving voices, performances, and banks between synth and computer and providing fast, cheap, and convenient disk storage, 4-Op Deluxe will create new sounds or modify existing ones with a randomizing function. This is an intelligent and flexible feature that lets you use a *Randomization Mask* to apply a selectable degree of randomization to a likewise selectable set of parameters. If a given mask works for you, you can save it for future use.

The main edit screen is busy but logical. Though just a little more creative use of the Amiga's color capabilities could have made it easier to distinguish among the tightly packed groups of parameters, all the information needed for editing is conveniently available on one screen. Envelope parameters are displayed and editable both as rows of numbers and as a graphic that displays an active envelope as a solid line, and the other three envelopes as dotted lines, each of which can be activated with a mouse click. All the rest of the edit parameters are arranged in a way that, while not always the same as in the synthesizer's LCD, is not difficult to figure out, and makes at least as much sense. Editing values is a standard click-and-drag proposition, made even more convenient by the fact that the mouse doesn't have to be on the scroll bar to move it. Once you select a parameter, you can change its value by clicking and dragging on the scroll bar or (a very convenient feature) any other point on the screen. You can also enter values from the Amiga keyboard, if you're so inclined. The program lets you move, copy, and swap voices among banks, as well as instruments among performances, with a minimum of fuss.

A performance edit screen lays out the parameters of all eight of the instruments a performance can contain. Having all the parameters of a performance in front of you at once enormously eases this editing job. Adding or deleting instruments and setting any of their functions—high-

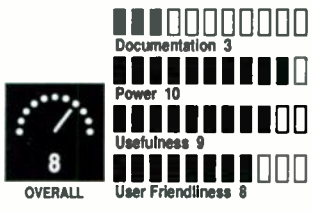


The main voice editing window in 4-Op Deluxe.

and low-note limits, detuning, volume, and so forth—is accomplished with the same click-and-drag technique as voice editing. Another convenience is that a click of the mouse plays any note on the synth, depending on the cursor's location; pressing the right mouse button applies modulation from any of 31 MIDI controllers, including the often-used Aftertouch, Mod Wheel, Velocity, and Breath. The software provides a number of ways to manipulate MIDI channels, control Program Change and System Exclusive data, and print your voice names.

The downside of this program is its documentation. One manual covers five different synths and both the Amiga and Atari computers, so the text regularly interrupts your learning curve with instructions for the computer or synth you're *not* using, and occasionally refers to features that don't exist on a particular synth. (There is no "configuration" on the TX-81Z.) It misnames features of its own screen display ("get all" for "get bank") and shows a regular disregard for syntax that forces the reader to read and re-read. Fortunately, the documentation is *complete*, so all your reading and experimentation will eventually pay off. Still the initial struggle is particularly distressing in light of the quality of the software—a useful and dependable package. Just watch out for that first step.

The program is copy-protected, but $15 gets you a one-per-customer backup disk.



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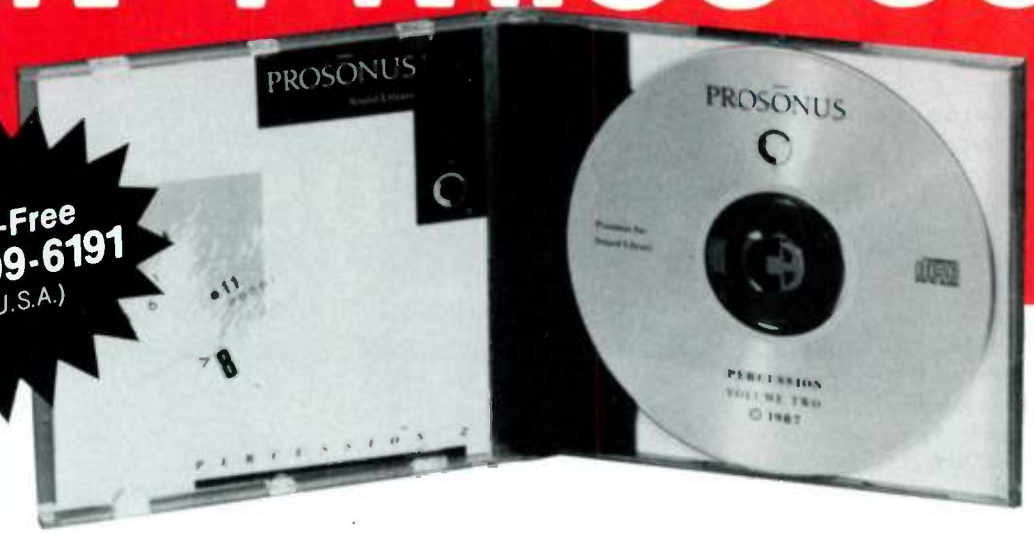

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Tascam 238 Syncaset

Eight tracks on cassette can't sound very good, right? Wrong. The company that put four tracks on cassette has doubled the density without cutting the quality.

By Craig Anderton

C.R. KING

When Tascam squeezed four tracks onto quarter-inch tape in the early '70s, the home recording boom got its start—and so did the quest for jamming more tracks into ever-narrower tape formats. I'm not sure where this will all end, but the latest step is indeed revolutionary: eight tracks on cassette. With Toa also entering the 8-track cassette sweepstakes, this is a format whose time has come.

Or has it? There's an understandable skepticism toward this new format, mostly based on concerns about sound quality. Yet there's also the nagging feeling that this could be technology for technology's sake—does the world really need an 8-track cassette? We'll tackle those questions as we check out Tascam's latest attempt to repeal the laws of physics.

SKETCHPAD DELUXE

Ever since the first Portastudio (a combination mixer and 4-track cassette recorder), Tascam has steadfastly maintained that these mini-recorders are not replacements for open-reel decks, but rather, "sketchpads" for taking audio notes, writing songs, and working out arrangements. Even when Bruce Springsteen cut a hit album with a Portastudio, the company's attitude didn't change; Tascam representatives pointed out, quite rightly, that the album required extensive mastering to compensate for the limitations of the medium. Despite Tascam's underplaying of expectations, though, cassette culture folks, and even some commercial operations, have indeed used Portastudios to create viable products. The 238 fits a similar slot: the sound quality is not quite as good as open-reel, but it certainly does the job.

FEATURES AND CONTROLS

The 238 is a compact, 3U, rack-mount recorder that is straightforward to use. There are no "shift control L"-type keystrokes required; all the buttons needed for operation are laid out clearly and unambiguously. The manual is more than adequate, and I can't imagine anyone other than a neophyte requiring more than an hour or two to understand completely every aspect of the unit's operation.

One important point is that there is no headphone monitoring, no input or output level controls (except for track 8, as this track can be used with sync signals that may require level setting), and no equalization. This unit demands an external mixer, which somewhat reduces the benefits of the unit's relatively small size.

The transport runs cassettes at 3¾ ips and seems very gentle, even when you hit stop during rewind or fast forward. A C-60 cassette can be rewound in a little over a minute, which means that you can get anywhere you want on the tape pretty fast (much faster than reel-to-reel). But the real action with this unit lies with the features, so let's get into specifics.

Connections: The eight inputs and outputs are unbalanced RCA phono jacks. There's also a connector for a punch-in footswitch and Tascam's accompanying RC-88 remote control.

Tape speed: This three-position switch offers external (for capstan control by SMPTE synchronizers and controllers), fixed, or variable (with an associated ±12% pitch control).

Transport controls: This section includes the standard rewind, fast forward, stop, play, pause, and record buttons.

Meters: The eight LED VU meters dominate the right side of the front panel. Each has its own Record On/Off switch and off/ready/record LED; the meters themselves have 12 steps and two colors —green for below 0 VU and red for above 0 VU. The red LEDs include a peak hold function; the green LEDs do not.

Shuttle: When on (as set by a switch), the Shuttle knob does the equivalent of manually "rocking the reels" with an open-reel machine. You can slow the tape speed down to a crawl if desired—this is great for cueing. The tape remains in contact with the heads, though, so high-speed, extended use of this function will accelerate head wear.

Tape counter: The counter is a pretty sophisticated, multi-purpose device. In addition to a standard counter, you can make it read out in minutes and seconds.

However, the latter function won't track rewind, fast forward, or shuttle; it's pretty much for timing passages on tape. The automated functions track the regular counter instead of the minutes/seconds reading.

dbx: Two rear panel switches let you activate or deactivate dbx Type II noise reduction for two channel groups (1-4 and/or 5-8). dbx cannot be disabled for individual channels, with the one exception mentioned in the next paragraph.

Sync accommodations: Two rear panel switches optimize the 238 for use with sync signals. Turning the tape sync switch on shuts off dbx for track 8 (even if the 5-8 group has dbx turned on) and routes the sync signal through an input level control and optional bandpass filter. This filter, recommended for use with FSK sync signals, helps increase immunity to signals recorded in track 7 (the filter is not recommended for use with SMPTE sync, though).

Autolocation: There's the usual return to zero function (pressing this automatically moves the tape to where the counter reads zero), but while the tape is playing *or* stopped you can also press two "marker" buttons, Memo 1 and Memo 2. The 238 stores the counter reading when either button is pressed; if you later press the Loc 1 button, the 238 will rewind or fast forward to the Memo 1 point. (If you press Play while the unit is locating, it will go into play upon reaching the specified point.) Pressing a Loc 2 button similarly autolocates to the Memo 2 point. One very considerate touch is that the memo points recalculate their proper position if you reset or change the tape counter.

Block repeat: Pressing Repeat causes the 238 to loop continuously between the two Memo points. This is great for practicing a part to a certain chorus or verse, for example.

Recording: As soon as the machine goes into record, the output switches from tape to source for all tracks in record mode (you can record up to eight tracks simultaneously). Most of the record functions are pretty standard stuff: you can enable individual channels, then press the transport Record switch to put the tracks in

SPLITTING HEADS: THE TECHNOLOGY BEHIND TASCAM'S 238

With the introduction of Tascam's 238 Syncaset, certain questions were bound to come up: "Sure it's convenient, but how does it sound?"; "Isn't there a lot of crosstalk and noise?"; and "Did Tascam compromise good sound just to introduce another tape format?"

While the 8-track audio cassette is a recent development, the multi-track cassette is not exactly new. The cassette format began with the Philips Carrycorder in 1964, nearly a quarter century ago. Advancements in noise-reduction circuitry and improvements in tape formulations increased the fidelity of this new medium that offered convenience (no tape threading!), a compact size, and, when compared to open-reel systems, an equally compact price. The first Tascam Portastudios debuted about ten years ago, and the advent of the 8-track cassette format seemed to be the inevitable next step. It wasn't easy.

Crosstalk (a condition where signals from one track "bleed" over onto adjacent tracks, thus reducing channel separation) was a major consideration. Tascam engineers minimized the problem by developing a split-head design. The record/reproduce head has two halves; four tracks on one side are separated by a quarter-inch from the four tracks on the other. This reduces crosstalk, caused principally by the coil windings of one track within the tape head magnetically feeding into the windings of adjacent tracks. The split-head design places the cores as far apart as those found on a 4-track cassette head.

The various cassette head formats and track spacings in **Fig. 1** demonstrate how Tascam's use of track "interlacing" minimizes crosstalk. Note that the 8-track format (listed in the diagram "*") staggers the head placement of nearby tracks, so, for example, track 5 is recorded by a head that is a quarter-inch away from tracks 1 and 2, even though track 5's data is recorded in the space between those two tracks.

In electronic music production, frequency response is another important consideration. Fortunately, track width has little to do with frequency response, as this is largely a function of tape speed versus gap length. One consequence of doubling the number of tracks on a cassette tape (thus reducing the tape area of each track by 50%) is that the signal-to-noise ratio is lowered by 3 dB, causing an apparent increase in noise. However, the 238's improved electronics and 30 dB of dbx noise reduction effectively deal with the difference.

