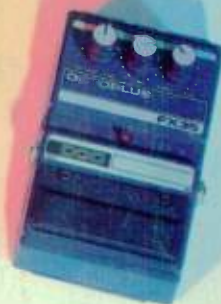


# Electronic Musician

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December 1989



# 100

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# Electronic Musician

AN ACT III PUBLICATION  
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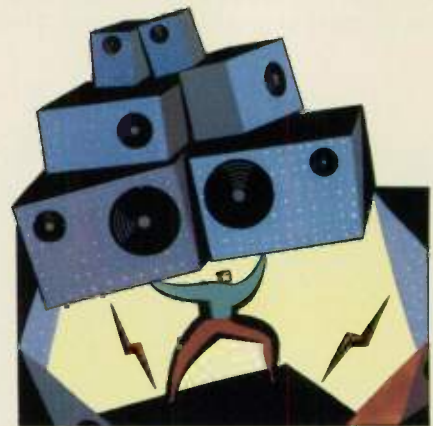
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**Cover:** Photograph by Pierre-Yves Goavec. Thanks to Leo's Audio and the following manufacturers: Casio, Fender, Shure Bros., and RolandCorp.

**Electronic Musician**® is published at 6400 Hollis St. #12, Emeryville, CA 94608, and is ©1989 by NBB Acquisitions, Inc. This is Volume 5, Number 12, December 1989. **Electronic Musician** (ISSN: 0884-4720) is published monthly. Second Class postage paid at Oakland, CA, and additional mailing offices. All rights reserved. This publication may not be reproduced or quoted in whole or in part by any means, printed or electronic, without the written permission of the publishers.





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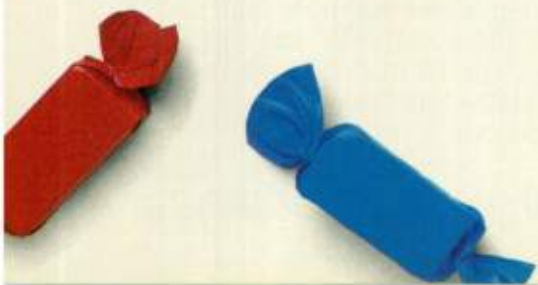


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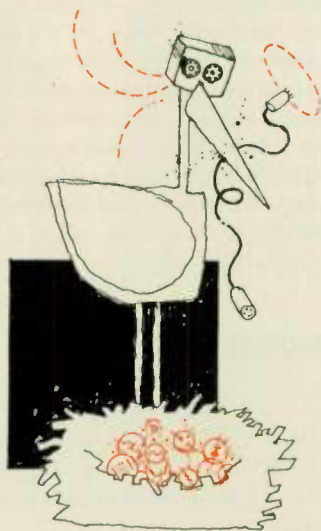
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If you read only one letter, read the first one. Also: new ICs, the military-industrial complex replies, and one reader proposes limiting our options to increase our creativity.



## AN URGENT WARNING

**A** recent occurrence in my life has compelled me to write this letter. It concerns a subject that is relevant to everyone—our sense of hearing.

I have been a professional musician since 1965. I spent years playing in clubs, schools, and all the other types of gigs that musicians do, not counting the myriad hours spent in rehearsals. As the guitarist-keyboardist for Kansas, I have recorded ten albums with that group, two solo albums, and three more albums with the group A.D. In addition to all that studio time, my ears logged thousands of hours of high-decibel concerts, sound checks, etc., over fourteen years of touring.

I recently completed recording my first instrumental project for Sparrow records, and I was scheduled to master it in Nashville. The night before my mastering date I was rudely awakened at 3 a.m. by a loud ringing in my right ear. I had experienced something like this before, but never at so alarming a level. It was still there in the morning, so I had to rely on the ears of other engineers and

friends at the mastering facility.

When I got home, I went through a battery of tests with doctors and audiologists who told me what I suspected anyway: noise-induced hearing loss. Even though for the last several years I have been monitoring at very conservative levels, my ears seem to have been seriously affected, and the prognosis for this type of damage to one's hearing is not very encouraging. Little or nothing can be done about it.

Unfortunately, our lives do not have an "Undo" command. If I had one, I would most certainly use it, for in retrospect all those wonderful decibels that were so exciting at the time were destroying the very means I had of perceiving them. Now my career, and other areas of my life, are in question, for deafness destroys a great deal more than just the enjoyment of music. All of these wonderful tools we read about in this publication become scrap metal without a God-given ear to hear them with.

It's not worth it, my friends. Rock and roll takes its toll. I wish I had listened to my dad in 1965 when he opened the garage door and yelled: "Can't you turn it down and still enjoy it?"

**Kerry Livgren**  
**Georgia**

*Kerry—Perhaps others will listen to you. I'm sure all our readers hope that you will recover your sense of hearing and continue to do what you love to do best.*

## MORE IS BETTER?

**T**he hallmark of the early days of electronic music was the ability of composers to take the simplest tools and create great music with them. Today, many electronic musicians find great music beyond them despite the wealth of tools available. I believe the

reason for this is that limited resources demand virtually unlimited creativity.

Currently there seems to be a prevailing attitude of, "More is better. If it's not the latest, it's not the greatest." Equipment and software vendors who bombard consumers with this message will eventually numb their prospective buyers. For electronic musicians, this attitude can be deadly. The artistic value of a piece of music should never be judged based on the tools used to create the piece.

The concept of an unlimited sonic palette is very seductive, but "infinite" resources require infinite exploration to be usable. Have any of us exploited all of the possibilities of even one of the instruments that we own? It is absolutely essential to take the time to really understand one's instrument(s). Get inside it. Experiment. Make some mistakes. Create some trash! Brilliant music is the result of the composer sculpting and refining it. If one doesn't take the time to learn the instrument, how can one expect to make great music with it?

To those who own tons of instruments, set some limits for yourself and try to create music within them. To those who have almost nothing, do not despair—whatever you own today is probably far more sophisticated than what our predecessors used to create the pioneering, but still astounding, works of early electronic music.

I do not advocate avoiding new technology and new instruments, but that we understand our tools to the best of our abilities. The benefit of this is that when we acquire new technology we will be better able to assimilate that instrument or technology. The more command you have over your resources, the better your ability to realize the music you find within yourself.

**John Zielinski**  
**Illinois**



## ● LETTERS

### MORE ON MOTOROLA

I have been following the articles on the Motorola 68705 processor with great interest. The 68705 is fairly powerful, but for those who are thinking of projects that are somewhat more complicated than the 68705 can handle, I recommend another processor by Motorola, the MC688HC11.

The 'HC11 is toward the higher end of the 6800 line of processors, so its instruction set is a superset of the 6800 and 68705. It runs at a speedy 8 MHz, and is entirely self-contained. Its on-chip facilities are impressive, as there are six subsystems besides the CPU: a timer, parallel interface, asynchronous and synchronous serial communications, and A/D converter. The timer has a free-running countdown timer, three input capture functions, five output compares, a pulse accumulator, and watchdog timer. The parallel interface has one 8-bit output port and one 8-bit bidirectional port, both with programmable handshaking. The serial communications interface is an NRZ standard, asynchronous interface compatible with RS-232 and MIDI (with external driver circuitry). The synchronous serial is an 8-bit port with programmable handshaking and the capability to connect two 'HC11s in parallel. The A/D converter is an 8-channel, multiplexed converter capable of single-shot conversion or free-running conversions.

