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Electronic Musician

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August 1989

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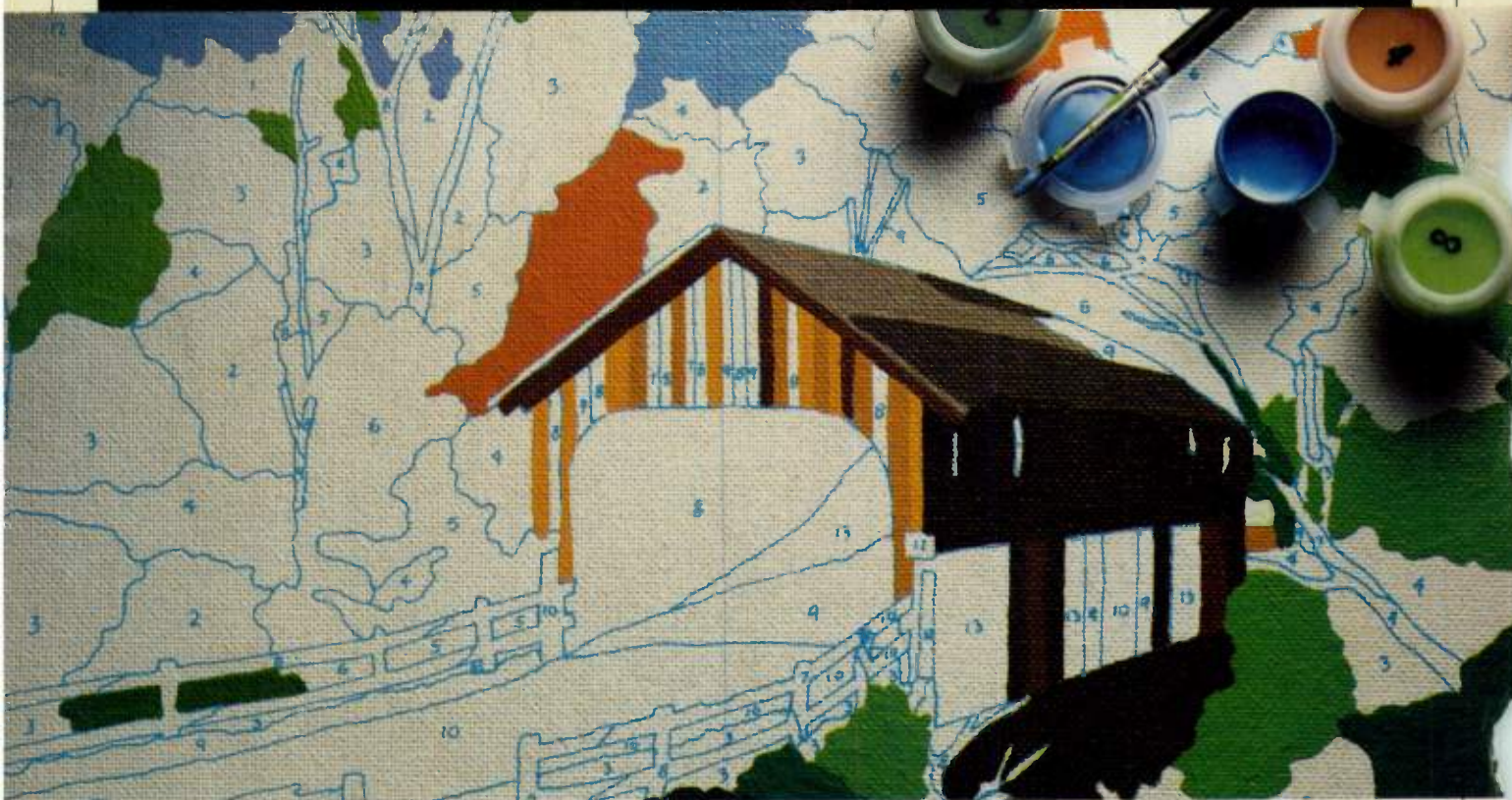


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AN ACT III PUBLICATION
AUGUST 1989 VOL. 5, NO. 8

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National Editorial, Advertising,
and **Business Offices**
6400 Hollis Street #12
Emeryville, CA 94608
tel. (415) 653-3307
FAX (415) 653-5142

Southern California
Advertising Office
tel. (818) 709-4662
FAX (818) 709-6773

WHAT'S NEW THIS MONTH

We're pleased to announce that Bob O'Donnell, formerly with *Upbeat* and *Music Technology*, has joined the EM team as associate editor. Bob's dedication, experience, and enthusiasm are already a great asset to the magazine; he'll be working with editor-in-chief Craig Anderton and the rest of the team to bring you the innovative features and useful information you've come to expect from EM. Also, Peter Hirschfeld has been promoted from associate publisher to publisher. Congratulations, Peter, you deserve it!

ABOUT EM (*Electronic Musician*):

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

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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.

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Manufacturers: Send press releases to our Emeryville, CA, address, attention: What's New. 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 encourage readers to scan "What's New" for new product announcements and contact the manufacturer for more

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DO-IT-YOURSELF (DIY) PROJECTS:

If you do not know basic electronic construction techniques, get a good book on the subject from your local electronics supply store (or try *Electronic Projects for Musicians*, available from EM Bookshelf). EM specifies parts values following international protocol, thus minimizing the use of decimal points and zeroes. A nanofarad (nF) = 1,000 pF or 0.001 μ F. Suffixes replace decimal points. Examples: 2.2k Ω (U.S. nomenclature) = 2k2 (Intl. nomenclature). 4.7 μ F (U.S.) = 4u7 (Intl.). 0.0056 μ F (U.S.) = 5n6 (Intl.).

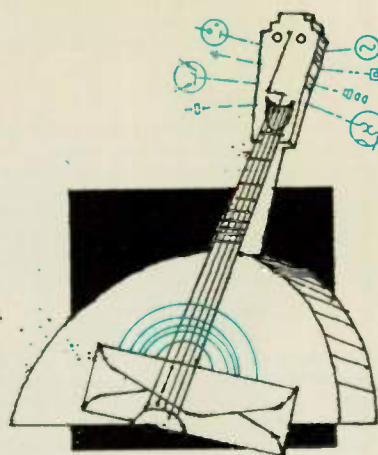
If you detect an error in a schematic or listing, let us know. If a project doesn't work for you, contact us to see if anyone has reported any errors (wait at least a month for EM to be in circulation).

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Readers sing the praises of Score and enlighten us about PC interface programming. Also, the last word on the Toshiba DX 900.



KEEPING SCORE OF NOTATION

I recently ran across your review of Passport Designs' *Score* desktop music-publishing software for the IBM PC (September 1988 issue). *Score* was the first piece of music software my husband and I ever purchased, and while I can sympathize with your reviewer saying he will never review a software package that complex again, I wouldn't want your readers to think that the program is so difficult that they should avoid it.

While we initially cringed at the complexity of the program, we quickly concluded that our best chance to learn the program was to type in all the examples contained in the Reference Manual. Once we understood the text-based entry system, we started to incorporate the interface shortcuts Passport has added. This proved to be a very workable method of learning the program.

The review contained a fairly comprehensive description of how to use *Score*, except in one instance. Although the reviewer properly praised the Justify function for its ability to space elements across a staff or staff system, he dismissed the Page section as being used primarily for part extraction. No, no, no! While it is true that you can extract parts from this area, for me, Page is one

of the best parts of *Score*.

The Page section acts as a gigantic justification program and paginator. You first define which files contain the segments of the song on which you are working. You then are able to pick a staff size that pleases you aesthetically and define how many staves you want on each page. You can also transpose the entire piece at this point, if needed. The program can automatically paginate, or if you're really particular, you can specify exactly how many measures are to be on each line. The program then justifies all the elements in the song, transposes, if desired, and correctly spaces the staves on each page. These "paged" files are combined in the regular *Score* program to create your final pages, where you can "fine-tune" the look of the page before printing it.

The beautiful output I get, even on my 24-pin dot matrix printer, makes it worth it, especially when I use it to print or transpose parts for our local community orchestra. Would I buy this program, knowing what I know now? Yes!

Karen Correa
California

SEQUENCER DEVELOPMENT FOR THE IBM PC AND MPU-401

Handling MPU-401 Interrupts with Turbo Pascal," in the May 1989 *EM*, clearly showed the basics of utilizing the MPU-401 in "Dumb mode" (also known as "UART mode"). I would like to expand a little on this article for the benefit of software developers and "hackers."

The first two "rules" of MIDI software development, including sequencer development, for the IBM PC are:

1. Your software should support the MPU-401;
2. Your software should use only the 401's UART mode of operation.

The primary reason for supporting the MPU-401 is because it is the current de facto standard in MIDI interfaces for the IBM PC. However, other fine MIDI interfaces have been making their way into the market. Some of them are 401 compatible; many are not.

It is a good idea to support as many interfaces as possible and certainly the 401 should be one of them. This notion of supporting multiple interfaces leads me to my next "rule."

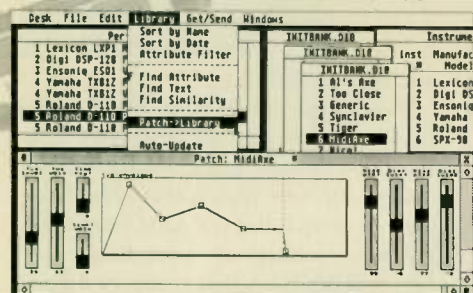
There are a few reasons to use the 401's UART mode. First, using Intelligent mode is difficult at best. It is true that in Intelligent mode, the 401 will perform some functions automatically. However, the amount of added functionality does not justify its use. Learning the ins and outs of Intelligent mode is very time-consuming and is hindered mostly by lack of documentation. Even the 401's technical reference book doesn't shed much light on how to use Intelligent mode. Second, the work it offloads from the PC is minimal. Remember, the 401 was developed in the days of the 6502/Apple II, when CPU cycles were at a premium, and it hasn't changed significantly. In short, what you have to "spend" in development time and complexity is not worth the CPU cycles you would save at execution time. However, even these are minor issues in the grand scheme of things.

The major reason for using UART mode is that by doing so, you leave the door open for the support of other interfaces that are not 401 compatible. In other words, when you use 401 Intelligent mode, your software is locked in to the 401 and virtually locked out of support of other interfaces. You will find that almost all non-401-compatible interfaces operate almost identically to the 401 in UART mode, with the only differences being minor ones relating to which IRQ or ports to use and how to initialize the interface. That is, they op-

Time

"What's it worth?"

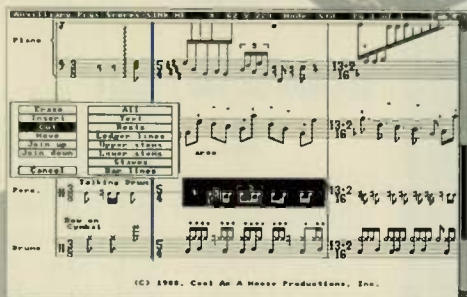
"Time is money" is the old saying. But musicians know that time is often more valuable than money. Wasted time can mean lost inspiration! You bought a computer to save you time, but now you're feeling all bogged



down. With today's modern computers it's not your hardware that's slowing you down, it's your software! All that loading and unloading programs, installing alternative operating systems, or just the time it takes the software to re-draw the screen. Those lost minutes can easily cost you lost hours!



We currently have over 20 programs that integrate together in our Multi Program Environment for the Atari ST, or fully Multitask on the Commodore Amiga. Powerful, fast, easy-to-use programs that do exactly what you expect and more.



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Amiga World

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● LETTERS

erate just as the term implies; in UART Mode. In my own case, modifying the Sequencer (GFmusic) to support other interfaces took about three hours.

There are other very fine non-401-compatible MIDI Interfaces on the market that sell for a very reasonable price (just scan the ads in **EM** and other publications). When you develop your software using 401 UART Mode, you are also 99.5% on your way to supporting most other interfaces. And, you get the added benefits of reduced development time and less complex software. But don't forget, your software will also run with a 401! What more could you ask?

Now for my final tip. Virtually all MIDI Interfaces (the 401 included) use a data port and a status port. Also, they all provide an interrupt just like the 401. However, the port addresses are often different and the interrupt (IRQ) it uses may also be different. And in case of conflicts with other boards in your PC, most manufacturers provide the ability to change the IRQ and data/status port addresses via switches on the circuit board. What this means is that you want to implement your software such that the IRQ and data/status port addresses are variables that can be configured by the user. This will give your software even more flexibility in supporting the widest variety of MIDI interfaces.

Gerald Felderman
GFmusic
Florida

TOSHIBA DX 900 UPDATE

Rick Lathrop's February 1989 "First Take" review of the Toshiba DX 900 VHS VCR with PCM encoder has drawn numerous queries from inquiring **EM** readers. Lathrop's statements could be easily misinterpreted and many important questions remained regarding how many tracks could be used for audio and SMPTE time code, PCM-F1 compatibility, sound quality, and unit availability. In response to these inquiries, we tested a DX 900 (courtesy of Rick King), with the able assistance of Alameda Digital Recording studio co-owner Jim Jenkins.

The DX 900 includes an internal, EIAJ digital-compatible PCM (pulse code modulation) processor that converts the audio inputs into digital form and stores it on the *picture* portion of the videotape. Thus, the unit will record

and play back tapes that are compatible with PCM processors from Aiwa, Sansui, JVC, Technics, Nakamichi and Sony (PCM-F1, -501, -601, -701). Unfortunately, only the Sony and Nakamichi processors can record with either 14- or 16-bit resolution. The others, like the DX 900, all record at 14-bit; they play back 16-bit recordings with 14-bit fidelity.

Using Donald Fagen's particularly well-engineered *The Nightfly* CD as a source, we compared the DX 900 to a Nakamichi DMP-100 (a Sony PCM-F1 clone) in 14-bit mode and to the source CD. In a series of blind tests, we could identify the DX 900 recording with 100% accuracy: its sound quality, while quite good, had inferior high-frequency response and was not as good as the Nakamichi. The Nakamichi was almost indistinguishable from the CD original. In fact, 14-bit DMP-100 sounded closer to 16-bit DMP-100 than to the 14-bit DX 900. It is Lathrop's opinion that the DX 900 sounds as good as a DAT machine; we strongly disagree. Nonetheless, we feel that the DX 900 outperforms most analog 2-track decks.

Besides the PCM tracks, the Toshiba deck also includes a linear track (the standard mono track found on all VCRs) and two Hi-fi tracks. The latter are not digital, but use AFM (audio frequency modulation), providing excellent reproduction that is almost digital-quality. Since both the Hi-fi and PCM (or picture) information are recorded *simultaneously* by the VCR's rotating heads, overdubbing the Hi-fi tracks over the PCM audio (or vice versa) is not possible.

Many readers asked if you can really record on five tracks (two PCM, two Hi-fi, and the linear track) with the DX 900 and whether you could stripe SMPTE time code on the linear track. Well, you can record on all five tracks (sort of), but not all at once. One major limitation is the way the linear track is accessed. Audio routed to the Hi-fi tracks automatically dumps to the linear track. Because the DX 900 lacks a separate output for the linear track (some VCRs have one), the time code would play back mixed with the Hi-fi tracks. Consequently, unless you fancy audible time code in your mix, this eliminates the use of the linear track with the Hi-fi tracks. You can, however, lay time code on the linear track with already-recorded PCM tracks, using the Audio Select button. Incidentally, the Audio Select button is

the key to accessing the various tracks.

Although you can simultaneously record on both the PCM and the Hi-fi tracks, the unit does not allow synchronized overdubs; you cannot monitor prerecorded tracks while overdubbing. (You can monitor when overdubbing to the linear track, but the linear track is low fidelity and not intended for high-quality audio reproduction.) The linear and Hi-fi tracks also have automatic record-level control, so the levels cannot be manually adjusted. When you simultaneously record PCM and Hi-fi tracks, the LED level meters only display the PCM tracks. (You can monitor levels on the Hi-fi tracks only when recording Hi-fi alone.)

Although, as Lathrop stated, no direct digital audio output exists for the PCM tracks, clone copies of digital tapes can be made by copying from the deck's video out jack to the video input on any VHS recorder. However, the Hi-fi information cannot be copied in this manner without experiencing a generation loss. To use the DX 900 for digital ping-ponging, you can route the DX 900 video out to the video in of any Hi-fi VHS deck and, at the same time, add new tracks onto the Hi-fi channels of the second deck. Then, remove the tape from the second deck, place it in the DX 900, and you'll have four first-generation tracks ready to mix.

Overall, we found the DX 900 to be an excellent unit, well worth the price (currently discount-priced in the \$750 range), with good sound quality and plenty of features. It's not as great-sounding as DAT, but you can't watch your favorite video on a DAT machine after the session is finished.

Unfortunately, Toshiba has discontinued the DX 900. However, it is still available from several suppliers, including: Tri State Camera, 160 Broadway, New York City, NY 10038; tel. (800) 221-1926 or (212) 349-2555, and The Video Depot, 1500 N. State St., Bellingham, WA 98225; tel. (800) 843-3687. There are probably several other sources, so check with local dealers or advertisers in video magazines. Note that **EM** does not endorse any particular vendor; we offer the above information as a service to our readers.

Steve Oppenheimer
Electronic Musician
George Petersen
Mix magazine

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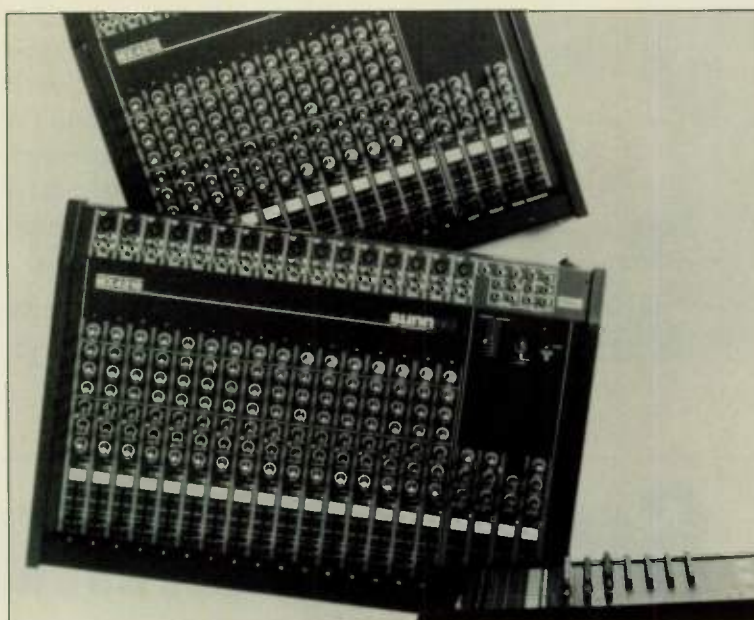
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For more information, contact your local dealer or Hughes & Kettner, 35 Summit Ave., Chadds Ford, PA 19317. (215) 558-0345.



Hughes & Kettner

Mysterious power boxes, motorized and MIDIized faders, and more are unveiled in this month's edition of news on the latest gear.



Sunn MX 4200 Series Consoles

and both high-impedance and balanced, low-impedance inputs. The top-of-the-line MX 4200 series offers additional bus and input/output possibilities.

Fender Musical Instruments
1130 Columbia St.
Brea, CA 92621
tel. (714) 990-0909

MOTORIZED FADERS

British-based Sellmark Electronic Services offers the *MF* series of motorized faders for sound- and light-mixing automation. DC servo drive cards with touch sensor and motor-off control circuitry are available, as is a motherboard that serves eight faders, provides 8-bit digital I/O, and supports all functions necessary to link to an automation computer. Up to eight motherboards can be linked, providing up to 64 channels of automation.

Sellmark Electronics (USA)
96 Dudley Rd.
PO Box 252
Sudbury, MA 01776
tel. (508) 443-8053

PATCH BAYS

The *MAP 8x4* programmable patch bay (\$449.99) delivers as many as 128 patch configurations, recalled via MIDI or manual program change commands. Its microprocessor handles up to eight send/return loops and four effects buses. Signal processors can be electronically "moved" from one channel to another during mixdown.

Peavey Audio Media
Research Division
711 A St.
Meridian, MS 39301
tel. (601) 483-5365

MIDI

Music Quest extends its line of MPU-401/IPC-compatible interfaces with the release of the *MQX-16* and *MQX-16S* (\$199 and \$249, respectively), which offer chase-lock tape sync (with real-time error correction) for all sequencers that support MIDI Song Pointer-based sync. The *MQX-16S* also includes SMPTE support (30-frame and drop-frame).

Music Quest, Inc.
2504 Ave. K, Suite 500-492
Plano, TX 75074
tel. (214) 881-7408

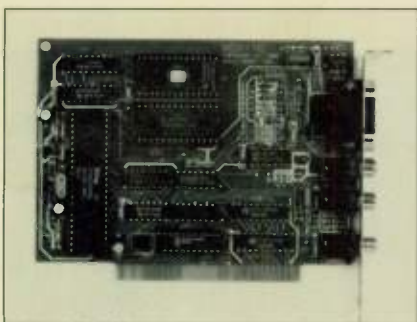
The *FaderMaster* (\$299) allows MIDI parameter control via eight user-programmable faders. Although it is designed for use with sequencers, effects processors, and synthesizers, the

unit can be used in many other MIDI control applications. *FaderMaster* has 25 preprogrammed setups for a variety of popular synths and processors, including products by Kawai, Oberheim, and Yamaha. An editing program (\$29) for the Atari ST and Macintosh allows you to create your own setups.

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

MIXERS

Sunn's latest sound reinforcement mixer lines are the *MX 4108/4112/4116* series (eight, twelve, and sixteen channels, respectively) and the *MX 4208/4212/4216* series (\$749 to \$1,799). The *MX 4100* series, although labeled "economy," includes phantom power



Music Quest MXQ-16 MIDI Interface

POWER SUPPLIES

Many signal processors (including some by Alesis, Valley International, and Lexicon) need a 9 VAC external power supply, and using several of these can be a hassle. Juice Goose addresses this problem with *Micropower* (\$165), a 1/4-rack-space power strip that uses a commonly available 3.5 mm mini plug attachment to power up to five units, with up to a 1-amp capacity per outlet.

Juice Goose
7320 Ashcroft, Suite 302
Houston, TX 77081
tel. (713) 772-1404

SERVICES

Hydratech is a high-level technical group specializing in tour and studio pre-production and support. Areas of expertise include programming, designing, modification, and maintenance of MIDI systems, studio systems, custom gadgets, synths, and audio systems. They also do work relating to NED Synclavier systems and a variety of other keyboards.

Hydratech
11824 Oxnard St.
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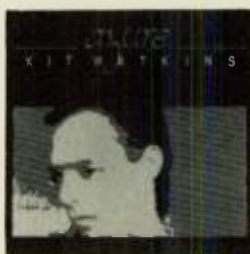
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● WHAT'S NEW SIGNAL PROCESSORS

In a marriage of digital and analog technology, White Instruments' Model 4700 1U rack-mount, digitally controlled, $\frac{1}{3}$ -octave graphic EQ (\$875 for one channel, \$1,375 for two channels) offers programmability and analog sound. Multiple units can be networked to respond to one command source, e.g., one EQ's front panel or an optional RS-232/EIA-422 interface. THD is less than 0.05%, and the signal-to-noise ratio is better than 98 dB.

White Instruments
PO Box 90099
Austin, TX 78709
tel. (512) 892-0752

Roland's GS-6 Digital Guitar Sound System (\$995), an integrated preamp and multi-effects system, offers four chorus modes with feedback for flanging effects, a panning delay, and eight reverb modes. The preamp emulates the sound of a variety of name-brand guitar amps, the outputs are buffered to simulate the sound of a speaker, and both preamp and effects settings can be stored in 64 patches, recallable from the front panel or via MIDI. The MIDI Bulk Dump format is supported for storing GS-6 data.

RolandCorp US
7200 Dominion Cir.
Los Angeles, CA 90040
tel. (213) 685-5141

SOFTWARE

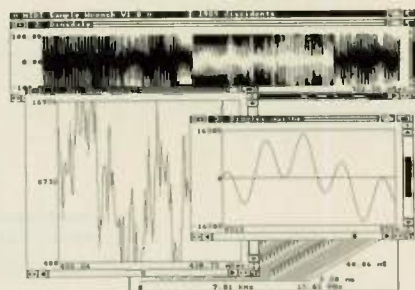
Big Noise Editor/Librarians for the IBM PC and compatibles (\$119.95) offer graphic envelope editing, patch copy and combine, selective patch randomizing, and a three-bank, onscreen librarian. Instruments supported include the the Kawai K1/m/r, Roland D-50/550, Roland MT-32, Roland D-10/20/110, Ensoniq SQ/ESQ, Korg M1/R (also available for Atari ST), and Casio VZ-1/10M. Recommended system requirements include 640K RAM, a graphics adapter, and an MPU-

401 or compatible interface (including the Music Quest MQX-32).

Big Noise Software
PO Box 23740
Jacksonville, FL 32241
tel. (904) 730-0754

Personal Copyist 1.7 (\$69) is a new macro system for Jim Miller's *Personal Composer* IBM PC/compatible sequencer. The system features a macro file with keystroke commands for fast input of notes, ties, accidentals, etc., for writing lead sheets and chord charts; a library of over 300 labeled guitar chord diagrams; and a selection of score and staff layouts.

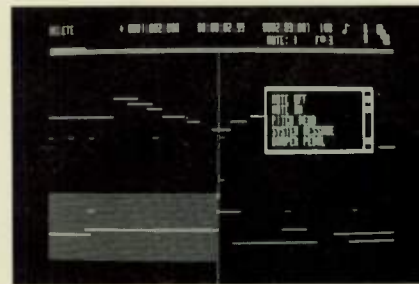
Imagine Marketing Co.
PO Box 1400
Brea, CA 92622
tel. (800) 662-6434
or (714) 528-2122



MIDI Sample Wrench from dissidents

Unlike most Amiga sound editors, the MIDI Sample Wrench (\$279) works with 16-bit, CD-quality samples. The extensive editing package includes porting of samples between supported machines; digital EQ; 50-point, time-scalable envelope generation; signal compression; sample rate conversion; and more. The MIDI Sample Dump Standard is supported.

dissidents
730 Dawes Ave.
Utica, NY 13502
tel. (315) 797-0343



Orpheus V.1.0. Graphic Editing Screen

A recent entry in the IBM-based sequencer market is the *Orpheus V. 1.0* (\$180). A full-screen MIDI data analyzer, an array of sync switches, and real-time recording of sysex data complement the basic features of this 100-track package. Other functions include map editing, MIDI macros, and "humanized" quantization.

Circa Industries
PO Box 3751
Reston, VA 22090
tel. (703) 435-5628

SOUND MODULES

The *Proteus* from E-mu Systems (\$995), a 16-bit, 32-voice digital sound module, is now shipping. Proteus contains 4 MB (expandable to 8 MB) of digital waveforms and ROM-based samples from the Emulator III library, a total of 192 sounds, extensive editing capabilities, and six polyphonic outputs, configurable as three stereo submixes with programmable panning.

E-mu Systems, Inc.
1600 Green Hills Rd.
Scotts Valley, CA 95066
tel. (408) 438-1921

Akai's XE8 (\$899.95) MIDI Drum Expander provides sixteen internal, 16-bit, sampled percussion sounds in its 1 MB of ROM and has two slots for additional 16-sound, 1 MB cards. User-modifiable parameters include MIDI channel, MIDI note range, tune, sweep, decay, reverse, and more. The 1U rack-mount unit has eight separate audio outs.

Akai Professional
PO Box 2344
Fort Worth, TX 76113
tel. (817) 336-5114



White Instruments Model 4700 Graphic EQ



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PATCH
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If you're considering a GR-50, here's something else to consider: the FC-100 MK II.

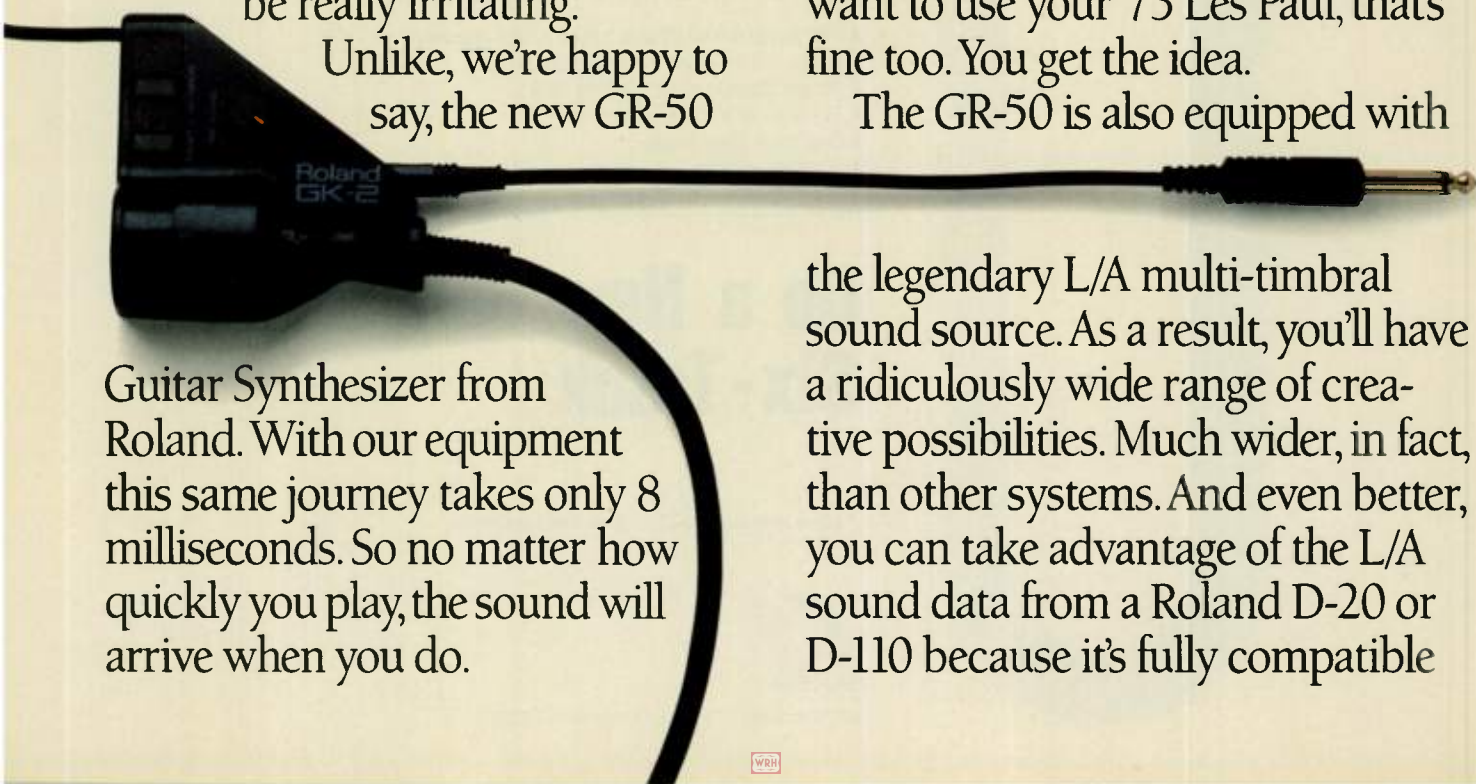
The GK-2 can be used

with any guitar. If you want to play your favorite Tele, that's fine. If you want to use your '73 Les Paul, that's fine too. You get the idea.