Remember, worrying about the subtleties of crosstalk, frequency response, and signal-to-noise ratios is really unimportant, unless you are prepared to do simple, routine maintenance—such as cleaning and demagnetizing heads—on a regular basis. Another critical point is avoiding cheap, "bargain basement" tapes. Besides providing superior audio performance, high-quality cassettes also offer better transport characteristics, with smooth rewinding and less chance of breaking or jamming. With cassette multi-tracks, the cost of buying a good tape is really quite low when compared with the number of hours you spend on a project, and isn't your music worth it? —*George Petersen*

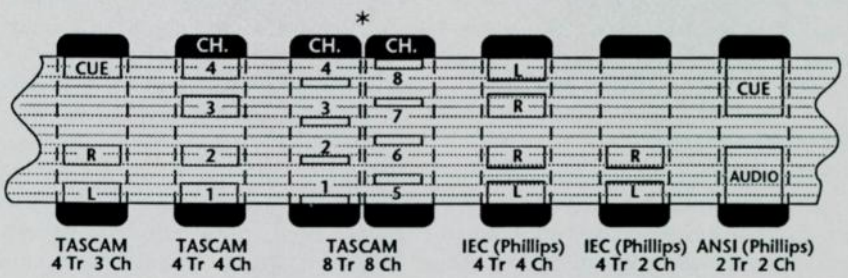
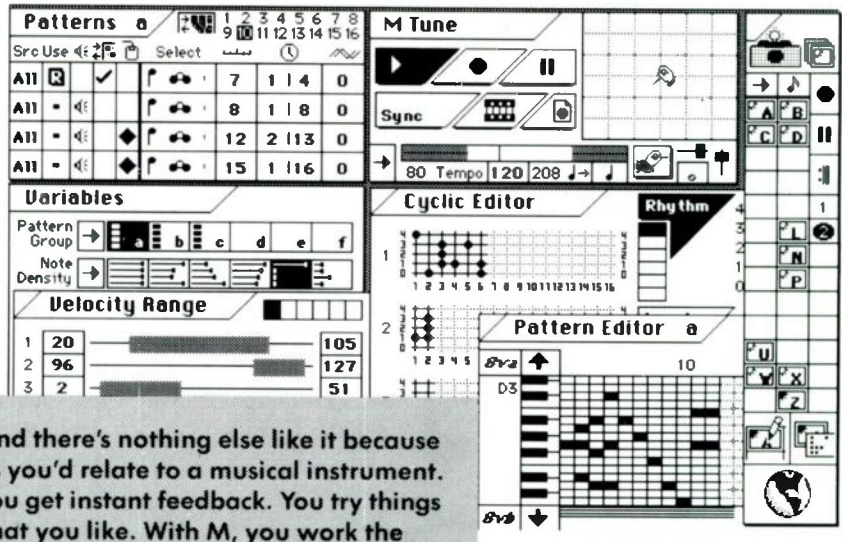


FIG. 1: Six cassette track formats, left to right: Tascam 2-track plus cue; Tascam 4-track; Tascam 8-track; IEC/Philips 4-track; IEC/Philips 2-track; ANSI/Philips mono plus cue.

It's Not Just Another Pretty Interface.



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record, or press the transport Record switch first and enable individual channels when you want them to record. This is the conventional, manual way of doing punches.

Auto punch-in/out: This has two modes, Rehearse and Auto In/Out (this approach is reminiscent of John Simonton's SMPL System of a few years back). During rehearsal, you set the punch points (pressing Record sets punch-in, pressing Play, punch-out), and on subsequent playbacks the meters and outputs switch from tape to source between those punch points—just as if you were recording, yet record is not active. This lets you verify the punch points as well as rehearse the part. After punch-out, the unit waits three seconds, then rewinds back to the point where you first pressed play.

Selecting Auto In/Out works the same way, except that the unit actually switches into record. One minor limitation: to get out of Auto In/Out, you have to clear the start and punch points; it is assumed that once you go into Auto, you're not going to want to rehearse again. During rehearsal, however, the start point and punch points are retained—even if you leave rehearsal mode—unless you change them, eject the tape, turn off the machine, or press the Clear button.

All these automated functions are tied to the counter, which gets its reference from capstan revolutions, not exact tape position. As a result, any tape slippage will change the counter setting relative to the true tape position. This is not too much of a problem unless the tape is poorly packed, or you fast forward and rewind a lot. If you need higher accuracy, the serial port lets you control punch-in/out via SMPTE (which gets its data from the tape itself) and an associated synchronizer.

Bouncing: Bouncing is possible, but as with all multi-tracks, you shouldn't bounce to adjacent tracks. Tascam recommends bouncing from one group of tracks to another—say, from 1-4 over to 5-8. This is because the 238 uses a staggered head arrangement where tracks 1-4 are grouped in one location on the head, and tracks 5-8 are grouped in a separate location on the same head.

Computer control: A The computer-control serial port, with four selectable bit rates (1200, 2400, 4800, 9600), is designed for system control and synchronization. However, I didn't have any accompanying control units and couldn't check this out. As the manual says, "For detailed technical information about the computer interface, consult Tascam."

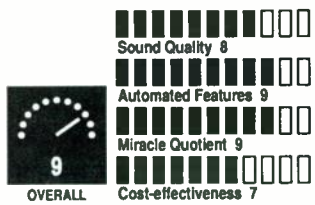
SOUND QUALITY

I was expecting somewhat marginal sound (what do you want from a cassette?), but was surprised when I checked the 238 on an oscilloscope: with dbx out, the response is quite flat from 30 to 16k Hz (better by far than the ±3 dB quoted by Tascam), and was down about 6 dBV at 17 kHz. Past that point, the response rolled off rapidly. The low end didn't exhibit any "head bumps," so the bass is not as muddy as early multi-track machines; however, as with most narrow-track formats, the "character" of the bass response seems a little on the thin side. And of course, the crosstalk characteristics are not as good as open-reel, but equal to the best 4-track cassettes.

The next step was to record some program material from a good-quality, 2-track reel-to-reel. It was not difficult to tell the difference between the two; the 238 was a bit noisier (even dbx can't kill all the noise riding along with a signal), and the 2-track had a sound that could perhaps best be described as "richer"; I could also hear some very subtle dbx "breathing." Although I was recording full-range program material (not just a single instru-

Product Summary

PRODUCT:
238 Syncaset
TYPE:
Cassette-based 8-track
RETAIL:
$2,295
FEATURES:
Two autolocate points, auto punch in/out with rehearse mode, dbx noise reduction, sync-track level trim/filter/dbx defeat, compact size
MANUFACTURER:
Tascam
7733 Telegraph Road
Montebello, CA 90640
tel. (213) 726-0303



ment) into a single channel—not really representative of how you would use the 238—the difference in sound quality was not all that obvious, and a casual listener might not detect much of a difference at all. I would put the sound quality up there with the better 4-track cassettes, which is nothing short of remarkable.

DOES THE WORLD NEED AN 8-TRACK CASSETTE?

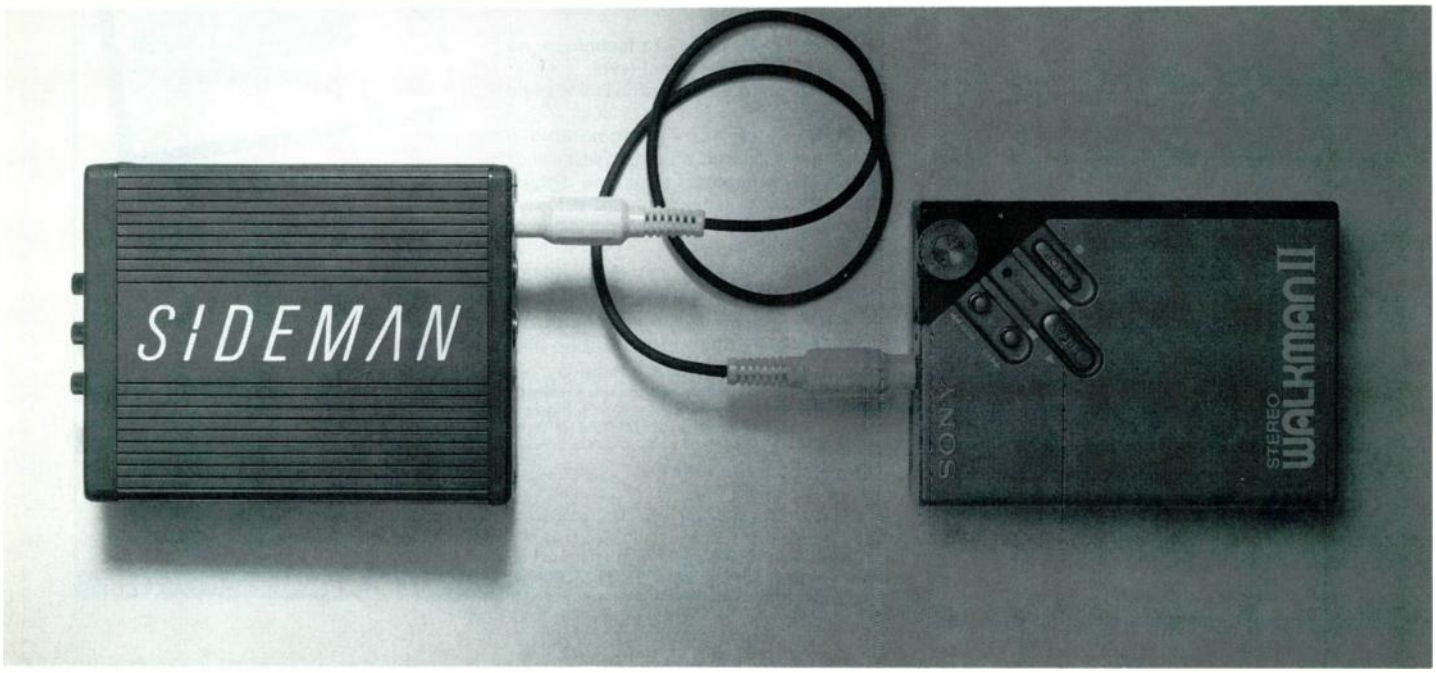
At $2,295, the 238 is not an inexpensive sketchpad, but considering there are eight tracks and lots of bells and whistles, we're definitely talking about a *deluxe* sketchpad. For those with sufficient disposable income to sketch with eight tracks instead of four, the extra expense is easy to justify. Not quite as obvious are some other advantages. The 238's small size lets it fit comfortably in even the smallest studio, and the use of cassettes means both convenience (no tape threading) and low operating cost (cassettes cost less than open-reel tape).

The disadvantages include the nonstandard format, the impossibility of splicing with a staggered head design, and the lack of trims and monitoring on the 238 that demands a mixer. This last works against the sketchpad concept a bit. The original Portastudio, which included a pretty capable mixer and 4-track cassette transport, was more of a "plug and play" device. Still, not including a mixer makes for a less limited machine overall.

In addition to sketchpad applications, I could also see a place for the 238 in budget MIDI studios. Since MIDI instruments and sequencers handle the bulk of the sound output, a tape recorder's requirements are less critical. The biggest problem would be vocals—you want good fidelity for those—but then again, in a MIDI studio you can sequence your backup band, sync it to acoustic parts recorded on the 238, and sing directly into the 2-track master as the premixed backing tracks play. In this context, the 238 has some very compelling features, including the ability to defeat dbx for track eight to accommodate sync, relatively low cost, and lots of automated functions (return to zero, repeat, etc.) that are conceptually right at home with sequencer-based thinking.

Like any piece of gear, the 238 needs to be matched to an appropriate environment, but it's a capable enough device to be at home in many. Eight tracks on cassette may seem outrageous, yet Tascam's machine works—and works well. ■

Now you can practi
players in the wo



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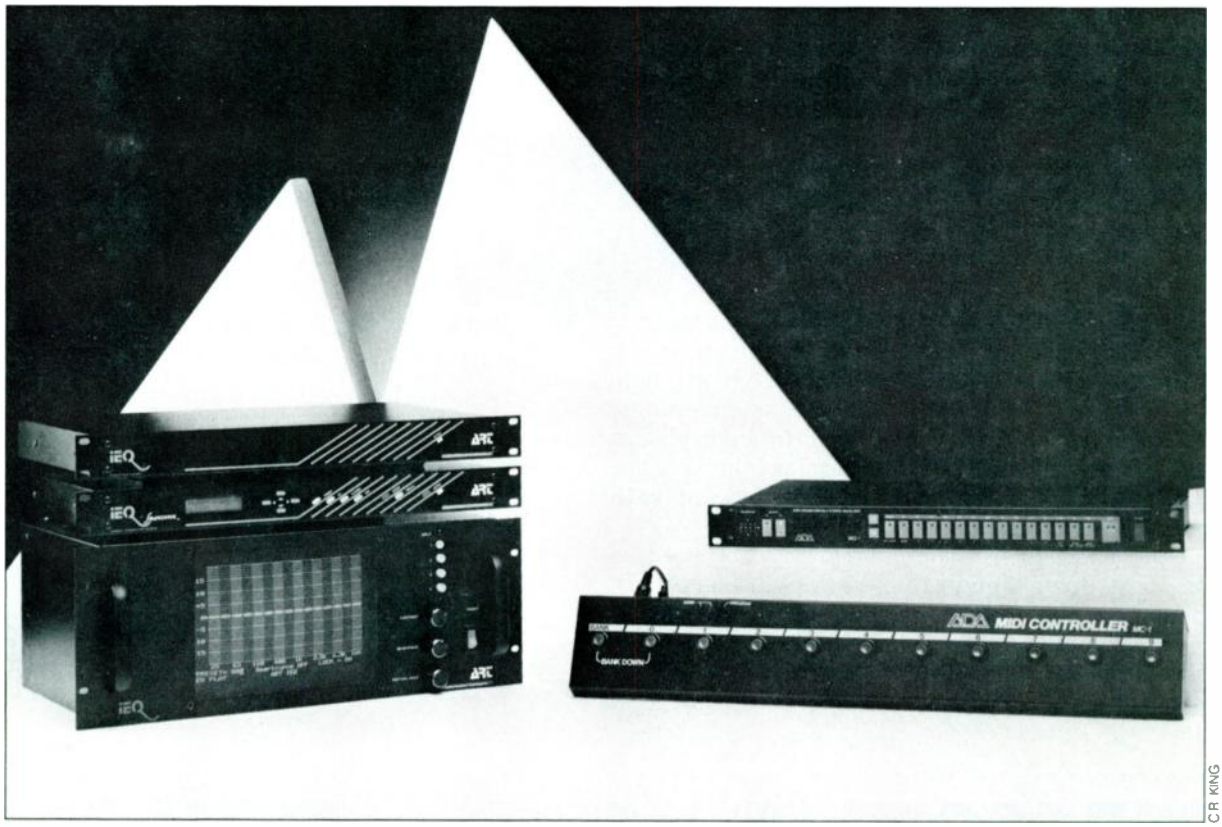
By Alan Gary Campbell



C R KING

ART IEQ and optional video monitor (left), ADA MQ-1 and optional remote controller (right).