The 'HC11 has, on chip, 512 bytes of EEPROM (68HC11A1) or 2K EEPROM (68HC811A2); 256 bytes RAM; 16-bit PC, stack, and two index registers; two 8-bit accumulators also acting as a 16-bit double accumulator; and an extensive, multiple-priority interrupt system. All of the 'HC11's peripheral subsystems are memory-mapped and run independently of the CPU so they don't tie up processor time. Any of the subsystems that are not used can be disabled and its external pins used as digital I/O, providing up to 38 lines of digital I/O. The 'HC11 can be configured to run as a single-chip processor for minimum parts or as an extended system with a 64K address space.

The processor is available from Arrow Electronics (Catalog Division, 25 Hub Dr., Melville, NY 11747-9828; tel. [800] 932-7769) for about \$22. Hardware manuals (#MC68HC11A8/D) and programming manuals (#M68HC11PM/

AD) are available from Motorola (Motorola Literature Distribution, PO Box 20912, Phoenix, AZ 85036), as is an inexpensive, single-board development system that includes a serial terminal port, 8K program RAM, and a complete debugging monitor. Development software is available free on the Motorola Free BBS described in Mr. Marxhausen's letter (May 1989).

**Kenneth Ryan**  
New Jersey

### THE MILITARY-INDUSTRIAL COMPLEX: ANOTHER PERSPECTIVE

Thanks for putting together such a great source of "what's new," "what's available," and "how to do it" under one cover. I've followed [Craig Anderton's] articles for many years in several publications and always enjoyed his point of view of the music scene. However, in the September "Letters" section, in a reply concerning working in musical electronics, Craig remarks that the military industry exists to kill people while, in contrast, the music business offers job satisfaction, working with good folks, and devoting your talents to making tools that entertain people. I couldn't let this fly, even as a general statement.

First, the military industry, of which I am a part, is here to protect the freedoms we've come to enjoy as Americans. Sometimes that means killing people that would take our freedoms away, but mostly that means having a technologically advanced deterrent presence. This requires competent engineers who can devote their talents to developing technology that protects people rather than leaves them vulnerable. The people one typically meets in this industry are great folks—passionate, skilled, creative, and principled.

Many of the music folks I have met lead lives that tear down the moral structure of the nation, are egotistical, and have a rather limited view of the world. Some of these people use their "talents" to spread hate messages and moral decadence to their listeners and "entertain" by bringing out destructive tendencies in people. Job satisfaction with some musicians that committed suicide was probably elusive.

**Jim Sutton**  
Texas

*Jim—Thanks very much for your letter. I suppose that my perceptions of the military-industrial complex are shaped by news of procurement scandals, Sgt. York tanks, and billions of dollars of waste—which tends to make me forget that there are dedicated, skilled people who are not into their jobs to rip off the taxpayer but, instead, to protect our country. Thanks for setting the record straight.*

*Regarding the music business, the generic letter referred to the "electronic music industry," by which I meant the technicians and companies involved in the electronics of music, not the recording industry. Having been a part of both, and this is certainly a generalization, I feel that the work environment provided by the electronic music industry is more congenial and less soul-destroying than the music business at large, which, as you point out, has its problems.*

### THOSE ELUSIVE UPDATES

Alan Campbell recently stated in *EM* that it is possible to install the ROM updates for the ESQ-1 yourself if you have a good knowledge of electronics.

While this may be possible according to an individual's ability, it is impossible according to Ensoniq. When I spoke with their customer service department a few days ago, I was told that they will not ship the update to an individual, only to their authorized service agencies who also must do the work.

I also found that it pays to shop around for a service person. One service company wanted \$47.50 to install the update and also said they need to keep my ESQ-1 for at least two weeks due to their backlog. As I couldn't do without the ESQ for that long, I called another Ensoniq service agency that installs the update on an appointment, while-you-wait basis. Their fee was only \$19.95. What a difference!

**Sally Daley**  
Illinois

### RETURN OF THE LAKE THING

Being a musician for most of my normal life and a buyer for a company that is required to attend both NAMM shows, I found "The Wake on the Lake" Back Page (September 1989) very interesting. Every quote made a

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reverb or delay times, wet/dry mixes, or even real time panning of any M1 sound, or change any other M1 parameter by simply entering MIDI control events into your M1 sequence.

**Hundreds of new digital waveforms** can be loaded from Frontal Lobe disks into your M1 with the optional PCM CHANNEL. You can also add your *own* waveforms from most popular samplers or software programs that support MIDI Sample Dump Standard and then process them through the M1's patch programming system. Create multi-sampled Multisounds, single cycle waveforms and new drum kits. Mix your waveforms with the M1's waveforms to come up with new and exciting patches. Everything from crystal-clear 16 bit acoustic sounds, to screeching tires, or even your own voice can be available by pressing a key on your M1.



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Lorenz Rychner —  
MUSIC TECHNOLOGY

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Bob O'Donnell —  
ELECTRONIC MUSICIAN

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## ● LETTERS

solid point and echoes the sentiments of everyone I spoke to in Chicago.

The statement made about product education is why I'm writing. It seems like the electronic musical instrument industry is out of control. Technology advances at a blinding speed while even the people at the cutting edge can barely keep up. Manufacturers should consider a new approach to introducing products.

Being a guitar player and the owner of a stack of poorly written MIDI instrument manuals, I find it very frustrating to search for information that should be in the owner's manual. Why are products shipped with bugs in the documentation and software? Why aren't more manufacturers designing products that can be updated to a registered owner at somewhat of a reduced cost compared to the price of a new machine? I would gladly spend more money on a machine that could be updated than buy another manufacturer's new machine with features I required and have to learn a new device all over again.

I think that if a company produced a good, updatable machine with a well-

written manual, consumers would buy new products from the same manufacturer when they were offered. And after all, isn't repeat business what keeps the disk drive spinning?

You folks do a great job, keep it up.

**George M. Selsky**  
Illinois

## SHOCK PREVENTION

In the article, "The J.L. Cooper PPS-1 Hot Rod Mod" (October 1989 *EM*), a sidebar about electrostatic discharge (ESD) carried a statement that might cause injury or damaged gear if it were misinterpreted by the reader.

The sidebar states that readers should wear a conductive wrist strap in order to drain off static electricity while working on electronic equipment. However, a wrist strap should be resistive and not a simple conductor. To prevent the wearer from becoming a conductive path to ground for hazardous voltage levels, manufacturers add a series resistor (typically about 1 megohm). The resistance limits current flow through

the strap (and the user), while allowing static charges that could damage sensitive ICs to be drained off.

In other words, *never* use a few feet of wire and a clip as a substitute for the real thing (I've seen it done more than once). You can pick up a decent strap for under \$4 at Radio Shack (part number 276-2397). Just remember: that little resistor might be the only thing protecting you and your gear from a nasty shock.

**Charles R. Fischer**  
Mescal Music  
California

## OPERATION HELP

**SCI sequencer:** I am using a Sequential Circuits Model 64 sequencer with an SCI Six-Trak and Roland TR-707. The setup works fine, but I live in constant fear that the Model 64 will go down (it fits very shakily into the Commodore SX 64), leaving me without a sequencer. I obtained a Sequential 242 interface (the Model 64 is no longer available) from Wine Country Productions, but there is no clock select switch on the 242, and the Roland drum emits clock signals upon power up. Thus, I am sunk without sync, as SCI's 910 software does not recognize MIDI sync. Is there a source for new or used Model 64 sequencers, or a way to build a clock select switch into either the 242 or the TR-707? Gary P. Bartels, 204 St. Pauls Ave., Staten Island, NY 10304.