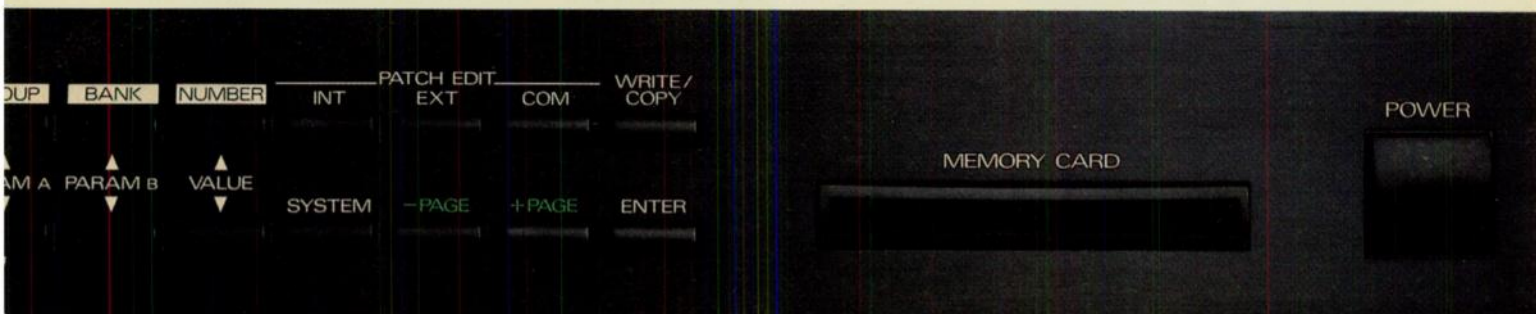
The GR-50 is also equipped with

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If you want to hook a remote control foot pedal to the GR-50, we humbly suggest our new FC-100 MK II. Among other things, it can be used with two expression pedals as well as an optional RMC-1 for sending MIDI information. And



With our GR-50 and GK-2 you can use any guitar you own, and even ones you don't.

unlike most foot controllers, the Roland FC-100 MK II lets you go directly to the particular number you want rather than making you run through all of the numbers in sequence.

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• WHAT'S NEW

SPEAKERS / HEADPHONES

Turbosound's TXD series loudspeaker enclosures are designed for sound reinforcement applications, especially where near projection and wide dispersion are required. The TXD-520 (\$665), designed to fill in areas not reached by the main speaker system, includes a 10-inch driver and soft-dome tweeter. Frequency response is rated at 100 Hz to 18 kHz, power-handling capacity is 125 W RMS, and dispersion is 90 degrees, nominal. The TXD-580 (\$2,244), designed for bands and small tours, handles 650 watts RMS, has an 18-inch driver, two 10s, a 2-inch compression driver, and features 100 degrees horizontal/50 degrees vertical dispersion. Two additional models are offered, the TXD-530 (\$1,064) and a subwoofer cabinet, the TXD-518 (\$999).

Edge Distribution Corp.
RR2 Box 144C
Milewood Rd.
Millbrook, NY 12545
tel. (914) 567-1400



Sennheiser HD 25 Headphones

Utilizing dynamic drivers in a closed-ear design, Sennheiser HD 25 studio monitoring headphones (\$199) offer a 30 Hz to 30 kHz frequency response, 0.5% THD, and high sensitivity (105 dB/mW) in a 5-ounce package. One driver can rotate off the ear and onto the user's temple for single-muff monitoring.

Sennheiser Electronic Corp.
6 Vista Dr.
PO Box 987
Old Lyme, CT 06371
tel. (203) 434-9190

SYNTHESIZERS

Like the K1, the Kawai K1II (\$995) is multitimbral and uses sampled waveforms. To the usual K1 features, the enhanced synth adds a digital reverb and a separate drum section that is independent of the other voices, so you can have drums without sacrificing synth voices.

Kawai Digital Products Group
2055 East University Dr.
Compton, CA 90224
tel. (213) 631-1771

TELECOMMUNICATIONS

The Macintosh Users at Berklee (College of Music) has expanded its National Computer Bulletin Board Service. The BBS offers public and private E-mail, popular music files (for Mac, Atari, Commodore, and IBM), a MIDI File library, a musicians' network, online lists of professional music services, tech support, etc.

Macintosh Users at Berklee
Joe Zobkiw
150 Massachusetts Ave.
Box 604
Boston, MA 02115
tel. (617) 424-6560
or online (24 hours/2400 baud)
(617) 739-2366

TUNERS

Zen-On's Chromatina 331 (\$99.95) is an 84-note (C1 to B7) chromatic quartz tuner with eight pitch shifts (A4=438 to 445 Hz). The tuner employs a microcomputer to eliminate needle fluttering and has mic and line inputs.

MIDCO International
908 West Fayette Ave.
Effingham, IL 62401
tel. (217) 342-9211



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TURBOSYNTH TIPS

Pseudo-resynthesis, simplified looping, and overcoming the struck thimble syndrome—there's a lot more to Turbosynth than initially meets the ear.

By Mark Jeffery

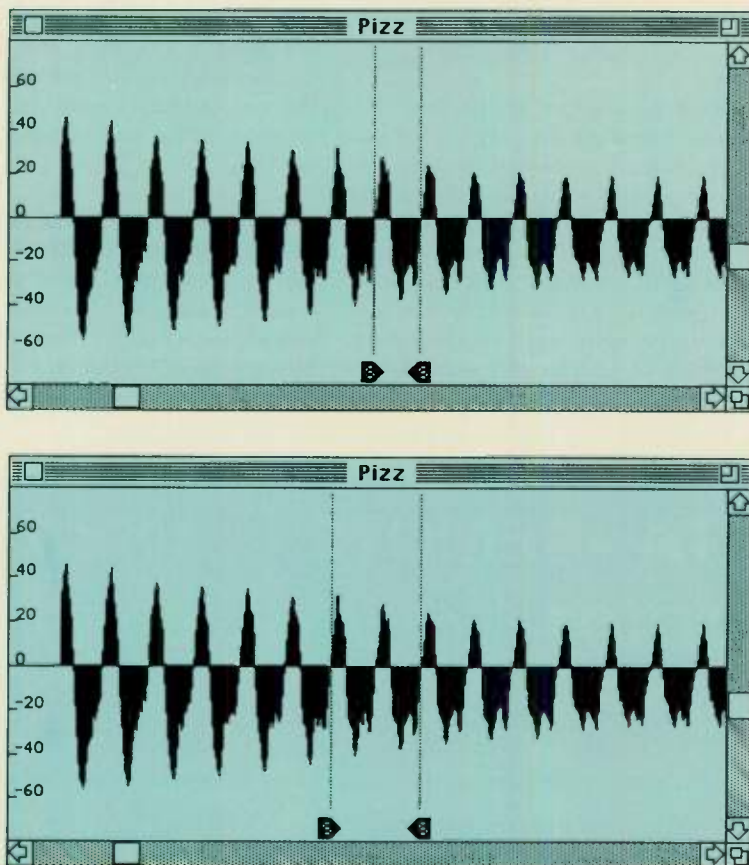


FIG. 1: The top window displays a sound with a loop containing one period of the waveform. Below, the loop contains two periods.

Digidesign's *Turbosynth*, a software-based sample generator (reviewed in the November 1988 *EM*) for the Macintosh, synthesizes and processes sounds using a variety of techniques. There are twelve different sound modules (including oscillators, sampled sounds, envelopes, and modulators), which can be connected in any configuration to produce a patch. Once a patch has been created, the sound generated by the patch can be transferred to a sampling keyboard for playback.

The program uses many tried and true sound-generating techniques and, in many ways, resembles a classic analog modular synthesizer, with "modules" connected together via "patch cords" that are created in software. But any resemblance ends there. Because of its all-digital implementation and approach to sound creation, *Turbosynth* provides many areas of exploration that go beyond traditional synthesis. In this article, we'll add a few new *Turbosynth* techniques to our bag of tricks.

PSEUDO-RESYNTHESIS

Turbosynth's oscillator differs from most synthesizer oscillators in a number of ways. For example, you can place waveforms at a series of points in time and have the oscillator crossfade from one to the next, producing a timbral evolution of the sound. The trick is to select a series of waveforms that will create an interesting timbral evolution.

One way to do this is to extract waveforms from sampled sounds and place them at the appropriate points in time in an oscillator. This process is somewhat like FFT-based resynthesis, in that a sampled sound is reduced to certain basic components that can be manipulated and recombined. As with resynthesis, frequency and duration can be edited independently of each other. In the process, a sound can be transformed into something quite different.

Before selecting a sampled sound for waveform extraction, keep in mind that the *Turbosynth* oscillator (like most oscillators) produces periodic, pitched waveforms. Hence, a non-pitched sound such as a snare drum is not an appropriate candidate for waveform extraction. Certain sounds with prominent enharmonics (non-harmonic overtones), such as bells, can also be troublesome.

Here is a step-by-step process for implementing the pseudo-resynthesis technique.

1. Select a sampled sound and determine its pitch, using *Turbosynth*'s sample module. You'll use this information later, when you try to identify waveforms throughout the sound. To determine the pitch, place loop points in a portion of the sound where the pitch is the most stable (probably toward the end).

2. Create a one-period loop (i.e., a loop consisting of one iteration of the waveform; see Fig. 1) using the Loop window. Experiment with shortening

● TURBOSYNTH TIPS

the distance between the two loop points to find the shortest possible loop.

3. Confirm that you have a one-period loop by going to the File menu and selecting **Save Loop As Waveform**. Next, create an oscillator and open the waveform. If the waveform display shows only one iteration of the basic waveform, you have succeeded.

4. Return to the sample module and note the "loop frequency" value in the sample's information box, and the difference between the loop start number and the loop end number in the Loop window's information box. (These values will be used later, when you insert the waveforms back into the oscillator.)

5. You're now prepared to extract waveforms from the sample in a systematic fashion. Simply go to different points in the sound—every tenth of a second is a good starting point—set the loop markers, and save the loops as waveforms. Use some consistent conventions to name the extracted waveforms to save yourself time and trouble later. Even something as simple as "Piano; C3; 0.5 sec." will help.

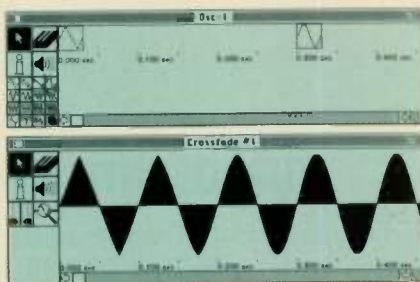


FIG. 2: The top window is an oscillator window with a triangle wave crossfading into a sine wave. The bottom window shows the smooth evolution between the waveforms.

Don't be alarmed if the loop frequency seems to vary slightly as you move from one section of the sound to another. This is normal in most natural sounds. A sound's attack, for example, will often exhibit more closely spaced peaks in its waveform than appear in later portions of the sound. As a rule of thumb, the more dynamic the sound, the more waveforms you will need to extract. Make sure you select the same

phase relationship for each waveform that you extract; if two successive waveforms are not in phase, crossfading from one to the next will result in phase cancellation (Figs. 2 and 3).

6. After saving a series of waveforms to disk, load the waveforms into an oscillator at appropriate locations. For the sake of comparison, set the oscillator's frequency to match that of the original sample. Give it a listen and start to play with it: change the frequency; spread out the waveforms; modify the waveforms; add waveforms from a different sample; mix the oscillator with the original sample; duplicate the oscillator, detune the duplicate oscillator, and mix the two oscillators together. Use your imagination (or someone else's, for that matter).

SPECTRAL INVERSION AND THE STRUCK-THIMBLE SYNDROME

Sounds pretty neat, huh? "Spectral Inversion" ranks right up there with "Ultra-wideband Linear Phase Transform Multiplication." Yet when you first tried it out, you got something that sounded

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like a thimble being struck. Well, don't write off this module just yet; there's a lot that you can get out of it.

First, though, a bit of review. All digital audio systems (such as sampling keyboards, digital reverbs, etc.) have a characteristic *sampling rate*, the frequency at which an analog audio signal is measured and converted into a series of numbers. The sampling rate is also the frequency at which digital samples are converted to analog audio signals. In either case, the higher the sampling rate, the higher the bandwidth.

The Nyquist theorem states that the maximum frequency a digital audio system can reproduce (the *Nyquist frequency*) cannot exceed half the sampling rate. So, a digital audio system using a 30 kHz sampling rate can only reproduce frequencies below 15 kHz. Spectral inversion takes the frequency components within a certain bandwidth (in this case all of the frequencies below the Nyquist frequency) and flips them around the center of that bandwidth (Fig. 4). The inversion's center point equals half of the Nyquist frequency, or one quarter of

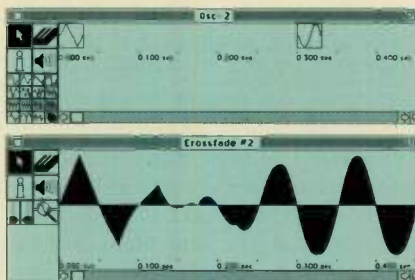


FIG. 3: The top window is an oscillator window containing a triangle wave and a sine wave. Notice that the sine wave is out of phase with the triangle wave. The bottom window shows the effect of non-phase-aligned crossfading.

the sample rate. For example, a 100 Hz sine wave sampled at 30 kHz will be spectrally inverted around 7.5 kHz, up to 14.9 kHz. Likewise, an 11 kHz sine wave will be inverted down to 4 kHz.

Now that we've examined the spectral inverter, let's take a look at the typical signal we might feed to the spectral inverter—a guitar sample. The fundamental frequencies of the notes played on a

standard guitar range from 82 Hz up to around 1 kHz. Since the guitar produces very strong first and second harmonics, most of a guitar sample's sound energy falls below 2 kHz and will be spectrally inverted up to above 13 kHz. That's pretty high, which is why you get the sound of a thimble being struck.

There are plenty of ways to work around the struck-thimble syndrome. The first is to develop an appreciation for the sound of thimbles being struck. If this fails, select a different sample to spectrally invert. A sound with a broad range of strong frequency components, such as a monster ambient snare drum sample, is a good candidate. Many percussion sounds have strong sound components throughout the audio bandwidth. Adding distortion to a signal will add high-frequency components, which can also sound interesting when inverted. As always, experimentation is the key.

Another way to make the spectral inverter more interesting is to use the inversion envelope. This envelope controls the mixture of the spectrally in-

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verted input signal and the "dry" input signal (Fig. 5). One application is to let the high-frequency, inverted sound provide an attack for the dry sound, then fade away into the main body of the dry sound.

SECRETS OF LOOPOLOGY

Since sampling keyboards (and computers) have a limited amount of RAM in which to store sound data, the concept of looping (i.e., continuously repeating a certain portion of the sound data) is very important. Looping can give the illusion that a short sample is much longer than it actually is. There are generally two types of loops: short and long. Short loops are best suited for static, sustained sounds, such as trumpets.

Most sounds, however, are not static. In many cases, the harmonic series of a sound will change dramatically from the beginning to the end of a sound. These sounds require longer loops in order to retain their dynamic character. Unfortunately, placing a longer loop in a sound increases the odds that the harmonic content at the loop start point will be different from the harmonic content at

the loop end point. Play this type of loop, and you'll hear a click every time the sample end jumps back to the loop start. Crossfading and bidirectional looping are two possible solutions, but there are other answers as well.

One way to ensure that a sound has the same harmonic content at both the loop start and loop end is through waveform duplication in an oscillator. Simply duplicate a waveform in an oscillator and place the duplicate at some later point in time. Make sure there are other, different waveforms in between. Next, adjust the loop start and end points in Turbosynth's output section to match those in the oscillator. If executed properly, this approach provides non-clicking loops in sounds that may have dramatic harmonic activity.

This technique doesn't just work with simple waveforms, but can help loop sampled sounds too. By mixing a specially set up oscillator with a sampled sound, we can create an overall sound that, again, has loop start and loop end points with the same harmonic content. There are two different ways to go about this.

In version one, extract two waveforms

from the sampled sound, one at the desired loop start point and one at the loop end point. Next, create an oscillator and load the two waveforms in reverse order (i.e., place the loop end waveform at the same point in time that the loop start will be and place the loop start waveform where the loop end will occur). Make sure the oscillator has the same frequency as the sampled sound. Mixing the oscillator and the sample effectively averages the loop start and loop end waveforms so they are the same. You may want to add an amplifier envelope to the oscillator so the loop waveforms fade in at the appropriate time. Adding additional waveforms to the oscillator can also produce nice results.

Version two of oscillator-assisted sample looping also uses extracted waveforms. However, instead of mixing the sample directly with the oscillator, fade the sample out and fade the oscillator in. By the time the loop points occur, the sampled sound should be completely faded out. Again, check that the loop start and loop end have the same waveform, with at least one different waveform in between.

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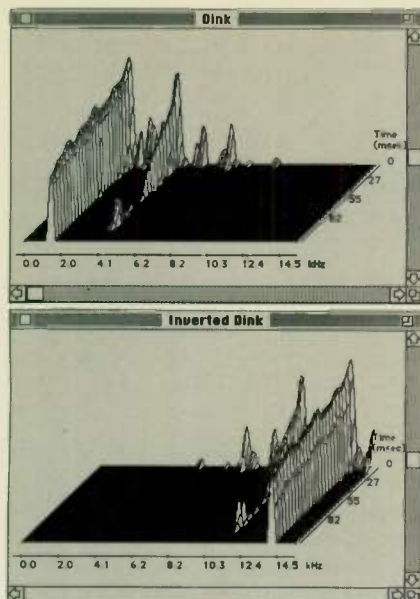


FIG. 4: The top window shows the frequency analysis of a sound. The bottom window shows the frequency analysis of the same sound after spectral inversion.

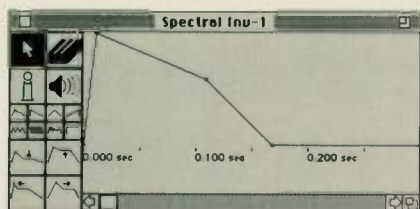


FIG. 5: The envelope above represents the change in wet/dry mixing through time for the spectral inverter. When the envelope reaches its highest point, the output is 100% spectral inversion, 0% original input. When the envelope reaches its lowest point, the output is 0% spectral inversion, 100% original input.

Another looping technique takes advantage of amplitude fluctuation. Due to various factors, musical timbres can exhibit severe dips in level. These dips are sometimes called *nodes*. One source of nodes is phase cancellation due to detuning. When signals are in phase, they tend to reinforce each other, and when signals are out of phase, they tend to cancel each other. If signals are at different frequencies with respect to each other, the phase changes that result will be much more complex. As a result, when mixed, the signals will reinforce each other at some points and cancel each other at other points. The pleasant sound of a 12-string guitar is an example of this effect. Other instru-

ments are played with tremolo, which also results in nodes. In any case, nodes can be great places to set loop points. Since the amplitude is very low at a node, any sudden change in harmonic content is effectively masked.

With Turbosynth, nodes can be created using either a pitch shifter or an amplitude envelope. Detuning by 5 to 25 cents and a 50% effect mix are recommended settings for creating nodes with the Turbosynth pitch shifter. The actual degree of cancellation achieved by pitch shifting depends on the waveform's symmetry. When the positive portion of a waveform has the same shape as the negative portion, the two halves will completely cancel each other. The sine wave is an example of a waveform that has identical positive and negative portions. If the two portions of a waveform are very different, a lesser degree of phase cancellation will occur.

The amplitude envelope offers an easy way to create nodes in a sound, but doesn't add the sweeping quality of the pitch shifter. Don't forget, though, that these techniques can be used together. To create regularly spaced nodes, simply select one of the LFO presets in the amplitude envelope module. The depth and rate of amplitude modulation can be adjusted using the envelope modifiers.

NOW IT'S UP TO YOU

If there was a design philosophy for Turbosynth, it was, "make it general enough that it can be used in ways we didn't think of, but don't make it so general that it is difficult to use." I hope we achieved that goal. There are many more potential modules that we could have added to the program, and many of the existing modules could be further enhanced, but Turbosynth provides some pretty flexible tools as it is. Hopefully, these tips will inspire you to think of some new techniques. Remember, there's always plenty of room in *anyone's* bag of tricks.

(Turbosynth has now been updated to Version 2.0. This version supports Digidesign's Sound Accelerator card and the Ad In converter, improves the fidelity of the filter and stretcher, and adds several new modules and some sample editing features.—Ed.)

Mark Jeffery is programmer general for Digidesign. The title of his next program will not contain any of the following prefixes: "Turbo," "Techno," "Ultra," "Mega," or "Mondo."

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T A S T I C

Using Dr. T's Programmable Variations Generator

It's complicated, unconventional, and maybe even a bit weird—but get on good terms with Dr. T's PVG, and it will show you a good time.

By Jim Johnson

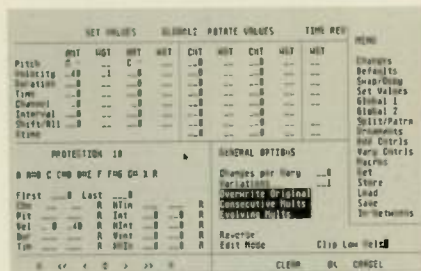


FIG. 1: Limiting note velocities to a minimum of 40.



FIG. 2: Scaling controller 7 data to 80% of the original values.

The Programmable Variations Generator (PVG), a component of Dr. T's *Level II Keyboard Controlled Sequencer* (KCS), adds random or deterministic variations to an existing sequence. It includes so many options that, although you can do just about anything you want with PVG, the down side is that even the most mundane tasks can be a lot more complicated in PVG than they are in less powerful, but more straightforward, programs.

This article describes how to perform both common and esoteric tasks in PVG. We'll also look at some applications of the *Master Editor*, another part of Level II KCS that can be as perplexing as PVG.

TAKING NOTE OF PVG

The key to understanding PVG lies in the *note selection criteria*. Generally speaking, any operation in PVG can be ap-

plied either to randomly selected notes, or to all notes in a sequence. In addition, individual notes can be "protected" according to certain criteria (described later). The only operations that always affect all unprotected notes in a sequence are those on the Global 1 and Global 2 screens, as well as the Global section of the Vary Controllers screen.

The Ornaments, Split/Pattern, and Add Controllers operations will operate on all unprotected notes in a sequence if Changes per Vary is set to zero, but this does not apply to the Changes, Swap/Copy, or Set Values screens. On the Global screens, only the operations are selected at random, assuming multiple WGTs (weights) are set and Changes per Vary is not zero. On the Changes, Swap/Copy, and Set Values screens, both operations and notes are selected at random.

The Protection options filter out certain notes from the list of "candidate" notes for each PVG operation, based on their individual parameter values (time, pitch, velocity, channel, etc.). This can be limited to only a portion of a sequence by setting the First and Last parameters in the Protection subscreen. You can also select notes based on their

position in any rhythmic cycle, using the Macros page. The variety of Protection criteria lets you narrow down the list of candidate notes very precisely; for example, you can select specific notes, falling in specific velocities, on specific channels. Protection also can be applied randomly by setting the Protection factor to some value other than 10; I don't see much use for this, though, so I leave it set at 10.

THE SIMPLE STUFF

Suppose you want to "clip" (limit) a sequence's note velocities to some maximum and minimum values; for example, note velocities above 90 will be set to 90, and note velocities below 40 will be set to 40. To affect *all* of the notes in a sequence, not just randomly selected notes, requires using one of the two Global screens. Because we want to set the values of notes that fall outside a certain range, choose the Set Values section of the Global 2 screen. Two separate passes of the Set Values operation are required, one to set the notes above 90, the other to set the notes below 40.

The protection settings for these two operations are very simple, since only one parameter (velocity) is being used

Meas.-step	Event	Time	Chan.	Type	Note	Vel.	Dur.
1-1		0		ON	G 4	64	12
1-2	2	1	1	ON	C 4	64	12
1-3	3	1	1	ON	C 4	64	12
1-4	4	1	1	ON	C 4	64	12
1-22	5	18	1	ON	C 4	64	12
1-23	6	1	1	ON	C 4	64	12
1-24	7	1	1	ON	C 4	64	12
1-25	8	1		DE			

FIG. 3: Sample reference sequence for autocorrection.

to test notes. Fig. 1 shows the settings needed to process the lower part of the note range; processing the upper range works similarly.

Here's a tip for those who use controller 7 for MIDI mixing (see "Mixing in the MIDI Age," July 1989 EM). If you like the overall contour of an instrument's recorded volume curve, but want to raise or lower it relative to the other sounds, use PVG's Vary Controllers screen (KCS does not have a dedicated controller offset or scaling function). Fig. 2 shows PVG settings needed to lower the volume curve on channel 1 in the current sequence to 80% of its current value.

The critical settings are the Channel and Type at the top of the screen, and the WGT and AMT settings for the Scale parameter in the Global box. (As always, it's a good idea to click on Clear before

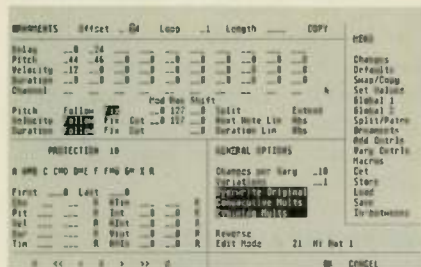


FIG. 4: Creating a hi-hat ornament.

setting this up to prevent unintended interactions from the other PVG screens.) Because we're using the Global box, the Changes per Vary parameter (which is normally very important) is not relevant.

1,001 WAYS TO AUTOCORRECT

KCS Level II's Master Editor includes an enormously powerful autocorrect system, hidden away in its Blend page, that (among other things) allows you to autocorrect the currently selected sequence against a "reference sequence." For example, suppose you want to autocorrect only those notes that fall more than three clock steps away from each sixteenth note. Go to the Master Editor's Blend page, enter the number of a reference sequence that will produce the desired results, then click on the Auto-correct button, followed by "OK." (If you've used the Blend page earlier in your session, you may need to disable some of the other options on this screen. You may also want to fiddle with the Edit Range settings if you only want to autocorrect part of the sequence.)

Setting up the reference sequence is

the key to all this. Fig. 3 shows one that accomplishes what we want to do.

By way of explanation, I work at a clock resolution of 96 steps per beat (384 steps per 4/4 measure), and since this sequence is 24 steps long, its length translates to a sixteenth note. The Blend page treats the reference sequence as a loop, so you should think of this sequence in the same way, with the first and last events occurring at the same time and the actual sixteenth note "beat" falling on event 1. Thus, the sequence consists of seven notes evenly

spaced around the sixteenth note beat—three before, one on the beat, and three immediately after.

When the Blend page does its thing, any notes that fall in the "gap" represented by the event with time 18 (event 5) will be autocorrected to the time of either event 4 or event 6, whichever is closer. Notes that fall outside that range will be autocorrected to the nearest step, which is to say they won't be autocorrected at all. Presto—partial autocorrection!

Best of all, you can save the reference sequence separately to disk, along with



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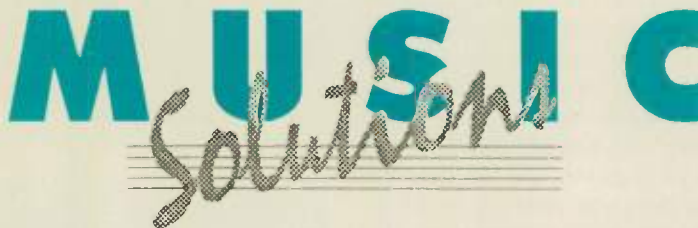
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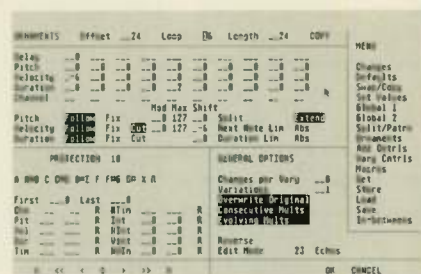


FIG. 5: Using ornament techniques to create an echo.

any other autocorrect "grids" you can dream up, for later use. In fact, if you use a sequence recorded by another musician (for example, the best funk bass player you know, playing a MIDI-fied bass guitar) as the reference sequence, the Blend page allows you to impress that player's "feel" on your own sequences! (Don't do this unless the musician agrees to it, though. I would no more recommend that you copy someone's "feel" without permission than I would recommend that you copy copyrighted software.)

HANG SOME ORNAMENTS

The Ornaments screen is perhaps the most powerful in PVG, not to mention the most confusing. In Dr. T's terminology, an "ornament" is a set of notes that is added to another note, much as a trill is considered an ornament in traditional music.

Here's an Ornaments page application suggested by Al Hoppers of Dr. T's. Al is a bass player, not a drummer, and has always had problems creating what he feels are good hi-hat parts. His recommendation is to start with several measures of evenly spaced closed hi-hat hits—say, on every eighth note. Now create an ornament containing two or three hi-hat hits. (Use the appropriate MIDI note numbers in the Pitch fields and set the Pitch switch to Fix.) One of these should be an open hi-hat, and the others should be closed. Set the Offset parameter to a sixteenth note (either positive or negative) and use sixteenth notes in the Delay fields. Now set the Changes per Vary parameter so that about a third of the notes in your sequence will receive ornaments, then click on OK. Fig. 4 shows an ornament I like for this purpose. The drum notes here are the "standard" MIDI note assignments for the hi-hat—42 for closed A, 44 for closed B, and 46 for open—and the clock resolution is 96 steps per beat.

Of course, the Ornaments page can do a lot more than play hi-hats. Ornaments can be anything from simple echos to outright "processors" that generate complex cascades from a single note. For example, Fig. 5 adds a decaying sixteenth note echo on every C in the affected sequence, while Fig. 6 produces a descending arpeggio-like figure for each note in the original sequence. The negative values in the Shift fields are the keys to these two ornament presets: in the first, the negative velocity shift causes the echo to fade away, while in the second, it transposes the figure down each time it repeats.

SHAKE IT UP!

PVG can "humanize" sequences by adding small random variations. This is especially useful with parts that have been over-autocorrected.

Start with the Changes screen, which lets you make minor changes to any of the parameters in a note. I usually like to restrict myself to changes in velocity, duration, and note start time when humanizing a sequence. Fig. 7 shows a Changes preset that I often use for humanizing hi-hat parts. For velocity and duration, I use the Gaussian change section, with a standard deviation (SD) of about 6 for velocity changes, or 3 for duration. (When humanizing drum parts, duration is usually irrelevant.)

When humanizing the note times, be sure to use Shift, rather than Time;

when a note's time is changed, Shift also adjusts the surrounding notes. You should never set the Shift value higher than 1 (at 96 steps per beat); otherwise, the slight fluctuation that you're looking for will turn to slop. The Changes per Vary parameter should be set to a value approximately equal to the number of notes in the sequence. (If you're only randomizing one parameter, set Changes per Vary to about a third of the number of notes in the sequence.)

When using the Changes page, note that PVG sometimes clumps many or all of the changes on the same note, especially when you're using a large number of changes per variation. This is a problem that (apparently) has to do with the ST's random-number generator and has been impossible to track down. When you humanize with the Changes page, examine the finished sequence before moving on, and watch for notes that have been shifted drastically or have extremely high or low velocities. Setting the Velocity Limits, Minimum Time, and Duration Limit parameters (in the Restrictions area) can help avoid this problem.

SUBTRACTIVE ALGORITHMIC "PERCUSSIONIST SYNTHESIS"

PVG's Macros page can do many different things, but I'll limit myself to one favorite example: generating drum parts totally from scratch.

I devised the macro in Fig. 8 for this application, which I call a "subtractive" macro because it subtracts unwanted drum hits from an existing sequence. The two-measure source sequence contains a bass drum, snare, and closed hi-hat hit on each sixteenth note. This sounds pretty miserable by itself, but think of it as a piece of wood that we will whittle down with the macro until a useful rhythm emerges.

All of the presets this macro calls are fairly simple and perform only one operation. The Erase 1 Kick preset, for example, erases a single bass drum note from the sequence. The Accent All preset adds 12 to the velocity of all notes that it affects, and Open 1 Hat replaces a single occurrence of a closed hi-hat with an open hi-hat.