Graphic EQs (equalizers) are just about indispensable in the studio or on the road. But just where should you set those sliders? It sure sounds *nasal* when you crank 'em up, the response is anything *but* flat with them centered, and the bands interact like crazy. Besides, attempting to adjust sliders on the fly is an exercise in futility (ever try to set 32 sliders between riffs?). And what was that great curve we used this morning? Was it +10 dB at 1 kHz, or +1 dB at 10 kHz?

Fortunately, graphic EQs have met MIDI, and they *like it*. No more worries about manually changing parameters between songs or reprogramming pet curves from hieroglyphics written on the back of an envelope. And hey, there's a microprocessor inside there, right? If it's not too busy, we'll get it to talk to a video display, or turn it loose on that band-interaction problem!

ADA MQ-1

The MQ-1 is a stereo, 14-band, programmable graphic EQ with center frequencies at 40, 65, 100, 160, 250, 400, 630, 1k, 1.6k, 2.5k, 4k, 6.3k, 10k, and 16k Hertz, that is, every *other* 1/3-octave ISO frequency, a reasonable compromise between resolution and complexity/cost. (ISO center frequencies are specific center frequencies determined by the International Standards Organization.) The left and right channels can be programmed independently, so you can use the MQ-1 as two separate mono EQs.

The front panel controls consist solely of membrane switches, one for each band (these do double duty for program select and MIDI functions), and one each for the Gain, Edit, Store, Bypass A, Bypass B, and Up and Down functions. Each switch (except Up and Down) has an integral status LED; there is a four-character, alphanumeric LED display, and two four-position, LED headroom displays (one per channel). All this is sealed under a

one-piece Lexan™ overlay, which makes the panel fairly impervious to gig grime. Rear panel stuff includes a non-detachable power cord; fuseholder; power switch; phantom power input (more on this later); MIDI In, Out, and Thru jacks; ¼-inch, three-conductor, active-balanced, line-level inputs (which can be used unbalanced) for both channels; and ¼-inch, single-ended, line-level outputs for both channels.

To set up a curve on the MQ-1, you select the desired channel via the Edit switch, press the switch for the band you want to adjust, and use the Up and Down switches to set the level (pressing both sets the curve flat). The boost/cut range is ±12 dB, in 1 dB increments; pressing the Gain switch lets you adjust the overall level without affecting the EQ. If you don't save an edited curve, it will get zapped when you call up a new one—there's no "Edit Recall." But saving is easy: just press store and select the desired program number. You can also enter a four-digit security code to prevent others from fooling around with your curves.

You can't adjust both channels simultaneously or copy curves between them. If you want equal stereo curves, you have to enter duplicate values by hand. This is doubly inconvenient since the MQ-1 doesn't graph EQ curves via the display—you have to step through the bands one at a time, noting the values. There *is* an EQ Curve function that represents the boost/cut settings via the brightness of the Band-select switch LEDs; a clever idea, but in practice it's very difficult to distinguish between the brightness levels, even in low ambient light conditions.

There are 99 programs, accessed sequentially via the Up and Down switches, or in ten banks, using the Bank switch and Up and Down switches to select the bank number, and the Band-select switches to select the program. (This *is* faster than using only the Up and Down switches, but why didn't they simply program the Bank switch to scroll?) Interestingly, the MQ-1 comes with factory "presets" in the first 18 program slots, which can be overwritten but restored at any time.

You can set the MQ-1 to receive on any MIDI channel or in Omni mode (responds to all information transmitted regardless of channel), and can easily map any MIDI Program Change number to access any MQ-1 program number. When the Level 2 software appears (sometime next year), you will be able to simultaneously edit channels A and B, as well as edit parameters or do bulk dumps via MIDI System Exclusive. Theoretically, you will be able to update the EQ throughout a piece, provided that you can teach your sequencer to talk to the MQ-1 via Sys Ex. Unfortunately, the MQ-1 produces some

FOR THE BEGINNER:

A Few Equalizer Basics

Equalizers, often referred to as "EQs," are sound-processing devices that alter the frequency response, or "tone," of a signal. The bass and treble controls on a home stereo are a simple type of EQ.

Inside an EQ are circuits called *filters*, so named because they filter out (or in some cases, accentuate) certain parts of the sound. Most EQs are either *parametric* or *graphic* and are classed according to the number and type of filters they contain.

Parametric EQs usually incorporate three or more adjustable filters, each with Frequency, Width, and Gain controls, or the like. The idea is that you can tune each filter to a frequency you want to equalize (called the center frequency), set the Width (also called "Q," "Resonance," or "Bandwidth") to determine how much the frequencies adjacent to the center frequency will be affected, and set the boost or cut as needed. Often, one or more of the filters will have limited frequency range—low, mid, high, etc.—to simplify adjustment. This gives precise control over a few frequencies, which is useful for feedback suppression and instrument formant simulation.

In contrast, graphic EQs have lots of filters, each with a different, *fixed* frequency and fixed width; each filter is connected to a separate front panel slider to control boost and cut. If there are enough filters spaced evenly across the audio spectrum, you can adjust the sliders to form a front panel "graph" of the desired response. This gives somewhat less precise control over a lot of frequencies, which is useful for room-response compensation and overall mix equalization. For more information on equalizers, see *Guitar Gadgets*, by Craig Anderton (AMSCO Publications; available from EM Bookshelf—see page 6).

—*AGC*

pops and clicks when EQ parameters are edited with an input signal present, which limits the usefulness of this technique. (*Note: Level 2 software will be provided to all registered MQ-1 owners at no charge as soon as it becomes available—Ed.*)

Aside from that, overall the MQ-1 excels sonically. It's very quiet and accurate—with both channels set flat, I could hear no difference between EQ and Bypass modes—and the constant-Q design avoids the "nasal" quality of some graphic EQs.

If you like to stomp on things to change programs, ADA also offers the optional MC-1 MIDI Footswitch ($199.95). It has a Bank-increment footswitch, which scrolls if you hold it down, ten Number footswitches, and a large alpha LED display—common stuff, but the MC-1 also has some nice hidden features. If you press the Bank and 0 footswitches simultaneously, the Bank number decrements; other switch-press sequences change the display from 1-128 mode to 0-127 or to octal mode (you can also change this permanently via solder jumpers inside), and change the MIDI Output channel from its default value, which is set with a rear panel DIP switch. You can "phantom power" the MC-1 by plugging its adapter into a jack on the back of the MQ-1 and using an optional seven-conductor DIN cable to connect the two via the special MIDI jacks provided.

You can also enter a four-digit security code to prevent others from fooling around with your curves.

ART IEQ

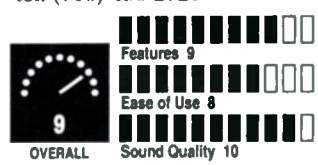
The IEQ is a 15-band, programmable graphic EQ (with the same frequency centers as the MQ-1, plus one at 25 Hertz). While it's monophonic, it offers some unique, advanced features.

Front panel controls consist of various buttons (including an ersatz cursor pad), a bright, 16 × 2, backlit LCD with adjustable contrast, and a *very* bright, two-color bypass LED (you'll need sunglasses when this thing shows red!). The rear panel includes ¼-inch *and* barrier-strip, active-balanced, line-level inputs and outputs (which can be used unbalanced); a Satellite Number DIP switch; MIDI In and Out jacks; Satellite In and Out jacks; an RCA-type, composite video output; and a non-detachable power cord (no switch).

The IEQ accesses parameters via four "menu" buttons: Preset, EQ, System, and MIDI. From there, the cursor buttons scroll horizontally to select menu items and vertically to set parameter values. For

Product Summary

PRODUCT:
IEQ
TYPE:
MIDI, programmable graphic equalizer
LIST PRICE:
Model 300 controller, $795; Model 310 1/3-octave satellite, $595
FEATURES:
15 bands on alternate 1/3-octave ISO center frequencies; Smartcurve™ response-correction algorithm; composite-video graphic display output; 128 programs; MIDI Program Change mapping; parameter control via MIDI System Exclusive commands; remote control and programming of Satellite modules
BASIC SPECS:
Boost/cut and gain adjust range, ±15 dB in 0.5 dB increments; dynamic range, greater than 105 dB; Total Harmonic Distortion less than 0.009% at 1 kHz, 0 dBm
MANUFACTURER:
Applied Research & Technology
215 Tremont Street
Rochester, NY 14608
tel. (716) 436-2720



example, to set up a curve on the IEQ, press the EQ button, then the Right or Left cursor to select the band, then the Up or Down cursor to set the level (pressing both sets the band flat). The boost/cut range is ±15 dB, in 0.5 dB increments, and you can adjust the overall level without affecting the EQ. As with the MQ-1, if you don't store an edited curve, it will be blitzed when you call up a new one. But again, saving is easy: just select the desired program number and press Store; the IEQ will remember the current edit when powered down.

There are 128 programs, selected via the Program button and Up and Down cursors, but you also have to press Recall to enable each one. This helps to avoid obliterating in-progress edits, but (a minor quibble) this "safety keystroke" might be better employed to make it more difficult to get *out* of edit mode. Curves can be copied from one location to another, and you can "lock" a program to protect it from being overwritten. You can even name programs—up to 16 characters—with surprising ease, using the cursor buttons.

The IEQ can receive on any selected MIDI channel or in Omni mode, and you can map any MIDI Program Change number to select any IEQ program with just a few keystrokes. You can do bulk dumps or edit parameters via MIDI Sys Ex. Unfortunately, like the MQ-1, the IEQ also clicks and pops when EQ parameters are edited with an input signal present.

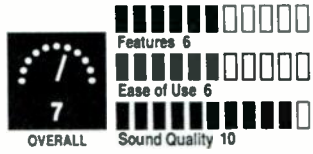
Sonically, the IEQ is superb. It's very quiet and accurate—with the curve set flat I could hear no difference between EQ and Bypass modes—and it, too, has smooth-sounding, constant-Q filters.

All this is fairly basic stuff, but the IEQ has some extraordinary special features. If you've used graphic EQs much, you've probably noticed that as you increase the boost or cut for a given band, the adjacent bands are affected. You have to go back and tweak the settings to get the results you intended, which makes it difficult to set up curves quickly, and nearly defeats the purpose of the "graphic" concept. But not with the IEQ. It has an algorithm called *Smartcurve*™ that adjusts the response to virtually eliminate unwanted band interaction. For example, if you want to equalize a sound system, you can use a common 2/3-octave spectrum analyzer to obtain the required boost/cut values, punch in the inverse curve on the IEQ, turn on Smartcurve, and get a useful result the first time instead of a peaky-sounding mess. I also tried Smartcurve while using the IEQ to simulate instrument formants (I interpolated some values from the graphs in Don Lancaster's "Simulating Acoustic Instruments with Synthesized Sound," in the August 1975 *Popular Electronics*) and what a difference! Smartcurve really *works*.

Display-wise, the LCD doesn't graph the curves for you, but there's a video output on the back that you can connect to any composite-type monochrome monitor to display the normal and Smartcurve plots and output level simultaneously. It shows active parameters and edits in real time, which greatly accelerates and simplifies editing. ART offers an optional rack-mount Model 290 monitor ($495), which we'll probably be seeing a lot of in concert setups, but I got pretty good results with an old Amdek Model 300 video monitor.

Product Summary

PRODUCT:
MQ-1
TYPE:
MIDI, programmable, stereo graphic equalizer
LIST PRICE:
$699.95
FEATURES:
14 bands on alternate 1/3-octave, ISO center frequencies; stereo operation; 99 programs; MIDI Program Change mapping; parameter control via MIDI System Exclusive commands (with Level 2 update)
BASIC SPECS:
Boost/cut range, ±12 dB in 1 dB increments; gain adjust range, ±12 dB in 2 dB increments; Equivalent Input Noise, 102 dB or quieter; Total Harmonic Distortion, less than 0.01% at 1 kHz, 0 dBm
MANUFACTURER:
ADA Signal Processors, Inc.
7303D Edgewater Drive
Oakland, CA 94621-3095
tel. (415) 632-1323



With the curve set flat, I could hear no difference between EQ and Bypass modes.