**Klemt Echolette:** I need information about an unusual West German guitar amp head called a Klemt Echolette Showstar L, type S40L. I think it may be from the late 1960s. I could use a schematic or any information about the company or its products. Kerry L. Townson, 1424 Eastwood Dr., Slidell, LA 70458.

*Address all Operation Help requests to "Operation Help," c/o Electronic Musician. We will print your address and phone number (if supplied).*

## ERROR LOG

**October 1989,** "Programmable Crunch: A Survey of Guitar Multi-Effects Processors," p.36-37: The photo was by C.R. King and the illustration/hand coloring by Pamela Prichett. ■

## SAMPLING THE EM MAILBAG

The number one recipient of nasty letters this month: Robert Carlberg, for his September review comparing various recordings (several in an unflattering way) to a theoretical model. Many readers felt that the premise just didn't fly, and that any album was worthy of consideration on its own merits—not how it was similar to, or different from, other recordings on the market. That's one way to do things, of course, but the purpose of Robert's column that month was to identify a trend and discuss the music he received that fit that trend. Each reader will decide whether he succeeded.

Many readers commented favorably on the "Wake on the Lake" Back Page, but one reader was disturbed that I had complained about "cookie-cutter" synth pop, dull new age music, and soulless "jazz lite," thinking that I was denigrating all pop, new age, and jazz music. Not so—just the

cookie-cutter, dull, and soulless examples of their genres.

The reference to the military-industrial complex also raised some ire (see the letter from Jim Sutton)—one reader went so far as to cancel his subscription. Yes, it was an off-hand remark, and sometimes I forget that people are prone to take things more seriously than how they were meant. But how can someone justify penalizing a great staff and a bunch of dedicated authors just because of one sentence I wrote in one issue? I'd recommend that if you disagree with something, don't condemn—educate the writer, as Mr. Sutton did. This is how we learn and improve ourselves.

We're getting so many letters these days that all the editors are pitching in and answering; so starting next month, each reply will be signed by the editor making the reply.

—CA



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# HE USES IT TO CREATE A LEGEND.

B.B. KING, JAZZ GUITARIST



B.B. King didn't finish high school. But he is one of the great ones. He plays a guitar he calls "Lucille" and he plays it like nobody else.

"I don't know computer talk like a lot of people." But he knows computers. B.B. King has an Amiga. "I heard the Amiga was going to be the computer of tomorrow. I tried it. It's so much easier than other computers, I took it home.

"I learned I could sit in my room. Didn't have to call in

musicians to rehearse something. It'll play 4 voices or 60 or 70 voices. I could take my guitar and *create tunes and not have to wait*. It would do it for me.

"Then I play with live musicians; I play the whole arrangement completely worked out. Now *this* is what I want."

B.B. King also plays chess on his Amiga.

"I'm one of those funny 64 year olds. I like to know what's going on."

Note. The Amiga is, in fact, an extremely powerful music workstation:

- 4-voice stereo synthesizer *built in* - lets you hear what you're composing using either

sounds digitally created by the Amiga or sampled from another source.

- May be equipped with MIDI interface to serve as synthesizer or as patch editor/librarian.

- Software available to produce professional quality printed sheet music.

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**Commodore**

The end of 1989 brings a violin pickup, a PZM mic, two unusual Amiga software packages, and rack-mount enclosures for DIY projects.



Ariel DM-N Digital Microphone

## MICROPHONES/PICKUPS

**C**rown's SASS-P (Stereo Ambient Sampling System) microphones (\$799) feature two PZM condenser mics mounted on boundaries that make each mic directional. A foam barrier divides the capsules, reducing acoustic crosstalk (and the resulting phase cancellations). The polar patterns and spacing between capsules (about the size of the human head) optimizes the system for applications requiring tight, realistic placement of sound images in an ambient field, such as sampling and location recording of sound effects.

**Crown International**  
1718 W. Mishawaka Rd.  
Elkhart, IN 46517  
tel. (219) 294-8000

**B**arbera Transducer Systems offers rosewood-and-maple violin transducer bridges (\$225/4-string; \$250/5-string) with a pickup for each string. They use passive electronics (no pre-

amps) and are available with a choice of interchangeable/adjustable or standard carved feet. The manufacturer notes that redwood adds a rich tonal quality.

**Barbera Transducer Systems**  
6725 13th Ave.  
Brooklyn, NY 11219  
tel. (718) 256-0665

**A**riel Corp. introduced an all-digital microphone, the DM-N (\$595), designed for analog signal capture and direct digital encoding, that uses two Motorola 56ADC analog-to-digital converter chips. The initial version works exclusively with the NeXT computer. The Ariel mic also has inputs for connecting external analog signal sources (such as CD players) to the NeXT; these inputs operate simultaneously with the regular mic pickup.

**Ariel Corp.**  
433 River Rd.  
Highland Park, NJ 08904  
tel. (201) 249-2900

## SOFTWARE

**B**ars and Pipes (\$250) is an object-oriented musical composition system for the Amiga that includes a sequencer (number of tracks only limited by memory) with 192 ppqn resolution, MTC sync, and standard MIDI file support; an editor that supports piano-roll notation as well as bars on a staff, and allows users to input traditional musical parameters; "The Pipeline," which directs the flow of data to and from various tools, both before and after recording; and "The Toolbox," a MIDI data processor that refers to user input to make intelligent decisions and includes a macro-creating function.

**Blue Ribbon Bakery**  
1248 Clairmont Rd., Suite 3D  
Atlanta, GA 30030  
tel. (404) 377-1514

**T**he Hyperchord Music Exploration Kit (\$129) for the Amiga contains four interrelated programs. The package provides a "dynamic riff sequencer" that combines algorithmic generation and selective real-time data manipulation during which you can switch scale modes, user-defined rhythms, or-



Barbera Violin Transducer Bridge



## ● WHAT'S NEW

chestration, harmonies, etc. The interface is designed to look, feel, and be played like a musical instrument. A special *Holistic Window* program provides a 3-D graphic, educational, sound-exploring aid.

**Hologramophone Research**  
331 East 14th St., Suite 4B  
New York, NY 10003  
tel. (212) 529-8845



**T**houghtprocessors' *The NoteProcessor* (\$295), desktop music publishing software for IBM-compatibles, imports and exports SMF and offers real-time MIDI input and alphanumeric (DARMS code) input, icon-based graphic editing, and MIDI and non-MIDI playback. The program features specialized notation such as guitar, ukulele, percussion, and Schenker graphs, and supports file transfers to graphics, word processing, and desktop publishing programs.

**Thoughtprocessors**  
584 Bergen St.  
Brooklyn, NY 11238  
tel. (718) 857-2860

**T**sunami Software is shipping its *MP100 Editor/Librarian* (\$299) for the ACT MP100 MIDI-controlled instrument preamplifier and IBM-compatible computers. All parameters of a patch, including EQ, active switches, and MIDI settings, are displayed on one screen. A Hercules or EGA graphics system is required.

**Tsunami Software**  
PO Box 35138  
Cleveland, OH 44135  
tel. (216) 671-8565

**G**elva Software presents *Eze* (\$249), an icon-driven "editing window" for the Ensoniq EPS and Atari ST (1 MB of RAM required). Unlike most wave-

form editors, editing occurs inside the EPS, with Eze as the control center, avoiding sample upload time. The program is optimized for fast data access and edits all EPS functions. Parameters edited can be auditioned in real time.