The key to getting "sensible" rhythms out of this macro lies in the From, To, Cyc, and Ops parameters. Because the Range Unit parameter is set to Step, the values entered under From, To, and Cyc are interpreted in terms of steps. Thus,

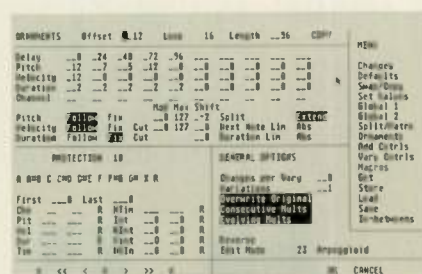


FIG. 6: Settings for a cascading, arpeggiated ornament.

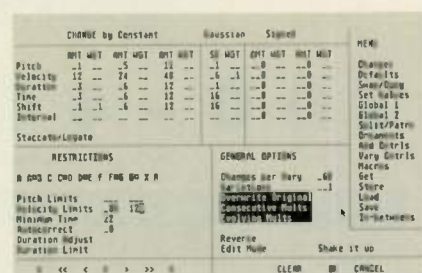


FIG. 7: Hi-hat humanizer settings.

The two lines that call the Accent All

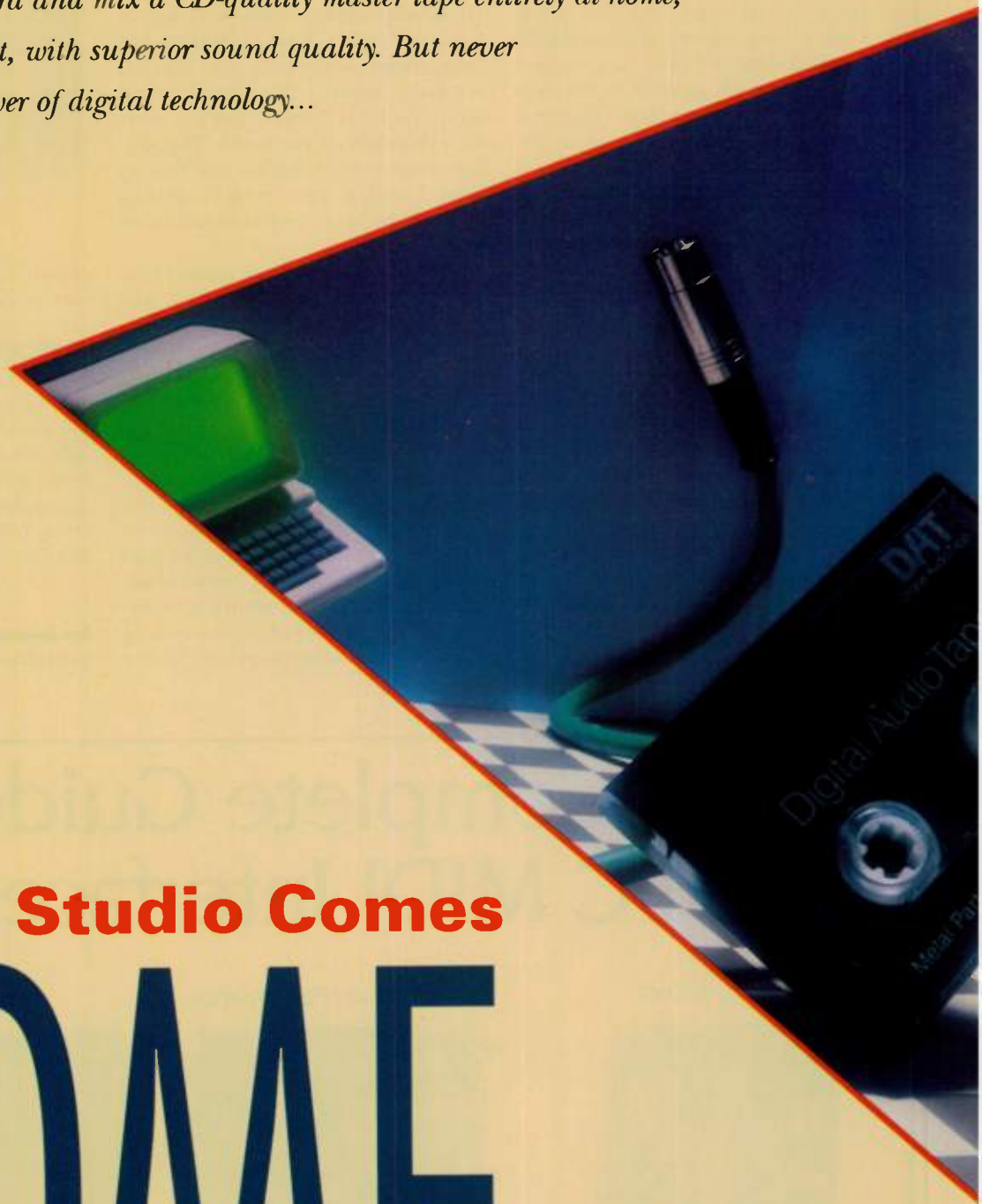
Applying this macro to a sequence like the one described above produces something that sounds like it might have been programmed by a slightly drunken rapper. Sometimes the results are terrible, but they usually contain interesting rhythms that might serve as the basis for a complete drum part, and some are usable "as is." Tightening up the "rules" that this macro uses to erase notes, or creating a somewhat less generic source

FIG. 8: The subtractive algorithmic percussion macro.

Itinerant programmer/musician
Jim Johnson has been isolated in the lab for six months. He hopes to emerge a new man.

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b y *C r a i g A n d e r t o n*



COVER STORY If you had told me ten years ago that my home studio would someday produce a 16-bit, digital-quality recording that would be released on a major label, I would have laughed and asked which lottery I had to win. But that was before the digital revolution occurred. Today, all the pieces necessary to produce a CD-quality release at home (except possibly for final assembly)—for a *fraction* of the budget of a low-budget album—are in place, from home computers, to MIDI, to samplers, to DAT. The results of this revolution in recording, which we'll watch unfold over the next several years, will have profound and probably irreversible effects. The current generation of musical tools will not only affect the music itself, but the type of contracts musicians sign, the job descriptions of engineers and producers, the notion of artistic control, and, eventually, the entire economic structure of the music industry.

And to top it all off, we're talking about an *affordable* revolution. Not only has the promise of quality sound been fulfilled, but the democratization of musical recording continues on its inexorable path.

In recording my latest album, *Forward Motion*, I was amazed at the synergy that occurs when you combine today's digital sound-making machinery into a system. I've never had a recording experience like it, but now that it's done, I sure hope to have more! Here is some background on the project and tips on what to do with your home studio to bring it into the CD age.

DAVID BISHOP



More than a thousand sounds Less than a thousand dollars

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THE ECONOMICS OF THE NEW STUDIO

As musicians, we really only have two dreams: to make great music and to be able to support ourselves so we can continue to try to make great music. Unfortunately, the economics of recording has made those dreams attainable by only a few musicians.

Recording costs, which range from a few thousand dollars to a over a million, but typically fall in the range of tens of thousands of dollars, are paid for by the record company and deducted from an artist's royalties until they are recouped. In essence, when you sign a recording contract, you are asking for, say, a \$50,000 loan. Sure, you don't have to pay it back, but then again, you don't make any money until it is paid back. At a not uncommon royalty rate of about a dollar per record, you'd have to sell over 50,000 albums before you would see a penny in royalties. Many acts find they have to sell hundreds of thousands of albums to break even.

Because the risks to the record company are so high—it's the Madonnas and Michael Jacksons whose success supports the rest of a label's roster—contracts are usually quite unfavorable to the artist. Most artists are signed to multialbum, long-term contracts because record companies don't want to invest lots of money in an act only to have it move on to another label just when it starts being profitable. To help recoup a bit more, companies put a lot of pressure on artists to give a substantial portion of their publishing rights to the company, which returns a bit more cash if the tune is a hit either for the original artist, or for someone else.

THE FRYING-PAN-TO-FIRE CONNECTION

I was all too aware of these facts as I started work on *Forward Motion*. Narada Productions was interested in the project based on some demo tapes I'd submitted, the fact that they'd liked some of my previous work, and because I was collaborating with Spencer Brewer, one of their artists. They felt the music would be most appropriate on their Sona Gaia affiliate, a label that didn't have a strong "new age" identity and would be more open to the type of music I was doing. But after the euphoria of not getting rejected for the umpteenth time wore off, I realized I had some problems.

First, although I sold a lot of albums back in the 1960s as a player and have worked on five albums since then,

you're only as good as your last hit, and I hadn't had one under my own name in a long time. Essentially, I was starting from scratch.

Second, with my commitment to *EM*, I couldn't just go and spend a month in the studio; I had to be available virtually every day (well, most musicians have day jobs, right?). Besides, the typical budget for a new age album by an artist in my position (read: unknown quantity) seldom exceeds about \$35,000. Unless I sold a lot of albums I wouldn't make any money, nor could I afford to spend months on something with no financial return.

Third, I felt that if I didn't make money for the company on this album, there might not be a second chance. My musical concept was for a rock/new age crossover that could appeal to heavy metal fans as well as Tomita enthusiasts. I knew the record company wasn't entirely convinced this idea would fly, so if it didn't take off, I presumed they wouldn't want to try again.

Fourth, I'm a perfectionist. I knew that \$35,000 of studio time wouldn't let me deliver what I heard in my head. How could I get enough time, working a few hours here and a few hours there, to be satisfied with the final results?

The solution: use the right tools and do it at home. At first, both Spencer and the label were skeptical that my collection of relatively nontrendy gear, a homemade mixer, and an eclectic mix of homemade, pre-MIDI, and MIDI signal processors could produce CD-quality sound. But by sequencing electronic instruments and recording straight to DAT, thereby avoiding the noise problems inherent in all but the most expensive multitrack tape recorders, I was able to keep the quality up and the budget down. You can, too, which is our next topic.

ELEMENTS OF THE CD-QUALITY STUDIO

The idea of the CD-quality home studio is not new. Just a few years ago, *EM* author Paul Lehrman tested the waters with *The Celtic Macintosh*, a tape where MIDI instruments were sequenced, in real time, into a VCR adapted for digital audio. The quality was excellent, but compared to today's standards the improved quality was only a foreshadowing of things to come.

In just a few short years, a truly remarkable series of events has occurred. At the time, they appeared to be small

steps, but put them all together, and you end up with a lot more than the sum of the parts. Let's look at each development, including some tips on how to exploit it in the quest for pro quality in the home studio.

Automated Mixdown

Automated mixdown has become affordable and practical (see "Mixing in the MIDI Age," July '89 *EM*). Finally, the

Mixing Forward

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mixing "moves."

quality of a mix is now limited only by your ears and patience, not physical dexterity. Most MIDI instruments respond to master volume messages over MIDI continuous controller 7, allowing a sequencer to store all your mixing "moves" as MIDI data. To see if a synth or sampler has this feature, check its MIDI implementation sheet. If the sound generator is multitimbral, make sure each channel can respond to its own volume controller messages.

If you're synching a sequencer to tape in order to record acoustic instruments or older MIDI synths and pre-MIDI gear that doesn't respond to MIDI volume commands, devices such as the J.L. Cooper Mix Mate (see review in April 1989 *EM*) or Iota MIDI Fader can add cost-effective, MIDI-controlled mixdown capabilities. Both of these boxes house several MIDI-controlled VCAs whose volume can be continuously adjusted and hence automated by MIDI controller messages. In addition, these and other pieces of gear let you mute tape tracks when nothing's being

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played, so noise levels can be kept under control. If you add noise reduction, you can approach CD-quality sound for acoustic instruments as well as electronic ones.

Sequencers and Software

Sequencers have become fast, efficient ways to record music and serve as an alternate to—and, in some cases, a replacement for—multitrack machines. Detailed editing, no transport hassles, and virtually unlimited tracks have earned sequencers a place, even in tape-based studios.

Mixing *Forward Motion* took about 280 hours (a little over 30 hours per tune), almost all of which was spent making changes in the sequences rather than remembering and implementing mixing “moves.” During the course of making literally thousands of edits on this project, the time a program takes to redraw screens and the ease with which you can navigate between menus becomes increasingly important.

I quickly found that my trusty old Mac Plus is no longer state-of-the-art, nor is

an unexpanded Atari 1040. Toward the close of the project, I purchased an Atari Mega 4, and I can see that if I want to preserve my sanity running the new generation of feature-laden, memory-hogging software on the Mac, I’d better upgrade to an SE/30 or Mac II. Argh. It’s not that the Mac Plus couldn’t do the job, but it certainly wasn’t optimum.

Master Tracks Pro served as my sequencer, mostly because graphic editing is an essential feature for me. I used it to add expressiveness to the synthesized parts: for upright bass, I could draw in little pitch bends or add crescendos and decrescendos to any sound, using controller 7 messages.

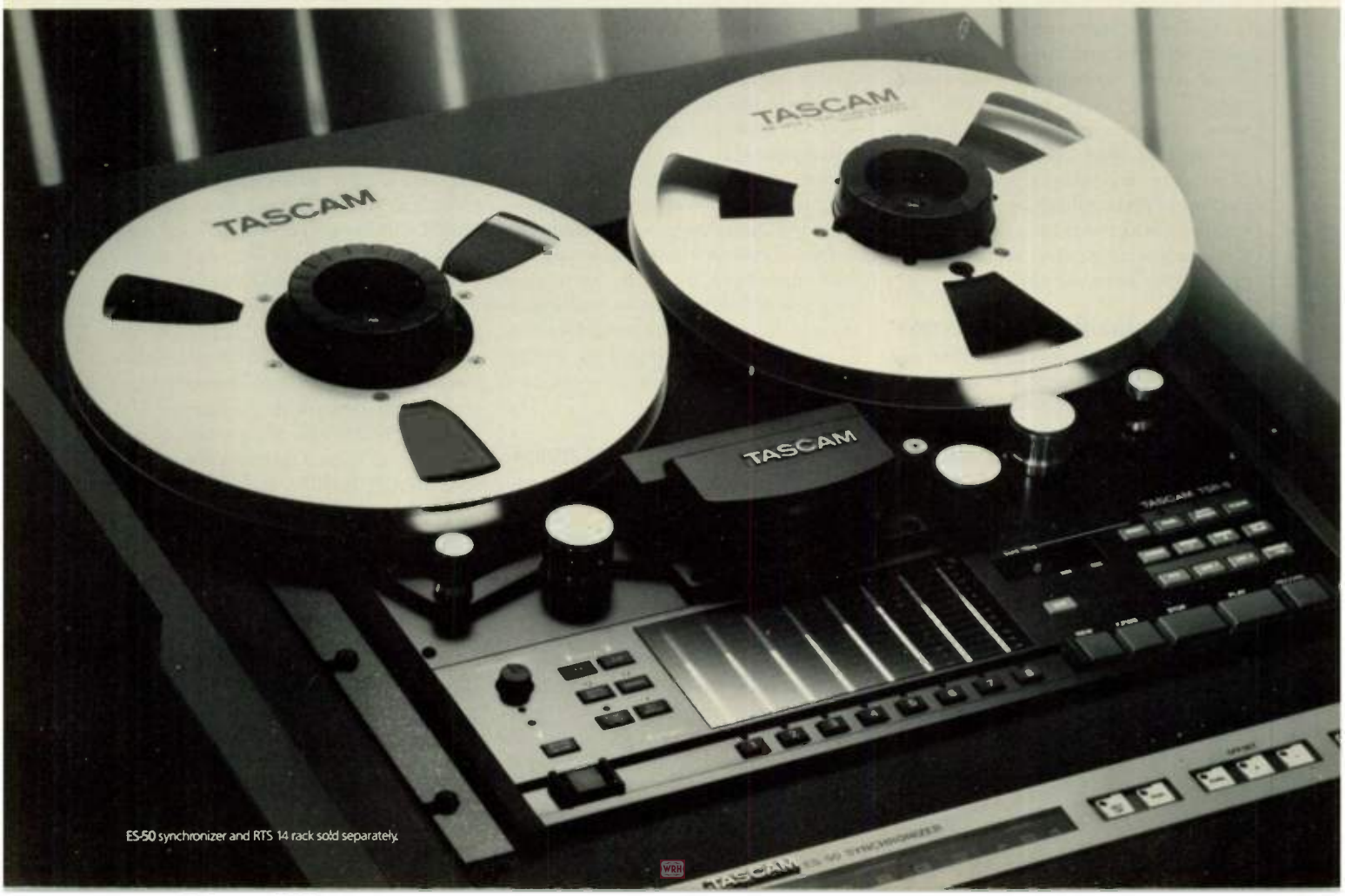
Graphic editing was also crucial in cleaning up MIDI guitar pitch bends and keyboard aftertouch. However, there were many times I would have preferred an event list (not available in the current revision of MTP), such as when checking velocities of a series of drum notes. The computer and software become the equivalent of a multitrack recorder, and it’s important to get the best (and fastest) you can afford.

**Finally, the quality
of a mix is limited
only by your ears
and patience, not
physical dexterity.**

By the way, even though I have a hard disk, I ended up not using it during the mixing process because of the noise factor. You don’t lose that much time with floppies when you’re working on one file with one program, and they’re much less intrusive.

Multitimbrality

Multitimbral instruments, coupled with dynamic allocation, allow a single low-cost synthesizer to produce multiple sounds. This drastically cuts the dollars-per-sound factor and, with some instruments, allows for exceptional stereo effects.



ES-50 synchronizer and RTS 14 rack sold separately.

Multitimbral samplers, in particular, offer another, more subtle advantage. The demos that had sold the project to Narada contained lots of overdubs of nonmultitimbral instruments, recorded on tape and synched to the sequencer. The solution: I sampled the sounds I would have overdubbed on tape into the Ensoniq Performance Sampler (EPS). With its eight "virtual instruments" and twenty voices, there was plenty of room for additional sounds. In fact, on one tune, I had the EPS pumping out six different sounds simultaneously.

I also "pseudo-ported" voices from one synth to another. Although I couldn't take an OB-8 organ sound and transfer it to a TX81Z, I could program the TX81Z to do something similar, freeing up the OB-8 to make sounds that only it could make.

Samplers

Sampling instruments have alleviated some of the problems of acoustic recording. Recording acoustic instruments requires quality microphones, room acoustics, and either tape with

noise reduction or a wallet-breaking digital recording setup, most of which are beyond the reach of the home studio. Now, however, you can buy samples recorded on digital recorders with top-quality microphones, in superb acoustic spaces, by experienced recording engineers.

Although it's very difficult to create the expressiveness of acoustic instruments with sampled sounds, in the hands of a musician who knows how to use techniques such as aftertouch, foot-pedals, modulation, and so on, it's possible to produce genuinely satisfying music—which is, after all, the bottom line.

Digital Audio Tape (DAT)

DAT provides 16-bit, CD-quality mastering for about the same price as a middle-of-the-road analog mastering deck with budget noise reduction. The only real drawback is the uneditable nature of DAT, but generally, mastering and final editing are two tasks that are still beyond the home studio, anyway.

Equally effective is a PCM-equipped VCR, standard digital two-track re-

corder, or top-of-the-line analog recorder with Dolby SR. If you use DAT (arguably the best approach), try to find a unit that will record at 44.1 kHz, the same sampling rate as CDs, as opposed to the standard DAT sampling frequency of 48 kHz, to avoid having to go through the hassle of format conversions.

I used the Fostex D-20 DAT during this project, and I must say it's incredible (for \$8,000, it should be; I was lucky enough to get one on loan). Remember that DAT had its origins as a consumer format, and even though just about any DAT has pro-quality sound, it may not have musician-oriented features. The D-20 records SMPTE in its subcode (you can even take a DAT recorded on another deck and add SMPTE with the D-20) and offers variable speed, direct-from-tape monitoring (thanks to its four-head design), XLR inputs, and glitchless punch-in/out. Throw in some nifty auto-location features, and you have a fine pro machine. However, less illustrious (and expensive) machines will work just fine, even if they don't

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have as many musician-oriented features.

One DAT is good, but two is better. Being able to do direct digital copies lets you make backups of your precious mixes; you can also do album assembly if you have three machines. Backups will save you from the anxiety I felt as I carried my one-and-only masters around on five small, fragile, DAT cassettes, knowing that if anything happened to them, I'd have to do substantial remixing.

Alternate Controllers

One of the biggest breakthroughs is that electronic instruments have a greater capacity for expressiveness than ever before, and now there are controllers to take advantage of this. When synthesized music was created entirely on keyboards, the music understandably had a certain uniformity. Now that guitar, drum, and woodwind controllers have most of their bugs worked out, electronic sound generators can take on whole new personalities.

Being trained as a guitarist, I used a lot of MIDI guitar on *Forward Motion*. My

main axes were a Yamaha G10 and Roland GM-70, although I also used a Beetle Quantar until it broke down and went to the factory, never to return (pity; it's a great controller). Using a guitar let me play more expressively and naturally, important points when you're surrounded by mountains of technology needing to be tamed. But there was also an unexpected side benefit. The MIDI guitar parts sounded different and fresh. MIDI guitar is not used that much, and hearing searing lead solos with synthesized timbres added an unexpected, yet familiar, element to the electronic soundscape.

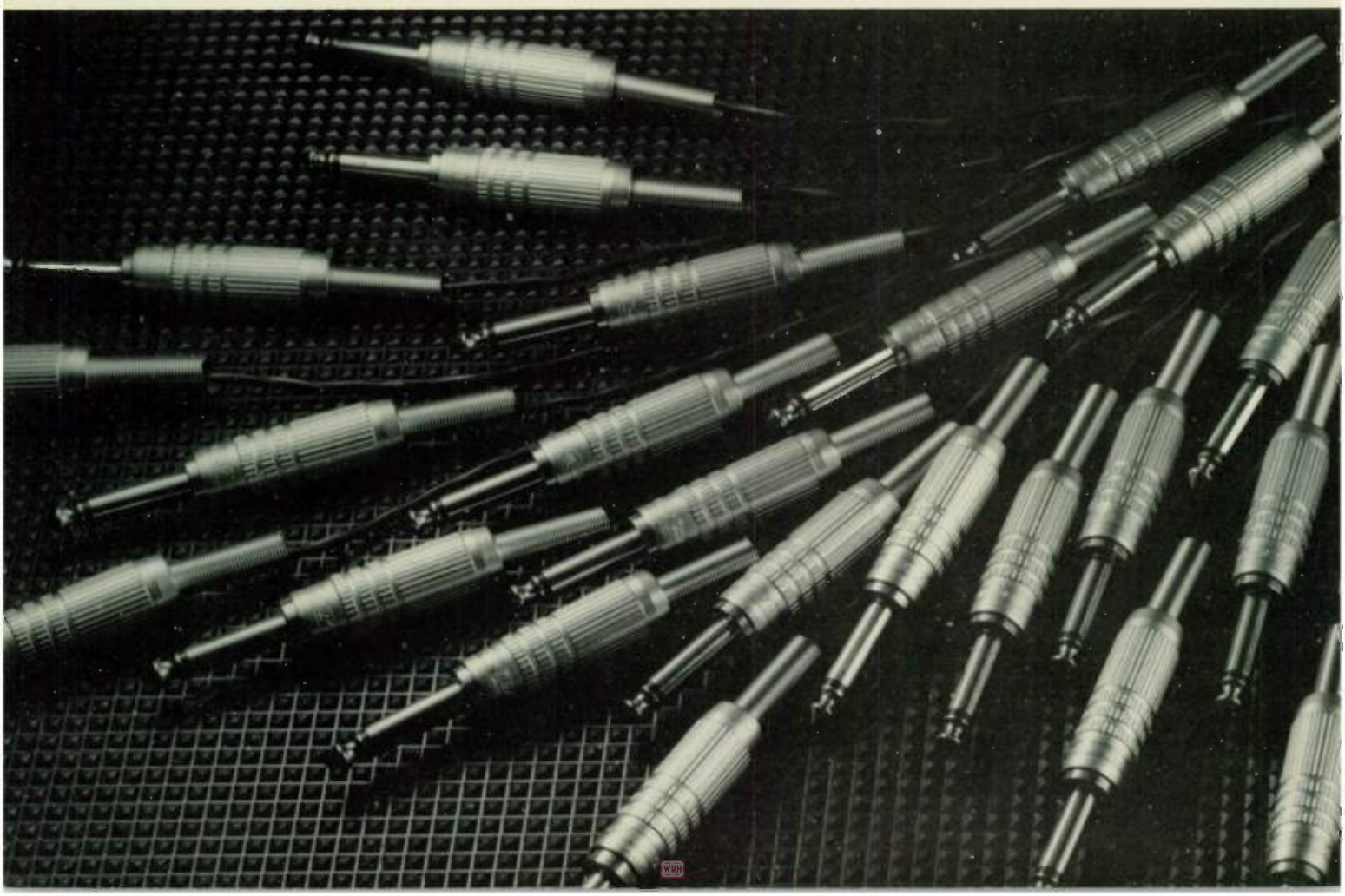
Simplified Mixers

Mixers dedicated to electronic sound generators can be simple, low-cost, quiet devices instead of giant behemoths. You don't need expensive faders (you're automating your mix anyway), mic preamps are pretty much unnecessary, and many equalization chores can be handled at the sound sources themselves, or with outboard signal processors.

Since I've never found a mixer that really suited my particular needs, I use a homemade mixer (Fig. 1) with a -95 dB signal-to-noise ratio (with all faders and masters up full), twenty inputs (not really enough, but I wished for more inputs only once or twice), very simple sound-shaping EQ on twelve channels, and two stereo aux buses. (*The next generation of this mixer will be written up for EM as a construction project—Ed.*) I do most EQ at the synth or sampler itself; if I need something more drastic or have to solve a problem, I'll patch some homemade parametric EQs I particularly like into the board.

With a "desktop CD" studio, always remember that less is more. Most instruments have hot enough levels that you don't need preamps. Don't add EQ if you can make the changes you need at the synth or sampler, and consider using a synth's built-in digital signal processing when possible instead of throwing yet another set of A/D and D/A converters (from outboard gear) into the signal path.

Eventually, I think I'll take a "distrib-



uted mixing" approach, with a satellite mixer for the synthesizers, and send stereo outs and aux outs to my main mixer. I can tell I'm going to need more inputs, and trying to fit those into a homemade console could be very unwieldy. Since most of the keyboard levels are set-and-forget (remember that MIDI takes care of controlling the volume), I'd rather relegate those controls elsewhere and use the main mixer solely for situations where levels need to be altered.

Inexpensive Digital Signal Processing

Digital signal processors have advanced to the point that anyone can have access to great signal processing at a very low cost. A decade ago, a digital reverb cost thousands of dollars. Now, better-sounding units cost hundreds of dollars. And it's a good thing, too; unlike tape, where you can use one processor set to a different setting for each pass of the multitrack, real-time mixing means real-time signal processing. Each effect you want to add will require its own signal processor, unless you can send several signals through a common bus to one proces-

Don't add EQ if

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sampler.

sor (as often happens with reverb).

I do have one comment about synth, sampler, and signal processor quality: when mixing for a 16-bit medium, those 8- and 12-bit instruments and processors really stand out, and not always in a good way. When it comes to sound quality, you really can't skimp. Take the money you saved in studio time and from not needing a multitrack and put it into quality sound sources and signal processors.

Simplified Collaboration via MIDI

Keeping the number of session musicians to a minimum can really help con-

trol costs, but I also feel that a lot of electronic albums are unsatisfying because having one person compose, produce, play, and engineer creates an unwelcome sameness.

I'm fortunate that Spencer Brewer, who has several solo albums to his credit, lives nearby. His keyboard chops run circles around mine, and he has an uncanny ability to come up with great lead lines. Since I'm pretty good with guitars and drum machines, and passable with keyboards, having Spencer add virtuoso keyboard parts added a whole other dimension to the album. Thanks to MIDI, he could come over at his convenience and record a part, and later I could edit it to fit into the music. This collaboration worked so well that on my next project, I hope to send disks with sequences stored as Standard MIDI Files to friends with particular talents and take advantage of their expertise without having to go through scheduling and transportation hassles.

I strongly recommend not working in isolation on projects where you have to spend hours and hours tweaking se-

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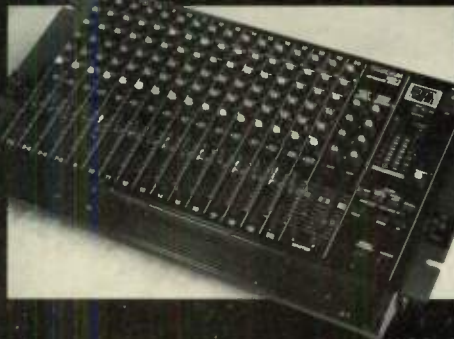
mixers try to tell you isn't necessary. Probably because they don't have it.

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quences; you can quickly lose your sense of reality. Other people are needed to give you a more objective perspective.

IN SEARCH OF THE PERFECT MASTER

All of the above techniques, taken as a whole, give you an incredibly potent studio. But there's more to producing a desktop CD than just mixing a bunch of tunes, so let's take a brief look at mastering.

Mastering is the process of assembling your tunes in the right order and adding just the right amounts of equalization, limiting, and other effects necessary to create a uniform final sound. This is something I really couldn't do at home; that would have required three DAT decks, and besides, I frankly didn't trust myself or my studio completely. I had never worked with DAT before, didn't really have optimum mixing acoustics (although I know my room pretty well), had lost all objectivity over the course of working on the same material for years, and wasn't even sure if my mixer could stand up to the scrutiny of the CD medium. Mastering would be the last chance to bail me out of any fundamental problems. My worst fear was that the mastering engineer would put on my tape and say something like, "Gee, didn't you know that when mixing to DAT, you need to (fill in the blank)? Sorry, but you'll have to go back and re-record everything."

To improve my odds, I worked with

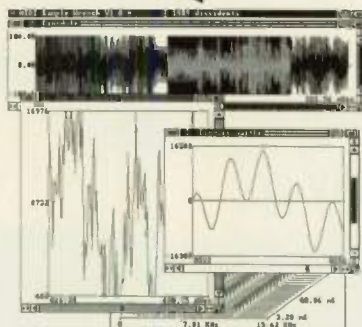


FIG. 1: The funky (but extremely quiet) mixer, sitting on top of an eclectic combination of signal processors.

16 bit sound editing on the amiga

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mastering engineer Randy Kling, who has mastered over 200 gold and platinum recordings, as well as some projects I worked on where he did a really great job. I figured if anyone could salvage a "home studio" tape, he could.

But, miracle of miracles, I found out that there was nothing wrong with my "home tape" after all. In fact, within just a couple of minutes of sitting down and listening to the mixes, Randy said the words that were far sweeter music to my ears than anything I had on tape: "This is awesome!" He couldn't believe how

clean and transparent the music sounded—a condition that was directly attributable to the previous combination of techniques. He said it didn't sound like it was coming out of speakers, but from right in front of him and all around him. I felt absolutely great; the "desktop CD" experiment worked.

INTO THE FUTURE

The digital revolution continues. Acoustic recording will be the next hurdle to conquer. Already, I hear some people are using multiple DATs, synched to-

gether, to record multiple acoustic tracks with 16-bit fidelity. This is still cheaper than buying a multitrack digital recorder. Devices like ADAP from Hybrid Arts, Dyaxis from IMS, and Sound Tools from Digidesign will provide a solid-state alternative to digital tape. As memory prices fall, which they will one day, and computers become more powerful and less expensive, solid-state recording may end up predominating over tape.

What's going to happen to pro studios when you can do almost everything they can at home? It's important to remember that pro studios offer treated acoustic spaces, often have awesome microphone collections, have MIDI studios, and keep on top of the latest gear. For sessions involving lots of acoustic work, the pro studio is still on top. However, as a friend of mine pointed out, perhaps someday people will rent a mobile studio, go to the acoustic space of their choice—cathedral, stadium, gym, or whatever—and record their acoustic tracks there.

THE BOTTOM LINE

When all is said and done, it costs less to install a CD-quality MIDI studio than it does to buy enough studio time to make a record. And, of course, this is an investment in your studio, not someone else's.