Remember those Satellite MIDI jacks we mentioned earlier? They let you use the IEQ to program and control up to 16 optional IEQ Model 310 Satellite modules ($595). Satellites are like the IEQ master unit (ART calls it the IEQ Model 300 Controller) without the front panel buttons and display. You "daisy-chain" the slave and master units in a loop configuration, assigning each slave a unique ID number via the rear panel DIP switches. Other IEQ controllers can be used as slaves, too, and you can set units with consecutive ID numbers to track, for parallel stereo operation. What all this means is that in a studio or concert situation, you can control a bunch of graphic EQs from *one master unit* with a minimum of hassle.

THOSE DANGEROUS CURVES

Comparing these units is like comparing apples and oranges. The IEQ has advanced features and more memory, but the MQ-1 offers stereo operation for about the same bucks. Both of them sound great, which is pretty amazing when you consider that these are only second-generation devices. (The ADA and ART devices reviewed here are not the first programmable graphics: the J.L. Cooper Filter Memory Bank and BSR Computer Memory Frequency Equalizer, introduced several years ago, were EQs ahead of their time.) While it's tempting to say that the IEQ—with its Smartcurve function and 0.5 dB resolution—sounds better, when you get right down to it, the MQ-1 sounds as good as or better than most any graphic EQ to date. The IEQ is probably the device of choice for high-end, multi-EQ installations, but for stereo EQ on a budget, the MQ-1 (absent copy function notwithstanding) has to be a "best buy." Really, you can't go wrong with either.

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

Turbosynth: Modular Synthesis Sampling Software

Remember the huge creative power of those old modular synthesizers? Feel the surge again through the magic of software and your favorite digital sampler.

By Tim Tully

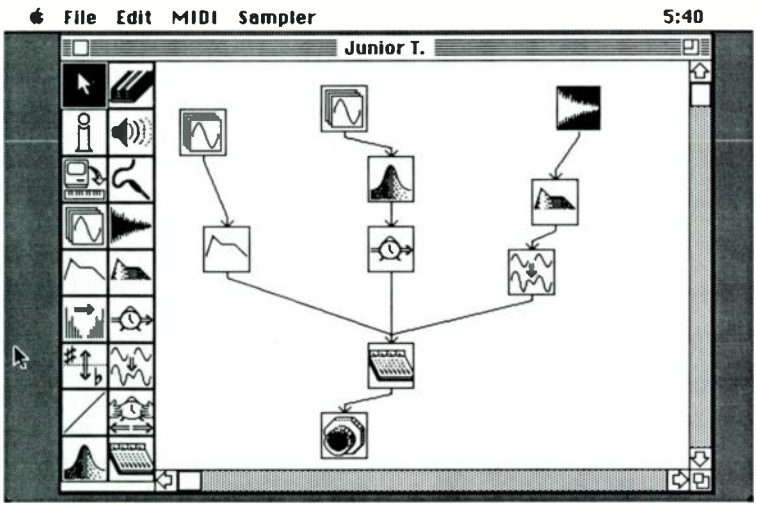


FIG. 1: The main Turbosynth screen allows creative arrangement and processing of oscillators and samples to build new sounds.

Digidesign, the company that's been the link between the samplers you can afford and the processing you wish they had, has released yet another of its clever sampler-aid programs. This new offering follows *Sound Designer* and *Softsynth*, two of the most used and useful programs for developing sounds for samplers not overly blessed with processing power (i.e., just about anything under $8,000). To the same end, *Turbosynth* puts the flexible architecture of the early modular synthesizers into a contemporary, digital package to give the samplists of the world a new tool.

Back in the '60s and '70s, some of the more popular synthesizers from ARP and Moog were designed as a series of modules that the user linked together with patch cords like those on an old-fashioned telephone operator's station. (This is how the word "patch" came to mean a "sound" on a synthesizer.) Changing sounds on these systems required repatching—using the cords to connect the modules in different ways—which took time and wasn't the easiest operation in the world to learn. As a result, subsequent generations of synthesizers came off the assembly line with their modules prepatched in what became a fairly standardized arrangement. Typically, one or more oscillators would generate waveforms, which would be shaped by some envelope-controlled filters, amplified by envelope-controlled amplifiers, then pumped into a sound system. This made going from patch to patch quicker and easier, but hard-wiring modules together gave less flexibility than modular designs.

Turbosynth, for the Macintosh (Plus or above, 1 MB of RAM required), lets us create samples for our samplers with old-fashioned, modular synthesis patching techniques. The basic idea is that you can place icons representing sound-generating waveforms in a window, reshape the waveforms with ten preset tools that modulate, stretch, soften, amplify, compress, and otherwise mold the sound, then link the processed waveforms with a "patch cord" tool to any of 12 other modules.

THE MAIN WINDOW

Most activity occurs in the Main Window. Along the left side of this window are 18 squares, representing tools and icons (**Fig. 1**). The top four are basic tools that appear in all of Turbosynth's windows. They activate the cursor arrow, play the sound, erase things on the screen, and provide information about the window. Another activates the "patch cord," and another sends the sounds you create from the Mac to your sampler. Happily, nearly all the popular samplers on and off the market are supported (see the product summary for a list). Compatibility does not seem to be a problem. The software saves all samples in a 16-bit format, and converts this and the sample rate as needed when sending sounds to a sampler.

The next 12 icons, which comprise Turbosynth's sound-generating and modifying functions, include software versions of the modules that made up a modular synthesizer (oscillators, envelopes, filters, amplifiers, and other processing tools). Click on any of these, drag them into the window, connect them with patch cords, and you've created a sound, entirely with software, that you can send to your sampler and play.

THE MODULES

The Oscillator module is one of Turbosynth's two main sound generators and is more flexible than any hardware oscillator you have ever heard. Opening the oscillator reveals a 700-millisecond time line, a palette of 15 preset waveforms, and a file drawer (**Fig. 2**). You can click and drag *any* of the 15 waveforms onto *any* point on the time line, play the oscillator, and the sound will crossfade smoothly from one waveform into the next, according to their placement. (The file drawer works the same way, but isn't limited to using preset waveforms. I'll get to this shortly.) So although the presets are all variations (some *greatly* varied) of the

familiar sine/square/saw, the crossfading can change the timbre enormously. (I don't know if there's a limit to the number of waves the window can hold, but I achieved only boredom and acoustic gibberish trying to overload it, and quit after 16.)

This feature alone goes a good way toward solving one of the more durable nemeses of both sampled and synthesized sound: the static waveform. To be "musical," a sound usually must change harmonically over time, as do the sounds of most acoustic instruments. But it takes a lot of circuitry and/or memory to do this electronically, so synthesizers often sound "flat" or static. Turbosynth's crossfading technique not only creates a sound with the subtle harmonic changes of an acoustic instrument, it lets you create a wave that changes from one sound into a completely different one. A piano attack might decay into a digiridoo, and so on.

Ever ones to gild the lily, the Digidesign programmers have provided yet another level of control here. Click on any of the waveform icons you've placed, and a window opens that not only allows you to substitute other preset waveforms, but gives you eight tools to modify amplitude and frequency, a wave-smoothing and a wave-roughening tool (!), and a pencil for redrawing the wave. This is control to the antimatter level.

Having created a waveform, you can save it to a file drawer (which contains your waveforms as well as a diskful of waveforms supplied by Digidesign with the program) and use it again.

USING SAMPLES

The Sample icon works in a fashion similar to the oscillator, but instead of invented waveforms, it uses any sample stored in Sound Designer format (including *Alchemy* files stored this way). You can't crossfade samples, but you can loop them, save the loops, and use them as oscillators.

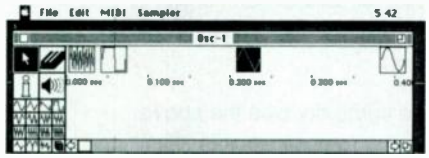


FIG. 2: Turbosynth will crossfade a sound from one waveform to the next, depending on where you place them on a time line.

The Extension Markers select a portion of a sample to loop or save for use elsewhere. This feature uses loop windows like those in other sample editing software to align beginning and end points of sections and create a smooth loop—zoom in and out and scale the *display* of the loop point (not the actual sound) four different ways for your viewing convenience, and use the scroll bar arrows to adjust the loop point. You can play this loop with a couple of key clicks to check whether the loop is satisfactory. Once you like it, it will act as an ordinary loop, or, if you want, you can fill the entire length of the sample with end-to-end copies of the loop. This may seem curious, considering that conventional sampling wisdom maintains that for conservation of memory, a good loop is a short loop. However, a longer waveform allows for better use of the sophisticated sample modulation the software gives you, so you

Speaking of bizarre, the Spectral Inverter is right up there.

may want to give up a little memory in return for having a sample you can process into a complex, dynamic sound.

PROCESSING

Once you've strung a bunch of waveforms and samples across the Main Window, nine modules are waiting to process these sounds in ways both common and arcane.

There are two envelope modules: one to modulate amplitude and one a 6 dB/octave low-pass filter. Each has eight preset shapes and four tools that change the shape globally. After these tools give you a basic shape, you can add breakpoints manually (as many, of course, as you like), then patch these in anywhere to get any number of effects; putting two identical filter envelopes one after the other, for example, creates a 12 dB/octave filter.

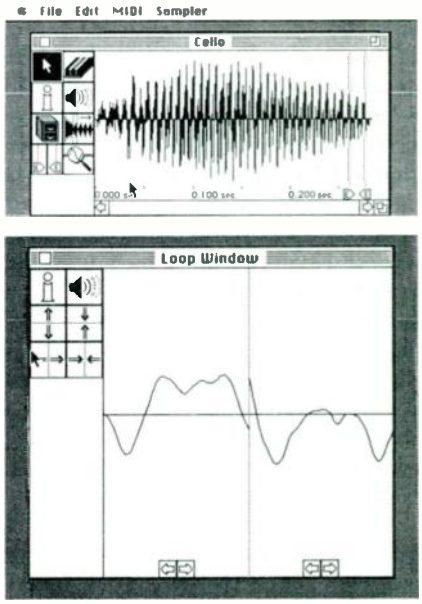
The Delay module acts just like an outboard delay unit, with coarse and fine delay controls yielding a delay of up to a second, in increments as fine as a tenth of a millisecond. Virtual sliders control feedback, polarity, and wet/dry mix for a delay that's super-clean, since it's done in software.

The Pitch Shifter module, as you might expect, shifts the pitch up or down in cents by as much as two octaves and plays any mix of the original and detuned sound to achieve various detuning effects. This feature works the same way that samplers transpose samples, so extreme shifting will make things weird. (Sound-generating oscillators, of course, can be of any frequency and don't need to use this feature.)

The Modulator module can work in two general ways. It can function like a low-frequency oscillator on an analog synthesizer, periodically modulating a sound's amplitude or pitch, or it can act like a high-frequency modulator in an FM synthesis system, modulating a wave's frequency so as to affect its timbre. Since it can use any of the available Turbosynth waveforms to accomplish any of these jobs, the results can be very complex modulation.

FUN STUFF

While the processors above should be pretty familiar to most electronic musicians, the other Turbosynth modules make me wish my word processor had a macro that typed, "You've got to hear this



Sample loops are defined by markers and can be modified in the loop window.

one to appreciate it." They all rate a very high neat-o factor, but are pretty technical concepts. Technophobes may want to skip over this next section.

The Stretcher is a resynthesis module that lengthens a waveform by looping small sections of it, one after the other in succession. You can set the length of the loop, how fast it moves through the sample, and the length of a "predelay" determining how far into the sound the processing begins. For samples that are too short, this is a neat alternative to standard looping and can do some bizarre things to a voice.

Speaking of bizarre, the Spectral Inverter is right up there. It inverts the frequencies of a sound's partials around the halfway point between 0 Hz and its Nyquist frequency (a frequency half its sample rate). This won't make a lot of sense unless you're familiar with some acoustics, but rest assured it does neat, if somewhat indescribable, things to a sound, kind of a Zylon robot effect.

Going from acoustics to trigonometry, the Waveshaper modifies the level according to a wave drawn on a graph in the Waveshaper window. Like the Waveform window, Waveshaper offers eight preset waves, ten shaping algorithms, and a pencil to draw or redraw the waves. This is another effect whose results do not (ahem) lend themselves to verbal description, and as with spectral inversion, requires a good deal of hands-on to become an everyday, household synthesis technique.

For those of you still with me, the Resonator enhances certain frequencies and induces a delay effect as well. As the manual says, "The best way to become familiar with this control is to experiment with it." Amen.

THE FINAL STAGES

Keep in mind that you can place all the sound generators and processors I've mentioned *anywhere* in a series—or in *any number* of series—in the Main window. These modules are not set in any factory-determined order, so they *require* your imagination to do their job. To that end, the Mixer module accepts up to 32 inputs and mixes them down to one output. Each of the inputs can accept just an oscillator, a sample modulated by one envelope, two oscillators stretched, resonated, and spectrally inverted, and so on, up to 32.

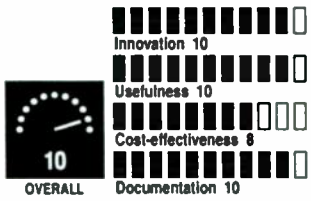
The Mixer combines the signals it receives and sends its output to the *output jack*, at which point all your previous labors can be summed into one single sound file and sent to a sampler. If desired, you can even use the sound file as one module in yet another sound.