**Gelva Software**  
PO Box 631  
Double Bay, NSW, 2028  
Sydney, Australia  
tel. (02) 665-1040

## DO-IT-YOURSELF

**R**ack Pack Kits (starting at \$45) are rack-mount enclosures for circuit boards, transformers, power supplies, etc. The kits are useful for such projects as prototypes, pre-production samples, and custom installations. Eight models are available; each is complete with mounting rails and rubber feet.

**Sano International, Ltd.**  
16 Passaic Ave.  
Fairfield, NJ 07006  
tel. (201) 808-0063

## CONTROLLERS

**C**heetah offers two MIDI controllers, the *Master Series 7P* and *5V* (\$1,399 and \$669, respectively). The MS-7P has an 88-note, weighted, velocity-sensitive (including release velocity) keyboard; eight user-definable keyboard zones; MIDI echo, delay, and arpeggio; four MIDI outs; three continuous controller wheels; MIDI merge; MIDI clock; and lots more. The MS-5V has 61 unweighted keys and many of the same features as the MS-7P.

**Jessico**  
11230 Grandview Ave.  
Wheaton, MD 20902  
tel. (301) 949-9314

## SIGNAL PROCESSORS

**P**assac's *ABS 1000* (\$299.95) is a half-rack space, bass guitar effects unit that mixes a synthesized "acoustic double bass" sound with the electric bass signal. A wet/dry mix control is provided, as is an active EQ section that includes a bass shelf filter ( $\pm 10$  dB below

800 Hz), treble filter ( $\pm 6$  dB around 5 kHz), and "Tilt" feature that boosts treble as it cuts bass and vice versa ( $\pm 6$  dB around 1 kHz).

**Passac Corp.**  
759 Ames Ave.  
Milpitas, CA 95035  
tel. (408) 946-8989

**B**SS Audio introduced the *AR-416* (\$799), a 4-channel, 1U rack-mount, active direct box. The unit features 1/4-inch, high-impedance inputs with three-way, selectable attenuation; 1/4-inch parallel and buffered link outputs for feeding amps or submixers; and four low-impedance outs, with lowpass filter, polarity reverse, and a ground lift function (also available on the inputs).

**Klark-Teknik**  
308 Banfi Plaza North  
Farmingdale, NY 11735  
tel. (516) 249-3660

## COMPUTER PERIPHERALS

**M**usic Quest introduced the PC MIDI Card (\$119), an MPU-401-compatible MIDI interface. Its selectable port address and interrupt levels and a high-speed bus interface allow



Passac ABS-1000

it to function with 80386-based, as well as less powerful, IBM-compatibles. The interface does not include tape sync circuitry.

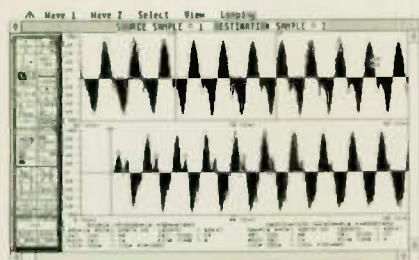
**Music Quest**  
2504 Ave. K, Suite 500-492  
Plano, TX 75074  
tel. (214) 881-7408

**P**ika Technologies announced *dMIDI-16* (\$395/sixteen channels; \$350/eight channels), a drum-pad processor package (including peripheral card, cables, and software) for IBM-compatibles that provides up to four adjustable, velocity-triggered note changes per pad, MIDI output, and a PC interface for up to sixteen drum pads. A footswitch provides momentary note

and channel switching for any pad input (i.e., open and closed hi-hat), while an optional second footswitch offers live switching of the entire drum setup patch.

**Pika Technologies Inc.**  
155 Terrence Matthews Cres.  
Kanata, Ontario  
Canada  
tel. (613) 591-1555

**I**nterval Music Systems released the *S1000 MEMEXP* (\$849), a 2-megabyte expansion card for the Akai



Gelva Software Eze

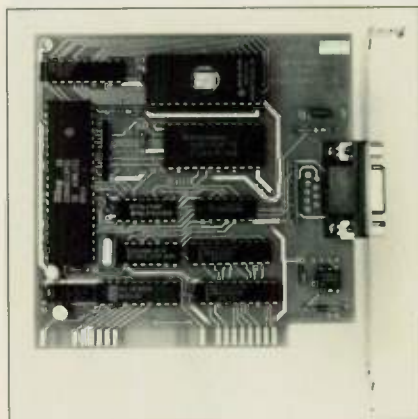
*S1000* sampler that provides an additional 11.88 seconds of stereo sampling time at 44.1 kHz. Three expansion cards (adding 6 MB) may be installed.

**Interval Music Systems**  
12077 Wilshire Blvd. #515  
Los Angeles, CA 90025  
tel. (213) 478-3956

## PUBLICATIONS


**N***ew Ears: A Guide to Education in Audio & the Recording Sciences*, by Mark Drews (\$11.95), provides lists and profiles of audio education schools and programs. Although primarily intended for high school students and guidance counselors, it also contains information with broader appeal, including sections on audio industry publishers, professional associations, and magazines and journals. Available from EM Bookshelf; see FYI page for details.

**New Ear Productions**  
1033 Euclid Ave.  
Syracuse, NY 13210  
tel. (315) 425-0048



Music Quest PC MIDI Card

**T**he *Recording Industry Sourcebook*, available in book form (\$34.95) and in Mac and IBM disk formats (\$195 includes book), lists national major and independent record companies, distributors, managers, and music equipment manufacturers, as well as L.A.-based recording studios, agents, promoters, music video production companies,



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## WHAT'S NEW

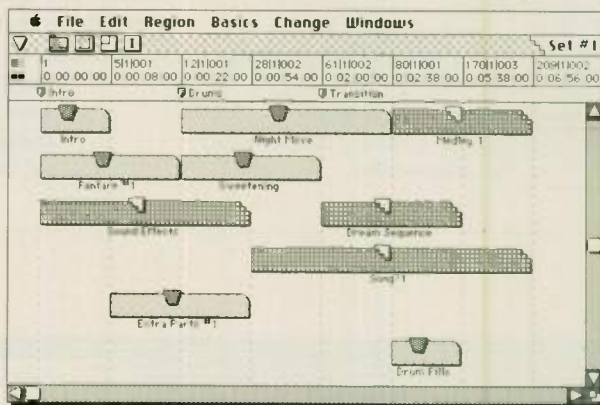
schools, audio engineers, producers, rehearsal stages, clubs, and lots more.

**The Recording Industry Sourcebook**  
**953 N. Highland Ave.**  
**Los Angeles, CA 90038**  
**tel. (800) 969-7472**  
**(213) 465-9527**

## REV UP

**T**welve Tone Systems (tel. [617] 273-4437) *Cakewalk V. 3.0* now supports standard MIDI files; *Cakewalk Professional V. 3.0* has a built-in programming language that allows users to write their own editing commands. Both programs have enhanced track-looping capabilities and several other new features. *Cakewalk Live! V. 3.0* updates also include the new track looping feature...New England Digital (tel. [802] 295-5800) introduced *Release 2.1*, a Macintosh-based software package for its PostPro and Direct-to-Disk digital multi-track editors. V. 2.1 includes EditView, which represents audio cues as graphic blocks for point-and-click editing of timings, durations, fades, etc.; full implementation of NED's MAC-422 RS-422 card, which handles communications between the Mac and the Direct-to-Disk unit; and access to NED's 2-gigabyte optical drive...Intelligent Music (tel. [518] 434-4110) released *M V. 1.1* for the Amiga. New features include continu-

ous Time Base Denominator values from 1 to 48 and previewing and "scroll-previewing" timbres; ten notable corrections have been implemented, including more reliable instrument loading, fixing the New command in the File menu and the problems with the Input Control system, and improved functioning with *Soundscape*. Updates are available for \$20...Mark of the Unicorn (tel. [617] 576-2760) debuted *Performer V. 3.2* for the Mac. New features include graphic sequence chaining, calling up sequences and accessing the "transport" controls from a MIDI controller, controller chasing, simultaneous event list and graphic editing, and hard disk installation.