These are indeed exciting times. Digital technology is changing the world, and no more so than in our studios. The pro studio *has* come home, and the practical limits of our tools continue to become less and less significant. Will this mean more creative music as people take more time and care on their music instead of watching the clock? Will pro studios have to fight for their lives, or will they be able to adapt their services to fit a new set of needs? How will the music business change when record companies, unable to resist the lure of top-quality finished master tapes, relinquish artistic control over an artist's work? Time will tell, and you can bet that a digital watch will be telling us what time it is.

(Note: *Forward Motion*, by Craig Anderton with Spencer Brewer, was released July 10th on the Sona Gaia label, distributed by MCA. The CD stock number is ND-62757; the cassette, NC-62757.) ■

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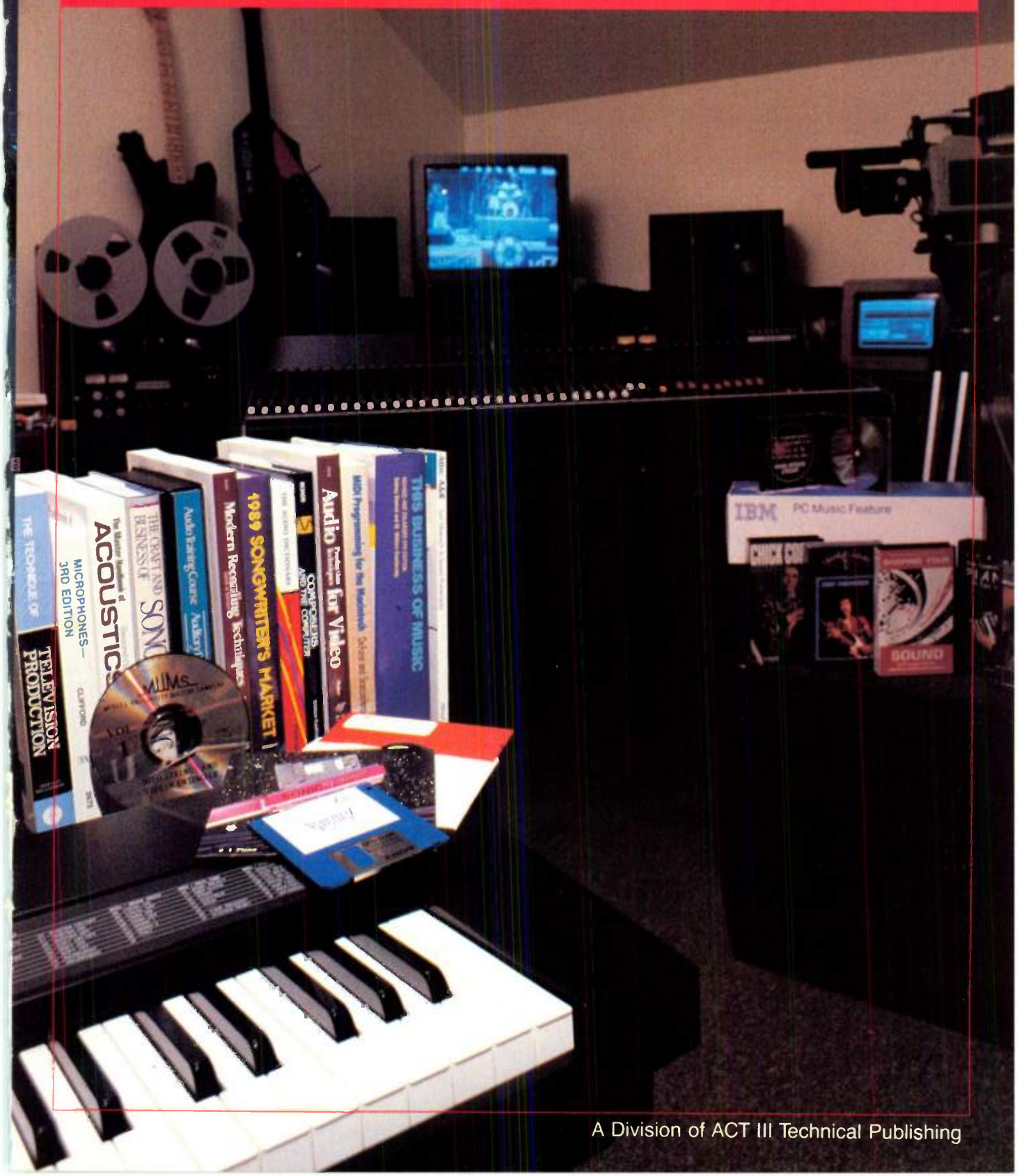
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PROFESSIONAL TECHNOLOGY FOR MUSICIANS . . . FROM ALFRED.

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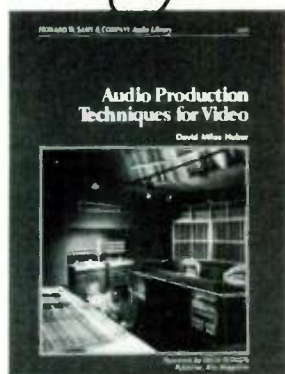
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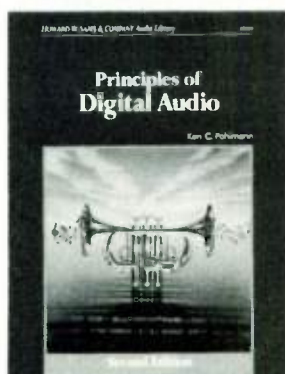


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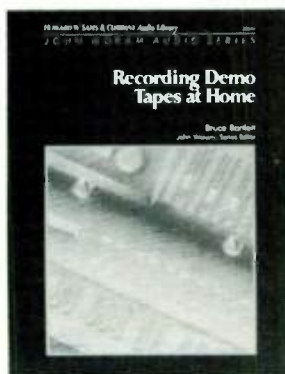


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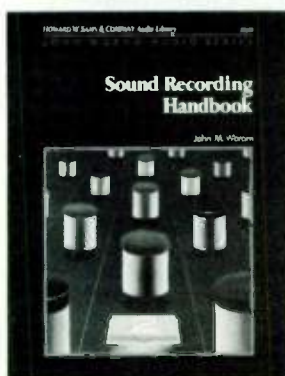


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SOUND REINFORCEMENT

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VIDEO TECHNOLOGY

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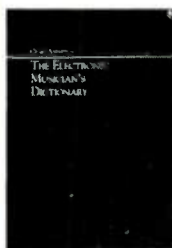
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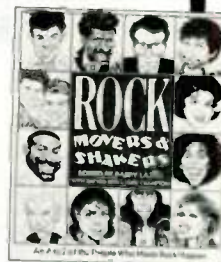
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● *Musiccollege Cassettes, from BMI-sponsored Los Angeles Songwriters' Showcase, are from the annual LASS Songwriter Expo held each fall in Southern California.*

5110D • NEGOTIATING SINGLE SONG CONTRACTS Entertainment attorney Neville Johnson covers performance rights societies, co-publishing, performance and mechanical income, "free goods" clause, "controlled composition" clauses, synchronization income, print income, advances, reversion, administration fees, division of royalties between co-writers, accounting period, foreign arrangements, registration of translations, infringement actions, changes in the lyrics, responsibility to pay royalties, demo costs, choice of law and choice of forum. 45 minutes \$10.00

5120D • RAISING MONEY FOR MUSIC PROJECTS Musician, personal manager and financial consultant Roger North covers many topics: know yourself and the project, confirming validity of project, setting goals, budgets, getting investors, and deal points (i.e., what you intend to offer, a description of the project, what your involvement is, minimum investment, what you are putting into the project, your requirements from partners and the actual deal). 90 minutes \$10.00

5130D • A&R: WHAT IT IS—WHAT IT ISN'T Neil Portnow, VP of A&R for EMI/America Records, provides an in-depth study of how record company A&R departments operate, getting your foot in the door, the importance of a video, what he looks for in a tape, getting songs to an artist on the label, the artist/producer hookup, the importance of a club following, getting started in A&R and more. 45 minutes \$10.00

5140D • LEGAL FREE FOR ALL Prominent entertainment attorney Al Schlesinger discusses copyright renewal, collection of mechanical royalties, investing in an artist vs. production company, nonstock vs. stock corporations, translation of hit songs into foreign languages, reversion of copyrights, publishing rights, gospel record deals vs. secular record deals, when not to sue, how to choose a lawyer, copyrighting your songs, how to prove ownership of your songs, copyrighting a collective work and infringement. 50 minutes \$10.00

5150D • MELODY WRITING One of America's top songwriting teams, Al Kasha and Joel Hirschhorn, discuss why people remember tunes, rhythmic prosody and melodic prosody, comparisons of bridge and verse, compounding the melody, the importance of intros, hooks, sub-hooks, range, intervals, the different ethnic flavors in melodies, minor and major chords, bass figures, progressions and more. 90 minutes \$10.00

5160D • SONGWRITING: THE BASICS LASS co-founders/directors Len Chandler and John Braheny give an excellent overview of the basic elements of commercial songwriting and business, creativity, being prepared, where ideas come from, form analysis, basic elements of style, function of publishers and producers, song protection, demo philosophy, collaboration and more. 90 minutes \$10.00

5170D • FINDING THE RIGHT RHYTHM SETTING FOR YOUR SONG Professional writer/arranger/teacher David "Cat" Cohen shows how to build effective rhythm tracks with drum machines and synthesizers. 90 minutes \$10.00

5190D • NEGOTIATING A PRODUCTION DEAL Attorneys Bob Rosene and Robert S. Greenstein represent an artist and independent producer in this interesting exercise that shows the many variables of major deal points. 50 minutes \$10.00

5210D • MAKING MUSIC CONNECTIONS: "IT'S WHO YOU KNOW" Michael Dolan and Eric Bettelli of *Music Connection* magazine and C.B. Brent of the Music Industry Network conduct a motivational seminar on making successful contacts in the industry, becoming visible to the right people, packaging your product effectively and turning rejections into opportunity. 90 minutes \$10.00

5230D • DANCE MUSIC: Panel Moderated by BMI's Dexter Moore Covers: standard vs. 12" dance remixes, radio vs. dance club mix, remixes for different areas of the country, production, promotion, record pools, distribution, the 22 dance music markets that count, publisher involvement, the international market, dealing with labels, sales, crossover, remixing costs, the aerobics market. 90 minutes \$10.00

● *Songwriter Cassettes, from the Northern California Songwriters' Association, are from seminars and the annual Songwriters' Conference held each fall in Northern California.*

5240D • SHOPPING AND NEGOTIATING A RECORD DEAL Entertainment attorney Peter Paterno tells how to approach labels, important deal points, territory, video, advances, recording costs, royalties for writers/artists, merchandising. 90 minutes \$10.00

✓ **5365D • COLLABORATION**, Tom Kelly & Billy Steinberg Hear stories and strategies from the stellar songwriting team that has written the hits "Like a Virgin," "Alone" and "True Colors." Their insights on the current music industry, approach to lyrics/melody and the benefits of collaborating provide a most revealing and inspiring seminar from pop's reigning dynamic duo. 90 minutes \$10.00

✓ **5370D • MUSIC FOR FILM AND TV**, Gaylon Horton As a music supervisor for Columbia Pictures, MGM, NBC, PBS and other major film and TV companies, Horton is well qualified to give some advice. His concrete examples reveal how music is acquired, produced and promoted in this blossoming market for songwriters. 90 minutes \$10.00

5310D • NEGOTIATING SONGWRITING CONTRACTS, Ned Hearn & Dick Ellinger The attorney for Windham Hill and the former VP of business affairs for Motown, RCA and others cover important

contract signing considerations for songwriters through mock negotiation of a publishing contract. They examine bargaining positions on reversion clauses, rewrites, payment, publishing splits, copyright exploitation conditions and much more. 90 minutes \$10.00

5320D • SONGCRAFTING, Mike Reid This Grammy-winning writer delivers solid, practical tips about his craft. Topics include organizing the creative process, use of the subconscious, various approaches to the verse/chorus transition, visual conceptualization, importance of prosody, logic and the positive use of collaboration, critical feedback and more. Reid's delivery and anecdotes greatly enhance the listener's ability to learn. 90 minutes \$10.00

5330D • MY FAVORITE SONGS AND WHY I LIKE THEM, Dean Pitchford This insightful seminar dissects eight classic songs that strongly illustrate the ingredients necessary for a great and memorable song. Areas covered include economy of words, rhyme schemes, modulations, counter-melody, alliteration, melodic range and prosody and much more. Pitchford is a master tunesmith. His advice is applicable to all styles, and his delivery is articulate and spirited. 90 minutes \$10.00

5340D • HIT SONGWRITER SEMINAR, J. Fred Knobloch This leading Nashville songwriter discusses his street-wise approach to writing, recording and pitching hit songs. Subjects include effective use of song forms, editing, harmony, use of the thesaurus, chord tones and prosody, clever approaches to overcoming writer's block and finding a tempo, and down-to-earth advice about demo preparation, production and pitching. A bonus is his helpful insight about the contemporary Nashville scene. 90 minutes \$10.00

5350D • RECORD PRODUCTION by Peter Bunetta This tape is for producers, publishers and musicians. Hear a Grammy Award-winning producer give advice on how to create a working environment, how to use keys, tempos and arrangement to achieve a certain "texture," and how to build from a demo to a master. While demos and hit singles are playing in the background, Bunetta explains what he hears and how his production strategy achieved its effect. This man is passionate about music and offers great insight into the mysterious, coveted world of hit producing. 90 minutes \$10.00

5360D • PUBLISHER PANEL BY INDUSTRY REPRESENTATIVES This mediated discussion moves rapidly through the entire process and consequences of a published song. The award-winning panel of A&R reps and publishers discusses song evaluation in terms of timeless copyright, crossover instincts, staying power, etc., using excellent examples of R&B, pop and country to illustrate their points. They also explain how they shop a song and reveal great angles on demo tape production and submission. 90 minutes \$10.00

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4309D • RICK EMMETT, Star Licks Video Super guitarist for Triumph, Emmett has attained worldwide gold- and platinum-record success. This two-hour tape starts off by addressing the basics of guitar, including tuning methods, simple finger picking, open and bar chords, rhythm patterns, scale forms and fingering. Emmett then goes on to a more detailed analysis of hard rock techniques, pull-off arpeggios, double-hand bar techniques, vibrato bar phrasing and legato scales. Highly recommended for beginning to intermediate players. 120 minutes \$44.95

4132D • JIMI HENDRIX, Legends, Star Licks Video You'll learn licks, tricks and special techniques that made Hendrix rock's first heavy guitar hero. Each lick is played once regularly and once slowly from "Voodoo Child," "All Along the Watchtower," "Red House," "Foxy Lady," "Little Wing" and more. Transcription booklet is included. 50 minutes \$44.95

4302D • LARRY CARLTON, SURE-FINGERED GUITARIST, Star Licks Video Voted NARAS' "Most Valuable Player" for three consecutive years and winner of a Grammy Award for "Best Pop Instrumental Performance," Carlton is truly a master of pop, rock and jazz music. In addition to seven solo albums, he has logged over 5,000 sessions with almost every notable name in the business. On this tape, he not only teaches technique, but imparts his attitude about playing, including self-editing and playing with taste and restraint. 40 minutes \$44.95

✓ **4131D • LEE RITENOUR, Star Licks Video** Acquire the traits of this master session player. Topics include the tasteful use of effects, proper warm-up techniques, use of diatonic scales, tips on sight-reading development, musical phrasing and creating the "right part." Also, a special in-session rehearsal shows you how this archetypal fusion performer prepares for a live performance. Booklet included. 52 minutes \$44.95

4211D • JOE PASS SOLO JAZZ GUITAR, Hot Licks Video Over the course of this one-hour lesson, you'll learn the best of Joe Pass, including chord melody, chord substitutions, leading tones, chromatic chords, voice movements and common tones. Learn to work within close voices and turnarounds; add substitution to your melodic playing, special licks, lines vs. scales, and create walking bass lines over chords with comping. 60 minutes \$49.95

4103D • JOHN SCOFIELD, ON IMPROVISATION, DCI Video This gifted jazz guitarist and Miles Davis sideman covers such topics as the use of 17 major modes and scales, chromatics, passing tones, melodic devices and picking techniques. A wealth of information for the serious guitarist. 60 minutes \$49.95

4401D • JAZZ GUITAR IMPROVISATION, Barney Kessel, Rumark Video This 90-minute tape and booklet features ten lessons, including playing what you hear, fills, turnarounds, the building blocks of improvisation and, of course, the blues. It is the perfect formula for the beginning improviser. 90 minutes \$69.95

4402D • JAZZ GUITAR IMPROVISATION, PROGRESSIVE CONCEPTS, Barney Kessel, Rumark Video Features 53 minutes of chord formations and sequence playing in six thoughtfully prepared lessons. Ideal for the intermediate to advanced guitarist who requires thorough concepts and ideas to work with. Includes a comprehensive booklet. Practice tracks and musical examples feature Kessel, with Dave Young on string bass. 53 minutes \$49.95

4403D • JAZZ GUITAR IMPROVISATION, CHORD-MELODY STYLE, Barney Kessel, Rumark Video Contains seven lessons of clear and precise instruction on developing ways to harmonize a melody. This course will ultimately lead to your own original harmonic style. It will appeal to guitarists who are developing their improvisational skills. Comes with a detailed booklet for in-depth study. Practice tracks and musical examples feature Kessel, with Dave Young on string bass. 45 minutes \$49.95

4212D • EFFORTLESS CLASSICAL GUITAR WITH WILLIAM KANENGISER, Hot Licks Video Here is your chance to learn true classical guitar. Develop perfect technique as you cover proper sitting positions, rest and free strokes, rasgueados, right- and left-hand synchronization and technique, slurs and stretching exercises. Musical pieces include Kanengiser's arrangements of "Rondo Alla Turca" (Turkish March) from Mozart's *Piano Sonata #11, for Study #9 in A Minor* and "The Miller's Dance" from *The Three-Cornered Hat*, by Manuel de Falla. Kanengiser served as actor Ralph Macchio's classical guitar coach on Columbia Pictures' film *Crossroads*. 60 minutes \$49.95

• BASS

4010D • CAROL KAYE'S ELECTRIC BASS COURSE, Carol Kaye Carol Kaye, a prominent studio bassist with an amazing track record of gold records, provides an easy-to-follow, logical program of simple starting techniques, tips on how to practice, and a "how to create" formula. Includes easy pop-jazz theory for interested rock and jazz pros and a step-by-step guidance program with over 90 exercises in all styles. 135 minutes \$59.95

✓ **4127D • BASS FUNDAMENTALS with Dave Spitz, Hot Licks Video** This new video delivers the solid foundation needed to develop your own style. Covers setting up your bass, tuning with harmonics, holding down the groove, chords, octaves, hammer-on and pull-off exercises, working with the drummer, warm-up drills and much more. 60 minutes \$49.95

4106D • JACO PASTORIUS, MODERN ELECTRIC BASS, DCI Video The definitive study of one of the world's most respected bassists. Interviewed by close friend and session bassist Jerry Jemmott, Pastorius discusses right- and left-hand technique, fretless bass, scales and arpeggios, study concepts, etc. Also included are solos and group performances with John Scofield and Kenwood Denard. 90 minutes \$59.95

4205D • BASS GUITAR MASTER CLASS WITH JOHN ENTWISTLE, Hot Licks Video This is your chance to learn with one of rock's all-time greats. You'll learn Entwistle's unique fingering, licks, octave style, chords, hammer-ons, pull-offs, picking techniques, harmonics, soloing concepts, walking bass lines, string-bending and phrasing. In addition, this video contains lots of useful tips and advice that will improve your style, technique and overall approach to bass playing. 60 minutes \$49.95



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4216D • SLAP, POP & TAP FOR THE BASS WITH STUART HAMM, Hot Licks Video Stuart Hamm is one of America's newest bass guitar talents. Here he demonstrates left-hand stretch exercises, major and minor arpeggios, playing chords, slapping and popping, funk, hammer-on slaps and triplets. Also includes right-hand, Flamenco strums; two-handed, polyphonic tapping techniques; contrapuntal playing; percussive tapping; playing a melody with the right hand while the left plays a bass pattern; and classical techniques and styles. 60 minutes \$49.95

4313D • JEFF BERLIN, Star Licks Video Jeff Berlin is one of the most respected and innovative bassists in contemporary music. His extensive live performance credits include stints with Allan Holdsworth, Bill Bruford and Pat Martino. On this tape, he begins with a discussion of his personal musical philosophy, then moves on to more specific techniques on harmonic practices, fretboard mastery, record transcriptions and more. Every bassist will come away from this tape a better player. 60 minutes \$44.95

• KEYBOARDS

4150D • THE SECRETS OF ANALOG AND DIGITAL SYNTHESIS, DCI Video A comprehensive overview of all aspects of the creation and performance of synthesizer sounds. A simple, no-nonsense guide to synthesizing any sound, with valuable insights into stage and studio performance techniques. Contains an in-depth tour of virtually every major manufacturer's synthesizer product line, including programming the Yamaha DX7. 120 minutes \$39.95

4207D • PROGRAMMING THE DX7, Ronnie Lawson, Hot Licks Video This video features Ronnie Lawson, player and programmer for Edgar Winter, Steve Forbert, Deodato, Al Kooper and others. This video teaches you to understand FM synthesis: algorithms, carriers, modulators, all DX7 parameters, programming sounds from scratch and envelope generators. Many of Lawson's original sounds are featured. Excellent. 60 minutes \$49.95

4208D • ADVANCED DX7 PROGRAMMING, Ronnie Lawson, Hot Licks Video This video, aimed at more advanced practitioners, discusses quick editing tips, provides understanding of DX7 keyboard-scaling feature, voice initialization, edit recall, programming split keyboard sounds from scratch, DX7 performance features such as breath controllers, aftertouch, modulation wheel and modulation pedal. Includes many more of Lawson's DX7 sounds. Get the most out of your DX7. 60 minutes \$49.95

4108D • RICHARD TEE, CONTEMPORARY PIANO, DCI Video A veteran of thousands of records ranging from Aretha to Paul Simon, Tee covers topics like practicing, chord substitutions, left-hand technique, backing a vocalist and more. Also featured are several performances with Steve Gadd, in-

cluding Ellington's "Take the A Train." A must for the serious keyboard player. 60 minutes \$49.95

✓ **4113D • CHICK COREA, KEYBOARD WORKSHOP, DCI Video** Invaluable insights into developing technique, practicing and composing. Features John Patitucci (bass) and Tom Brechtlein (drums). Extensive booklet included. 60 minutes \$39.95

4120D • CHICK COREA, ELECTRIC WORKSHOP, DCI Video Corea goes into detail about creating sounds with synths and layering them to produce new textures. He also writes a new composition, which is then developed and performed by his trio. Booklet included. 60 minutes \$39.95

4114D • GEORGE DUKE KEYBOARD IMPROVISATION (Vol. 1), DCI Video A video seminar during which Duke discusses left-hand comping, phrasing techniques, soloing, chord constructions, voicing and various tricks of the trade. Booklet included. 60 minutes \$39.95

4115D • GEORGE DUKE, KEYBOARD/ VOCAL ACCOMPANIMENT, DCI Video Duke shares the benefit of his vast experience, gathered over years of working with artists such as Quincy Jones, Anita Baker

and Michael Jackson. He discusses concepts such as chord substitution, voice leading and phrasing. Booklet is included. 60 minutes \$39.95

✓ **4314D • STEVE PORCARO, Star Licks Video** Porcaro is on the cutting edge of music production. As one of the world's top session players, his recording credits are diverse and extensive. On this tape, Porcaro gives a detailed tour of his MIDI setup and shares his insights and hard-won knowledge, covering MIDI and computer use, analog and digital synthesis, programming, sequencing and signal processing. A great tape on the MIDI studio. 50 minutes \$44.95

✓ **4129D • DAVID BRYAN, How to Play Keyboards in a Rock and Roll Band, Hot Licks Video** This new release teaches classical technique, arpeggios, octave exercises and contrary motion, and has drills to develop your strength, speed and accuracy. Includes blues and rock licks, pentatonic improvisation, left-handed rhythms, cluster chords and illustrations on how to work with a drummer and guitarist. Both hands are shown close up. Booklet included. 60 minutes \$49.95

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Tolchin advocates theory and ear-training over note-reading. This video for beginners contains the equivalent of six to ten weeks of lessons, beginning with the names of the notes, scales, chords, rhythms and improvisation. Includes all the basics you'll need to get started on keyboard. 120 minutes \$49.95

4421D • Volume II, Beginner

Using the Beatles' song "With a Little Help from My Friends," Tolchin shows you how to learn a tune from a recording. You'll learn how to hear melody and chord changes, and how to voice and invert chords. You'll also gain hands-on experience of 60 three-note chords. 60 minutes \$49.95

4422D • Volume III, Beg/Intermediate

This tape is an introduction to the blues—its simplicity, variety and intricacy. You don't need years of study to jam with other musicians and have fun. All you need is three chords, the pentatonic scale and your creativity. Includes blues licks, progressions, rhythms and seventh chords. 60 minutes \$49.95

• DRUMS

✓ 4123D LATIN-AMERICAN PERCUSSION, DCI Video

Designed for both beginning and experienced players, this new video teaches basic techniques for playing congas, bongos, timbales and shakers and explains the differences among many key Afro-Cuban rhythms. Ensemble playing examples are featured. Booklet included. 45 minutes \$39.95

4101D • STEVE GADD, UP CLOSE, DCI Video

One of the most recorded drummers of all time, Gadd demonstrates practice techniques, applying rudiments to the set, chart reading, keeping time, bass drum technique, 4-stick drumming, sambas, solos and much more. 60 minutes \$49.95

4102D • STEVE GADD II, IN SESSION, DCI Video

Features Gadd in the studio with two all-star rhythm sections, including Will Lee, Richard Tee, Jorge Dalto and Eddie Gomez. Gadd works up tunes in a variety of styles, including funk, reggae, bebop and

several Latin feels. Also included are some of Gadd's most exciting recorded solos. 90 minutes \$59.95

4105D • ED THIGPEN, ON JAZZ DRUMMING, DCI Video

Covers the basics of jazz drumming, the importance of the bass drum in jazz, jazz ride patterns, phrasing in time and extensive brush technique. Includes several outstanding solos. 60 minutes \$49.95

4112D • BILL BRUFORD AND THE BEAT, DCI Video

This fine portrait of Bruford is entertaining as well as instructional. He demonstrates and discusses various aspects of his drum technique and his attitude toward music in general. Also featured is excellent footage of him with King Crimson and Yes, with special appearances by Robert Fripp and Steve Howe. 30 minutes \$39.95

4116D • STEVE SMITH, PART ONE, DCI Video

Features tips on rock and jazz drumming, double bass and timekeeping, plus a sizzling performance with Vital Information. Winner, Best Music Instructional Video, 1987, American Video Awards (*Billboard* magazine). Includes a 36-page study booklet. 60 minutes \$39.95

✓ 4122D • STEVE SMITH, PART TWO, DCI Video

Smith's class continues with double-bass drumming, developing creativity and building a drum part (using "Don't Stop Believing" as an example). Features additional performances by Vital Information. Also includes rare, in-concert footage of Step Ahead and an exercise/transcription booklet. 60 minutes \$39.95

✓ 4134D • CHET MCCrackEN AND CHESTER THOMPSON, Basic Drum Tuning and Techniques, Star Licks Video

Fine-tune your drum habits with two of today's finest and most versatile drummers. You'll hear and see tips on selecting, maintaining and tuning your drums properly to get the best and most compatible sound possible. Drum heads, muffling techniques and equipment are also covered. Thompson explains how to master the movement around the drums and McCracken demonstrates some simple groove patterns. A booklet contains charts and diagrams of their setups and notated examples. 50 minutes \$44.95

✓ 4121D • TERRY BOZZIO, SOLO DRUMS, DCI Video

Bozzio presents his overall approach to the drumset as an orchestra-in-itself. The tape opens with an incredible solo, which he breaks down section-by-section, explaining the various techniques used. Covers double-bass drumming, hand techniques and a study of his part for "U.S. Drag." He also outlines exercises to strengthen chops and independence. Transcription/exercise booklet included. 60 minutes \$39.95

✓ 4135D • DAVE WECKL, BACK TO BASICS, DCI Video

This video offers invaluable insights into the fundamentals of drumming. Topics include hand and foot technique, practice routines, and practical drum kit setup and approach. He also performs several tunes and solos with sequenced percussion and taped band accompaniment. Excellent overview of drum skills for any level drummer. 72 minutes \$39.95

✓ 4133D • JEFF PORCARO, Star Licks Video

Porcaro describes his approach to straight time, triplet and shuffle feels, and Latin grooves. He breaks down a variety of drum patterns from Toto's set list and discusses half-time shuffles, bass drum-pedal technique and timing techniques to achieve a variety of effects on the hi-hat. Porcaro demonstrates his style in a live set. Booklet included. 40 minutes \$44.95

✓ 4128D • TICO TORRES OF BON JOVI: Drumming Essentials, Hot Licks Video

This versatile veteran teaches you about rock, jazz and Latin styles, stick preparation, snare tuning, tuning the kit, equipment care, studio miking, cymbal technique, the "buzz" roll, crescendos and much more. Includes special exercises to help eliminate back problems. Also, you'll learn about his parts on some of Bon Jovi's biggest hits. For beginning through advanced players. 60 minutes \$49.95

4225D • TOMMY ALDRIDGE, ROCK DRUMS, Hot Licks Video

This thorough, hour-long presentation of Aldridge's best techniques teaches you double-bass balance, three- and five-note patterns for the feet, how to add double-bass to your licks and solos, substitution of bass drums for other parts and triplets. He also shows you how to add stick twirls to your solos and demonstrates cymbal "choking" and double-bass shuffles. Great workout for both beginning and advanced players. 60 minutes \$49.95

4206D • DRUM MASTER CLASS, Carmine Appice, Hot Licks Video

This tape features one of the most dynamic drummers and best teachers around. Appice discusses and demonstrates various rock patterns, hi-hat accents and patterns, fills, double-bass drum techniques and patterns, complex stick-twirling for added performance "flash," substitutions and much more. Examples are performed several times at different tempos and the patterns are shown on the split screen. 60 minutes \$49.95

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► "If this tape meets with the wide success that it rightly deserves, he may become the most familiar piano instructor in the country..." *Nominee Best How-to Video, Video Review*

#4420-2C

LEARN THE ESSENTIALS OF PIANO with Talc Tolchin



● OTHER

4226D • ROCK AND ROLL SAXOPHONEWITHSTEVEDOUGLAS, Hot Licks Video Douglas helps you work on "chicken sax," adding "growl" to your tone, "singing" with the sax, flutter tongue techniques, alternate fingerings, and the "great shake" armature exercises, rock and roll licks and scales, chromatic runs, false fingerings and other great rock and R&B techniques. 60 minutes \$49.95

✓ **4130D • VOCAL EASE: Care and Exercises for the Singing Voice with Pamela Pollard** Build your strength and confidence as a vocalist with a pro who has worked over 25 years with such luminaries as Kenny Loggins and Manhattan Transfer. Topics include eating/drinking habits, vowel shapings, posture, improving range, breathing, projection and mic technique. Equivalent to seven sessions with a vocal coach. Contains five warm-up exercises. 78 minutes \$39.95

✓ **4125D • FINGER FITNESS: The Art of Finger Control with Greg Irwin, Hot Licks Video** Working your fingers to the bone? These new exercises promote strength, flexibility and finger independence and can reduce stress and fatigue in the hands. The program can literally be practiced anywhere, anytime, at your own convenience. A great way to improve the coordination and dexterity of your hands. 30 minutes \$29.95

4311D • DOBROVIDEO LESSON, Star Licks Video Includes detailed study of bar technique, pick technique, chimes, trills, bending strings, hammer-ons, pull-offs, slants, rhythm chops, slow songs, fast songs and much more. Solos taught: "Cripple Creek," "Great Speckled Bird," "Fireball Mail" and "Red-Haired Boy." Beginning/intermediate. 90 minutes \$39.95

4312D • BANJO VIDEO LESSON, Star Licks Video This easy, step-by-step video course is for the absolute beginner or the intermediate player. Includes learning to read tablature, right- and left-hand techniques, efficient practice habits and much more. Tunes include: "Cripple Creek," "Foggy Mountain Breakdown," "Will the Circle Be Unbroken," "Your Love Is Like a Flower," "Blackberry Blossom." 120 minutes \$39.95

SEQUENCING / PRINTING

● MACINTOSH

OPCODE SEQUENCER 2.6 from Opcode Here is a proven professional sequencer, priced for beginners. Create up to 26 sequences per file and chain them together to build complete compositions. Features include independent looping and quantization for each track; real-time recording of tempo changes; an "undo" feature; and editing functions like cut, copy, paste and merge of tracks and sequences. Powerful and simple. Files can be printed on *Deluxe Music Construction Set*.