The only problem I can see with Turbosynth might be the time needed to send files to a sampler. I used the RS-422 port on an E-mu Emax, which was very fast, but sending via MIDI would be considerably slower. Still, that's a small price to pay for what you get. If you like developing sounds for samplers, Turbosynth is a great new tool. It gives you powers of sound creation unlike anything else I know and can be a lot of fun in the process.

Tim Tully *is in the process of sampling the sound of one hand clapping. Properly edited, it could become a whole movement.*

Product Summary

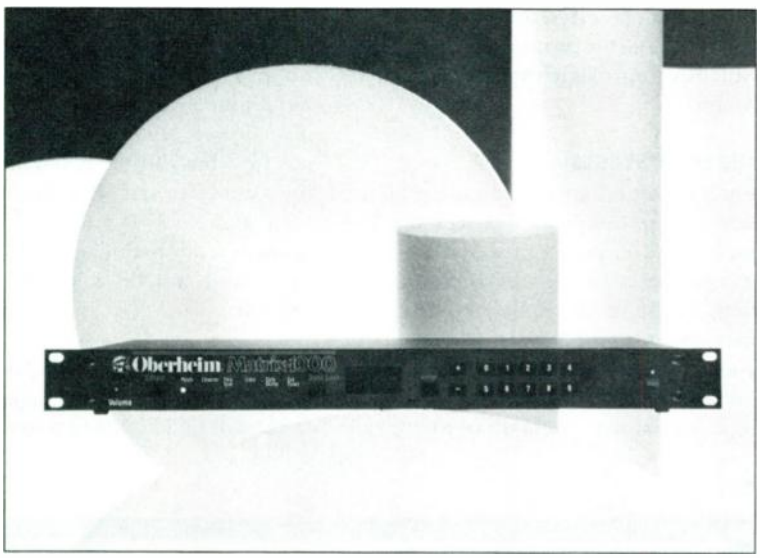
PRODUCT:
Turbosynth
TYPE:
Modular synthesis-style sample generator
HARDWARE REQUIREMENTS:
Macintosh Plus or higher, hard disk, any of the following samplers: Akai X7000, S700 or S900; Casio FZ-1; E-mu Emulator II or Emax; Ensoniq Mirage/Multisampler or EPS; Korg DSS-1 or DSM-1; Roland S-10, S-220, MKS-100, S-50, or S-550; Yamaha TX16W.
PRICE:
$349
MANUFACTURER:
Digidesign
1360 Willow Road, Suite 101
Menlo Park, CA 94025
tel. (415) 327-8811



The Oberheim Matrix-1000

With 1,000 on-board analog sounds and a budget price, this rack-mount subtractive synth offers plenty of bang for the box.

By Steve Oppenheimer



C.R. KING

The Matrix-1000, Oberheim's new six-voice, 1U rack-mount, analog synthesizer, sounds good and fat. Though it has limitations, especially for users without computers, it's easy to understand (given a knowledge of analog synthesizer fundamentals) and has flexible programming features and a reasonable price tag ($595).

The newest Matrix synthesizer doesn't have quite the sound of such Oberheim classics as the OB-8, Xpander, or Matrix-12. Part of this is because the Matrix-1000 has digitally controlled, as opposed to voltage-controlled, oscillators, and its VCF has just one mode—4-pole, low-pass—as opposed to the Matrix-12's 15 filter modes. Nonetheless, it's close enough to "classic Oberheim" for most purposes. It has a clarity of sound, courtesy of new technology, and to my ears sounds much richer than either L/A or FM synths.

The unit comes with 800 programs in ROM and 200 in user-accessible RAM; the programs in ROM can be copied to RAM and edited. Many of the imitative sounds (jazz guitar, trumpet, oboe) are disappointing, but Electric Bass is string-pickin' percussive, the strings are lush, and the bass section of the piano—a difficult sound to program with analog synthesis—is a pleasant surprise. Serious programmers will undoubtedly take advantage of the 1000's programming capabilities to create more accurate imitative sounds.

The synthy sounds are much better than the imitative ones and demonstrate the sonic strengths of analog, subtractive synthesis. At first, I found the factory programs did not use continuous controllers very creatively: Mod Wheel 1, for example, brings in a frequency modulation (vibrato) of the same amplitude for most of the patches. However, Mod Wheel 3 triggered more creative modulation effects. (MIDI continuous controllers are unipolar, but are often inverted within a synthesizer to produce "negative" modulation. The Matrix-1000 can take signals from a modulation wheel and split it into two "virtual wheels," Mod Wheels 2 and 3, with one responding positively and one negatively to continuous controller messages.) If you enjoy programming, you'll want to modify what's there or create your own programs; even if you want to use only the factory sounds, you should experiment with the MIDI controller assignments for best results.

The LED readout shows three digits and no names, so unless you have a computer, you'll need to keep the program list handy. Bank Lock lets you select a program from the current bank by entering only the two-digit program number (00 to 99); otherwise you must enter both program and bank number each time you select a program. The manual claims that when changing banks or programs from a MIDI master controller that has no program 00, the master's program 01 calls up the Matrix's program 00. This didn't work for me (I used a Rhodes Chroma as a controller), but Oberheim assures me it worked on the controllers they used, including the Yamaha DX7 and Roland D-50.

GLOBAL CONTROLS

In addition to the global controls marked on the front panel, such as Fine Tune (±1 semitone in 31 increments) and MIDI Channel Select (1 through 16, plus nine groups of six channels in Mono mode), there are eight modes under the Extended Function label.

Transpose changes the pitch of all programs ±3 octaves in semitone increments.

In *Unison* mode, all six voices play the same note. Although this means you can't play chords, you do get a rich, fat sound that really comes to life with MIDI bass, woodwind, lead guitar, or other single-note lines.

Invert MIDI Volume is very useful for (among other applications) MIDI guitar: the "whammy bar" on a MIDI guitar typically transmits zero MIDI Volume in the rest position, forcing the player to push the bar down to increase the level. By inverting MIDI Volume, the audio signal normally stays at maximum amplitude and decreases as you push the bar. When

the Matrix is used with a pair of synths that respond normally to MIDI Volume commands, Invert makes the volume pedal a useful crossfader between the two synths.

Regarding extended functions, MIDI Echo turns the MIDI Out into a software MIDI Thru that, among other applications, allows layering of daisy-chained synths. Of even more interest is the *Group* function, where between two and six daisy-chained Matrixes (including Matrix-6/6Rs) are summed to act like a single synth. From 12 to 36 voices are allocated alternately, on a rotating basis, to each unit. A non-Matrix MIDI synth can be used as the last unit in the group, but will play no more than six voices.

When MIDI Channel Select is set to Mono modes G1 through G9, each of the Matrix's six notes is assigned to a separate MIDI channel; this is vitally important for MIDI guitar applications. Each of the controller's strings is assigned its own voice, albeit with the same sound and a common, monophonic audio out.

PROGRAMMING

You can access the instrument's programming features either through the front panel of a linked Matrix-6/6R, or with a software editor. The Matrix-1000 is largely compatible with existing Matrix-6 editors by Opcode (Mac, Atari, and Amiga) and Dr. T's (Commodore 64, Atari, Amiga), but both companies have released Matrix-1000 editor/librarians that should be completely compatible, including on-screen lists of all factory program names. (Unfortunately, Dr. T's no longer supports the C-64 for newer programs, so users of this computer must rely on the Matrix-6 software.) Given the potential benefits of modifying the 1000's factory programs, having to do all voice editing via computer or a Matrix-6/6R is a limitation, although this approach does keep the cost down.

Programming flexibility in the form of *Matrix modulation* is the most powerful feature of the Oberheim Matrix series. In addition to providing "hard-wired" control and audio signal paths, Matrix modulation in the 1000 allows any one, or several, of the 20 modulation sources (envelope generators, LFOs, velocity, levers, etc.) to modulate any one, or several, of 32 destinations (including DCOs, the VCF, VCAs, and other modulation sources), providing a profusion of possible audio and control paths.

Each voice is generated from two DCOs capable of variable pulse waves, mixable sawtooth and triangle waves, variably filtered noise (DCO2 only), a low-frequency spike or "click" for percussive attacks (DCO2), or a mixture of the above. The DCOs are summed into one VCF for each voice.

Other major modules include two VCAs, three envelope generators, portamento, and two LFOs that can be modulated by both the Matrix modulation sources and ramp generators for tremolo and other effects. The VCF can be driven into oscillation (maximum resonance) and frequency modulated with DCO1; this is labeled "FM Effects."

The Matrix-1000 has some limitations: it is unitimbral (plays only one program at a time) and cannot be "zoned" (Oberheim's term for telling the unit to play only a specified range of notes). There *are* hardware and software solutions to this (including the new Oberheim Systemizer), and this is not a problem with sequencers or master keyboards like the Yamaha KX88 that can send on a separate MIDI channel for each slave.

A nice feature would have been a cassette interface. Non-computer users could load the many available third-party Matrix-6 programs (except those using splits), and computer users could load special sets without lugging "Big Mac" everywhere. This might have raised the price, but it would make the box more attractive to the many non-computerized electronic musicians. Still, Oberheim feels that 1,000 programs should satisfy most users, especially with 200 available in RAM, and they may be right.

The Matrix-1000's rich layered sounds and smooth analog VCFs and VCAs make it a good match for MIDI wind controllers.

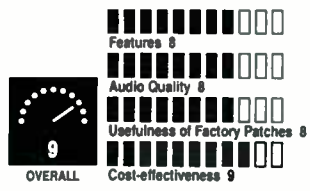
The manual is clear and explains the front panel well, but says nothing about programming or the subtleties of the 1000; the Matrix-6 editor/librarian manuals tell you how to access features, not how to use them. If you don't know Matrix programming, pick up a copy of *Oberheim Matrix-6, Getting the Most out of Yours* by Jeff Burger (available from EM Bookshelf; see page 6). The MIDI implementation chart should be included in the manual; if yours is missing, Oberheim will supply one.

The Matrix-1000 is not just for keyboard players and MIDI guitarists. The richness of the layered sounds, the smooth operation of the analog VCF and VCAs, and the unit's flexible responsiveness to MIDI controllers make the 1000 a good match for MIDI wind controllers.

You don't *need* a computer or a Matrix-6/6R to use the Matrix-1000; having 1,000 plug-and-play programs is nifty. But editing and storage capabilities make the difference between a nice-sounding box and an all-around professional tool. As it is, the sound quality, special features such as Group mode, and the programming potential make the Matrix-1000 an excellent, cost-effective add-on for studios and computer-equipped electronic musicians.

Product Summary

PRODUCT:
Oberheim Matrix-1000
TYPE:
Rack-mount analog synthesizer
RETAIL PRICE:
$595
MAIN FEATURES
1,000 factory programs, including 200 user-accessible; Group mode; programmable via MIDI; optimized for MIDI guitar controllers
MANUFACTURER:
Oberheim-E.C.C.
2015 Davie Avenue
Commerce, CA 90040
tel. (213) 725-7870



Steve Oppenheimer *is a Rhodes Chromasaurus programmer, studio denizen, and former road musician who wondered what a home was. As an editorial assistant for* **EM**, *he is discovering that a home would be nice if he had time to spend there.*

AKG Acoustics ADR 68K Digital Reverb and Effects Processor

They say you get what you pay for—and when you pay close to $7,000 for a digital reverb, you get a lot.

By Jim Johnson

C R KING

One of the unexpected benefits of being a regular **EM** contributor is that every so often I get a chance to work with a piece of equipment upon which I would otherwise never lay eyes, ears, or hands. A prime example of this is the AKG Acoustics ADR 68K signal processor, which, at roughly $7,000 list, is not the type of device you find in many home studios. Those of you with long memories will remember that this is roughly what a good professional plate reverb sold for about ten years ago; now that the digital equivalents of these massive reverbs have dropped to the under-$200 range, it's hard to imagine what could possibly push the cost of such a device back into the multi-kilobuck arena. Fortunately for me, I don't have to imagine any longer—and let me assure you, the reality is pretty stunning.

THE PHYSICAL MACHINE

The ADR 68K looks pretty distinctive; once you've seen it, there's no chance that you'll mistake it for a lesser device. The reverb processor itself is housed in a 2U rack-mount package (the "mainframe"), which is simplicity itself in appearance: basic black, with spartan graphics, along with a cartridge port and front panel power switch. All control functions are handled through a special remote controller, which has a 4 × 40 character LCD, three bar-graph VU displays, six faders, a numeric keypad, and 20 other buttons that perform various functions. The remote control is a menu-driven device; the current menu determines the functions of the six faders and six "soft keys," so a fader can quickly adjust every function in the machine. This approach is fast, friendly, easy to use, and beats any (external) computer-based editing system I've seen.