Mark of the Unicorn Performer 3.2

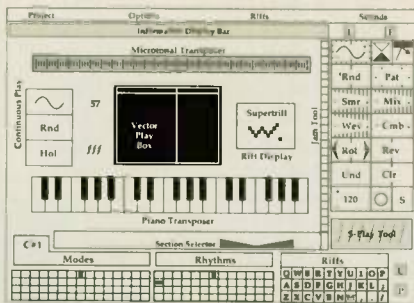
## CALENDAR

**December 2-3** MacMusic Fest 3.0; Paramount Pictures, 5555 Melrose Ave., Los Angeles, CA. For info, call Macintosh Entertainment Guild of America (MEGA); tel. (213) 468-5496.

**December 6-8** Sony Professional Audio Training Group courses: Large console applications. Contact Raymond Callahan or James Gayoso; tel. (305) 491-0825, ext. 186.

**December 11-15** Sony Professional Audio Training Group courses: Sony MXP-3000 technical service. (See above.)

**December 11-15** Video Expo Orlando. Orange County Convention Center, Orlando, FL. Contact Debbie Rotolo, Knowledge Industry Publications, Inc., 701 Westchester Avenue, White Plains, NY 10604; tel. (800) 248-KIPI or (914) 328-9157.



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## Look, Ma! No Cables: Wireless Systems Applications

Choosing the right wireless system is only half the battle; you also need to know how to make it work consistently well.

By Larry (the O) Oppenheimer



**U**nlike using an equalizer or a reverb, using wireless (radio frequency or RF) systems is not a "plug in and go" proposition. Each situation (a different venue or even the same place at a different time) presents its own demands, which the user of an RF system must accommodate. Hence, the single most important thing to understand in the application of RF systems is troubleshooting.

The primary problems encountered are dropouts and interference, which are most easily controlled by antenna placement and operating frequency. Working range, another important consideration, typically falls out as a result of these variables. The best way to test, troubleshoot, and correct problems is to walk around with the transmitter and see where problems crop up.

### DIVERSITY OR NON-DIVERSITY?

For those who have not purchased a system yet, consider whether or not to purchase a diversity system. (For an explanation of diversity systems and further information on choosing an RF system, see "Cutting the Cord: Choosing a Wire-

less System" in the November 1989 *EM*.) For many applications—for example, a situation where you will not be moving around much and it is easy to place the antenna—a diversity system is not necessary. On the other hand, experts like Bill Sien of Systems Wireless (in Virginia) strongly recommend always using diversity systems. The main benefit of diversity systems is in the reduced possibility of dropouts, which is a cardinal concern. In addition, the flexibility of two antennas can be used to maximize usable working range. Since diversity systems cost more than non-diversity ones, budgetary concerns may come into play, but in a situation that exhibits many problems, there may be no other practical choice besides diversity.

### TESTING 1, 2, 3

The first step in using an RF system is to ascertain that the system is working properly under optimal conditions. In the discussions that follow, it is assumed we are talking about an RF microphone, but there is no practical difference with an RF guitar system.

1. If there are several systems in use,

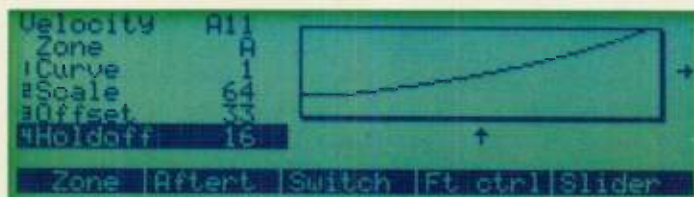
switch off all but the one under test. While holding the transmitter, stand within a few feet of the receiver.

2. Speak into the mic and make sure that reception is clear and crisp, with no funny grunge noises or intrusion from other RF sources (local radio or TV). Make hissing sounds and pops and listen for artifacts. If everything is clean, you're golden to this point.

3. If not, check dumb things first. More often than not this is where the problem lies. Change the battery in the transmitter; even slightly weak batteries can cause problems that may be difficult to trace. In fact, change the battery often and always put a new one in before a particularly important show. Check for bad cables by substituting new ones one at a time. If it is a bodypack-type of transmitter, try gently wiggling the ends of its antenna to make sure the signal is not intermittent. (In many cases, the antenna is in the wire leading from the microphone to the bodypack.) Is the receiver plugged in? Are the transmitter and receiver both switched on? Do they have pilot lights and, if so, are they lit? Sure, this is all obvious stuff, but you'll save yourself a lot of time and grief by remembering to check these things first when there's a problem.

### ANTENNA PLACEMENT AND DROPOUTS

Receiver antenna placement is the single most important consideration in using RF systems, influencing dropouts, interference, and range. The antenna should be as close, and on as direct a line-of-sight, to the transmitter as possible. This may mean putting it in the wings, at the mixing station, or somewhere else in the hall near the stage, depending on how the performer intends to move. It is best to get the receiver antenna above the heads of the crowd. Avoid placing the receiver near other possible sources of RF energy,



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The majority of dropouts are from obstructions in the working area, either blocking the signal directly or causing multipath interference (where reflections off metal surfaces arrive at the receiver out of phase and cancel). Hence, it is best to position the antenna away from potential sources of reflections, such as metal pipes and beams. The size of the "dead spots" from multipath interference is directly proportional to the wavelength of the signal, meaning that they are typically only a few inches across. With a diversity system, separating the antennas by a few feet is often sufficient (one manufacturer recommends a minimum of three feet); the two may be moved further from each other if there are persistent problems or a strange setup in the venue.

It also may be necessary to separate the antennas to avoid dropouts caused by obstructions that come between the transmitter and the receiver. Remember that you are a potential obstruction; placing an antenna behind you should be avoided whenever possible. Many RF users will put an antenna on each side of the stage, elevated to head level or a little higher (to minimize obstruction by other people, including band members), and this accommodates a variety of onstage movements. If you want to walk over a large distance, say, from the stage into the audience (feedback considerations aside), you may need to put one antenna offstage and another in a strategically chosen spot, such as at the mixing station. This trades off quality of coverage onstage for the desired additional range.

Speaking of range, remember that the environment in which you use the system almost completely determines the obtainable working range. In an open, outdoor situation, there is much less likelihood of reflective surfaces causing multipath cancellations or blocking the signal, but there may be a larger distance over which the signal will travel. In this case, it is necessary to space the antennas farther apart. In an indoor venue, the construction of the building can be a factor. Older buildings made with a lot of wood will tend to create less multipath problems than newer buildings with aluminum in the walls. This may mean that an RF system will have a drastically different working range and

antenna placement in two seemingly identical halls.

In most situations, RF systems will work reliably at a range of up to at least 50 or 60 feet, but beyond that the workable range can vary drastically with environmental conditions.