11701 • for Macintosh \$149.00
What you need to run it: Macintosh with at least 512K RAM; MIDI interface; MIDI instrument(s).

MASTER TRACKS, JR., from Passport

See Apple/Commodore section for description.
14606 • for Macintosh \$149.95

DELUXE MUSIC CONSTRUCTION SET (DMCS) from Electronic Arts
Create eight-part scores with easy point-

and-click operation. Input notes in step-time from any MIDI keyboard or transcribe *Opcode Sequencer 2.6* files. Notate in any key signature, with a variety of timing options, in the treble, bass, alto and tenor clefs. Mouse-driven note editing is fast and intuitive. Playback through any MIDI instrument(s) or your computer's speaker. Notes flash on screen during playback. Laser print-out available with *Sonata* music font from Adobe.

14640 • for Macintosh \$129.00

14216 • for Amiga \$99.00

What you need to run it: any Macintosh or Amiga. Optional: MIDI interface; one or more MIDI instruments; printer.

MACDRUMS from Coda Go beat-crazy with this self-contained, fully programmable, 4-voice polyphonic drum synthesizer and sequencer. You can choose among the designed instrument "sets" or create some of your own using 35 onboard instruments. Each sound is a digital sample. Also, you can trigger these sounds with your drum machine or MIDI-equipped instrument for some spicy collaborations.

14970 • for Macintosh \$59.95

What you need to run it: Macintosh with at least 512K RAM. Optional: external speakers; MIDI interface; MIDI instrument.

ZERO • ONE

The power to be the best.

Macintosh users prefer the Zero One editor/librarians over all other brands. **Here's why?**

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- **The most intelligent patch generator, ever.**
- **The best memory management.**
- **The best reviews** E.M. Jan. 89.

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#002	D50/550 Librarian	\$ 99.
#003	D10/110/20 Editor/Lib. w/Orchestrator	\$199.
#004	D10/110/20 Lib. w/Orchestrator	\$149.
#005	MT32 Editor/Lib. w/Orchestrator	\$179.
#006	MT32 Librarian w/Orchestrator	\$139.

Order now from Mix Bookshelf 1-800-233-9604 & Save!



Zero One Research exclusively marketed by:
KEVIN KENT & Co
6522 Winnetka Ave., Woodland Hills, CA 91367 USA

MASTER TRACKS PRO 3.0 from Passport This award-winning sequencer gives you 64 tracks, has graphic, step-time editing capabilities, allows you to sync to SMPTE time code via MTC and provides numerous enhancements for working on film or video soundtracks. The program displays the SMPTE location in the Transport window. Fit Time adjusts stored tempos to make a given section fit a particular length. Markers can be locked to SMPTE locations for playback. MTP 3.0 automatically chases external clocks and responds to program changes. Combined with Passport's powerful sequencing and editing capabilities, this program delivers a total MIDI-control station.

14630 • for Macintosh \$395.00

14438 • for IBM \$395.00

14025 • for Atari ST \$395.00

16075 • for Apple IIGS \$395.00

What you need to run it: Macintosh with at least 512K RAM, IBM or compatible with 640K RAM, Atari ST, or Apple IIGS with 1.25 MB RAM; one or more MIDI instruments; MIDI interface.

✓ **ENCORE from Passport** A desktop composing solution with a variety of input options, MIDI playback and publishing-quality output. Encore transcribes Standard MIDI Files, Master Tracks Pro and Jr. sequences, live MIDI performances in real time or step time, or data input with mouse. Notate up to 64 parts with multiple key signatures, meters, clefs, smooth slurs and slanted beams. Cut-and-paste functions are complemented by MIDI event editing, layout control and intelligent handling of text and lyrics. Supports the Sonata music font and PostScript. Save compositions as scores, MIDI Files or Master Tracks Pro sequences.

16010 • for Macintosh \$495.00

What you need to run it: Macintosh with at least 512K RAM; ImageWriter, LaserWriter, PostScript or compatible printer. MIDI interface and one or more MIDI instruments recommended.

✓ **VISION from Opcode** Opcode's new professional sequencer features simultaneous access to 26 sequences, up to 99 tracks per sequence, with full chaining and looping. Do easy graphic editing on the "piano roll" screen or get down to individual MIDI events in the List Editing mode. Along with thorough cut-and-paste, merge and unmerge features, Vision offers flexibility in selecting events, isolating melodies from chords and transposing events with user-definable maps, all documented with plenty of online help. Thirty-two assignable faders provide automated control of any MIDI device, from mixers to lights. Includes full SMPTE support, 480 ppqn resolution, multichannel recording capability and Standard MIDI File compatibility.

16015 • for Macintosh \$495.00

What you need to run it: Macintosh 512K, Plus, SE or II; MIDI interface (Opcode Studio 3 recommended); one or more MIDI instruments.

PERFORMER V. 2.4 from Mark of the Unicorn The studio standard for pro sequencing. Just record in real time, then use one of Performer's error-correction commands to clean things up. Do more delicate editing in the step-record window. Rearrange and repeat sections with cut, copy and paste; add smooth crescendos; change rhythm, duration or velocity; loop tracks or fragments independently; transpose, quantize, deflam, invert pitch, reverse time and split notes until you get it right! Sync to SMPTE using two different time-lock modes. Version 2.4 features quick playback of selected notes from the event list, a conductor track for visual editing of tempo, meter and key changes, a new system exclusive editing window and Standard MIDI Files. Convert your sequences to sheet music with Mark of the Unicorn's Professional Composer.

12123 • Version 2.4 for Macintosh \$395.00
What you need to run it: any Macintosh with at least 512K RAM; a MIDI interface; one or more MIDI instruments.

PROFESSIONAL COMPOSER V. 2.3 from Mark of the Unicorn Professional Composer transcribes Performer sequences and so much more! Create score paper; enter and delete symbols from computer keyboard or MIDI instrument; group notes and phrases with beams, measure lines, slurs and ties. Switch to fast-input mode and use the editing menus to move and copy passages, transpose parts, change rhythms, merge voices and insert lyrics. Advanced features let you validate instrument ranges, designate measure numbers and rehearsal markings, and create piano reductions. Automatically extract transposed parts from your score and check for out-of-range notes with a single command, rebar a selected region, combine several staves into one (while adjusting stem direction for different parts) and double or halve all note durations. Print up to 20,000-symbol symphonies in a variety of formats and text styles, complete with full or abbreviated part names or instrument names; lyrics; a full range of expression, tempo and dynamic markings; even a specially formatted title page. Version 2.3 features two new fonts and improved dot matrix printing. Compatible with Adobe Sonata Font.

1180 • Version 2.3 for Macintosh \$495.00

What you need to run it: any Macintosh with at least 512K RAM; any Mac-compatible laser or dot matrix printer. MIDI interface and MIDI keyboard supported as input device.

✓ **SCORING AND SOUNDTRACK WITH MACINTOSH from Opcode** Professional film and video scoring requires a rigorous approach, and this hardware/software combination from Opcode Systems is up to the task! The Timecode Machine is a compact and inexpensive way to implement SMPTE time code with your MIDI setup. It reads and writes all varieties of SMPTE time code and converts SMPTE to either MIDI Time Code or the "direct time lock"

format used by Mark of the Unicorn's Performer. It easily stripes time code on tape, will regenerate faulty time code and has a high tolerance for drop-outs and other anomalies.

The box really shines when used with CUE—The Film Music System. Version 2.0. CUE is a software support system for soundtrack composers and editors. It automates each paperwork task and calculation necessary to sync music to picture. The cue sheet displays all you need to know: absolute and relative time, timings before a cue begins, tempo and meter changes, cue point descriptions and lots more. The MIDI events window allows you to describe up to 40 MIDI events of up to five channels each, which trigger at specific SMPTE numbers and play back locked to SMPTE. Tempo Search searches up to 36 tempos at once and automatically calculates accelerandos and ritards to hit cue points exactly. CUE will print out custom scores; includes real-time features such as a click track locked to SMPTE; and allows entry of timings in feet and frames, all varieties of SMPTE, minutes and seconds, or measures and beats. A new revision of CUE for the Mac II should be available in late spring. **16085 • Cue 2.0 and Timecode Machine from Opcode \$895.00**

What you need to run it: a Macintosh computer with at least 512K RAM; MIDI interface (Opcode's Studio Plus Two recommended, also available from Bookshelf); one or more samplers or other MIDI instruments.

✓ ARCHIE: STUDIO MANAGEMENT SYSTEM FOR THE MACINTOSH

- Creates session tracksheets covering setup, mics, track allocation, cue points, outboard equipment and personnel. Archie even computes rhythm-compatible, digital delay options from beats per minute.
- Prepares session timesheets including hours worked, titles recorded, materials used, breaks and downtime.
- Manages your master tape library.
- Prepares invoices with computed totals, automatically using negotiated or book rates. Includes user-definable sales tax calculations.
- Generates statements, reports totals of outstanding billing and tracks delinquent accounts.
- Maintains payable and receivable ledgers and handles the checkbook.
- Manages inventory of equipment and supplies.
- Maintains and sorts mailing lists of clients, producers and vendors. Prints mailing labels and Rolodex cards.
- Comes with online help, a 24-hour bulletin board and telephone tech support.

16080 • \$795.00

What you need to run it: Mac 512KE, Plus, SE or II with at least one megabyte RAM and a hard disk; ImageWriter, LaserWriter or compatible printer.

IBM PC MUSIC FEATURE CARD

THE IBM PC MUSIC FEATURE This revolutionary, plug-in option card turns a personal computer system into a musical instrument suitable for use in schools and universities, at home and among professional musicians. Once it's plugged into an expansion port, the IBM PC Music Feature puts a Yamaha FM synthesizer under the hood of your IBM PC. Now musicians can compose, perform, record and play back music directly from their PCs. Eight notes at a time can be played from 336 available preset sounds. You can emulate the sounds of a guitar or piano, or even of ensembles by mixing in a flute, trumpet or zither. Add a second card to your system, and you can orchestrate as many as 16 different instruments on your computer. Also included in the IBM PC Music Feature is a MIDI in/out/thru interface that allows you to connect all other MIDI instruments to your setup. The software listed below affords you different ways to create and learn about music. The programs are available individually or as part of an application package that includes an IBM PC Music Feature card.

IBM PC MUSIC FEATURE from IBM

This full-length expansion card is a combination MIDI interface and Yamaha FB-01 8-voice multitimbral, FM synthesizer, with 240 quality preset voices and 96 programmable sounds on board. Other features include a mini-stereo (Walkman-type) headphone output and two RCA stereo outputs for monitoring through an amp or hi-fi. A MIDI in/out/thru interface is included to provide connection to other MIDI instruments.

14540 • for IBM \$495.00
Sale Price \$425.00

What you need to run it: IBM PS/2 Model 25 or 30, PC, XT, AT or true compatible.

COMPOSE from Yamaha

This interactive music composition program is fully compatible with the IBM PC Music Feature card. It's simple enough for beginners, yet at the same time, powerful capabilities are available for more demanding musicians to create multipart compositions for playback and printing. With *Compose* and the Music Feature card you can create up to eight parts, access up to 336 voices, print or play any subset of a composition and capture real-time performances for composition data. Implementation of external MIDI devices, such as drum machines, is available to support any MIDI setup.

14459 • for IBM MFC \$109.00
What you need to run it: an IBM PC or compatible. IBM PC Music Feature card. Optional: MIDI instruments, Playrec sequencing program, printer.

PLAYREC from Yamaha

The *Playrec* is an interactive music performance, recording and playback program for the IBM PC Music Feature card. With *Playrec*, you can lay down tracks playing the Music Feature's multitimbral FM voices and/or other MIDI synths. As the recorded tracks are replayed, you can overdub additional parts (16 tracks are available). Divided into two programs, *Playrec* provides easy composition for starters; a more advanced option that allows simple voice editing (no punch-in), allocation of 336 voices, volume, tempo and meter. This program is flexible enough to involve and educate the musical semiliterate, as well as provide an inexpensive intro to MIDI sequencing for someone with real chops.

14400 • for IBM \$77.00
What you need to run it: IBM PC or compatible. IBM PC Music Feature card, one or more MIDI instruments.

TEXTURE CLASSIC from Magnetic Music

Now in its third revision, *Texture* has endured because of its modular architecture, speed and musician-oriented design. You can create as many as 96 patterns, each containing 24 tracks, with each track assignable to any MIDI channel. It has simple keystroke commands and pop-up dialog windows for fast operation. In addition to the standard record, play, punch-in, overdub and tape sync features, it also includes note-by-note editing that allows global creation of crescendos and ri-

tards. If your IBM has 640K RAM, *Texture* can record and playback about 72,000 notes. A great mix of features and reliability at a new price.

12304 • for IBM \$199.00
What you need to run it: IBM or compatible with at least 256K RAM, one or more MIDI instruments; IBM Music Feature Card or MPU-compatible MIDI interface card.

✓ MUSIC PRINTER PLUS VERSION 2.0 from Temporal Acuity Products

Need a fast, easy method for notation entry without compromising quality? This new version offers single-key selection of all music characters. Prepare publication-quality printouts of any size. Listen to the score on the Music Feature card, then extract parts automatically. Features include control of stem directions, beams, ties, slurs and key signatures, and transposition of an entire score. Prints lyrics and accepts real- and step-time entry from a MIDI instrument. Printing capabilities include high-resolution dot matrix (both 9-pin and 24-pin); supports wide-carriage printers and laser printout (Bubble Jet-130). Accommodates specific customizations.

16055 • for IBM \$395.00
What you need to run it: IBM PC, AT, XT, PS/2 Models 25/30 or compatible with 640K RAM; monochrome or CGA, EGA, Hercules, PS/2 color monitor. Optional: IBM Music Feature card or MPU-compatible interface; MIDI instrument.

PERSONAL COMPOSER SYSTEM / 2 (V. 2.0) from Jim Miller

Here is the popular IBM sequencing/scoring integrated program. Do the composing yourself with your IBM keyboard or a mouse, or record a keyboard performance via MIDI and have the program convert it into notation for you. Then edit your score with short, simple commands, play it back, transpose it, automatically verify rhythms and/or synchronize it to external programs. *Personal Composer's* printed score output is still the industry standard for quality notation on IBM. Shift to Recorder Mode and the program becomes a 32-track sequencer. Through MIDI event editing, each track can be erased, looped, bounced, cut-and-pasted and quantized. Customize the program by saving a repeated series of keystrokes into a single function (macro). A nice extra for IBM Music Feature card users is the ability to configure the onboard

FB-01 sounds from a simulated, onscreen front panel. Print out with Epson/IBM-compatible dot matrix or PostScript printers such as Apple LaserWriter with Sonata music font. This program offers the most punch under one title.

12400 • for IBM (5.25" disk) \$495.00

14440 • for IBM (3.5" disk) \$495.00

What you need to run it: IBM PC, XT, AT, PS/2 Model 25/30 or compatible with at least 640K RAM (hard disk recommended); Hercules compatible graphics card; IBM PC Music Feature card or MPU-compatible interface; MIDI instrument(s). Optional: printer; Microsoft mouse.

STARTER SERIES #1

IBM PC Music Feature, Yamaha Playrec; *MIDI for Musicians*, by Craig Anderton
ISS20 • for IBM \$469.00

STARTER SERIES #2

IBM PC Music Feature, Yamaha Playrec and Compose, ICS Editor/Librarian; *MIDI for Musicians*, by Craig Anderton
ISS28 • for IBM \$499.00

ADVANCED SERIES #1

IBM PC Music Feature, Magnetic Music Texture, ICS Editor/Librarian; *MIDI Home Studio*, by Howard Massey
IAS30 • for IBM \$579.00

ADVANCED SERIES #2

IBM PC Music Feature, TAP Music Printer Plus, *Musical Through MIDI*, by Michael Boom
IAS35 • for IBM \$699.00

MASTER SERIES

IBM PC Music Feature; Jim Miller Personal Composer; ICS Editor/Librarian; *MIDI Home Studio*, by Howard Massey
IMS40 • for IBM \$859.00

14540M • IBM PC MUSIC FEATURE TECHNI- CAL REFERENCE

Documents the functions and operations of the IBM PC Music Feature card. Manual is shrink-wrapped, unbound for insertion in 3-ring binder. Crucial resource for programmers or advanced users. \$29.95

• IBM (MPU-401 INTERFACE STANDARD)

SONGWRIGHT IV from SongWright Notes entered from the computer keyboard or lines played on a MIDI keyboard are automatically transcribed into notation. Play back individual parts with synched lyrics or hear full orchestrations with optional use of MIDI. Transpose compositions into any key. SongWright prints quality manuscripts, lead sheets, piano/vocal and ensemble scores, including text, chords and dynamics. Laser printer support now available.

12402 • for IBM \$89.95

16000 • Laser Print Drive \$39.95
What you need to run it: IBM PC, XT, AT, PS/2 Models 25/30 or compatible with at least 256K RAM; CGA or Hercules graphics board; IBM/Star/Epson-compatible printer. Optional: MPU-compatible MIDI interface; MIDI instrument.

CAKEWALK V. 2.0 from Twelve Tone Systems This hip, powerful and affordable program has 256 tracks available, with independent names, play/mute switches, and pitch and velocity transpositions. You can use a mouse with pull-down menus or shortcut keystrokes to execute common operations quickly. Other features include aural

editing, flexible transport (auto rewind/stop), cut-and-paste editing, quantization down to 32nd-note triplets, and synchronization to MIDI clock with Song Position Pointer or FSK. You can print files with *The Copyist*.

14405 • for IBM \$150.00

What you need to run it: IBM PC, XT, AT, PS/2 Models 25/30 or compatible with at least 256K RAM; MPU-compatible MIDI interface; MIDI instrument(s).

SEQUENCER PLUS (V. 2.0) from Voyetra This program is organized into screens that give access to the information you need, when you need it. The Main Track menu displays and controls available MIDI recording tracks. You can name them, assign MIDI channels, embed initial program numbers or transpose. The Note Edit screen uses a "piano-roll" metaphor; as each note is highlighted, all its attributes are shown. The View Screen's dynamic track sheet makes arranging and punch-in overdubs a breeze and offers cut-and-paste editing. The Song Files menu displays all recorded files (up to 28 per screen) and keeps complete records for each. The Options menu displays and controls metronome on/off, lead-in, clock source, time signature and more. The program's unique Transforms allow you to mark off a section of your song and treat it with any one of the available transform algo-

rithms for manipulating pitch, time, velocity and split. Dozens of system commands put you in the driver's seat, while an excellent manual helps you navigate. All three levels (Mark I, II and III) have identical displays; they vary in the numbers of recording tracks, extensiveness of the editing features and SMPTE implementation. Upgrades are available. You can print files with *The Copyist*.

14436 • Demo \$10.00

14420 • Mark I for IBM \$129 (16 tracks)

14435 • Mark II for IBM \$295 (32 tracks)

12303 • Mark III for IBM \$495 (64 tracks)

What you need to run it: IBM PC, XT, AT or compatible, or IBM System/2 models 25/30; at least 640K RAM; DOS 2.0 or later; Roland/Voyetra or compatible MIDI interface; one or more MIDI instruments.

✓ PC/MUSICPAK from Voyetra

Complete MIDI starter package for the PC and MIDI synth (see advertisement). Includes *Sequencer Plus* Mark I Version 2.0, V-4001 MIDI interface, demo disks and P.A.N. membership.

14432 • for IBM \$249.00

What you need to run it: IBM PC, XT, AT or compatible with at least 512K RAM; one or more MIDI instruments.

THE COPYIST from Dr. T's This popular notation software is available in three levels. All levels include a full selection of musical symbols, six clefs (including percussion), guitar fret symbols, all key and time signatures, and mouse-controlled cut, copy, paste and move functions. You can quantize timing and duration independently, each track independently, and sections of score or individual tracks differently. *The Copyist* supports MIDI files, features extremely flexible note placement and editing functions, and transcribes many popular sequencers, including (Atari version) KCS, MRS, Steinberg Pro-24; (IBM) Texture, Sequencer Plus and Master Tracks. Level Two has all that, plus a symbol editor that allows ten user-created symbols, converts any supported sequencer format to any other, extends score length to 50 pages and supports Atari laser printer (ST version), HP Laserjet Plus and HP plotters. Level Three has all of the above and supports PostScript-compatible laser printers, includes Adobe Sonata fonts, extends score lengths to 100 pages, converts *Copyist* files to TIFF and EPS formats, and interfaces with PageMaker, Ventura and Publishing Partner Pro. All three levels are fully file-compatible and upgradable.

LEVEL I

14040 • for Atari ST \$99.00

14450 • for IBM \$99.00

LEVEL II

13027 • for Atari ST \$275.00

12403 • for IBM \$275.00

LEVEL III

14045 • for Atari ST \$399.00

14455 • for IBM \$399.00

What you need to run it: an Atari ST computer (1 Megabyte RAM recommended). Optional: printer. What you need to run it: IBM or compatible with at least 512K RAM; two disk drives; CGA or Hercules monitor. Optional: printer.

MUSICPRINTER™ PLUS

THE ULTIMATE INSTRUMENT FOR DESKTOP COMPOSING



Elegance in composing, printing and performing music.

- Compose/arrange directly on the screen—WYSIWYG
- Print scores in pro-quality hi-res dot matrix—9 or 24 pin & BJ 130
- Play MIDI out with studio musician precision

MusicPrinter Plus is the most comprehensive, friendly, easy-to-learn composition package on the market today. This award-winning program was developed by composers/educators and is published and backed by the nation's leading music education software company. Version 3.0 (6-89) update will add real-time MIDI input & laser/ink-jet printing.

SUPPORTS

IBM PC, PC/AT, PS/2, or compatibles with 640K RAM. CGA, EGA, VGA, or Hercules. IBM Music Feature, MPU-401 or Yamaha C-1. Call or write for information.

Temporal Acuity Products, Inc.

#16055

● APPLE/COMMODORE

GLASS TRACKS from Sonus

This easy-to-use, powerful sequencer features tape recorder-type controls and extensive editing capabilities. Features eight sequences/eight tracks, meter adjustment by bpm, nondestructive bounce (retains original track if "bounced" track isn't what you wanted), transposition and autocorrection to nearest 32nd. *Glass Tracks* includes several demo songs from classical, rock and popular styles.

14200 • for Commodore \$69.95

What you need to run it: Commodore 64/128 computer; MIDI interface; one or more MIDI instruments.

14600 • for Apple \$99.95

What you need to run it: An Apple IIe, II+ or IIGS computer; MIDI interface; one or more MIDI instruments.

THE MUSIC SHOP FOR MIDI from Passport

Here is a Commodore user's "musical word processor." This program lets you create, store and edit compositions and print out sheet music in piano, single staff or quartet formats. Enter music from any MIDI keyboard in step time or input and edit under joystick control. Supports all key signatures and can hold up to 20 pages of music in memory.

10915 • for Commodore \$149.95

What you need to run it: Commodore 64/128 with disk drive; MIDI keyboard; MIDI interface card; printer. Optional: joystick.

MASTER TRACKS JR. from Passport

This entry-level sequencing program offers 64 tracks with easy, onscreen controls. Build large works by repeating sections and adding phrases from other sequences. Editing features include cut, copy, paste, clear and mix, as well as regional editing, automated punch-in and step-time recording. Fully compatible with *Master Tracks Pro* files and Standard MIDI Files. Sequences can be transcribed into notation and printed as sheet music with *Pyware MIDI Translator* and *Pyware Music Writer*.

14602 • for Apple IIGS \$149.95

14020 • for Atari ST \$129.95

14606 • for Macintosh \$149.95

What you need to run it: Atari ST, Macintosh or Apple IIGS with at least 512K RAM; MIDI interface; one or more MIDI instruments.

✓PYWARE MIDI TRANSLATOR from Pygraphics

Convert your *Master Tracks Jr.* sequencer files into *Pyware Music Writer* notation files to create a complete music-processing workstation.

16050 • for Apple IIGS \$79.00

What you need to run it: Apple IIGS with 768K; Passport Master Tracks Jr.; any level of Pyware Music Writer.

✓PYWARE MUSIC WRITER from Pygraphics

A notation and composition tool that maximizes the enhanced features in the Apple IIGS. The user interface implements a mouse and pull-down menus. Check your score with full MIDI playback or listen to the IIGS'

internal Ensoniq sound chip. Record tracks in real time or step time from any MIDI instrument for immediate transcription or enter notation with the mouse from eight palettes of musical symbols. The Professional Edition supports up to 32 tracks or staves; the Special Edition accommodates six staves. Output your entire score or extracted parts. Features a variety of word processor-style functions for editing scores and formatting the layout and includes alternate note heads for percussion. We give you full trade-in value when upgrading from Special Edition to Professional Edition.

10632 • Special Edition for Apple IIGS \$295.00

10634 • Special Edition for Apple IIe \$295.00

10636 • Professional Edition for Apple IIGS \$595.00

10638 • Professional Edition for Apple IIe \$595.00

What you need to run it: Apple IIGS with at least 768K RAM (1.25 MB recommended) or Apple IIe with 128K; mouse; ImageWriter or LaserWriter printer; MIDI interface and one or more MIDI instruments suggested.

MASTER TRACKS from Passport

Simple and powerful, this popular program lets you compose, arrange, orchestrate and record an unlimited number of tracks, assignable to 16 MIDI channels. Aside from all the standard features, *Master Tracks* offers real-time sync with other MIDI sequencers and drum machines; auto-correction to 32nd note triplets; recording of all MIDI controllers, including pitch bend, velocity and aftertouch; and independent track looping. With Song Mode, you can step-assemble songs using 16-channel sequences created in step or real time and play back sequences in any order, tempo or transposition. Visually assemble up to 256 different sequences. Over 8,000-note recording capability.

10402 • for Apple \$249.95

10625 • for Apple IIGS \$249.95

10900 • for Commodore \$249.95

What you need to run it: Apple IIe or IIGS or Commodore 64/128 with disk drive; one or more MIDI instruments; MIDI interface.

MASTER TRACKS PRO from Passport

This is an enhanced version of the *Master Tracks* sequencer (see above). Expanded memory up to 325,000 notes allows you to create multitrack songs in sections or as continuous works. *Master Tracks Pro* sends and receives MIDI Song Pointer for SMPTE sync applications.

10412 • for Apple IIe \$299.95

14205 • for Commodore \$299.95

What you need to run it: Apple IIe with at least 128K RAM or Commodore 128; one or more MIDI instruments; MIDI interface.

**Our \$249
PC/Musicpak™
has something
you can't get
anywhere
else...**



Any product is only as good as the reputation of the company that stands behind it.

Which is why we've created PC/Musicpak™.

For only \$249, it has everything you need to start making music with your PC and MIDI synth:

- **V-4001™:** Industry-standard, MPU-compatible interface with FSK tape sync (\$199 value).
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- **Demo disks** for our full-line of music software (\$20 value).
- **Sign-up fee waiver** to the P.A.N. MIDI bulletin board (\$150 value).

And best of all, it's backed by the same reputation for quality that made Voyetra the most respected name in PC music software.

So why take a chance on products that may only look good on paper? With PC/Musicpak™, you can invest in ones that have proven themselves in the real world.

Voyetra

#14432

• ATARI ST

✓ **TWELVE** from Steinberg/Jones This budget-priced, entry-level sequencer has professional features without the steep learning curve. Record in real time or step time using either the linear, tape recorder metaphor or pattern-based, drum-box-style sequence mode. The score-edit page displays your song in standard music notation for intuitive, mouse-driven editing. Sync features implement song position pointer. *Twelve* also has extensive MIDI filtering and VU-style MIDI activity meters. Upwardly compatible with PRO-24 and *The Copyist*.

16020 • for Atari \$69.00

What you need to run it: Atari 520 or 1040 ST; one or more MIDI instruments.

MASTER TRACKS JR., from Passport See Apple/Commodore section for description.

14020 • for Atari ST \$149.95

MIDISOFTSTUDIO-Advanced Edition from Midisoft Beginners who need room to grow will enjoy this full-featured, 64-track program. Onscreen, tape-style "transport" controls let you move through the piece, recording or playing from any point. Mouse-controlled commands include programmable tempo changes and velocity scaling. Has regional editing capabilities and records /

plays sys ex info to control your entire MIDI setup from a single screen. Full MIDI sync capabilities and Standard MIDI File support.

14007 • for Atari ST \$149.00

14008 • demo for Atari ST \$10.00

What you need to run it: an Atari ST; one or more MIDI instruments.

16045 • for IBM \$199.00

16050 • demo for IBM \$10.00

What you need to run it: an IBM PC, AT, XT, PS/2 Models 25/50 or compatibles with 640K RAM; MPU-compatible interface card; MIDI instrument(s). A mouse is recommended.

PRO-24 III from Steinberg/Jones

Here's the popular 24-track sequencing program for ST users. Features include real-time editing, logical user interface and a wide range of utilities. In recording mode, you can use up to four tracks simultaneously. The main options are rewind/fast rewind, quantize to 64th note triplets, transpose, punch-in/out, loop, copy, edit, solo/mute, auto-record, auto-locate, insert, delete and assign names. Functions can be remotely controlled from your MIDI keyboard. There are three visual edit screens: grid edit, score edit and the exceptional drum edit. Drum edit allows both real-time and step-time input for creation of rhythms, which may be enhanced with intelligent variations created by the computer. **PRO-24** implements Standard MIDI

Files and can be scored out on *The Copyist* (see IBM section).

13023 • for Atari ST \$350.00

What you need to run it: any Atari ST with at least one megabyte of RAM; one or more MIDI instruments.

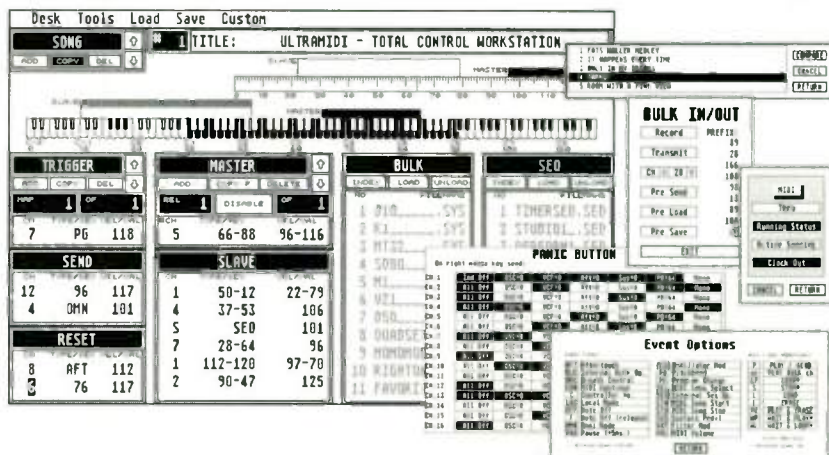
✓ **ULTRAMIDI Total Control Workstation** from MIDImouse Music Use your Atari ST as the front end of a flexible, performance-oriented MIDI workstation, with all sequencing and bulk operations driven remotely from any MIDI controller. **ULTRAMIDI** will load and play back Standard MIDI Files from your regular sequencer, handle bulk dumps of system exclusive data with its built-in generic librarian and has flexible MIDI routing maps for automatic reconfiguration of your system. You can loop a section of your sequence, transmit program changes and switch synth configurations all from a single key on your master controller. Allows global transformations, inversions and scaling on almost any MIDI message, features an "all notes off" panic button and includes a module that communicates with your keyboard's LCD, so you can leave your computer monitor at home!