The back panel contains two (stereo) inputs, one pair of main outputs and another of auxiliary outs, MIDI In, Out, and Thru, and a jack for the remote controller. The audio connections are all balanced XLR connectors. Input level sensitivities can be set to one of four levels between -10 and +18 dBV with internal jumpers. The difference between the main and auxiliary outputs depends on the effects algorithm currently in use: in some algorithms, the signals from the two outputs are identical, while in others, different components of the processed sound are routed to the two output pairs. On the back of the remote unit are four ¼-inch control voltage input jacks that can accept signals from an external device or any passive footpedal (like the one used with the ESQ-1, for example).

ALGORITHMS AND PRESETS

The ADR 68K has 14 distinct effects *algorithms*, or programs. An algorithm, for those who sometimes get lost in the terminology, is simply a "way of doing things"—in this case, a way of processing the audio signal (see sidebar). While the algorithm names may be reminiscent of some of the effects algorithms used in budget reverb boxes, these algorithms are extremely complex, and include multiple adjustable parameters. For example, the Dual Delay algorithm has two independent delay lines, each with its own LFO for modulation effects; the two delays can be connected in series, parallel, or "split" (this produces separate delays on the left and right channels). All of the reverb algorithms allow you to set separate delay times for up to six early reflections, and all except the Reverse Reverb can include gating. The Multi-effects algorithm is especially complex and has two fixed delay lines, stereo chorusing, hall reverb, 2-band equalization, and two multi-tap delay lines, all connected in a rather complex fashion. Fortunately for those of us who are easily confused, the manual contains a set of very clear block diagrams that show the configuration for each algorithm, along with a list of the algorithm parameters and descriptions of those fac-

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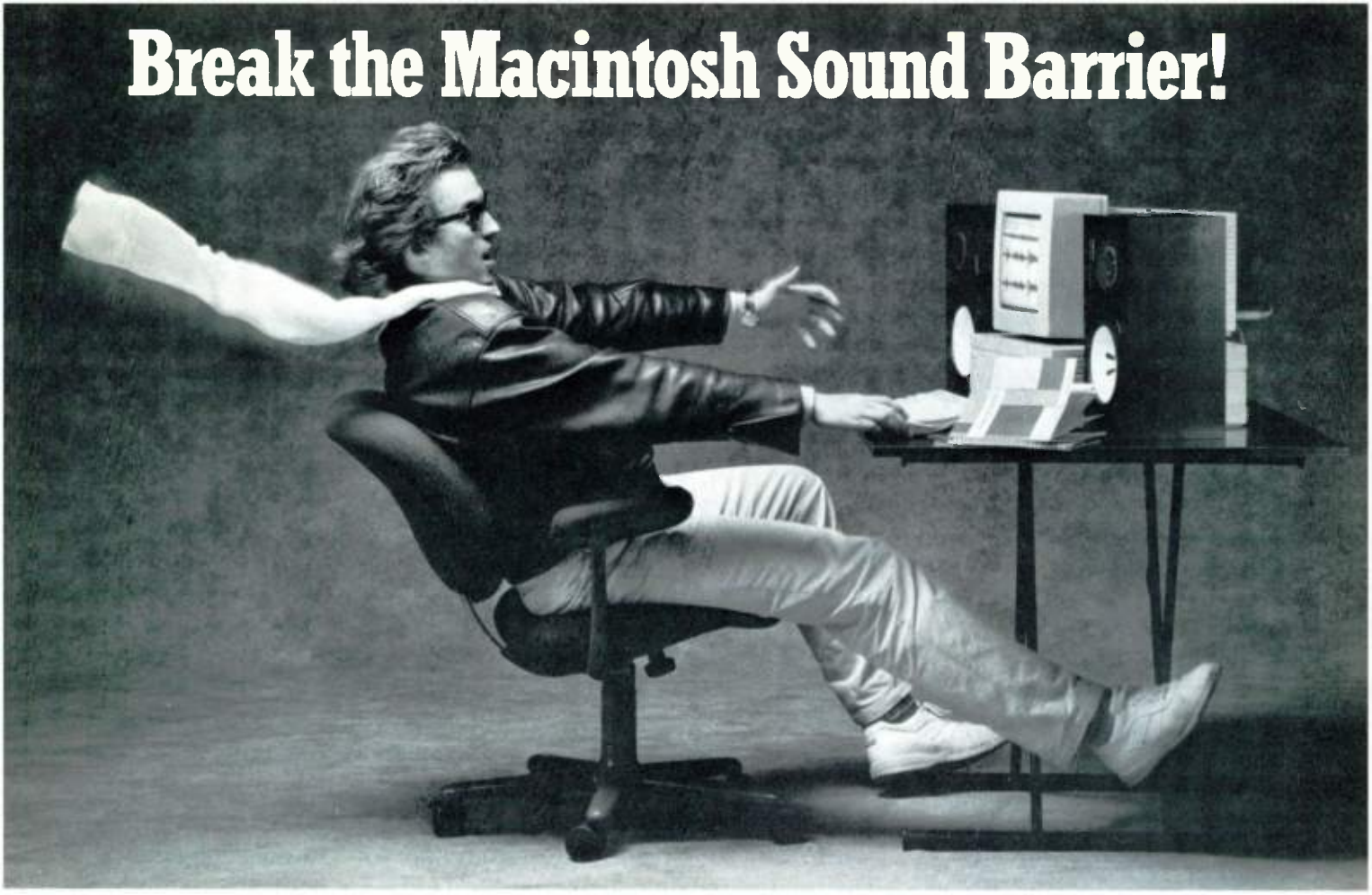

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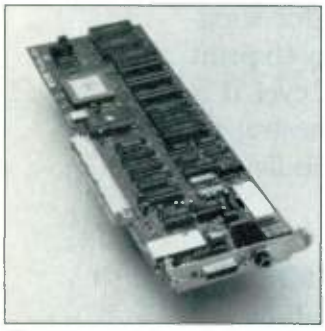

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Data Format: 16-bit linear. **Sample Rate (playback only)**: Variable up to 156 kHz (stereo); optimized at 44.1 kHz. **Frequency Response**: 20 Hz-20 kHz. **Signal-to-Noise Ratio**: Greater than 90 dB. **Total Harmonic Distortion** (THD): .009% max. **Installation**: Mac II: NuBus slot; Mac SE: Expansion slot. **Connections:** Stereo 1/4" jack; 15-pin D-type connector (for digital I/O).

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WRH

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tory presets that use the algorithm.

In addition to the signal processing algorithms, there are six different sampling algorithms. Some of these produce samples that can be played back within the other signal processing algorithms; some are mono, and some are stereo; some can be played back at different pitches, and some must be played at a fixed pitch. Individual "effects" are stored as "presets" within the unit. Three separate preset memory areas are available: Factory (stored in ROM and therefore permanent), Internal, and Cartridge. Up to 50 presets are available in *each* memory area, and MIDI patch numbers can be assigned to 128 of these. Presets are further organized in "banks," according to the algorithms used in each.

MIDI GALORE

Along with "artificial intelligence" and "workstation," the term "full MIDI implementation" is one of the most overused (and meaningless) catch phrases in the musical instrument business today. While some manufacturers' "full MIDI" means the instrument receives patch changes, I'm happy to report the ADR 68K does indeed have a complete MIDI implementation, second to none in the world of effects and even better than any synth or sampler of which I'm aware.

The 68K supports two MIDI control modes, Auto and Parameter. In Auto MIDI mode, every control on the ADR 68K's remote unit is assigned to a particular MIDI controller. The unit both sends and receives MIDI data in Auto mode, so every action you take on the control panel can be recorded in a sequencer, allowing for total device automation. This is great for recording engineers, who no longer need to manipulate an effects device in real time during a mixdown: get the "moves" right once, record those moves into a sequencer synched to tape, edit if necessary, then play back the sequence along with the tape during the remainder of the session.

The front panel controls in Auto mode are permanently assigned to the General Purpose controllers (controllers 16 to 19 and 80 to 83) on the unit's MIDI channel, which prevents them from conflicting with most other MIDI devices; but due to the ADR 68K's menu organization and rather unusual assignment arrangement, editing the resulting MIDI data is not at all easy. Still, this is a very straightforward and workable approach to effects automation.

In Parameter mode, any parameter in the current preset can be affected by the MIDI controller of your choice: velocity, continuous controllers, note value, etc. Actually, that's a bit of an understatement, since parameters can also be modulated by input signal level, MIDI clock rate, or the input to any of the four control voltage jacks. A preset may have up to ten

THE ADR 68K'S EFFECTS AND SAMPLING ALGORITHMS

- Complex Plate
- Optimal Chamber
- Medium Room
- Natural Hall
- Plate/Hall
- Plate/Plate
- Hall/Hall
- Hall/Chorus
- Hall/DDL
- Reverse Reverb
- Dual Delays
- Poly-chorus
- Stereo Processor
- Multi-effects
- Mono Effects Sampler
- Stereo Effects Sampler
- Mono 32-second Sampler
- Stereo 16-second Sampler
- Mono 12-voice Sampler
- Stereo 6-voice Sampler

parameter assignments, or "maps," and each map allows you to set the source controller, destination parameter, the range of the source to use, and the range for the effect on the destination parameter (e.g., you could set the device so mod wheel values between 64 and 100 change the delay parameter from 100 ms to 440 ms). All of the displayed values are presented in appropriately descriptive terms, rather than arbitrary numeric values—for example, "mod wheel" instead of "controller 1," and "C#2" instead of a MIDI note number. Negative modulation is possible, and a single controller can control multiple parameters, which essentially means that there are no restrictions (other than the ten-parameter-per-preset limit) on what you can control via MIDI.

AKG also sells a master ROM cartridge ($150 list) for the ADR 68K, programmed by **EM** author Paul Lehrman (who also wrote the manual), which makes extensive use of the unit's MIDI programming features. These presets really show off the machine's capabilities. For example, the MWRPT preset allows you to trigger echoes with the portamento pedal, with

The ADR 68K's sampler won't take the place of your Emulator III.

echo time controlled by the mod wheel, and a weird delay-derived pitch bend controlled from the pitch bender. Other presets in this cartridge put delay time under the control of MIDI clock rate (for precise repeats that track changes in tempo), allow manual flanging with a modulation wheel, etc.

SAMPLING

In addition to the effects algorithms, the ADR 68K can also sample up to 32 seconds of mono or 16 seconds of stereo audio and store these samples in up to 12 locations. Being more oriented towards special effect generation and mixdown repair, the sampling capabilities are not as potent as what's found in standalone samplers, and the limitations on the use of the samples are fairly restrictive. It's possible to change the pitch of the samples, for example, or to route samples through the effects processor, but not simultaneously.

Sample editing is minimal, consisting of variable start/stop points and a simple attack-decay envelope generator; no looping is possible. You can control the samples from an external MIDI keyboard by setting up a rather complex MIDI parameter map. Samples can also be triggered from an audio signal, which allows you to use the machine as a very expensive drum module, or from a footswitch or the remote controller. If you're starting to get the idea that this sampler won't take the place of your Emulator III or even a budget sampler, you're probably right; but as an auxiliary sampler for adding spice during studio projects, flying in vocals, or building choirs, it's quite handy. Samples can be dumped and received through MIDI (using either the MIDI Sample Dump Standard or AKG's own proprietary format), so any samples can at least be ported to other machines for further editing and modification.

HOW DOES IT SOUND?

Bells and whistles are meaningless without good sound quality, but as you would expect from a unit in this price range, all of the effects are wonderfully accurate and clean. Especially considering the machine's stated 15 kHz bandwidth, the high end is surprisingly crisp. Changing from one preset effect to another is very smooth, with no audible glitching. The unit does make some slight popping sounds when delay times are being adjusted, but this is nowhere near as severe as on other, less expensive effects devices.

After working with this device for a while, one thing's for sure: I'll be sorry to send it back. My budget effects processors, while they seemed miraculous a few months ago, pale beside the ADR 68K. For high-end studios that can afford a world-class MIDI-controlled reverb, the ADR 68K should be worth every dollar.

Jim Johnson *is no longer the most eligible bachelor in Arizona, having gotten married in September. He still has pointy sideburns.*

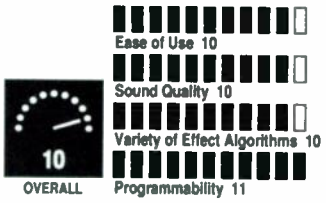
Product Summary

PRODUCT:
ADR 68K Version 4.0

TYPE:
16-bit MIDI-controlled multi-effects processor and sampler

LIST PRICE:
$6,990 (The AKG ADR 68K is also available in Version 3.07, priced at $4,995, which features eight seconds of sampling, fewer split operation programs, and a less complex MIDI implementation than Version 4.0.)

MANUFACTURER:
AKG Acoustics
Digital Products Division
125 Walnut Street
Watertown, MA 02172
tel. (617) 924-7697



MIDI Software and Programming Books

Our resident book reviewer looks at a series of buyer's guides for music software and a MIDI programming book for hardcore hackers.