### FREQUENCY SELECTION AND INTERFERENCE

Interference is perhaps the most difficult problem to deal with using RF systems. Aside from the obvious sources (local broadcasting, multiple RF systems), interference can come from a multitude of environmental sources external to the venue, such as auto ignitions. The first line of defense against receiving any undesired signal is to set the squelch (mute/gate) level of the receiver so that only the intended signal (from the transmitter) opens it. Many RF sources create problems by putting noise on the AC lines. Line conditioners and filters can eliminate some of these problems, but sometimes the only solution to this may be to power the receivers from batteries.

RF systems share the airwaves with many other systems, ranging from radio and television stations to two-way radio, CB, and so on. Not only are RF systems regulated very tightly by the Federal Communications Commission, but the FCC has declared them the lowest priority. If your RF system interferes with any other legitimate user of the airwaves and a complaint is filed, you lose. FCC regulations strictly limit which frequencies and how much power can be used by RF

systems and require licensing for systems in the VHF and UHF bands. You heard that right. In the frequency ranges in which most professional RF systems operate, licensing is required. That's just in the U.S. There are many countries in which the RF systems discussed here are illegal. *If you are traveling internationally, be sure to check local laws or you may lose your equipment and be subject to prosecution.*

The airwaves become more polluted every day, and manufacturers have made a slow but steady climb in operating frequencies in search of open space. The UHF band is less cluttered than the VHF frequencies, but the higher the frequency, the shorter the wavelength, which makes everything from antenna orientation to operating power more critical. As a result, range is often less than in the VHF bands. What does all this mean for using your system? Everything.

First of all, the operating frequency to be used must be chosen carefully to avoid interfering with local broadcasters. Television channels 7 through 13 are often used for RF systems, but this is legal only for broadcasting and video and film production, provided the system doesn't cause interference. The FCC does not license adjacent channels in the same area, so if there is a channel 7 in your area, for example, channel 8 would be a safe choice to run on. Reputable RF systems manufacturers and dealers typically have such information available for your locality.

All well and good if the system will always be used in the same locality, but what if you're on the road? This poses a thornier problem: If there's channel 7 here, it is likely there is channel 8 in the next city. There are several approaches to solving this. One involves RF systems that can operate at more than one frequency. Some companies make systems that can be switched between two adjacent channels so that if one is a problem, the other can be selected. This is, as John Scheib of the Sands Hotel Casino in Las Vegas puts it, "A quick down and dirty thing for the guy who's traveling." Sometimes two channels aren't enough; for ultimate insurance, you may want two switchable systems operating on different channels for a total of four possible carrier frequencies.

There are also some very expensive systems that synthesize the broadcast (carrier) frequency rather than using a



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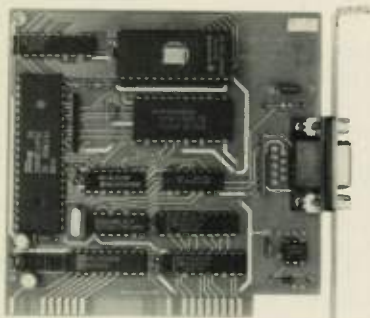
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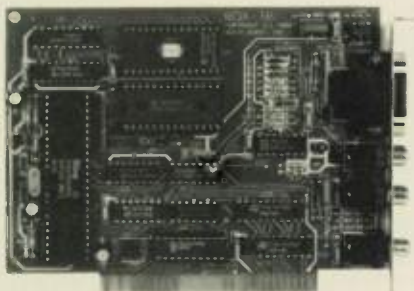


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fixed-frequency crystal. This allows choosing from as many as a dozen frequencies. Many heavy users of RF systems discourage both switchable and frequency-synthesized systems, however, because they feel that their carriers are less stable and that the front end of the receiver may not be as selective as those found in fixed-frequency systems. Additionally, the legality of using these systems is not clear. In practice, the FCC won't take action without a complaint, but it is not legal to arbitrarily choose an operating frequency for which you are not licensed.

A more brute-force method is to carry two fixed-frequency systems that operate at different frequencies and use the one that is appropriate.

The problem of interference is not even as simple as picking up transmissions at frequencies that are close to each other; modern fixed-frequency front ends are typically selective enough to filter out much of the potential direct interference. More serious is interference created by frequency mixing, wherein a carrier from some other source couples into the output stage of the transmitter and interacts with its carrier, causing intermodulation products to be generated at sum and difference frequencies for the fundamental and each of the harmonics.

#### THE WIRELESS BAND

The question of using multiple RF systems opens another whole can of worms. Now the spectrum of interference between your own systems is added to interference with local broadcasts. Multiple systems can have interference problems from operating on insufficiently spaced frequencies, from intermodulation of two carriers, or even from three-way intermodulation. Further, since receivers are not perfectly shielded, leakage between oscillators within the receivers can cause frequency mixing problems. When using multiple systems, coordination of frequencies is absolutely imperative. The more systems in use simultaneously, the messier things get.

The best way to deal with this is to coordinate frequencies from the start. Since the potential intermodulation products are so many, given a few RF systems and local broadcasting, most manufacturers (and many large-scale users of RF systems) have computer programs for calculating safe combinations of frequencies. Generally, the manufac-

## WIRELESS MANUFACTURERS

The following is a list of manufacturers that produce wireless systems, either for vocals, guitar, or both. We've also listed companies that produce MIDI wireless systems, for those of you searching for that technology.

Unless otherwise noted, companies listed sell a wide range of transmitters, such as instrument bodypack, or handheld, headset, or lavalier mics with a variety of elements from which to choose. Contact them for information. Ask for wireless product literature, a price sheet, and dealers in your area; tell them you saw it in EM.

■ **AKG Acoustics Inc.**  
77 Selleck St.  
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tel. (203) 348-2121; FAX (203) 324-1942

■ **Audio-Technica U.S., Inc.**  
1221 Commerce Dr.  
Stow, OH 44224  
tel. (503) 627-0832; FAX (503) 641-8906

■ **Audix**  
5634 W. Las Positas  
Pleasanton, CA 94566  
tel. (415) 463-1112; FAX (415) 463-2149

■ **Beyer Dynamic, Inc.**  
5-05 Burns Ave.  
Hicksville, NY 11801  
tel. (516) 935-8000; FAX (516) 935-8018

■ **Crown International**  
1718 W. Mishawaka Rd.  
Elkhart, IN 46517  
tel. (219) 294-8000; FAX (219) 294-8329

■ **Electro-Voice, Inc.**  
600 Cecil St.  
Buchanan, MI 49107  
tel. (616) 695-6831; FAX (616) 695-1304

■ **Gambatte, Inc.**  
1442 Tullie Rd.  
NE Atlanta, GA 30329  
tel. (404) 325-4843  
(Note: makes digital instrument wireless to transmit MIDI signals)

■ **HM Electronics, Inc.**  
6675 Mesa Ridge Rd.  
San Diego, CA 92121  
tel. (519) 535-6000; FAX (619) 452-7207

■ **J.B. Player International**  
PO Box 30819  
Charleston, SC 28417  
tel. (800) 333-3094  
(Note: makes guitars with built-in transmitter; no cumbersome bodypack.)

■ **Lectrosonics**  
PO Box 15900  
Rio Rancho, NM 87174  
tel. (800) 821-1121; FAX (505) 892-6243

■ **Micron Audio Products**  
210 Westlake Dr.  
Valhalla, NY 10595  
tel. (914) 761-6520; FAX (914) 761-9501

■ **Midco International**  
908 West Fayette  
PO Box 748  
Effingham, IL 62401  
tel. (217) 342-9211  
(Note: distributor for Rexer wireless systems.)