14026 • for Atari \$229.95/Manufacturer's special price: \$199.95

What you need to run it: Atari ST 520, 1040 or Mega; one or more MIDI

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- Load/Play Standard MIDI Files from your sequencer
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- 255 Maps per Song
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- Definable PANIC Button
- GEM allows use of Desk Accessories
- Special Prefix Section for Custom Writing SYSEX Requests
- Channel Info Program Included ensures SYSEX compatibility with new MIDI devices
- Atari ST 520, 1040, Mega • Color or Mono



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Masterpiece • Atari ST



MIDI MUSIC LESSONS • Atari ST

instruments; sequencing software recommended.

- ✓ **MOUSTERPIECE from MIDImouse Music** This software lets you use your Atari ST as a unique MIDI controller and compositional tool. It combines a real-time recorder and step-sequencer with mouse control of note events, one-touch access to MIDI controller messages and powerful template and mapping functions. Play back sequences while doing augmented improvising from the computer in real time. Events can be controlled across all 16 channels; maps consist of X, Y and Z axes. Works with any and all MIDI devices, from synths to lights.

14027 • for Atari ST \$229.95

What you need to run it: Atari ST 520, 1040 or Mega; any MIDI instrument.

• AMIGA

MIDI RECORDING STUDIO (V 1.1) from Dr. T's This introduction to the Dr. T's approach features a simplified version of Track mode (a mouse-operated control panel that directly emulates the corresponding tape recorder functions), eight tracks, cue recording and many edit features. MRS is compatible with advanced Dr. T's programs

and can be printed with *The Copyist* scoring software (see IBM section). If you wish to upgrade, we offer a full trade-in allowance on the KCS V 1.6A. A great place to get started in MIDI.

14003 • for Amiga \$69.00
What you need to run it: an Amiga computer; MIDI interface; one or more MIDI instruments.

KEYBOARD CONTROLLED SEQUENCER V 1.6A (KCS) from Dr. T's Start with Track mode, with its "tape deck" screen, where recording on any of 48 tracks begins with a touch on your MIDI keyboard. Click over to the track edit screen, where all parameters in the event list can be tweaked individually, edited in blocks with cut-and-paste commands or transformed regionally. Arrange your tracks into sequences and dive into Open Mode, where up to 126 sequences can be freely altered, chained, looped and nested, even triggered by other sequences. For straight-forward song assembly, pull together your parts in Track Mode. Want to overdub the whole piece with a screaming MIDI guitar solo? How about deleting all the pitch bend and adding real-time volume changes? Need SMPTE sync? KCS lets you do it all. Our tests found this program has rock-solid timing and is nearly crash proof. The right choice for a professional Amiga sequencer.

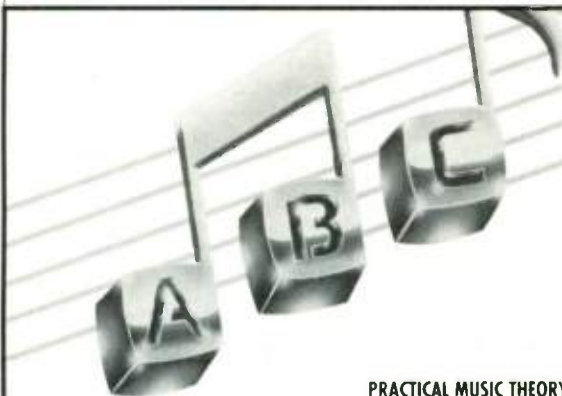
14210 • for Amiga \$249.00

What you need to run it: an Amiga 500, 1000 or 2000 with at least 512K RAM; MIDI interface; one or more MIDI instruments.

EDUCATION AND EAR-TRAINING

PRACTICAL MUSIC THEORY, Sandy Feldstein *Practical Music Theory* is a three-volume music curriculum. A variety of computer interactions guarantee that all materials are understood. Units include random drills of music materials and variations in content material. Competency levels are established for each lesson sequence, with aural examples played by the computer. Each lesson is reinforced with a review section.

The program has a total of 84 topics. Vol. 1 lessons include the staff, clefs, measures, time signatures, notes and rests. Vol. 2 reinforces the first segment with further instruction in time signatures, notes and rests, ties and slurs, repeats and endings, and flats, sharps and naturals. Vol. 3 covers scales and key signatures, sharps and flats,



MUSIC MADE EASY

Apple II (8281)

Commodore 64 (8282)

A fun, self-teaching program that teaches the basics of music in a step-by-step approach. Lessons include The Staff, Clef, Measures, Time Signatures, Notes and Rests, Ties and Slurs, Flats, Sharps, Naturals, Scales, Key Signatures, Dynamics, Chords, Inversions, Harmonizing and Creating Melodies and more! Each lesson is reinforced with drills and quizzes. Includes one diskette and a reference manual. In full color.

PRACTICAL MUSIC THEORY COMPLETE

Apple II/Commodore 64 (2404)

IBM 5-1/4" (3500)

IBM 3-1/2" (3535)

Atari (3510)

Practical Theory utilizes a drill and practice approach to music theory instruction, beginning with the basics of music notation and ending with chord inversions and smooth voice leading. Ideal for reinforcing new concepts presented at the theory lesson. Use it in the school software lab, music classroom, or private teaching studio. Includes 6 diskettes and a complete spiral-bound workbook. MIDI compatible.

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by Sandy Feldstein

ALFRED'S BASIC PIANO THEORY SOFTWARE

Levels 1A, 1B & 2

Apple II/Commodore 64 (2102)

IBM 5-1/4" (2107)

IBM 3-1/2" (3149)

Atari (3512)

Levels 3, 4 & 5

Apple II/Commodore 64 (3148)

IBM 5-1/4" (3147)

IBM 3-1/2" (3146)

Atari (3513)

Designed for piano students, age 7 and up. Contains entertaining games and theory drills—great to use at home or in the teaching studio. Each diskette correlates with three levels of piano instruction, as presented in Alfred's best-selling piano method *Alfred's Basic Piano Library*. Each package includes one diskette and a reference manual. MIDI compatible. In full color.

MUSIC ACHIEVEMENT SERIES

Apple II/Commodore 64 (7225)

IBM 5-1/4" (7234)

IBM 3-1/2" (7235)

Atari (3511)

An effective test series in three levels that correlates with Volumes 1, 2 and 3 of the popular *Practical Theory* series. It may also be used with other theory materials or used as a placement test.

A new, randomized series of items is presented in each section each time the test series is used. Includes a password system for students and the instructor. Up to 50 students' scores can be stored on each diskette. Includes 3 diskettes, a *Practical Theory* workbook and a Teacher's Manual. MIDI compatible.

IBM versions require color monitor, color graphics card and IBM-DOS/MS-DOS of 2.1 or above. All Alfred software is copyprotected.



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and dynamics. In addition, Vol. 3 includes advanced concepts of listed topics plus lessons on tempo, chords, inversions and harmonizing. Final lessons conclude with composing a melody. Complete 3-volume set/6 disks:

2404 • for Apple II+/IIe/IIc \$199.95

3500 • for IBM \$199.95

2469 • for C-64/128 \$199.95

✓ **ALFRED'S MUSIC ACHIEVEMENT SERIES**, Sandy Feldstein A theory-test series, correlated to the *Practical Theory Complete* package, that generates a new, randomized series of items in each section each time the test is used. It stores the scores for each student, which are easily reviewed by the teacher and student; up to 50 students' scores on one diskette! MIDI keyboard-compatible. Book and three disks. 3505 • for IBM and compatibles \$125.00 What you need to run it: IBM PC, XT, AT or compatible with at least 512K RAM. MIDI interface and MIDI instruments optional. 3506 • for Apple II and Commodore 64 \$125.00 What you need to run it: Apple II+/IIe or Commodore 64. MIDI interface and MIDI instruments optional.

✓ **PERCEIVE from Coda Music Software** This interactive environment for exploring music is a complete course of study in theory, ear training and timbre that requires no extra hardware and no previous knowledge of music or notation. Students' progress is reinforced by text and workbooks and is tracked by the Reports module. Six programs on two disks cover intervals, triads, seventh chords, scales, modes and tunings, plus waveform analysis and graphic sound design. Hear notes through the Macintosh's internal sound chip or any MIDI sound source as you "touch" the onscreen keyboard. Includes 120-page textbook, 55-page workbook and 30-page reference manual. 16030 • for Mac \$99.00 What you need to run it: Macintosh 512K, Plus or SE. MIDI interface, MIDI instruments and ImageWriter printer supported as optional output devices.

THE MUSIC CLASS from Coda Five complete courses teach you what you need to know: how to read notes and music symbols, follow rhythms and use your ears to tell what's happening in a piece of music. You can choose the speed and repetition and keep a record of the student's progress. Handsomely packaged, every course comes with an easy-to-read guide and special sections on musical concepts.

14956 • **FUNDAMENTALS: Learning the Basics** \$49.00 (Note reading, rhythm 1, major/minor scales, intervals.)

14957 • **RHYTHM: Learning to Feel the Beat** \$49.00 (Two disks, four programs about rhythmic structure, meter, measures and pulse.)

14958 • **EAR TRAINING: Learning to Hear** \$49.00 (Melodic error detection and correction, aural interval recognition, melodic and rhythmic dictation Part I and II.)

14959 • **MUSIC SYMBOLS: Learning the Language** \$39.00 (Animated graphics and games teach you how to read the symbols and words that make up the musical language, two disks, four programs.)

14960 • **NOTE READING: Learning to See and Understand** \$39.00 (Learn to read notes on any clef in any position in any piece of music.)

14961 • **COMPLETE PACKAGE** \$189.95 What you need to run it: Apple II/II+/IIc/IIIGS with 64K; one disk drive.

✓ **TAKENOTE from Take Note Software** This ear-training program for the Atari ST has recognition drills for pitch, intervals, chords, arpeggios and scales and teaches you how to get around on the keyboard, guitar fretboard and staff. It accepts input from a mouse or MIDI keyboard and sends output to the Atari internal sound chip or optional MIDI instruments. Automatically tracks student progress.

16035 • for Atari \$79.95

What you need to run it: Atari 520 or 1040 ST; monochrome or color monitor. TOS in ROM required. MIDI instruments supported as optional input/output devices.

✓ **NOTE WIZARD from MIDImouse Music** Features timed note-reading drills in five levels with nine stages per level. Drills include two-, four- and six-note problems. Saves test results for instructor; uses MIDI keyboard for input device. For beginner through advanced.

15051 • for Atari \$69.95

What you need to run it: an Atari ST 520, 1040 or Mega; any MIDI keyboard.

✓ **SCALE MASTER from MIDImouse Music** These speed drills on scale skills cover major, natural minor, harmonic minor and melodic minor, plus blues scales in all 12 keys. Accuracy and tempo are recorded for instructor review; three song files with chord progressions are included for practice. Beginner through advanced.

15052 • for Atari \$69.95

What you need to run it: an Atari ST 520, 1040 or Mega; any MIDI keyboard.

✓ **CHORD MAGIC from MIDImouse Music** Train on major, minor, diminished and augmented triads; seventh chords, including dominant, major, minor, diminished and augmented; plus all inversions. 36 timed drills; use your MIDI keyboard as the input device. Beginner through advanced.

15053 • for Atari \$69.95

What you need to run it: an Atari ST 520, 1040 or Mega; any MIDI keyboard.

✓ **ATARI MUSIC EDUCATION SERIES from MIDImouse Music** MIDImouse's instructional software for the Atari is now available at a special package discount! The combination of Note Wizard, Scale Master and Chord Magic provide a thorough, three-stage course in music fundamentals.

15054 • for Atari \$188.95

What you need to run it: Atari ST 520, 1040 or Mega; any MIDI keyboard.

EAR-TRAINING, THEORY AND TECHNIQUE TUTORIALS: Instructional Software from Electronic Courseware Systems

Music education software allows students to learn independently, at their own pace and skill level. Many programs offer incentives for improved performance and retain student records for the instructor. These lesson-specific programs are available on Apple II+ or IIe, IBM and compatibles, Atari ST and Commodore 64/128; most of them implement MIDI. Call or write for our complete catalog of educational software, which includes extended program descriptions. (Please specify computer when ordering.)

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M-1168 • Keyboard Arpeggios—MIDI \$79.95

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M-1166 • Keyboard Intervals—MIDI \$79.95

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M-1239 • Functional Harmony: Basic Chords—MIDI \$39.95

M-1107 • Elements of Music \$99.95

M-1169 • Early Music Skills—MIDI \$39.95

M-1171 • Keyboard Speed Reading—MIDI \$79.95

✓ **ALFRED'S BASIC PIANO THEORY SOFTWARE, Sandy**

Feldstein Designed for young piano students (age 7 and up). Contains fun games and theory drills for the student, at home or in the teaching studio, to reinforce new concepts presented at the piano lesson. MIDI compatible, full color.

2102 • for Apple/ Commodore \$29.95

2107 • for IBM (5.25" disk) \$29.95

3149 • for IBM (3.5" disk) \$29.95

3512 • for Atari ST \$29.95

MUSIC MADE EASY, Sandy

Feldstein A fun, self-teaching program that teaches the basics of music in a colorful, step-by-step approach. Lessons include: the staff, clefs, measures, time signatures, notes and rests, ties and slurs, repeats and endings, flats, sharps, naturals, scales, key signatures, dynamics, tempos, chords, inversions, harmonizing and creating melodies. Each lesson is reinforced with drills and quizzes.

8281 • for Apple II \$29.95

8282 • for Commodore 64 \$29.95

✓ **PYWARE MUSIC ADMINISTRATOR from Pygraphics** A complete management system designed for music educators. It has interactive modules and flexible reporting for easy tracking of student files, an automatic uniform check-out system and equipment-inventory and music-library management. Features include a general ledger, budget planner and fund-raising manager, plus a built-in word processor. This integrated system allows you to build customized databases and reports and offers power, convenience and ease of use.

16060 • for Apple \$295.00

16061 • for IBM \$295.00

What you need to run it: Apple IIe, IIc or IIgs with at least 128K RAM, or IBM PC, XT, AT or compatible with at least 640K RAM. Supports Apple ImageWriter, Epson, Okidata and compatible printers.

HARDWARE● **APPLE/MACINTOSH****APPLE STANDARD MIDI**

INTERFACE from Sonus For use with Apple IIe, II+ or IIgs. One in, two outs, with drum sync.

14963 • \$99.95

APPLE MIDI INTERFACE WITH TAPE SYNC from Sonus

For use with Apple IIe, II+, IIgs. Sends sync tone to tape. Also has one in, two outs, with drum sync.

14964 • \$149.95

APPLE IIe, II+, IIgs MIDI INTERFACE WITH DRUM SYNC from Passport

MIDI in/out, DIN sync out and two MIDI cables.

13001 • \$129.95

APPLE IIe, II+, IIgs MIDI INTERFACE WITH TAPE AND DRUM SYNC from Passport

With tape sync, this interface will send a sync tone to your analog tape recorder. Your tape recorder will then be

in sync with additional MIDI overdubs. Provides in/out, DIN sync out, tape sync in/out, two MIDI cables.
13000 • \$199.95

MACINTOSH PRO PLUS INTER-

FACE from Opcode For use with the Macintosh Plus and 512K. Includes one MIDI in and three MIDI outs. Comes with appropriate Mac cables and power supply.

13302 • \$125.00

STUDIO PLUS II INTERFACE

from Opcode For use with the Macintosh Plus; it fits under the computer so it stays out of the way. Two MIDI ins let you record from two keyboards at once or record and sync at the same time; six MIDI outs include two independent sets of three outputs each to reduce MIDI delay. Special features include modem and printer-through switches for using accessories without unplugging cables. It also acts as a 2-in, 6-out MIDI thru box when the computer is not in use.

13303 • \$225.00

✓ **STUDIO 3 INTERFACE from**

Opcode The state-of-the-art solution for professional sequencing and video scoring applications. This rack-mount, Macintosh MIDI interface has two independent inputs and six user-assignable outputs. It reads and writes all SMPTE time code formats and will do Jam Sync. It even has printer and modem serial pass-through.

16065 • for Macintosh \$459.00

● **COMMODORE/AMIGA****AMIGA MODEL A INTERFACE**

from Dr. T's Standard MIDI interface for the Amiga 500 or 2000. It features one in, two outs and serial pass-through.

14347 • \$75.00

COMMODORE 64/128 STANDARD MIDI INTERFACE from Sonus

This standard MIDI interface includes one in and two outs.

13103H • \$89.95



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COMMODORE 64/128 MIDI INTERFACE WITH TAPE SYNC from Sonus One in, two outs, sends sync tone to tape.
14342 • \$149.95

COMMODORE 64/128 MIDI INTERFACE WITH DRUM SYNC from Passport MIDI in and out, DIN sync out, two MIDI cables.
13102H • \$129.95

COMMODORE 64/128 MIDI INTERFACE WITH TAPE AND DRUM SYNC from Passport With tape sync (and cable kit #13101H), this interface will send a sync tone to your analog tape recorder. Your tape recorder will then be in sync with additional MIDI overdubs. Includes in/out, DIN sync out, tape sync in/out, two MIDI cables.
13100H • \$199.95

COMMODORE TAPE SYNC CABLE KIT 1 from Passport For use with the tape and drum sync; required for the sync-to-tape features.
13101H • \$25.00

• IBM

MPU-IPC IBM INTERFACE from Roland Finally, an affordable, smart interface for IBM users. This unit combines the IPC half-card and a port terminal with one in, two outs, one sync out, one tape in, one tape out and metronome out.
14546 • for IBM \$199.00

V-4001 MIDI INTERFACE from Voyetra An all-in-one, smart interface (MPU-IPC compatible), including FSK Sync Conversion, unpitched metronome and one in, one out, tape sync in/out.
14547 • for IBM \$199.00

OP-4000 MIDI INTERFACE from Voyetra Identical to its cousin, the OP-4001 (see below), but does not include FSK/CLK sync. It's designed for

use with MIDI sync or SMPTE.
14545 • for IBM \$179.00

OP-4001 MIDI INTERFACE from Voyetra An all-in-one, smart interface (MPU-IPC compatible), including FSK/Clock sync conversion, unpitched metronome and one in, one out, tape sync in/out.
13201 • for IBM \$239.00

✓ **MQX-32 EXTENDED FUNCTION INTERFACE from Music Quest** This MPU-401 compatible interface for IBM computers has two independent MIDI outputs for 32-channel MIDI transmission. It will read/write 30-frame drop and non-drop SMPTE time code and MIDI Time Code. The MQX-32 gives you SMPTE cue point control and chase-lock tape sync.
16070 • for IBM and compatible \$299.00

MIDI CABLES from Hosa High-quality cables are DIN-plug-to-DIN-plug. Please specify your plug color preferences (black, blue, red, orange or white).
CBL1 • 1' MIDI cable \$4.00
CBL3 • 3' MIDI cable \$5.00
CBL5 • 5' MIDI cable \$6.00
CBL10 • 10' MIDI cable \$8.00
CBL15 • 15' MIDI cable \$10.00
CBL20 • 20' MIDI cable \$12.00

INSTRUMENT CABLES from Hosa Reliable, 1/4"-to-1/4", metal-tipped, instrument cables. 5-year warranty.
IC5 • 5' instrument cable \$8.00
IC10 • 10' instrument cable \$10.00
IC18 • 18' instrument cable \$12.00
IC25 • 25' instrument cable \$14.00

MT-70• MIDI THRU INTERFACE from Sonus Solve your MIDI cable nightmare. This unit includes two ins, eight outs and has independent input switches for each of the eight outputs. Compatible with all MIDI setups.
14348 • \$95.95

✓ **14001 • THE SHARP PC900 OPTO-ISOLATOR** This hard-to-find component is a crucial part of most D.I.Y. MIDI projects. \$3.00 each

THE MIDI VIEWPORT from Datastream

A versatile, hand-held device for troubleshooting and education. Use it to analyze MIDI transmissions: the buffer retains the last 64 bytes, scroll buttons let you move forward or backward through the buffer and the Liquid Crystal Display shows each byte in both decimal and English. Responds, in real-time to all MIDI mes-

sages. Messages pass unaltered through the MIDI out port. Also transmits test messages to check receiving devices in your system and includes a MIDI cable test function. This handy new accessory is a Mix Bookshelf exclusive!
✓ 14350 \$159.95



SOUNDS

SONICFLIGHT DIGITAL SAMPLES from MIDImouse Music Sonicflight samples feature advanced computer editing techniques, including layering and stacking of samples, crossfield sampling and sample splicing, resulting in superb clarity and sonic realism. When ordering, specify your sampler brand.

Available for Casio FZ-1/10M, Ensoniq Mirage/EP5, Roland S-50, Akai S900, DPX-1, Prophet-2000 (specify expanded or unexpanded), Prophet-2002+, Prophet-440, E-mu Emulator II (E-II disks 1 to 10 only) and Emax.
Each disk \$24.95, 10 or more \$19.95 each. Sample list may vary for each brand. Below is Roland S-50 list.

- #1 Piano: 1) Grand Piano C2-C7; 2) Grand Piano C1-C6; 3) Grand Piano C3-C8.
- #2 Bass: 1) Slap Bass; 2) Picked Bass; 3) Double Slap; 4) Metal Bass.
- #3 Master Strings: 1) Cello/Violin; 2) Strings; 3) Pizzicato.
- #4 Bass: 1) Brass Section/Trumpet; 2) Saxophone.
- #5 Orchestra Classics: 1) Gong/Timpani/Orch. Strings/Finale+ Applause/Orch. Tune.
- #6 Anthology: 1) Clarinet; 2) Flute; 3) Oboe; 4) Bassoon; 5) Bassoon/Oboe; 6) Clarinet/Flute.
- #7 Composer's Tool Kit: 1) Drum Kit/Bass/Piano; 2) Drum Kit/Bass/Piano/Flute; 3) Drum Kit/Bass/Saxophone.
- #8 Drum Kit: 1) BD1/BD2/SD/Tom/CHH/OHH/Ride/Ride Done/Crash1/Crash2; 2) BD1/BD2/Tom3; 3) BD1/BD2/SD/Tom1/CHH/OHH/Ride/Ride Dome; 4) BD1/BD2/SD/CHH/Tom1/Tom2/Tom3/Ride Dome.
- #9 Percussion: 1) Timbali1/Timbali2/Timbalim/Cowbell1/Cowbell2/Woodblock/Cabasa/Scraper1/Scraper2/Vibraslap1/Vibraslap2/Tincup/Jinglebells/Tambourine/Belltree/Triangle; 2) four different keyboard setups.
- #10 Cosmos: 1) Bass Tock/Spacevoice; 2) Dark Base/Spacesynth; 3) Tock Two/Space Bells; 4) Soft Encounter/Polyspace.
- #11 Vibraphone, etc.: 1) Vibraphone; 2) Marimba; 3) Vibraphone/6 percussion sounds.
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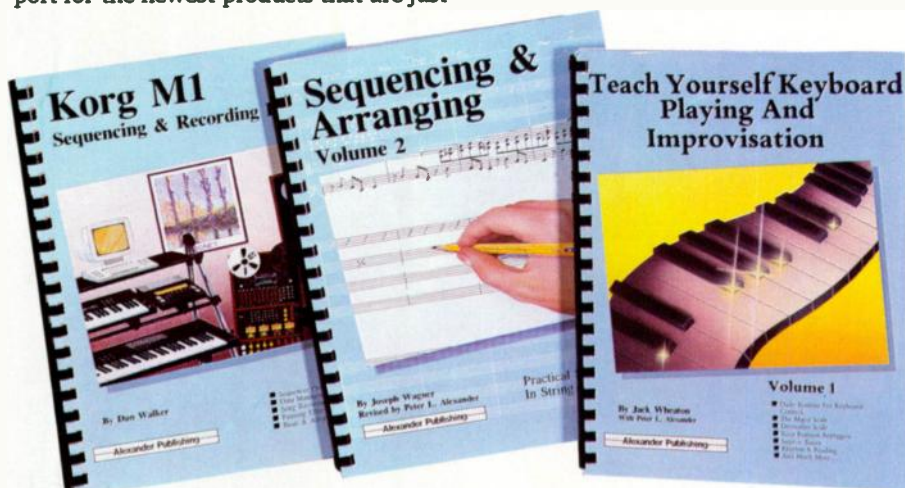
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- ☐ **R8 Drum Machine Book**
- ☐ **W30:**
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Sequencing & Recording
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Yamaha

- ☐ **V50:**
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- ☐ **RX8 Drum Machine**

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- ☐ **M1:**
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- ☐ **T1:**
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CD PACKAGING



VINYL RECORDS AND TURNTABLES are becoming obsolete as compact discs take center stage in record stores, radio stations, and households around the world. Unfortunately, though, some independent artists and smaller record companies are missing out on the CD boom. They mistakenly assume that compact discs are too expensive to produce and that the format is viable only for those record companies that can afford to replicate them in tremendous quantities.

The fact is, a lot of changes have occurred since the CD was first introduced. Many small record companies consider the CD the optimal format for their recordings because it offers state-of-the-art sound, provides high impact at radio stations and at retail outlets, and, even in small quantities, is now surprisingly affordable to produce (see "Compact Disc Production for the Independent Musician," Feb. '88 *EM*).

However, making a CD and marketing it are two entirely different animals. There are now more CD packaging and labeling options than ever before, and many people

are surprised to learn that the most expensive packaging is not always the most effective. It's important to know the alternatives as you consider both cost and aesthetics.

The key is to match the packaging to the distribution channel through which the CD will be marketed.

For retail sales, your best bet is probably a *long box* with top quality, colorful graphics. The object is to create a package that will stand out in a display rack loaded with hundreds of CDs.

Long boxes can be very effective for retail sales but are financially viable only if produced in significant volume. There are two additional costs: first, allow enough in your budget for the high-quality graphics needed to compete in today's marketplace; second, the CD replicator will almost certainly charge for inserting the disc into the package. Before you invest in a long box, decide whether the results will justify the extra expense.

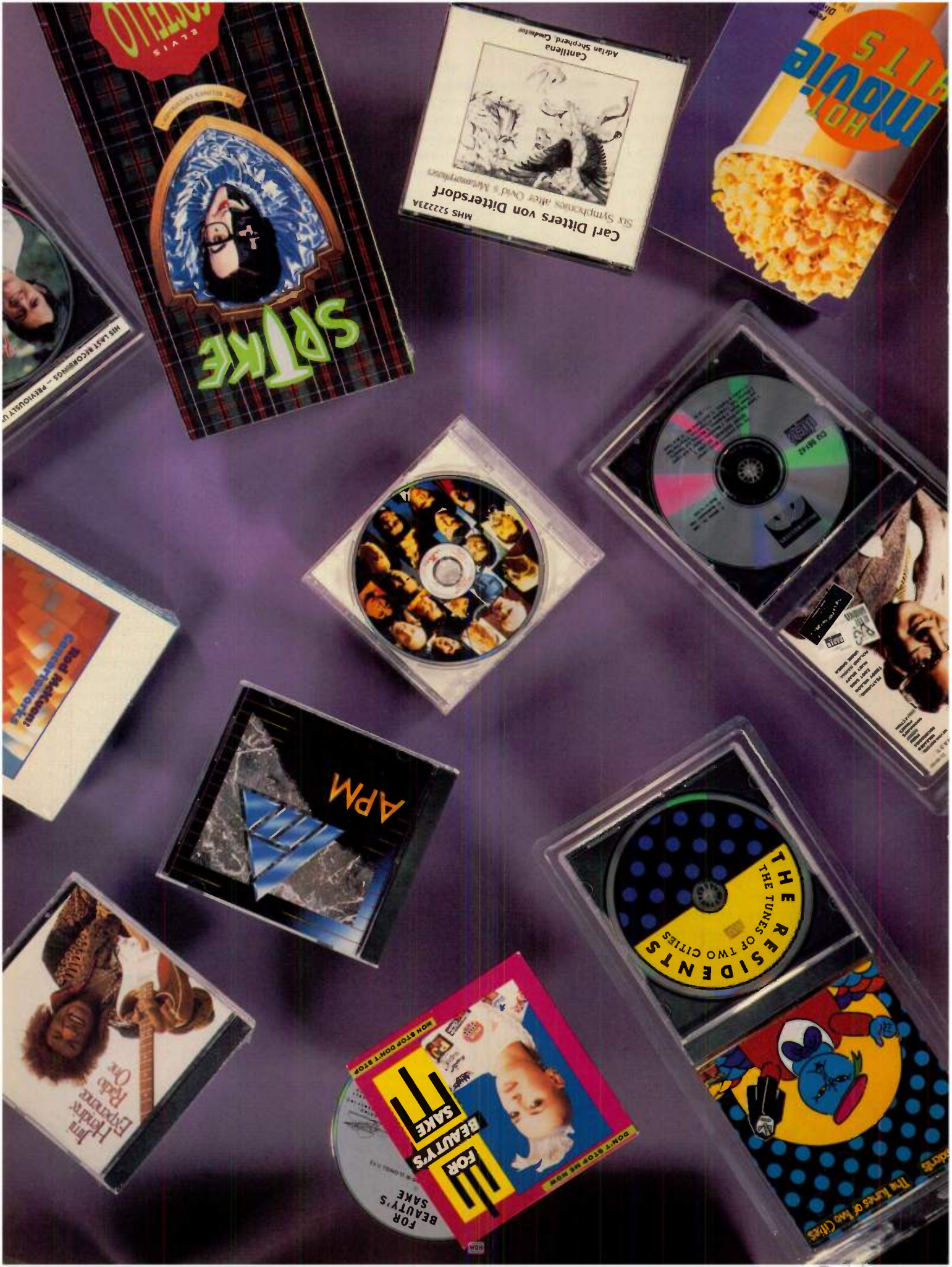
A lower-cost option, also suitable for retail, is the *blister pack*. This can work very well if the CD displays a colorful label or *insert* (the booklet enclosed with a CD). Money in-

PAUL MORRELL

STATE OF THE ARTS

How can you present and package your self-produced CD as attractively—and cost-effectively—as possible? An expert from a leading CD replicator tells all.

By Robert Bloom



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• CD PACKAGING

vested in color separations (special negatives required for full-color printing) for the label is well spent, because an attractive label entices the customer to buy and is enjoyed by the music-lover each time your CD is played.

If the CD's *jewel box* (the plastic hinged box favored by most record companies for holding the CD itself) is visible through the packaging, consider using a colored plastic insert tray. In addition to the standard gray found in most jewel boxes, many replicators offer red, white, and blue trays at a minimal additional cost. This gives your product extra impact.

An even lower-cost option than either the long box or blister pack is to simply shrink-wrap the jewel box. This is ideal for promotion (selling at concerts, etc.) and mailings, since the total package is relatively light and requires less postage. If you have a great insert, a nice label, and a colored tray, you'll have excellent visual appeal for a very reasonable price.

In some instances, *slip-cover jackets* are best. These are just like record album covers—cardboard packages into which you slip the CD. Less expensive than long boxes, but providing more graphic options than shrink wrap, slip-cover jackets are particularly well-suited for mail order, European distribution, and special promotion, because they cost little to mail and slip easily into a standard envelope.