By David B. Doty

C R KING

The Compact Guide to MIDI Software Series
(for Atari ST, Commodore 64/128, IBM PC/PS, and Macintosh)
by Howard Massey and the staff of CEM
Amsco Publications
$3.95 each or $15 for the complete set

The *Compact Guide to MIDI Software* series consists of four paperbound booklets (each 64 pages), similar in size and shape to a wine list from an upscale restaurant, filled with reviews of MIDI programs for the four most popular personal computers. Each guide is organized by program type, e.g., sequencers, patch editors, notation programs, compositional aids, etc. The number of titles covered ranges from 19 for the IBM PC to a surprising 30 for the Commodore 64/128.

Each review starts out by giving a lot of vital information at a glance: who wrote the program, what computer and operating system are required (including any special requirements for system configuration or peripherals), what MIDI interface is required, what version of the program was tested, and the suggested retail price. Sequencer reviews also include an indication of note-storage capacity.

The reviews, which run from one to three pages, depending on the complexity of the program, are thoughtful and well-written, and, given the number of reviewers involved, are remarkably consistent in style and format. The operation of each program is described in considerable detail, with attention to the user interface, quality of documentation, power/price ratio, and special features. Where appropriate, comparisons are made with competing programs of the same class. The limitations of each program are critiqued, and a summary suggests the type of application for which each program is best suited. My only real criticisms of the *Guides* are that, like all product-specific books, they are likely to have a rather short shelf life; also, there are no feature-comparison charts that allow the reader to compare a number of similar programs at a glance.

While the *Compact Guides* may not tell you everything you need to know about choosing the right program for any task, they certainly give you enough information to decide which products you ought to examine more thoroughly. And there's no denying that it's much more convenient to flip through a single booklet, rather than a pile of back issues of **EM** and other music periodicals, when you want to find a review of a particular program.

C Programming for MIDI
by Jim Conger
M&T Books
$22.95 (book only)
$37.95 (book plus program disk)

C Programming for MIDI (216 pages, paperbound) is intended primarily for the IBM PC/compatible environment; all of the book's programs use a group of 80X86 assembly-language subroutines for reading and writing MIDI data to and from the Roland MPU-401 MIDI interface. In addition, extensive use is made of PC BIOS and DOS calls for such tasks as file and screen manipulation. Mac, Atari, and Amiga programmers will therefore find the book of limited value. A sophisticated programmer could, of course, port the code from this book to run in another environment, but a programmer that sophisticated probably doesn't need the book in the first place!

The book is aimed primarily at intermediate to advanced programmers. Programming examples are extensive, and the text explaining the code is fairly terse. The author advises novice programmers to pick up a tutorial book, such as *The C*

Primer and the standard reference, *The C Programming Language* (Kernigan and Richie, Prentice Hall, 1978), before proceeding with this book. To make full use of the book you will, of course, need a C compiler; Microsoft *C* or Borland *Turbo C* are recommended. If you don't order the accompanying disk, you'll also need a copy of the Microsoft *Macro Assembler* (MASM) to assemble the low-level I/O routines. The book's MIDI coverage is also rather sparse, so you'll probably want to keep a good reference book on MIDI at hand. Mr. Conger could have made things easier for his readers by including the MIDI 1.0 Specification as an appendix.

C Programming for MIDI is aimed primarily at intermediate to advanced programmers: the text explaining the code is fairly terse.

C Programming for MIDI is concerned primarily with the creation of three programs: *READMIDI.C*, a simple MIDI data analyzer that displays incoming MIDI messages on the screen and allows the user to type commands for output; *PATCHLIB.C*, a patch editor/librarian for the Roland Alpha Juno-2; and *RECORD.C*, a one-track MIDI sequencer. All the programs follow the widely approved practice of building reusable modules that are linked to create the finished application.

By far the largest portion of the book, both in terms of text and program code, is devoted to building the patch editor program. As such, it is regrettable that the author didn't choose to write for a more common synthesizer. While there is certainly much that can be learned by reading the text and studying the code, hands-on experimentation will only be possible for those who have an Alpha Juno or have the skills and tenacity necessary to modify the program for use with another instrument.

As the author notes, at least half the program code in the book is devoted to displaying information on the screen and getting input from the user. I question the wisdom of devoting this much space to non-MIDI-specific material. The author justifies his approach by stating that "The input/output is what your customer sees. It is this aspect that makes or breaks most programs, not the internal workings." This is true, but this emphasis assumes that the reader is aiming to create a commercial application. My suspicion is that most professional or semi-professional C programmers, i.e., those who need to think in terms of customer response, already have the tools for building menu screens, and that musicians and hobbyists who are interested in creating programs for their own personal use might prefer to forego the aesthetic niceties in order to gain more knowledge of the "internal workings." On the other hand, the chapters on screen manipulation cover such important programming topics as the use of pointers, dynamic memory allocation, and linked lists, and so they are quite valuable even if you are indifferent to screen aesthetics.

In conclusion, *C Programming for MIDI* is a good choice for intermediate programmers who want to improve their knowledge of C while gaining some experience with MIDI. Beginning programmers and those whose programming experience is limited to unstructured languages such as BASIC are likely to find this book intimidating; they should take the author's advice and learn the fundamentals of C before attacking this volume. Unless you are among the world's fastest and most accurate typists, I wouldn't even think about buying the book without the program disk. You should definitely not buy *C Programming for MIDI* in the expectation of getting professional software for the price of a book and a disk. The programs, especially the sequencer, are fairly primitive compared to current commercial versions; it would be better to regard them as raw materials from which, with diligent effort, useful programs can be built. After all, it is only by struggling to solve real-world problems that anyone learns to program.

(*Note: Both books are available from EM Bookshelf; see page 7 for information.*)

David B. Doty *is a composer, synthesist, and professional technical writer. His compositions can be heard on two albums by Other Music. He is the editor of* 1/1, *the quarterly journal of the Just Intonation Network, and the author of* Programmer's Guide to the Hercules Graphics Cards *(Addison-Wesley, 1988).*

SETTING RECORDS IN THE NEW AGE

Whether with market-driven hype or truly unique musical statements, record industry conglomerates clamor for the new age dollar.

By Robert Carlberg

Most artists' records are personal statements. Rarely is a record released that is not the result of much sweat, blood, and tears, and a little apprehension.

On the other hand, the record companies (at least the larger ones) tend to view records as "product." This one shipped gold, that one isn't paying back its production costs, Mr. X is due to deliver "product" on such-and-such a date. To be sure, the record execs are well aware that they are in the music business and have to deal with temperamental musicians, licensing fees, shady distributors, and obtaining press coverage. Numbers, not music, are their game: how many units, positions on the charts, points for artists and producers, and the bottom line. The music business is about music, but nonetheless it is a business.

Trends are important to a numbers-driven industry. Like program trading on Wall Street, once a trend is spotted, everyone jumps on it full force. And like the stock market, this can cause massive overreaction to relatively minor fluctuations in the market.

The Trend (capital T) of the late '80s is new age music. The enormous size of the baby boom demographics induces corporations to cater to boomers' buying preferences, which increasingly are new age works. As the peace generation finds themselves graying in the 'burbs with two kids and a mortgage, they're turning to music to unwind and put eight hours at General Consolidated Development behind them.

The trend surprised almost everyone. Record companies lost track of their customers during the '70s, putting their resources behind a shrinking number of increasingly corporate rock bands and a variety of smaller, less successful projects. When the baskets holding almost all the eggs began to sour as the audience grew up (but the record companies didn't), the record companies began cutting back budgets, axing rosters, and retrenching for hard times ahead. "New artist development" was not in their vocabulary. They promoted some old stars and pursued the youth market somewhat, but the numbers simply weren't there.

Then somebody noticed that a carpenter in Southern California was selling records faster than he could make them. His own naive guitar records, and particularly those of his piano-playing buddy, were selling like proverbial vinyl hotcakes. William Ackerman is generally credited with establishing new age music as a genre with his Windham Hill label, which totally went against the industry wisdom of elaborately produced, emotionally vacant hard rock. Suddenly (well, not so suddenly—it took a couple of years before they noticed), the record companies realized their buyers weren't all visiting relatives overseas. They were simply disenchanted with the music industry.

The response was twofold: set up distribution agreements with the successful independents, and assemble their own new age rosters. By and large, the first stratagem has been successful, while the success of the second is mixed at best. However, both have had the effect of chilling independents, as they suddenly found themselves competing with giants. Perhaps that is why so many have given up the ghost and signed distribution deals (ECM by Polydor, Private Music by RCA, Meadowlark by Capitol, Global Pacific by CBS, Windham Hill by A&M, Narada by MCA, etc.). Like Wall Street, acquisition/merger is the road to success in the '80s.

At the same time, most of these corporate behemoths have established their own new age division, usually in a set of albums with a similar, Windham Hill-ish look.

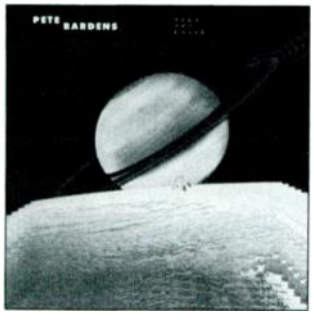
Capitol Records introduced Cinema Records in June 1987. Cinema's motto was: "The new progressive label out to earn your trust." They promised to bring the latest from "the most consistently innovative founders of today's progressive rock," including Patrick Moraz, Pete Bardens, Michael Hoenig, and Tony Kaye. Their initial set of releases consisted of four albums and a sampler, and was launched with an expensive-looking press kit with a glossy brochure, artist photos, and biographies. The hype they used sometimes got a little thick ("Cinema music shimmers with high-tech cleverness and futuristic tension"), but the motivation was real ("For a few years now, millions of post-'60s music fans who grew up on bands such as ELP and Yes have felt ignored—their favorite sounds squeezed out of record stores and off radio playlists"). Cinema Records, it was announced, would step into this void with a consistent flow of "brave new product" that will "attract core elements of both the mainstream

AOR and more eclectic EOR audience." For the uninitiated, that's Album-Oriented Rock, where FM plays tracks other than the hits, and Eclectic-Oriented Rock, where college and smaller, commercial stations play songs that never were intended to become hits. Radical, huh?

Cinema's first four releases were *Seen One Earth*, by **Pete Bardens** (ST-12555), *Human Interface*, by **Patrick Moraz** (ST-12558), *Xcept One*, by **Michael Hoenig** (CLT-46919), and *The Interstellar Suite*, by **Amin Bhatia** (CLT-46869).

Pete Bardens, former keyboardist for the "eclectic" British progressive rock band Camel, said of his *Seen One Earth*: "What I'm doing now is a logical progression of what was happening in the Camel days." That may be, but I recall reading that they were having difficulty securing a record contract due to less-than-stellar sales. At any rate, *Seen One Earth* is less Camel-like than it is the keyboard musings of what sounds to me like a burned-out rock star. Except for one Camel-like vocal, it's all instrumental, and the tunes are rarely hummable. The basic tracks were composed in the early '80s while Bardens was between record contracts. It's not unpleasant, but hardly "brave new product," either.

Human Interface, on the other hand, continues a series of unimpressive solo albums by keyboardist Patrick Moraz (ex-Yes, ex-Refugee, ex-Moody Blues, ex-progressive rocker). It renews his membership in the Wakeman/Emerson/Van Der Linden club for bombastic, neoclassical keyboards, over-orchestrated with string synthesizers and organ voices.



Michael Hoenig is described as a "founding force of Tangerine Dream," although my research (published here in May 1986) said he only toured Australia with them in March 1975. His previous solo album, *Departure From the Northern Wasteland*, is back in print and selling better than it did in 1978. *Xcept One* is described as "seven years in the making," which again may be due less to elaborate composing than to

lack of opportunity (it was recorded in four months). As with Bardens, it is a "logical progression" compositionally, continuing Hoenig's trademark of integrating sequencers with hand-played chords. *Xcept One* succeeds in updating and improving on *Departure's* ten-year-old concepts, although the concepts themselves are somewhat anachronistic these days.

Amin Bhatia's *The Interstellar Suite* differs from the other three by being the most blatantly derivative and not by a recycled pop star. Bhatia (previous credits are winning Roland's tape competition twice and some award-winning soundtrack work in advertising) programs neo-orchestral suites that are indistinguishable from Larry Fast. He's arguably more imaginative and does a wonderful job of re-creating the Synergy sound, but does the world really need more symphonic synthesis? Also, the bio blurb does injustice to Bhatia by quoting him in the following context: At 17, it says, Bhatia was given a Minimoog by his father. "I paid my dues during those years," he is quoted,

but he is "grateful for the limitations I worked under." Geez, that's gratitude.

Overall, the Cinema catalog stems from a positive motivation and probably addresses an untapped market. They need more work on the concept and stronger emphasis on the "progressive" aspect of their "brave new product," but I hope to hear more. I say hope, because as of this writing, one year after the above releases, the promised Tony Kaye album still has not appeared, nor have any others. My calls to the publicist went unreturned; the bean-counters at Capitol may have decided to put Cinema on ice. I hope not.