■ **MusicSoft**  
30 North Raymond Ave., Suite 505  
Pasadena CA 91103  
tel. (818) 449-8838; FAX (818) 449-9480  
(Note: makes digital instrument wireless to transmit MIDI signals.)

■ **Nady Systems, Inc.**  
1145 65th St.  
Oakland, CA 94608  
tel. (415) 652-2411; FAX (415) 652-5075

■ **Peavey Electronics Corp.**  
711 A St.  
Meridian, MS 39302-2898  
tel. (601) 483-5365; FAX (601) 484-4278

■ **RolandCorp US**  
7200 Dominion Cir.  
Los Angeles, CA 90040  
tel. (213) 685-5141; FAX (213) 722-0911  
(Note: only instrument wireless systems, no microphones.)

■ **Samson Technologies Corp.**  
485-19 South Broadway  
Hicksville, NY 11801  
tel. (516) 932-3810; FAX (516) 932-3815

■ **Sanken**  
1032 N. Sycamore Ave.  
Los Angeles, CA 90038  
tel. (213) 469-4773; FAX (213) 466-8835  
(Note: wireless mics only, no instrument wireless systems.)

■ **Sennheiser Electronic Corporation**  
6 Vista Dr.  
PO Box 987  
Old Lyme, CT 06371  
tel. (203) 434-9190; FAX (203) 434-1759

■ **Shure Brothers, Inc.**  
222 Hartrey Ave.  
Evanston, IL 60202-3696  
tel. (800) 257-4873;  
in Illinois (800) 624-8522

■ **Sony Corp. of America**  
1600 Queen Anne Rd.  
Teaneck, NJ 07666  
tel. (201) 833-5200; FAX (201) 833-9645

■ **Telex Communications, Inc.**  
9600 Aldrich Ave. South  
Minneapolis, MN 55420  
tel. (612) 887-5550; FAX (612) 884-0043

■ **Vega**  
9900 Baldwin Pl.  
El Monte, CA 91734  
tel. (818) 442-0782; FAX (818) 444-1342

turer is happy to provide you with frequency coordination service free of charge if you supply information about the locality in which you expect to operate the system and the number of systems you intend to use. If you purchase systems with this in mind, you greatly reduce the possibility of interference between your own systems. But you

don't eliminate it. If problems persist, use troubleshooting techniques to isolate the problem:

1. Turn off all systems except the one under test. If there is still a problem, it is probably an external source, which may be a broadcast or something that inadvertently generates RF energy. Check the squelch level and/or try relocating

the transmitter and/or receiver. If there is still a problem, you may be unable to use that frequency. If you can use another by switching or using a different system, this is the time to try it.

2. If there is no problem with only one system running, turn on the other receivers one by one. Only the receiver that matches the transmitter that's on



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should be heard (unquelch). Again, the problem may be proximity of the receivers to each other and relocation might solve it.

3. If no problem appears with all receivers on, try turning on transmitters one by one and see if a problem appears. If it does, systematically try different combinations to determine whether the problem is caused by two or more sources. If it is a three-source problem, for example, it will only show up when all three transmitters are on. If relocation of transmitters and/or receivers

doesn't help, you may have incompatible frequencies.

### TIPS FOR THE TALENT

Of course, even once the system is set up properly, you need to observe certain cautions. Wearing a great deal of metal bracelets and baubles or sequins on a costume could create problems from the reflectiveness of the metal and possibly even cause artifacts from the metal-on-metal contact as you move. If you are using a bodypack system, be sure that the antenna does not get curled up, ei-

ther deliberately or as a result of being tucked into clothing. Antennas lose effectiveness if they are not allowed to extend to their full length. Where handheld units with internal antennas are used, you should be aware of the adverse effect of covering the antenna with your hand, which blocks the RF radiation. Of course, you should also understand the practical limits of range and the effects of going near obstructions.

### WHEN THE GOING GETS WEIRD, THE WEIRD TURN PRO

Inevitably, there will be a certain percentage of failures that are difficult to pinpoint. The only way to deal with these sorts of hassles is with a combination of experience and those good old troubleshooting skills. Scheib tells of several encounters with cracked crystals in the transmitter. The RF systems he was using worked fine until the performer was on stage, then they failed completely. When tested in the shop later, they again worked fine—until he accidentally left a unit running under a hot worklight in the shop. Throwing the system into the dressing room refrigerator confirmed the thermal nature of the problem.

### CONCLUSION

RF systems can be a wonderful boon to a performance or production, but they can also be tricky to use. Don't expect too much from an RF system; although modern systems are of excellent quality, they still have limitations. I have yet to hear an RF system that sounds as good as a cabled microphone, no matter what any manufacturer says. The main byword for solving problems is to make sure that your thinking cap is on. Be methodical. Keep careful track of the symptoms and each tactic you try in troubleshooting. Look for dumb stuff first (bad batteries, cables, unpowered receivers, etc.). Most of all, experiment and remember what works.

(Thanks to James Einolf of Little Wing Recording for assistance in gathering information for this article and Mike Hughes and Ken Fasen of HM Electronics for fact-checking.)

*Aside from consulting and performing sound engineering with his San Francisco-based company, Toys in the Attic, Larry the O has appeared in an environmental protection suit with the Haight-Ashbury Free Band.*