Remember, for direct mail sales, your product is presold, not an impulse buy. A less expensive packaging choice allows you to spend more money on other aspects of marketing. For promotional products (i.e., copies to be sent to radio stations, clubs, etc.), a slip-cover jacket might be the right choice. This lets you create an eye-catching package without the expense of a long box.

Companies that specialize in custom manufacturing make it their business to provide several packaging options. Make sure you understand what options are available so you can target the product to your particular needs.

CD packaging options shown on previous page: blister pack—Benny Goodman, The Residents, Harry Chapin; long box—Hot Movie Hits, Elvis Costello, Rod McKuen; slip case—For Beauty's Sake; shrink-wrapped jewel box—Jimi Hendrix; black-and-white halftone photo—Carl Ditters Von Dittersdorf; picture disc—center; jewel box with booklet—APM.

INSERTS

An attractive insert need not be expensive; a number of creative, responsive printers are interested in working with smaller labels and understand that you have budgetary constraints. Often the compact disc replicator will be happy to provide you with the names of good printers, based on feedback from their customers.

If you can provide color separations and camera-ready artwork (i.e., typeset artwork that needs no further preparation to be printed), an order of 1,000 to 2,000 booklets or inlays can cost as little as \$500 to \$600. If you do not have camera-ready artwork, for about the same price you can go for less expensive, two-color artwork and pay for layout and typesetting with the money you save.

If you need help with artwork, the disc replicator can often recommend freelance artists and designers and give you a rough idea of the costs involved. Talk to these people, look at their work, and establish a range of prices at the outset to achieve the best results from your investment.

LABEL COPY

Unlike the label on a vinyl record, which is prepared separately and affixed to the record, the "label" on a CD is printed directly onto the CD's upper surface. A bright, professionally produced label can provide a "look" and identity that is as creative as your sound.

When deciding how elaborate to make your label, consider your marketing goals. If the CD is packaged in a clear blister pack or a shrink-wrapped jewel box, an eye-catching label might be enticing enough to garner a sale. You can often use a colorful label instead of a cover booklet, significantly reducing the cost of your artwork and printing. If the CD will be packaged in a cardboard box, where the label won't be seen until after the customer has bought the product, the label becomes less important.

A one-color label is the most economical and can do the trick when simplicity suits your marketing program. However, some companies offer three-color capability (from a spectrum of over 60 colors) at no extra charge. You may want to take advantage of the extra colors, even though you'll probably have to spend a bit more to generate the original three-color artwork.

If you want to get really creative with your label and spend a little bit more,

picture discs offer a fantastic marketing advantage. The picture disc uses a color stamping process that imprints your artwork right onto the disc. The cost for color separations, setup, and the picture is quite reasonable; you don't have to be Springsteen or Prince to utilize this first-class format. The picture disc is particularly effective in showcasing the image of an artist or group, which may be especially appealing to your target market.

The *half-tone* process, which is considerably more affordable, can reproduce a photo in black and white (or in any of the stock colors offered by a replicator) against a solid background. This process, too, provides a distinctive-looking product that can offer added appeal.

5-INCH VERSUS 3-INCH CD: MAKING THE RIGHT CHOICE

The 5-inch "maxi single" format, with twenty minutes of music, has great market potential as a low-cost alternative to the conventional, 74-minute, full-length CD. Maxi singles are ideal for everything from dance tracks to promotional samplers. Unlike the 3-inch "CD single,"

there's no adapter required and no special packaging requirements. While you might think that 3-inch CDs would save money, they require an adapter and specially produced packaging (as well as special-case handling), which raises the overall cost. Also, retailers and consumers have been slow to accept this format.

DON'T BE SHY: GO TO THE EXPERTS


Those involved in any aspect of CD production—replicators, graphic artists, photographers, and printers—can offer valuable advice, particularly to smaller labels with limited experience. Printers who regularly produce CD inserts can advise you on which type of artwork is most cost-effective and still takes care of your needs. Photographers know what kind of shot works best on a long box or a label.

Most important, a CD replicator can become part of your marketing team, enabling you to benefit from the company's broad experience. For example, our company recently assisted a Chicago-based record company in combining the packaging and music so effec-

tively that they are selling very well at retail in the U.S. and internationally. Packaging really can make a difference, and since companies *want* you to be successful (that's where repeat customers come from), they'll be glad to help you accomplish your goals, whatever those goals may be.

After all the time and effort you put into making a record, take that final step and make the packaging as good as the music. Options are available for just about any budget, and there are many helpful people in this industry who want to assist you. If you are part of a small record company, or even a larger one, you can make the most of your release, using the CD format and good marketing savvy.

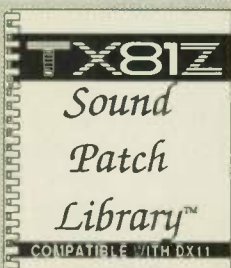

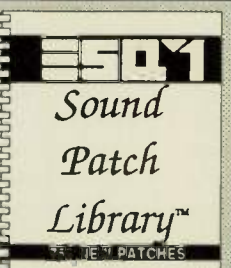
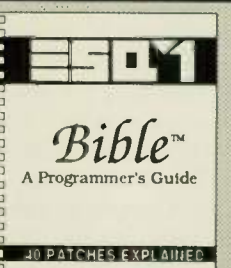
Robert Bloom, an account executive at Philips and Du Pont Optical, is responsible for sales of compact discs to independent producers and record companies. A graduate of the University of Illinois, he spent more than ten years as a professional musician, leading his own band in club appearances in New York and Chicago.



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RandoM1: A PATCH GENERATOR/ LIBRARIAN FOR THE KORG M1

This useful accessory program for the Korg M1 and Atari ST not only saves and loads patches to and from disk, but generates new sounds to delight your ears.

By David Snow

Original Data Format (seven bytes)								
Byte 0	b7	b6	b5	b4	b3	b2	b1	b0
Byte 1	b7	b6	b5	b4	b3	b2	b1	b0
...Byte 6	b7	b6	b5	b4	b3	b2	b1	b0

MIDI Data Format (eight bytes)								
Byte 0 (msb_byte)	0	b7	b7	b7	b7	b7	b7	b7
Byte 1	0	b6	b5	b4	b3	b2	b1	b0
...Byte 7	0	b6	b5	b4	b3	b2	b1	b0

FIG. 1: M1 Data Dump Format.

It was a tough choice: either go on a Hawaiian dream vacation or buy a big black box of metal and plastic (kind of makes you wonder about some people's values, doesn't it?). My wife smashed through the logjam of indecision when she advised me to go ahead and buy the Korg M1; anything was preferable to my constant whining and sulking. Well, I haven't regretted the decision. What an axe! It has 142 waveforms in ROM (4 megabytes worth), including multisamples, drums, and digitally generated sounds, all in sparkling 16-bit fidelity, not to mention two independent, programmable stereo effects units, 8-program multitimbral output with up to 16-voice polyphony, and an 8-track sequencer. It's a nice package. (For more information on the M1, see the review in the November 1988 issue—Ed.)

However, programming a synth as sophisticated as the M1 can be intimidating. A random patch generator can help overcome "programmer's inertia" and provide a few jolts of inspiration for jaded ears, but where do you put all those wonderful new programs? There's no internal disk drive for saving pro-

gram and sequence data, so to make room for your new patches, you'll have to either erase some of the factory patches (most of which are too good to waste), buy a handful of those costly little 256K RAM cards, or save and load data via MIDI system exclusive (sys ex) dumps. Clearly, the latter is the most cost-effective way to go if you already have a computer.

RandoM1 is a GEM-based, integrated patch generator/librarian for the M1 and Atari ST. It stores programs to disk in banks of 50 or 100, depending on which M1 memory allocation option you select. New patches are created by selecting parameters randomly from other patches, a trick Tim Dowty used as the basis for his CZ-101/C-64 patch generator, CZPLUS (August 1987 *EM*).

HOW IT WORKS

To save a bank of patches to disk, or generate a new patch, it is first necessary to transfer patch data from the M1 to the computer. To do this, *RandoM1* sends a MIDI system exclusive (sys ex) All Program Parameter Dump Request to the synth, which responds by sending

a sys ex dump of all its programs. (For information about system exclusive messages, see Tim Dowty's "CZ Patch Librarian" in the February 1987 *EM* and Jim Johnson's "Fun With System Exclusives" in the March 1987 issue.)

To create a new sound, the software selects 143 parameter bytes randomly from the patches sitting in the ST and stuffs the mongrelized data into a buffer. The new patch then goes to the M1 in a Single Program Parameter Dump, and *RandoM1* patiently waits for you to try out the sound on the instrument. If you like what you hear, you can store it in the M1 in the normal fashion (push the synth's EDIT PROG button, go to Page 9, press WRITE, and select OK), or you can keep creating new patches until you find one you like.

Loading the patch bank in the ST and saving it to disk requires binary saves and loads of the bank buffer, while loading the synth with a patch bank requires an All Program Parameter Dump from the ST.

There is a complication, however. According to the MIDI spec, data bytes for any MIDI message (including system exclusive messages) cannot exceed a value of 127. However, many of the M1's parameters exceed 127, so the M1 needs to "compress" its data before sending over MIDI.

The CZ-101 method of compression, accommodated by CZPLUS, splits each byte into two nibbles (4-bit units) and sends them in separate bytes. The M1 uses a more efficient but more complex scheme (Fig. 1). It groups the data into sets of seven bytes each, strips off bit 7 of each byte in the set and places it into an extra byte, then sends this byte before the other seven during the dump. Therefore, for every seven bytes of original data, eight are sent via MIDI (and it's a good thing, too, since a patch dump in the CZ sys ex format would take almost

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twice as long).

To send data back to the M1, either as a single-program or all-program dump, requires converting back into the M1 sys ex format. The subroutine in **Listing 2** accomplishes this and requires three parameters:

- A pointer to the patch data buffer;
- A counter indicating the number of 7-byte data sets to be outputted; and
- A remainder value indicating the number of bytes left over after the last 7-byte set.

Both machine-code modules are loaded from data statements in the RandM1 program listing (**Listing 1**, lines 15-24 and 26-36).

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● M1 PATCH GENERATOR

LISTING, from page 51

```

64 menu 2,0,1," File "
65 menu 2,1,1," Open... "
66 menu 2,2,1," Save... "
67 menu 2,3,1," Quit "
68 menu 3,0,1," Dump "
69 menu 3,1,1," Synth to computer "
70 menu 3,2,1," Computer to synth "
71 menu 4,0,1," Randomize "
72 menu 4,1,1," Generate patch "
73 menu 5,0,1," Allocate "
74 menu 5,1,2," 100 programs "
75 menu 5,2,1," 50 programs "
76 openw 0,0,0,640,400,0
77
78 on dialog gosub dialog_trap: on menu gosub menu_trap
79 dialog on: menu on
80 reset: mouse 257
81
82 while 1: wend
83
84 dialog_trap:
85 on dialog(0)gosub dummy,dummy,dummy,redraw_window
86 return
87
88 menu_trap:
89 on menu(0) gosub desk,files,dump,generate,allocate
90 return
91
92 desk:
93 if menu(1)=1 then alert 1,"RANDOM 1|((C) Copyright 1988 David Snow | LDW BASIC
(C) 1987|by Logical Design Works, Inc.",1," OK ",exit_val
94 return
95
96 files:
97 on menu(1) goto open_file,save_file,exit
98
99 open_file:
100 gotoxy 0,0: print " Select file to load: "
101 ask file dir$,sel_file$,exit_file$,exit_val
102 if exit_val=0 then return
103 load exit_file$,allprg_buf%
104 mouse 256: gosub print_names
105 return
106
107 save_file:
108 gotoxy 0,0: print " Enter file to save: "
109 ask file dir$,sel_file$,exit_file$,exit_val
110 if exit_val=0 then return
111 bsave exit_file$,allprg_buf%,file_len%
112 return
113
114 exit:
115 end
116
117 dump:
118 on menu(1) gosub dump_to_computer,dump_to_synth
119 return
120
121 generate:
122 gosub random_patch
123 while 1
124 alert 0,"1. Generate another patch |2. Resend patch|3. Abort| ",1," 1 | 2 |
3 ",exit_val
125
126 if exit_val=3 then return
127 on exit_val gosub random_patch,send_patch
128 wend
129
130 allocate:
131 if menu(1)=1 then
132 data_set$=2041: data_rem=5: file_len%=14300
133 bank=0: lines=19: alloc=100
134 menu 5,1,2: menu 5,2,1
135
136 else
137 data_set$=1020: data_rem=2: file_len%=7350
138 bank=2: lines=9: alloc=50
139 menu 5,1,1: menu 5,2,2
140
141 endif
142 return
143
144 dump_to_computer:
145 mouse 256: clearw 0
146 print " Getting programs from M1..."
147 while inp(-3)>0: discard=inp(3): wend

```



```

138 gosub send_header
139 for index=0 to 2: out 3,dump_request(index): next
140 while inp(3)<256<>&hf0: wend
141 for byte=0 to 4: discard=inp(3): next
142 call dump_module%(allprg_buf%)
143 print_name%:
144 clearw 0
145 n=0: pointer%=allprg_buf%
146 for x=0 to 60 step 15
147   for y=0 to lines
148     gotoxy x,y: print str$(n); ". ";
149     for index=0 to 9
150       print chr$(peek_b(pointer%+index));
151     next
152     n=n+1: pointer%=pointer%+143
153   next
154 next
155 reset: mouse 257
156 return
157
158 dump_to_synth:
159 mouse 256: reset
160 gotoxy 0,0: print " Sending programs to M1... ";
161 gosub send_header: out 3,&h4C: out 3,bank
162 call send_module%(allprg_buf%,data_sets,data_rem)
163 out 3,&hf7
164 redraw 0: mouse 257
165 return
166
167 random_patch:
168 patch_number=patch_number+1
169 for index=1 to len(str$(patch_number))
170   prog_name(index+5)=asc(mid$(str$(patch_number),index,1))
171 next
172 for index=0 to 9
173   poke_b program_buf%+index,prog_name(index)
174 next
175 for param%=10 to 142
176   poke_b program_buf%+param%,peek_b(allprg_buf%+(int(rnd*alloc)*143)+param%)
177 next
178
179 send_patch:
180 gosub send_header: out 3,&h40
181 call send_module%(prog_buf%,19,2)
182 out 3,&hf7
183 gosub send_header
184 for index=0 to 3: out 3,edit_mode(index): next
185 gosub send_header
186 for index=0 to 3: out 3,prog_mode(index): next
187 return
188
189 send_header:
190 for index=0 to 3: out 3,sysex_header(index): next
191 return
192
193 redraw_window:
194 redraw dialog(4)
195 return
196
197 dummy:
198 return

```

USING THE PROGRAM

RandoM1 is a GEM application, which allows access to desk accessories and generally makes the user interface more pleasant. The program is written in LDW BASIC (from Logical Design Works, 780 Montague Expressway #205, San Jose, CA 95131), a compiled language that creates stand-alone program

files requiring no run-time module. If you have LDW BASIC, type in the listing with the text editor of your choice (don't bother with line numbers, they're just for reference), save it, compile it (with the "window environment" option off), and run it in high or medium resolution. (Unlike other ST programs that have appeared in *EM* recently,

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● M1 PATCH GENERATOR

RandoM1 is too complex to convert to ST BASIC, so you must have LDW BASIC in order to use this program—Ed.)

A dialog box will ask you to set the M1's global MIDI channel to channel 1. Also, make sure that the M1 can send and receive system exclusive information (as determined by the EXCL switch on Global Page 5-2). RandoM1's default setting is for large program allocation (100 programs/100 combinations). To set up for large sequence allocation (50 programs/50 combinations), point to the Allocate heading on the menu bar and click on "50 programs."

To load the ST with the M1's patch bank, point to the Dump menu heading and click on Synth to Computer. The program then names and numbers all programs in the bank, on screen. Be sure to save the bank to disk *before* you begin messing around with your patches. Enter a file name in the file selector box (the default file extension is .M1), then press RETURN.

To create a new patch, point to the

Randomize menu and click on Generate Patch. To help you keep track of these patches, each patch is named RANDOM when created, followed by a number from 1 to 999. Try the patch out on the M1 keyboard and, if you like it, save it in the synth. If you don't like it, press RETURN, or click on button 1 in the dialog box to generate another sound.

On rare occasions the transfer of a new patch from the ST to the M1 will glitch (evidenced by the RANDOM patch number on the synth's LCD not incrementing). If this happens, resend the patch by clicking button 2 of the dialog box. Resending is also useful if you start to edit a generated patch at the M1, mess it up, and want to start over. When you've had your fill of patch generation, click on button 3.

Load a patch bank disk file into the ST. You can dump that patch bank to the M1 by pointing to the Dump menu and clicking on Computer to Synth, or you can use the bank to generate new patches.

M1 Sysex Send Module Assembly

```

move.l 6(a7),a5
move.l 4(a5),a6
move.l 12(a5),d7
bsr loop1
move.l 20(a5),d7
bsr loop1
rts

loop1  clr.w d6
        clr.w d5
        move.w #7,d4
loop2  move.b 0(a6,d5.w),d3
        andi.w #128,d3
        lsr.w d4,d3
        or.w d3,d6
        addq.w #1,d5
        subq.w #1,d4
        tst d4
        bne loop
        bsr bconout
        move.w #6,d4
loop3  move.b (a6)+,d6
        andi.w #127,d6
        bsr bconout
        dbra d4,loop3
        dbra d7,loop1
        rts

bconout move.w d6,-(a7)
        move.w #3,-(a7)
        move.w #3,-(a7)
        trap #13
        addq.l #6,a7
        rts

end

```

LISTING 2: Sysex Send Module.

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CMS

● M1 PATCH GENERATOR

M1 Sysex Receive Module Assembly

```

move.l 6(a7),a0
move.l 4(a0),a6
loop1 bsr bconin
*
*
move.w d0,d6
move.w #7,d5
loop2 bsr bconin
cmpi.b #127,d0
bhi return
move.w d6,d4
lsl.w d5,d4
andi.w #128,d4
or.w d0,d4
move.b d4,(a6)+
subq.w #1,d5
tst d5
bne loop2
bra loop1

return rts

bconin move.w #3,-(a7)
move.w #2,-(a7)
trap #13
addq.l #4,a7
addi.w #256,d0
rts

end

```

LISTING 3: Sysex Receive Module.

HELPFUL HINTS

After generating a patch, play the M1's keyboard in all registers before you decide to keep or trash it; some patches sound lousy in one range and great in another. Remember that a potentially interesting patch might have a long attack slope, so hold the key down if you don't hear anything at first.

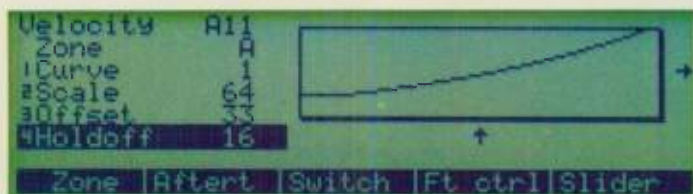
If you're accustomed to the factory programs, you'll be intrigued and, occasionally, amused by the generated patches. Some will sound quite natural and others quite unnatural. Many will be usable with some tweaking, depending on your taste and sanity.

Although all random patch parameters are derived from other patches, it is still possible to have "illegal" values since they are taken out of context. Sometimes a patch will not play at all (usually when the oscillator mode is set to DRUMS), or more rarely, will produce distinctly unmusical weirdness, which seems to happen when an Early Reflections program has been selected in the M1's effects section; the E/R time value is usually bogus. At any rate, keep the output level low enough to avoid alienating neighbors and loved ones.

I like this program because it's full of surprises. It doesn't do everything I'd like, but tradeoffs were necessary (such as being limited to MIDI channel 1) to keep the listing shorter than the Manhattan phone book. You can't shuffle individual patches between bank files and the synth, you can accidentally wipe out your M1 patch bank by dumping an empty buffer to it from the ST (I told you to back up your patches, didn't I?), the program does not check for dump load errors from the M1, there's no error-checking for file operations (trying to open a nonexistent file or attempting to save to a full or write-protected disk will crash the program), and the program hangs if you attempt a dump from the M1 without the synth attached.

But you need something to work on during those inevitable long winter nights, don't you?

David Snow is a composer and self-styled domestic god (read "househusband"). His music has been premiered by such diverse ensembles as the Composer's Chamber Orchestra, the Harvard Wind Ensemble, the Ruby Shang Dance Company, and the Los Angeles Tuba Quartet.



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QUESTIONS AND ANSWERS

Get more out of guitar synths, upgrade your ESQ-1, use microfiche service manuals, and more—our grab bag of tech tricks is at your service.

By Alan Gary Campbell



would no longer be available.

The usual method to add strain relief to a device such as the GK-1 is to disassemble the device, temporarily desolder the leads (in this case, 24 of them), and install one or two layers of heat-shrink tubing at the stress point. But as far as I can tell, the GK-1 cable is not flimsy. To date, I've had only one customer with a reported "cable" problem—actually caused by a cracked solder joint at one of the power supply voltage regulators (techs, check this on units in for service).

The GK-1 cable incorporates several redundant ground leads, which can be used to replace other leads that become open or intermittent. However, for continued safe operation, I'd suggest that no more than two of the ground leads be reassigned. To test multiwire cables such as this, a DMM with an "audible continuity test" function is helpful.

The tracking-improvement "mod" is contained in the GM-70 Rev 1.03 ROM upgrade. No hardware change is required. The ROMs are available at no charge from Roland service centers, but installation is extra.

Q. I have a Roland GM-70 guitar-to-MIDI converter and a GK-1 guitar interface. When I run the straight guitar signal through the GM-70, it sometimes distorts. Is there a way to fix this? Also, I jump around a lot on stage, and I'm concerned about the sturdiness of the GK-1 cable. Is there a way to add some strain relief? Also, I've heard that there is a mod for the GM-70 to improve the tracking. How is it done?

A. Inside the GM-70, the guitar and synth signals are run through simple VCAs, each made up of a matched-transistor differential pair and

two op amps. Some guitar pickups (and active guitar electronics) and synth outputs are hot enough to overdrive the differential pair, producing a really fuzzy sound, though you probably won't want to generate distortion effects with the GM-70!

To minimize clipping and distortion, reduce the guitar and synth input levels and compensate by adding gain after the GM-70. This will reduce the signal-to-noise ratio slightly, but the alternative is to completely redesign and rebuild the GM-70 VCA circuits. Of course, you could bypass them entirely and run the signals through a stereo volume pedal or the like, but the remote synth/guitar balance control afforded by the VCAs

Q. I want to get the Rev 3.5 ROM update for my Ensoniq ESQ-1 synth. Supposedly, there are different versions for the "plastic"- and "metal"-cased ESQs. The tech at the dealer says the versions are interchangeable; Ensoniq says they aren't. My ESQ has metal and plastic case parts. How can I tell which version I need?

A. Metal-cased ESQs, with a sheet metal top panel, have serial numbers below 25000; plastic-cased ESQs have serial numbers above 25000. The Rev 3.5 ROMs are the same for both ESQ versions; however, the metal-cased instruments require a *big* ferrite bead (one inch!), for RFI suppression, around the power supply input harness. This is fixed

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● SERVICE CLINIC

in place with jumbo-sized heatshrink tubing, which requires an industrial-strength heat gun for installation. Update kits are available from Ensoniq service centers at no charge, but installation is extra. Complete installation instructions (and owner's manual addenda) are included, making this a reasonable do-it-yourself project if you are experienced in instrument repair. If you don't own a plastic-cased synth, though, you'll need access to a heat gun (be careful, those things get hotter than some soldering irons). Note that you have to remove the ESQ's keyboard to get at the ROMs.

ESQ-1 service notes: While you have the keyboard removed, check to make sure that IC U22 (U1 on plastic-cased versions), a 74LS04, has a 470 pF ceramic capacitor tack-soldered from pin 1 to the nearby ground bus. This fixes "start-up" problems (no display, loss of sequence or sound data, etc.), as described in Ensoniq *ESQ-1 Service Bulletin #1*, June 1988. Check with your service center. (The bulletin suggests that an area of solder mask must be scraped

away in order to tack-solder the cap to the ground bus; however, on recent ESQs, there is a solderable ground bus feedthrough right next to the IC.)

Note that if the 74LS04 is a Signetics or National Semiconductor IC, this mod won't work, and the mainboard must be replaced. Note, too, that if crystal Y1 is an SIU-brand component (SIU is clearly marked on one side), then it should be replaced. These are no-charge updates (to the original owner) if the unit has an SIU crystal, a Signetics or National Semiconductor IC, or a serial number less than 25449.

■ **Is it possible to field-service surface-mount, flat-pack ICs without using expensive equipment?**

■ Flat-pack ICs can be safely removed with a heat gun. Resoldering consists of applying a liberal quantity of solder, then removing the excess with Solder-Wick. This method requires only common shop tools but has the disadvantage that the replacement IC is exposed to heat twice (*four times*, if the original IC is

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Casio's innovative authorized service centers use a computer-based, service-data reporting system (described in "Service Clinic" in the October 1986 issue of *EM*). All service centers with a Casio account can access C.A.P.O.E.S., Casio's Automated Parts Order Entry System (see the June '88 "Service Clinic"), which provides 24-hour, online order entry, parts search, and even a library of device-specific troubleshooting tips.

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(kudos for this), and "zoom" cells: extra-large reproductions of schematics, for greater resolution on fiche readers that lack fancy lenses.

Given the incredible number of products released by Casio each year, this represents a significant potential reduction of service data storage space, especially for full-line service centers. The cost, at less than \$20 per manual set, is comparable to that of hard copy. Moreover, Casio also offers a complete Master Parts List on fiche—a real time-saver.

Currently, many affordable readers are available, including several from Eyecom that "caught my eye." I tried out the Model 1100 (\$269 list), a desktop reader with a vertically oriented screen, which seems just about ideal for bench use. Oh, boy—a new gizmo! It can

be hard to find bench space for these things, but the screen and controls of the Model 1100 are visible when it is placed on a shelf.



Eyecom Model 1100 Microfiche Reader

Service centers specializing in electronic musical instrument repair might be justifiably unenthusiastic about buying a reader to access just one manufacturer's data, but other manufacturers will no doubt follow suit. Still, Casio should consider continuing to offer hard copy service manuals for their pro music gear. I suppose you could photoprint relevant pages on the local library's fiche copier—sort of "fillet-of-fiche."

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reinstalled).

This technique is covered in Casio's Instructional video *Technical Guide to Casiotone*, part number VT-EM11. This was reviewed by yours truly in the April '87 **EM**; the tape is available from Casio for \$74.01 plus \$2 S/H, but phone orders are not accepted. This tape has the additional distinction of being the only service-oriented instructional video in the field, to date.

If you'd like to try flat-pack, surface-mount techniques on something less expensive than, say, your VZ-1 synth, Heathkit has a light meter kit, catalog number SMD-1 (\$19.95, plus shipping and tax), that provides a tutorial introduction to surface-mount soldering techniques. Included are a PC board, flat-pack IC, and various surface-mount, passive components—even chip resistors and LEDs. It helps if you have really good near-field vision. Heath Company, Benton Harbor, MI 49022, tel. (800) 253-0570, or (800) 782-2702 (in MI).

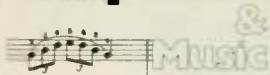
Unfortunately, other types of surface-mount components *do* require expensive equipment to rework/resolder, which makes me wonder how (read: if) most service centers will be able to fix future gear. Anybody got a magnifying glass?

Q. Where can I get a heat gun for use with heatshrink tubing? Which brand is best?

A. Several manufacturers offer quality heat guns, among them, Ungar's petite model 6966 (great for small tubing and desoldering flat-pack ICs) and the newer, larger model 1095, which offers more power at lower cost. Most electronics supply stores carry these, though mail-order houses offer better prices. Try Fordham Radio, 260 Motor Parkway, Hauppauge, NY 11788, tel. (800) 645-9518, or (800) 832-1446 (in NY); or Mouser Electronics, PO Box 699, Mansfield, TX 76063, tel. (800) 992-9943 (this address and phone are for for catalog requests only).

Alan Gary Campbell is owner of *Musitech*, a consulting firm specializing in electronic music product design, service, and modification. He is also a contributing editor to *Electronic Musician*.

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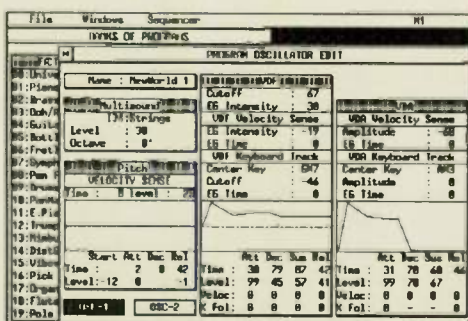
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By Bob Scott

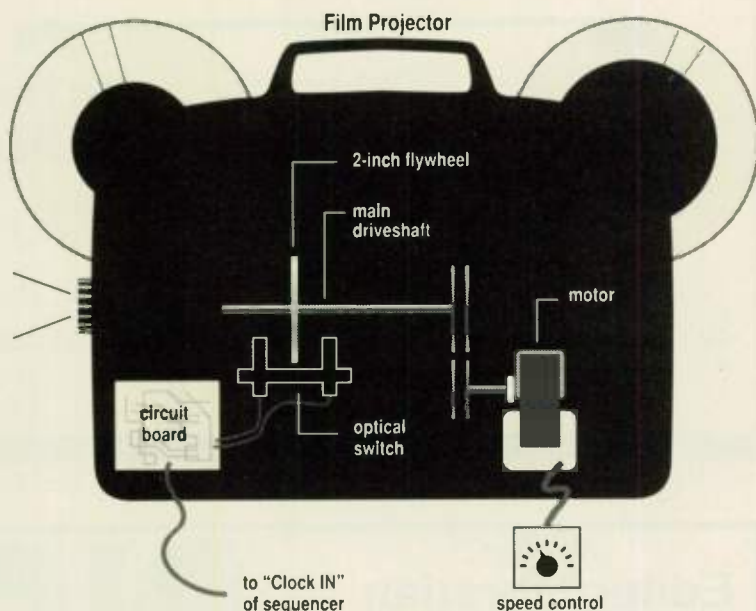


FIG. 1: Modified projector drivetrain.

When our band decided to incorporate visual images in live performance, the usual methods seemed inadequate. We wanted dynamic, rapidly changing pictures (which ruled out using slides), but video images aren't very effective in a club without a megabucks projection system. So, for an affordable way to get pictures as big and bright as possible, film was the way to go.

We wanted the images to be precisely synchronized with our songs. Although slides can be synched to an analog pulse, and video can use SMPTE time code, synchronizing traditional film is tougher. You can't simply record SMPTE time code onto the film audio track and use that as your timing reference, because film sound fidelity is not good enough for reliable time code playback.

MECHANICAL SYNC

One alternative is to sync to the mechanical action of the projector. Movie

projectors all work pretty much the same way: film is pulled along by the action of a mechanical "claw," which grabs onto the sprocket holes at the edge of each frame. Each revolution of the projector motor produces one pull of the claw, resulting in the advance of exactly one frame of film. By generating a series of electronic clock pulses from this mechanical action, and sending the pulses to the sync input of a sequencer (or any type of sequencing mechanism, such as a drum machine, clock converter, trigger device, etc.), it's possible to precisely synchronize the music with the film.

There are some important advantages in this method. First, you don't need to visit a sound lab, because a film audio track is unnecessary. Also, synchronization is extremely precise, variations in projector speed are not problematic, and should the projector speed up or slow down, the rate at which clock pulses

are sent will vary accordingly. By clocking a sequencer directly from the mechanical action of the projector, you always get exactly the same ratio of frames per beat.

TIMING "HITS"

It's not complicated to edit film, because you always know which frame of film corresponds to which musical beat, regardless of song tempo. With a fifteen-dollar roll of film, you can create intricate, timed effects that would otherwise cost countless studio dollars. Bouncing-ball cartoon sing-a-longs are a cinch. With single-shot animation, you can easily plan colorful graphics and optical patterns that precisely match the rhythms, pitches, and timbres of the music. You can also work out exciting interactions between performers on stage and pictures on screen. The fixed ratio between film frames and musical beats actually encourages close synchronization.