Another set of records (four albums and a sampler) comes from I.R.S. (manufactured and distributed by MCA) in the name of the No Speak series. Their motto, "Music too good for words," described "active, vital, accomplished foreground music for a segment of the market that

hasn't been to the record store lately." As with Cinema, the music is instrumental music "unemcumbered with banal lyrics aimed at teens," made by musicians disenfranchised by the MTV generation. The initial four releases are **Pete Haycock**, *Guitar And Son* (No Speak 001); **Wishbone Ash**,

Nouveau Calls (002); **Stewart Copeland**, *The Equalizer and Other Cliff Hangers* (003); and **William Orbit**, *Strange Cargo* (004).

Pete Haycock was the founding guitarist of the Climax Blues Band, another "eclectic," progressive, this-time-blues band that had a string of mildly successful albums before they ran aground in the low tides of the mid-'80s. *Guitar And Son* is the guitar equivalent of Bardens's *Seen One Earth* : pleasant but unmemorable musings from an accomplished player. It came about because Haycock submitted a tape to producer Miles Copeland—creator of No Speak—of three-minute pop songs without any of Haycock's well-respected guitar. "What happened to your guitar playing?" Copeland asked. "Everybody wants a single," Haycock is quoted as replying. "Otherwise, I can't get a record deal." In response, Copeland created the No Speak series, for "great players who have somehow found themselves out of the music business because their musicianship is no longer valued."

Wishbone Ash is another refugee from the money droughts. Copeland managed them in their heyday and commissioned *Nouveau Calls*. They're more rock-oriented than Haycock, with a dual-guitar, bass, and drums lineup, but Copeland says he'd much rather listen to them in his car than new age; otherwise, he'd fall asleep and end up wrapped around a telephone pole. *Nouveau Calls* is more fun than *Guitar And Son*, too, although how one markets instrumental rock that studiously avoids any jazz elements is a good question. I hope Copeland and I.R.S. figure it out soon, because there are eight more instrumental LPs planned for this year.

The Equalizer and Other Cliff Hangers, by Stewart Copeland (Miles's brother and ex-Police man), brings the No Speak series into the electronic age. As on his previous solo, *The Rhythmatist* (reviewed April '86), Stewart Copeland uses his Fairlight and programs odd rhythms and combinations of sounds; again his influences are heavily African. Guitar sounds (maybe real guitars—Fender is credited), drums (of course), and Copeland's trademark tuned-gong Fairlight patch combine with Fairlight horns, strings, piano, percussion, and synthesizer sounds. Each segment has a rock mentality, but unlike Wishbone and Haycock, there is more complexity. If you liked *The Rhythmatist*, as I did, you will probably enjoy its No Speak relative.

And then there's William Orbit, who supposedly had a dance band and did some producing, film scores, studio work, *et cetera*, but I've not heard of him before. *Strange Cargo* is easily the best album of the set, so I hope to correct this situation. Like Bhatia, Orbit does not fit the mold of the other three releases, only this time, it's because he has more variety than his labelmates. Recorded "at various times between 1984 and 1987," this is one record definitely not tossed off in a couple weeks in the studio. Orbit is a multi-instrumentalist and plays everything himself. I hear guitars, percussion, drum machines, and lots of expensive synthesizers. The tracks vary wildly (as recording dates would indicate), but several feature nylon-string guitar over a sampler with ethnic percussion, a recipe not unlike Acoustic

Alchemy. Raw electric guitars pop up elsewhere, though, so Orbit can't be pinned to one style. If you buy just one No Speak, begin here.

In April of this year, I reviewed a set of new age releases called the New Horizons Series on Prism Entertainment. This series (four albums and a sampler) definitely falls into the same category as the Cinema and No Speak series, although I won't ask you to sit through them again.

The last series I want to mention, al-

though there are several others that could conceivably be included (CBS Portrait, Virgin Venture, Antilles New Directions, RCA Novus, MCA Pangea, and others) is the MCA Master Series. The Master Series is by now well-established, being in its third year, and has been reviewed faithfully here, as deserved. Each set of records (4, 5, and 6) has been accompanied by a sampler and had matching graphics, although MCA has been uncharacteristically reserved about the purpose of the series. The best quotation I can pull from the press kit is that MCA vice-president Tony Brown hopes to "show the diversity of music emanating from Nashville." They've done that, and a lot more.

The latest batch, their fourth, includes four albums and *two* samplers (one all-guitar, from the whole Master Series catalog). The Master Series has, by now, an established stable of nine artists (and their bands), to which they add one more, **Jon Goin**, a multi-instrumentalist.

Jon's debut album, *Waltz At Big Sky* (MCA 42127), is the culmination of "two intensive months of 18-hour days in the studio." It is *large* music (see September '88 **EM**), incorporating a lot of instruments and a lot of styles. Goin plays synthesizer, of course, but also guitars, bass, drum machine, piano, and percussion. Tracks vary considerably, from pop-jazz to deep electronics, always with the care and polish we've come to expect from Masters. Some of the pop-jazz selections get a little drippy (I must say), but overall the album stands up to the best new electronic music.

The second duet album by synthesist **Michael Utley** and steel drummer **Robert Greenidge**, *Jubilee* (MCA 42045), marks the next Master entry. Greenidge's pan work, a staple of Jimmy Buffett's band, projects a languid island jazz, while Utley's synthesizers (also featured with Buffett) provide an easy-going backing. The album is successful as a pleasing diversion, and I don't believe it is intended as anything more.

Acoustic Alchemy's second Master's release, *Natural Elements* (MCA 42125), follows in the footsteps of their debut, *Red Dust & Spanish Lace* (see October '87). As mentioned earlier, Acoustic Alchemy (Nick Webb and Greg Carmichael on acoustic guitars with not-so-acoustic accomplices) has pretty much defined the standard for synthesis/acoustic guitar combinations (with maybe Latitude, too —oh never mind!). They are tuneful, colorful, light jazz with almost none of the saccharin aftertaste of Jon Goin.

The last album of this set, and this column, is *Nothing Is Lost* (MCA-42105), **Giles Reaves**'s stunning follow-up to his stunning debut, *Wunjo* (see July '87). *Wunjo* was unusual for the lack of drums, a trait not easily assigned a positive or negative value. *Nothing Is Lost* makes it easier by including them. Once again, large music. Reaves adds his own personality with restrained use of sound effects, atonality, nature recordings, and, of course, his starkly memorable melodies. I like it.

Some sure-footed successes, some faltering steps. Overall, from what I've heard of the record companies' attempts to "cash in" on the new age phenomenon, they have not yet reached the bottom of the barrel, and a lot of genuine talent remains untapped. The efforts to "rehabilitate" some of the homeless refugees from the mid-'80s purge of intellectuals may stand a chance of success if they can keep the poor old buzzards from feeling sorry for themselves. However, it's the younger players who understand the temper of the times, and they must lead music into the future. Nostalgia is inherently self-limiting, and for the generation that was going to change the world, it's a pretty strange place to end up.

Robert Carlberg *does not drive a VW bus or a BMW, but a pickup truck. He never had long hair and shaved off his beard years ago. He does not partake of bumper stickers or lapel buttons, but he does encourage you to vote this month. Music for review should be sent to: PO Box 16211, Seattle WA 98116.*

TEN BEST SO FAR

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

OTHER NEW ARRIVALS

Rick Brandeburg & Paul Korsmo *Legends and Myths*
Spencer Brewer *Portraits*
Sri Chinmoy *Heart-Power-Victory*
Christaal *Mystic Traveller*
Crossing Point *Point of No Return*
The Crusaders *Life In The Modern World*
Cusco *Apurimac*
Deuter *Celebration*
Deuter *Land of Enchantment*
John Doan *Departures*
Suzanne Doucet *Reflecting Light*
Gandalf *More Than Just A Seagull*
David & Steve Gordon *Lightspring*
David & Steve Gordon *Oneness*
Brian Keane *Suleyman The Magnificent*
John Kesh *Tour de France*
Shona Laing *South*
Randy Leago *Reckless Life at Home*
Tod Machover *Valis*
Don Malone *Concert*
David Michael/Randy Mead *Petals in the Stream*
Minnesota Composers Forum *Freefall*
R. Carlos Nakai *Sundance Season*
Joe Poshek *Humanistic Dances*
Steve Roach *Quiet Music*
Mikel Rouse Broken Consort *A Lincoln Portrait*
Mark Sloniker *True Nature*
Andy Summers *Mysterious Barricades*
Michael Urbaniak *Cinemode*
various *Cultures Electroniques 2*
various *The Narada Collection*
various *Narada Sampler #3*
various *Steal This Disc 2*
various *The Voyage Beyond...*
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Sequence Editors for Passport MIDI 4+/8+ and Syntech Studio One programs, $19.95. **Generic Librarian,** $24.95. Please include $2.50 shipping and handling. For more info, write SoundWare, PO Box 1913, Nederland, TX 77627.

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● OPERATION HELP

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EML Synthesizer and Mu-tron Bi-Phase: I would greatly appreciate any information concerning the Electro Comp Model 101 Synthesizer from Electronic Music Labs, Inc., and the Mu-tron Bi-Phase, Serial #05529. I have no idea how to use either piece and would love to be able to toy around with them. Please help. Gary Fitzgerald, 37-75 63rd St. #B29, Woodside, NY 11377; tel. (718) 446-3857 (call collect).

FZ-1 Hard Disk: I use my Casio FZ-1 exclusively for sound effects and thus am loading and unloading the full RAM frequently. I have been looking for a hard disk/WORM drive mass storage system that can interface with the FZ-1's parallel port. Is someone out there interfacing the parallel port with a hard drive, either through an outboard computer or as a stand-alone device? If so, I would like to hear from them. If not, can someone design and build an interface between the non-standard parallel port and a personal computer? Clifford Hoelscher, 8540 Tujunga Valley St., Sunland, CA 91040; tel. (818) 352-0697. ■

ADVERTISER INDEX

IT'S NOT JUST A GOOD IDEA, IT'S THE . . .

Wherein an anti-copy protection advocate changes his tune—for some pretty compelling reasons.

by Jim Johnson

(We seldom run guest editorials, but this month, I'd like to turn this space over to **EM** *author and software programmer Jim Johnson. His thoughts about copy protection merit a wider audience; so climb up on the soapbox, Jim. —Craig Anderton)*

As a software user, I have always been opposed to copy protection, and even after I began writing software for profit, I was not too happy with the restrictions of copy protection. A recent experience, though, changed my mind.

After an Atari user's group meeting, I went to another musician's house to try out one of his instruments. One of the first things I noticed on his disk was an illegal copy of *ESQ-apade* (an ESQ-1 editor from Dr. T's). When queried about this, he replied, "Oh, I just used it once to download some sounds a friend gave me." I asked him whether he thought the program's author was entitled to some compensation; his response was, "Well, Jim, people are going to buy what they're going to buy." I didn't press the point, but the experience left a bad taste in my mouth.

I later visited another musician who *also* had an illegal copy of ESQ-apade sitting by the computer. He had gotten his copy from—you guessed it—the same person I'd visited a few weeks before! Here were two ostensibly "nice" people, both *in possession of stolen property*, who, amazingly enough, didn't think they were doing something wrong.

After these and other experiences made me realize how commonplace piracy is, I had no choice but to recant on my previous anti-protection stance. Since then, I have put many hours into improving copy protection schemes—hours that I would much rather have spent debugging my programs or developing new ones.

A recent letter in **EM** stated that copy protection was more or less defunct in the MS-DOS world and that music software publishers should take the same approach. However, because of lawsuits by software publishers, most major corporations forbid the use of illegal software. Many employers inspect employees' PCs on a regular basis and erase any installed programs found without an accompanying manual. This is not going to happen with music software.

Another problem, at least for Atari ST software publishers, is the European market. While software theft is bad enough in the U.S., at least we have laws against it. In Europe, no such laws exist, and many user's groups exist for the sole purpose of copying and trading commercial software. Some European distributors have even been known to refuse to carry products that aren't copy-protected.

In an industry as small as ours, we're all in this together. Without customers who pay for programs, music software developers will eventually go back to their more lucrative jobs in the defense and appliance industries. I already know of programs that won't be written because the authors don't think they can charge enough for the program to make a profit in a market gutted by software theft.

Illegal software distribution hurts all of us, and everyone shares the responsibility for putting a stop to it. For musicians, I suggest the following:

1. Remember that no one wants to use copy protection; don't take it as a personal insult.

2. When you learn of people who are trading or giving away copyrighted software, warn them not to do it, and if that doesn't work, report them to their victims. Wouldn't you call the police if someone was breaking into your neighbor's house and carting off a TV?

3. Protect *yourself* by obtaining legal backups (when available) of your important programs, since protected disks are more likely to fail than unprotected disks.

For publishers, I suggest:

1. Make it easy for legitimate customers to obtain a backup copy, which should be sent at no charge on receipt of a registration card.

2. Remember that musicians *depend* on these tools. If a registered owner accidentally trashes a key disk, bend over backwards to send a replacement.

3. Finally, subject production disks to stringent quality control. Insist that your duplicator provide you with disks that work on a variety of disk drives.

I am tired of preaching about copy protection, but I am even more tired of seeing my work, and that of my friends, given away free. Let's all stop complaining about copy protection and go after the real cause of the problem: the people who steal software.

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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