PROJECTOR MODIFICATION

Almost any projector, Super 8 or 16mm, can be modified to send clock pulses. More than likely, somewhere amidst the whirring parts will be a rotating shaft that makes one revolution for every pull of the "claw" that advances the film. The idea is to generate pulses with this rotating shaft.

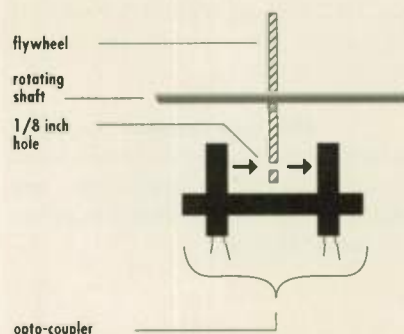


FIG. 2: Detail of flywheel and opto-interrupter.

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● FILM SYNC

An opto-interrupter circuit, combined with a flywheel attached to the shaft, encodes the shaft motion (see Fig. 1). The flywheel has timing holes drilled neared the edge. The opto-interrupter has an optical emitter on one side and a detector on the other; an optical connection is completed every time a hole passes between them, generating an output pulse (Fig. 2).

The flywheel should be rigid, but thin enough to move freely through the opto-interrupter's slot. Any stiff plastic or metal disk—about two inches in di-

ameter for optimum performance—will do. Parts surplus stores often have a variety of little gears and wheels. Old mechanical toys are another good source. It shouldn't be hard to track down a flywheel that will fit onto the projector shaft. Drill three equally spaced holes, 1/8-inch in diameter, through the plane of the disk, near the outer edge (Fig. 3). Mount the flywheel and opto-interrupter so that the holes align with the light-path between the emitter and detector.

Two cautions: Projectors vibrate a lot,

so the flywheel and opto-interrupter should be securely mounted; any appropriate spot on the projector is fine. Also, be careful that stray light from the projector lamp doesn't shine on the detector; a cardboard shade may be necessary.

The opto-interrupter output drives the simple, one-chip circuit of Fig. 4. The 74LS121 is a monostable multivibrator with a Schmitt-trigger input, perfect for shaping the opto-interrupter output into nice, clean pulses. The 74LS121 is a little different than most TTL ICs; it's okay to leave pins 1, 2, 8, 9, 12, and 13 unconnected. Perf-board construction is fine. You'll need an accurate, stable, +5-volt supply for this circuit. You might be able to tap this off your existing equipment; if not, a suitable design is shown in Fig. 5. This can be constructed on perf-board or wired point-to-point on terminal strips.

I used the Texas Instruments TIL138 opto-interrupter. If these are not readily available in your area, you should be able to substitute other, similar components, such as the General Electric H21A1 and NEC PS4001. Be sure to wire the opto-interrupter correctly. The emitter side is usually indicated by a bevel, notch, or dot; the short lead is the cathode. On the detector side, the short lead is the collector.

Trimpot R3 adjusts the sensitivity of the opto-interrupter detector to compensate for variations in ambient light



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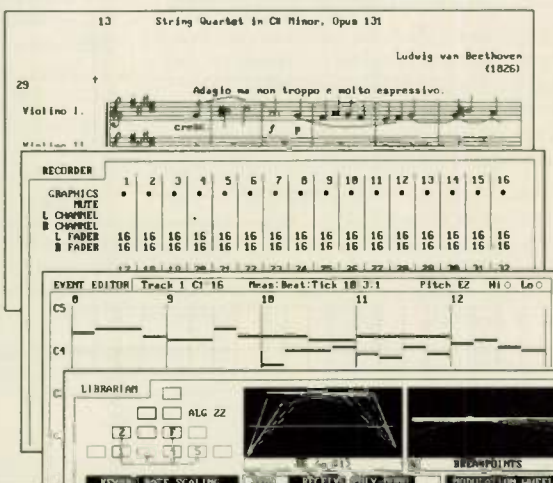
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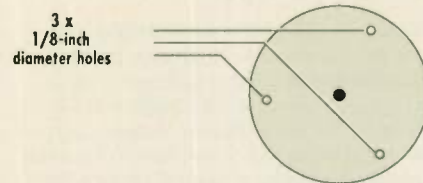


FIG. 3: Flywheel layout.

and component tolerance. Adjust this control to provide the most stable output.

The output pulses are 5-volt TTL signals, compatible with the 24-clocks/beat analog clock inputs on sequencers. A clock-converter box can be used to transform these pulses into MIDI clock data (or use the "Small Tock" circuit in the August 1986 EM).

All of the parts for the modification should cost well under fifteen dollars. If constructing your own encoder is too

much trouble, you can buy a prefabricated, industrial-quality shaft encoder from an electronics supply house. Such devices basically consist of a flywheel and optical-switch mechanism in a housing that looks like a small electric motor. They come ready to install; just link the encoder and projector shafts via small gears, pulleys, or even a length of surgical tubing. (Select a length of tubing with an inside diameter that will fit snugly over the projector and encoder shafts. Use this as a flexible coupling; it can bend up to about 45 degrees.) However, a ready-made encoder will set you back several hundred dollars.

ADJUSTING TEMPOS

The flywheel rotates once every time a frame of film advances, generating three clock pulses. Assuming the projector is running at the industry-standard speed of 24 frames/second, that's 72 pulses/second going to the sequencer. With sequencers that run at 24 pulses/beat, the base song tempo will be 3 beats/second, or 180 beats/minute. (Note: One hole on the flywheel will send 24 pulses/

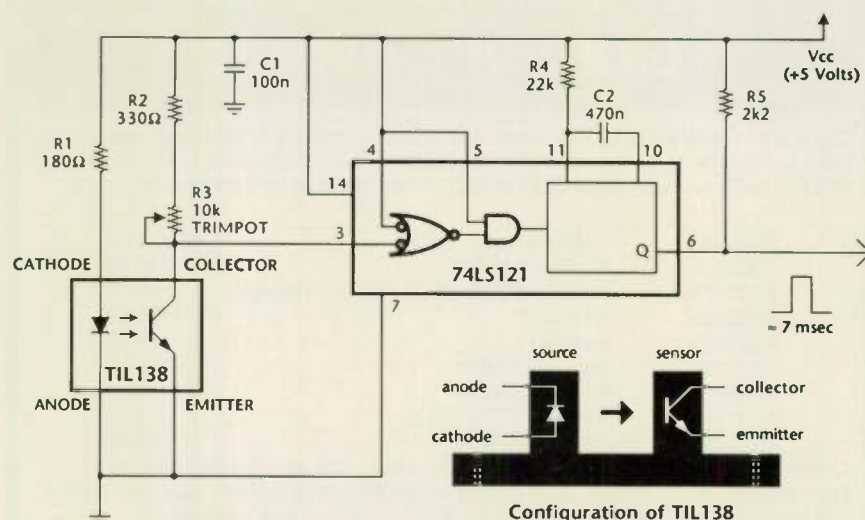


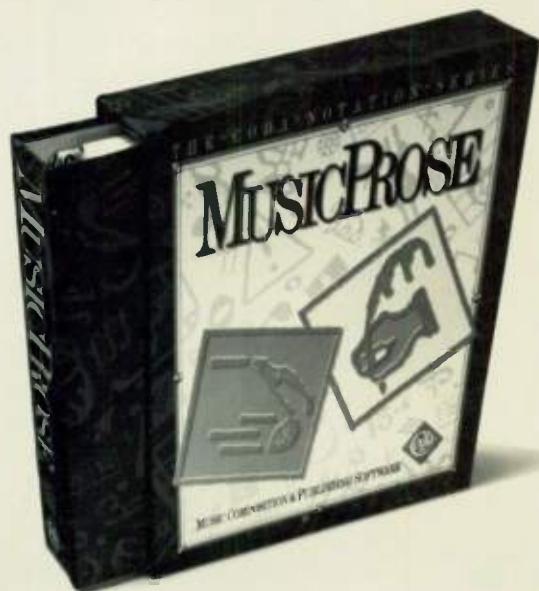
FIG. 4: Encoder schematic.

second; two holes, 180-degrees apart, generate 48 pulses/second.)

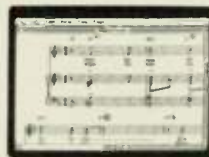
The easiest way to adjust song tempos is to convert the sync pulse output to MIDI clocks, then apply the relevant editing functions of a MIDI hardware or software sequencer. A program like

Mark of the Unicorn's *Performer* is ideal, since you can write your songs in regular time, then use the automatic scale time feature to spread them out over a longer interval. For example, scaling by a factor of two (doubling the number of clocks between beats) gives a tempo of 90

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SEMICONDUCTORS

IC1	74LS121 low-power Schottky monostable multivibrator
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OTHER PARTS

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-----	------------------------------------

Flywheel;
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SEMICONDUCTORS

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IC1	7805 +5-volt IC voltage regulator, TO-220 package

OTHER PARTS

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PARTS AVAILABILITY

The General Electric H21A1 and NEC PS4001 opto-interrupters are available from Mouser Electronics, PO Box 699, Mansfield, TX 76063; tel. (800) 992-9943 (use this address and phone number for catalog subscriptions only). The H21A1 is also available from Digi-Key, 701 Brooks Avenue South, PO Box 677, Thief River Falls, MN 56701; tel. (800) 344-4539. All other electronic components are available from either supplier.

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beats/minute. You then have a range of available tempos from 90 to 180 beats/minute, or 480 to 960 clocks/beat. You can even set up fractional tempos (e.g., 481, 482, 483); 479 clocks/beat gives in-between tempos, in 1/4-beat/minute in-

tion corresponds to which song tempo. A useful range of film speeds is from the full 24 frames/second down to about half that, corresponding to song tempos of 180 to 90 beats/minute. You probably won't want to go much slower, or the

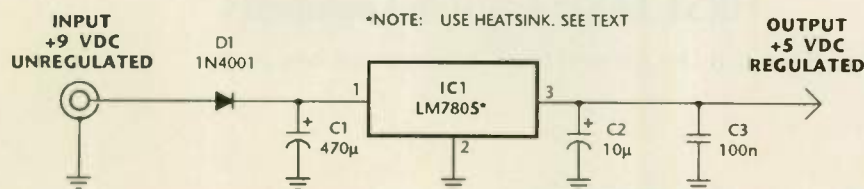


FIG. 5: Power supply schematic.

crements. Once you've determined a song tempo, you can calculate the clock points where each frame will fall.

An alternative is to use a variable-speed projector, but very few projectors incorporate a speed control, and some that have this feature have unacceptably dim projection lamps. Eiki and L & W International are two companies that manufacture vari-speed projectors. (Eiki International, 27882 Camino Capistrano, Laguna Niguel, CA 92677; tel. (714) 582-2511. L & W International/Athena, 255 East Easy Street, Suite C, Simi Valley, CA 93065; tel. (805) 522-3284.)

If you're mechanically inclined, your best bet is to modify a projector. You might even be able to modify one of the old Bell-and-Howell-type classroom projectors—these are practically being given away now. The basic idea is to replace the difficult-to-control AC motor normally found in this type of projector and install a DC motor that comes with, or will accept, a speed control. The details will necessarily differ from machine to machine, so don't try this unless you know what you're doing. (I modified an Eiki projector with a vari-speed circuit board motor from one of their other models that had the same motor but a dimmer light; it worked fine, though the factory service department suggested that the retrofit was not "up to spec.")

Caution: When you slow down a projector that's not designed to slow down, you may also affect its internal cooling fan, causing film meltdown. You may have to hook up a small, additional fan to keep things from overheating.

Most speed controls use a simple potentiometer with an indicator knob. The easiest way to keep track of film speed is to mark which point in the knob rota-

tion corresponds to which song tempo. A useful range of film speeds is from the full 24 frames/second down to about half that, corresponding to song tempos of 180 to 90 beats/minute. You probably won't want to go much slower, or the

IN USE

Simply line up the first frame of film behind the projector lens, set your sequencer to play from the beginning of the song, and start the projector. Clock pulses will immediately start streaming out, and the song will play at a matching tempo. It should be possible to show an entire 20- or 30-minute reel of film without losing sync. You can chain a series of films and songs together and change tempo while the projector is running. Although this is a budget method, there's nothing cheap about the quality of this synchronization; it's bang-on, accurate to the frame.

FILM IN THE DIGITAL AGE

Editing movies on strips of celluloid may seem archaic, but the image quality of film can be brilliant and beautiful at a very low cost, and film takes on unexpected "digital" qualities when a projector is linked to a drum machine or MIDI sequencer. A movie is, after all, a sequence of frames of visual information. A projector can be thought of as a visual sequencer that is "clocked," much like a drum machine, but providing visual rhythms. Try it and see.

Bob Scott is a member of *The Martian Invasion*, a three-piece multimedia band from Toronto, Canada. Their show, *In a Red World*, uses electronic music, animated films, and computerized lights to help portray the life of Vasio N. Martianin as he struggles for survival and understanding in today's world.

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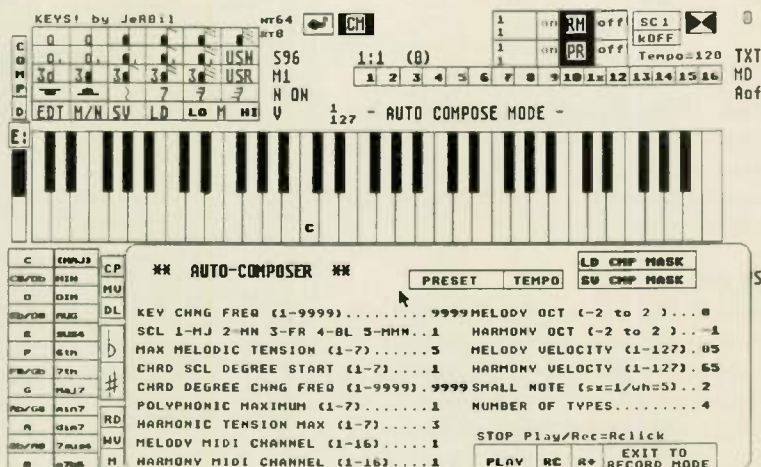
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FIRST TAKE: Capsule Comments

This month, we have software from the Doctor and a great way to rack-mount nonrack-mount gear.



Dr. T's KEYS! Version 1.25 Auto-Composer Screen

ity that lets you get more out of this chip than you might expect. While the results aren't going to substitute for a Kurzweil 250 and there's a three-note polyphony limit, it's better than nothing for people without MIDI synths who want to learn about computer music.

Step entry can be done from a mouse using point-and-click techniques, or from a MIDI keyboard. There is no facility for real-time recording in either mode, so if your MIDI technique doesn't include note-by-note input, you are likely to feel handcuffed. If you are comfortable with step input, you'll find this system a vast improvement over Dr. T's numeric event lists in KCS.

It's a good thing KEYS! has a comprehensive 91-page manual (the tutorial section is invaluable), because the screen display is bewildering at first. There are no less than 100 different screen buttons, with many functions duplicated on the ST's keyboard. However, since certain functions are of limited utility (see "Chord Mask"), I assume that most musicians will end up using a particular subset of those 100 buttons for the majority of their work, which simplifies matters. The screen also displays a 61-note piano keyboard (middle C position is adjustable in three ranges to access all 88 notes of a standard piano keyboard) and a ten-line, G- and F-clef staff for recording or reading note data.

In addition to the step-time input options, KEYS! is an auto-composer. The program will import sequence files directly from KCS (and, with use of the translation programs, from MRS) and "improvise" on your sequences, a great feature when the creative juices just aren't flowing.

When you click on the "auto" button, the grand staff gives way to the Auto-Composer menu, with another fifteen options. Among these are a choice of five scales (major, minor, fourths, blues,

AllEM 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

Dr. T's KEYS! for the Atari ST (\$79)

By Bruce A. Johnson

KEYS! serves two main purposes: it's a step-edit entry module for Dr. T's *Keyboard Controlled Sequencer* (KCS) and an auto-composer. Like that other famous multipurpose tool, the Swiss Army knife, some of KEYS!'s functions are very useful, while others are less so.

The program comes on one 3.5-inch, copy-protected disk, which includes additional programs that can transfer KEYS! files to and from Dr. T's *MIDI Recording Studio* (MRS) and *Copyist* programs. KEYS! runs on all STs, although there are some note-capacity limitations with the 520. Written in GFA BASIC, KEYS! is not GEM-based and, surprisingly, will not run in Dr. T's much-touted *Multi-Program Environment*.

A MIDI sound generator, though recommended, is not necessary; KEYS! can "play" the ST's sound chip and, fortunately, there's a waveform-shaping util-

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● FIRST TAKE

and melodic minor), key-change frequency, smallest note value, maximum number of notes, and maximum melodic tension. The amount of variation possible in the fifteen parameters is such that no two settings ever have to be the same (several have parameter ranges from 0 to 9999). If desired, through the use of a "Rhythm Mask," KEYS! will only compose in the rhythmic patterns you program.

The auto-composer functions pretty much as advertised, but a tendency toward writing in four- and five-flat keys

makes it difficult for the nonvirtuoso to sight-read its scores. For those of us who have to see the music, a screen dump utility makes it possible to print out the contents of two ten-line staves to most any printer.

The step-time input and auto-composer features of KEYS! are strong points; the weaker aspects, such as the Chord Mask function, are more ancillary. Upon selecting a chord from the screen, its notes are highlighted on the screen's keyboard. While this could be a very useful feature for musicians with



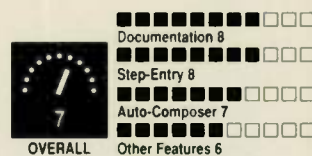
KEYS! Version 1.25 Main Screen

little music theory training, it takes up about an eighth of the screen, which seems excessive in relation to the function's usefulness.

Probably the most confusing aspect of KEYS! is that it can't seem to decide whether it's designed for the beginning musician and MIDI user who needs compositional lessons, or the advanced user who needs a step-time/auto-composer utility. However, just as a Swiss Army knife owner always finds a good use for it, perhaps KEYS! will find its niche in the MIDI world for being what it is—a program that accommodates both beginning and advanced users, offering different features to each.

(Dr. T's released KEYS! Version 1.4 in mid-May. According to Dr. T's, program author Jeffrey Reed Baker has added several features, including full GEM support, real-time recording, and a cleaned-up display.—Ed.)

Bruce A. Johnson spends a lot of time at work, which explains why his friends call him "Code-A-Phone."



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continued on page 105

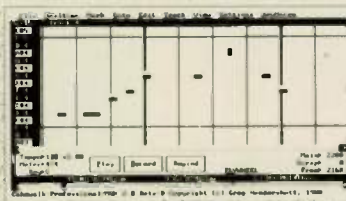
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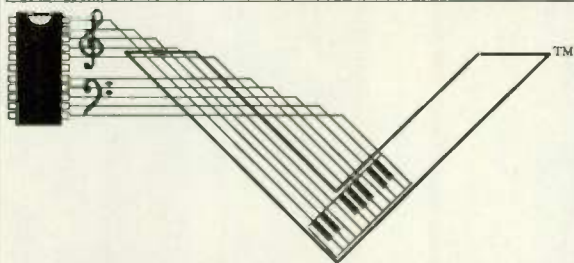
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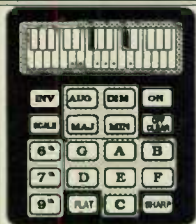
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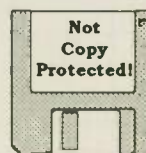
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Opcode Vision for the Macintosh

Another Macintosh sequencer? Not quite. Vision is the first of a new generation of Mac sequencing software, and the results are impressive.

By Craig Anderton



Flexibility is a much over-used word, but *Vision*, written by Dave Oppenheim and Ray Spears, is entitled to use it. Vision, like Dr. T's and some other sequencers, uses what I call the "toolbox" approach: it's a program in which you choose the subset of its zillions of features that best fits your working style. You want graphic editing? Sure. You like event lists better? Sure. You work with film? Check out those functions. Oh, you're into algorithmic composition? Try the sequence-altering features.

Both linear (tape recorder emulation) and modular ("drum machine" style) recording are available. I generally found myself using the modular approach when songwriting, which allows for easy shuffling of different tune sections. Once I was comfortable with the song, I converted this to a linear sequence (a special routine lets you capture a bunch of sequences into a linear sequence with a few keystrokes) and overdub new parts, trying to play the entire track in one pass for the best feel. There was one case, though, where I needed to break down a long linear sequence into shorter segments for easier handling; that worked, too.

Individual sequences can loop independently, which is another useful compositional aid; you can loop the drums for sixteen bars and, while the drums loop in the background, overdub up to 999 bars of soloing. Pick the best sixteen bars of the solo, get rid of the rest, and you have a solo sequence ready to call from another sequence, call from a song list, put in a queue with other sequences for real-time playback, play by typing a letter from A to Z (Vision holds up to 26 sequences at one time), play along with another sequence, or paste into a linear track. And that's not all; since we're on the subject of composition, maybe you'd like to take that drum track and give it a little algorithmic spice, courtesy of the "generated sequence" feature.

As you can see, the program is very flexible. Having all these ways to compose is useful, even if it did take me a while to get comfortable with switching back and forth between them.

THROUGH THE MAGNIFYING GLASS

There are two main types of sequence editing; some people like graphic editing, some like lists. In what is bound to be a continuing trend, Vision does both and does them well.

Graphic editing is available for a wealth of data (controllers, velocity, bend, mono and poly aftertouch, notes, etc.). Several "canned" ways to manipulate that data (add, scale, clip, etc.) are available as menu selections. The window handles one sequencer track at a time (which can consist of multiple instruments on different MIDI channels), and up to four editing windows can be viewed at once, although only one will be "active."

Like several other programs, there's a piano-roll display for notes, but Vision accesses that display simply and cleanly. You can easily zoom in to any level of resolution you want by option-dragging

over a region of notes, or defining a region of notes and clicking on the "magnify" icon; either method fills up the window with the selected region (not unlike sample editors that let you easily zoom in on different sections of a long waveform). Command-clicking lets you pick up discontinuous ranges of notes, or ranges and individual notes (Fig. 1). There are two ways to define a region: with a cursor, in which case operations occur only on notes, or an I-beam, which includes everything (controller data, etc.). Of course, you can cut, paste, copy, merge, and so on, either with individual tracks or collections of tracks.

One of Vision's best features is the individual/group note editing. Position the cursor somewhere over the middle of a note and move the mouse up or down to transpose. Position the cursor at the head of the note and drag its start time wherever you'd like, or "pull" on the end of the note to lengthen it. Erasing is a simple drag-and-hit-backspace operation. If you've selected multiple notes, the note-editing options affect the entire group. This makes it very easy to transpose a portion of music, or move a selected group of start times forward or back a few clock pulses.

Cursor movement is quantizable, which comes in handy when you want to cut-and-paste on measure or beat boundaries. This is also useful when inserting notes (yes, you can do that too, and yes, step time is also offered) as well as when dragging notes by the quantization amounts, i.e., if you quantize to a whole note, you can drag a chord to precisely the same location in a totally different bar.

CONTROLLING CONTROLLERS

Vision graphically displays continuous controllers, velocity, duration, program changes, tempo, and similar information on a strip chart that sits toward the

bottom of the window (Fig. 2). You can even enter lyrics, text, and cue points. Editing options include "set" (draw a horizontal line, and all data peaks move down or up, as required, to meet the line), scale (from 25% to 400%, which can be done successively for greater or lesser percentages), add or subtract a constant, limit maximum and/or minimum velocities, and randomize. The main "drawing" tool is the line mentioned above, which can define a limit for one piece of data, or a linear "slope" of values. Freehand drawing of curves is, unfortunately, not an option (but, according to Opcode, will be in the next revision, which will be a free update).

One problem is that if two notes occur at *exactly* the same time, one piece of, say, velocity data will cover the other. A more significant problem is tedium. Although using any of the "canned" editing options (like scale or add) is fast and simple, trying to create curves from a series of lines is time-consuming; drawing, for example, a logarithmic fadeout

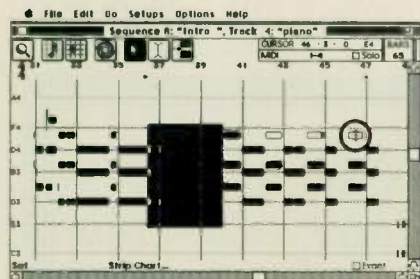


FIG. 1: The black rectangle selects a region of notes; the three "hollow" notes toward the upper right have also been selected. The circle (which is not a part of Vision) highlights the cursor, which is set to transpose the selected notes.

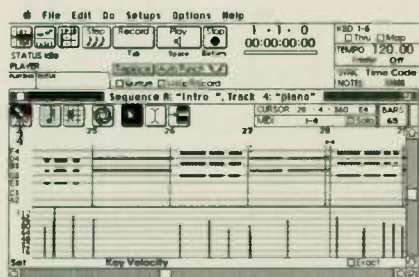
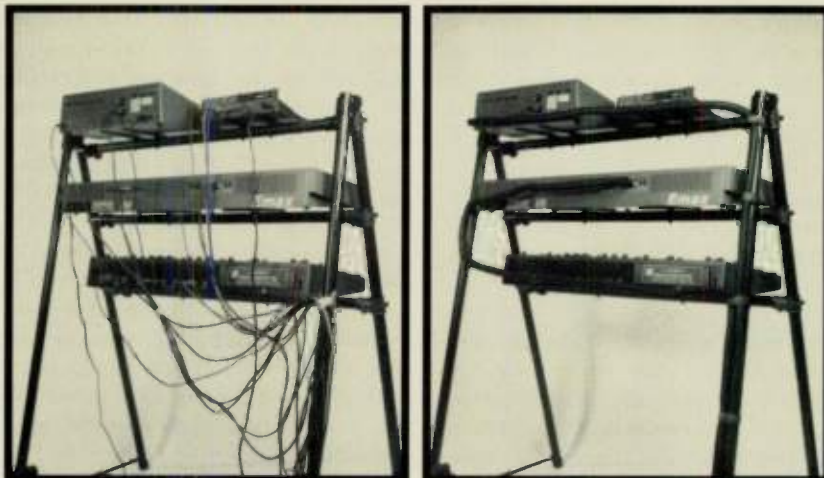


FIG. 2: The strip chart shows key velocities for the notes displayed in the upper part of the window. The section above the window shows the transport controls, counter, punch options, and other information.

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● VISION

is neither painless, nor fun, especially if you don't get it right the first time and want to change the curve. It's faster to overdub several fadeout curves on a spare track, with the mod wheel mapped to controller 7, then cut the one you like the best and paste it where desired.

However, there are also some very hip features. You can shift-click on selected notes and affect only those notes, which, when applied to (for example) velocity, lets you emphasize a bass or lead line hidden with a series of chords: just draw a line on the strip chart, and the selected notes will jump to the desired value. Another nice touch is a density setting that, when adding in data, lets you specify how much of MIDI's capacity will be allotted to controller data.

MAKING A LIST AND CHECKING IT TWICE

The list editing window displays (for one track) MIDI events, lyrics, and even system exclusive data, should you feel like editing up to 10K worth of sys ex (the maximum editable amount in Vision). You can restrict the data being

shown to particular types of data, if desired. Like the graphic editor, four list windows can be open at once, and, as expected, you can edit and add events. Less expected, but very welcome, is the ability to display all event times in absolute or relative SMPTE—relative meaning that the beginning of the piece is taken as 00:00:00:00 (see Fig. 3).

This is a perfect example of how Vision lets you choose your favorite way of working. Those who are forced to make a choice between graphic or list editing often find themselves needing the other method at some point or another; Vision provides both *at the same time*, without really compromising either one.

LIGHTS, CAMERA, ACTION

Vision was obviously designed with film and video work in mind, especially if you have Opcode's Studio 3 interface, which reads SMPTE and sends MIDI Time Code to Vision. But film work requires more than just an interface, and there are a variety of stretch-time options to fit hits to beats or tempos to onscreen action. Using the list editor as a SMPTE

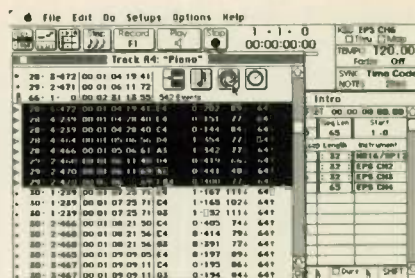


FIG. 3: Vision's List window. Several notes have been selected for editing; the cursor is about to click on the Mogriphy icon and select an editing option.

cue list—and being able to make comments about each cue—is very helpful as well. I'm not an expert on audio-for-video, so I didn't get too far into this; but my impression is that those into this field should take a careful look at what Vision has to offer.

THEM CUTE LITTLE FADERS

One of Vision's windows pops up a display of virtual sliders (Fig. 4), assignable to various MIDI parameters and controllable in real time. You can record the



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fader motions for most assignments in two ways: as an overdub on tracks that already contain notes, or on a separate track (which can be merged later with another track if desired).

This is a great idea in theory and a reasonably good idea in practice, especially since you can remap incoming data and send it out as something else (modulation wheel to controller 7, for example). The practical limits are that these are *very* short-throw faders, manipulated by a mouse, which makes precise selection of values difficult (unless you type in a value, which is available as another option). This is particularly problematic with controller 7 (which you would expect to be the most logical use of the faders), since many volume curves "bunch up" the values toward the upper extreme of the range, thus limiting the throw even further.

Another limitation is that the faders do not move during playback to show what's going on with a mix. This data is available in the strip chart, but it would be convenient to see volume variations displayed on the faders window, too. If

Opcode increases the fader length and throws in some non-linear curve options (e.g., logarithmic), these faders would graduate from good to great.

NOBODY'S PERFECT

Speaking of things that need improvement, here are my remaining gripes about Vision.

This may sound petty, but there are a lot of mixed type faces and sizes used in the various displays. Opcode has tried to make the Mac interface a little more artistic, and I can't fault them for that, but the end result is that the user interface looks more cluttered than it really is. On the other hand, the use of different type is not always just for show. Boldface characters have special meaning, usually indicating that you can click on them and see a menu or make some other kind of choice.

My next complaint is that the graphic displays don't scroll as the tune plays; you have to use the horizontal drag bar. When I called Opcode about this, they assured me that scrolling will be included in the next revision (or is that reVi-

THE PROBLEM WITH SOFTWARE REVIEWING—AND SOFTWARE PURCHASING

It's mid-May. I've been using Vision for about a month, which I don't feel qualifies me as an expert. But if I spend any more time working with the program, the review won't make the August issue. And August is late enough; by that time, Opcode will have updated Vision to a newer revision, and several other manufacturers will have introduced major updates to existing programs, or altogether new programs.

Short product life is only one problem. Programs are getting so complex that not only are they difficult to learn, they're difficult to describe. Just listing and defining features could take up *lots* of pages.

Since few musicians get to really check out a complex piece of software in depth, many people rely on printed reviews. However, due to the fast-paced nature of the industry, reviews are sometimes obsolete before they hit the streets. So what

do you do if you're shopping for complex software, such as a sequencer? Try the following.

1. Get a demo disk for any sequencer that interests you so that you can get a feel for the user interface. Opcode is one of several companies that makes demo disks available. Bring an 800K formatted Macintosh disk to your Opcode dealer, and they'll copy the disk for you, or send \$10 (postage and handling are included) to Opcode, and they'll send you a disk.
2. Beg your dealer for a "loaner" manual. Reading a manual should give you an excellent idea of what the program does (the command summary sections are particularly helpful). Vision's manual is very good in this respect.
3. Reviews can help you make more informed decisions, but they are not gospel. All magazines are faced with the fact that some reviews are obsolete even before they are printed and distributed.

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