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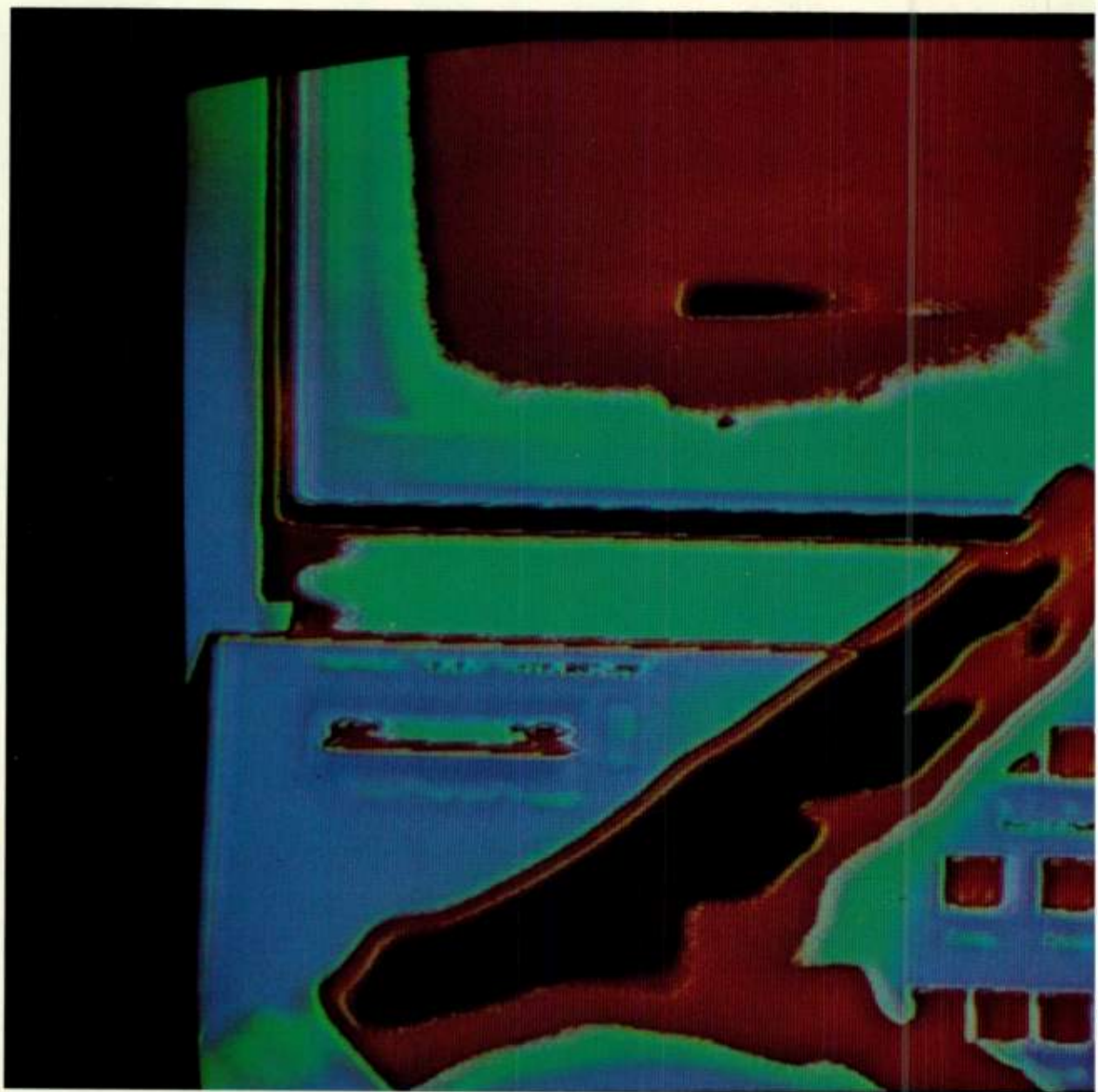
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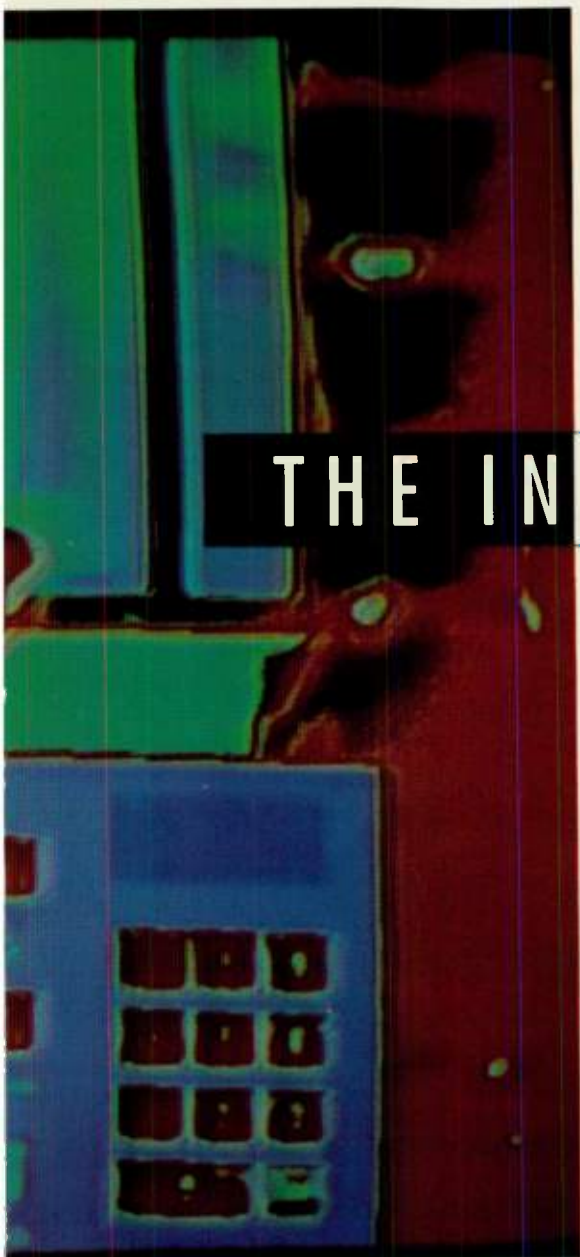




*Looking for a new outlet for your creativity? Composing and performing the music for industrial videos could prove to be a lucrative track for electronic musicians of the 1990s.*

By David Bradfield

Computer Art by Julius Vitali



f you're like most musicians who have MIDI studios, you've no doubt considered, or at least dreamt about, scoring a film or video. You've also probably immediately disregarded the thought as an impossible dream. However, if you're willing to set your sights slightly lower

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than the big silver screen, you'll find that there *is* a demand for original music to accompany video projects. Producers of industrial videos, in particular, are turning to composers with MIDI studios to meet that need. Okay, so maybe you won't be working with Steven Spielberg, but you can satisfy a demand, make some money, and have a good time in the process.

### ALL ABOARD

"Industrial video" does not refer to videos from industrial rock groups like Ministry or Skinny Puppy. In television and film circles, "industrial video" refers to educational or promotional videotapes and films a company uses to instruct its customers, train its employees, or promote a product. In many cases, an industrial video may do all three. If you've recently flown in a DC-10, chances are the safety features of the aircraft were explained to you via an industrial video projected in the front of the cabin.

Industrial videos seldom receive airplay on commercial or cable television, but they are viewed by hundreds, if not thousands, of



## ● MUSIC FOR VIDEOS

people in many diverse environments. Best of all these videos usually need music, and that's where you fit in.

Now don't get overexcited and quit your day job just yet. There's not a huge amount of work available, but the market is expanding. Although I make my living teaching electronic music, I've had the chance to score some industrial videos, as has another faculty member at our school. Several of my students also are getting into the act; it appears that there will continue to be more of this type of work available in the future.

### GET ON THE RIGHT TRACK

Until recently, low-budget videos relied heavily on music libraries. This "canned music" generally comes on cassettes or CDs and contains musical selections in a variety of styles. Although licensing arrangements vary, generally producers pay a one-time fee for the rights to use the music from the entire collection. Once it's paid for, they're free to use the music in any of their videos.

As you might imagine, most producers don't like to use this canned music

because it forces them to match their video edits to points in the prewritten music, instead of vice versa; but many do so because of budget restrictions. On the other hand, some cannot break out of this mode—they want you to write the music first so that they can make their visual edits fit your music.

Also, many video producers are keenly aware that the owner of a well-equipped MIDI studio can compose a custom, synchronized video score at a relatively low cost; others are not. Most have some idea that you can use computers and synthesizers to produce a musical score, but often are uninformed about the process and frequently have preconceived ideas about what sequenced music will sound like. Your job is to convince them that you have the creative and technical skills to do the job. But first, you need to have the right equipment.

### GEARING UP

I know, you never have enough gear. However, don't underestimate your home keyboard setup. For one of my

first projects, I had a Macintosh sequencer, Roland SBX-80 (synchronization box; see "MIDI Sync, MIDI Time Code, and Direct Time Lock" sidebar), TEAC 6 x 4 mixer, Roland D-50, Casio CZ-101, Yamaha DX7, Oberheim Matrix-6, and Yamaha SPX90. The producer specified a master format of 1/4-track tape (stereo reel-to-reel tape that can be recorded on in both directions, generally available in 1/4-inch and 1/2-inch sizes) at 7.5 ips with no noise reduction. I sequenced the music and recorded the synths directly to the 1/4-inch tape. Using today's multitimbral synthesizers with onboard effects processors, you could get by with even fewer synthesizers.

In addition to the normal synths, drum machines, MIDI switchers, multi-effects processors, etc., of a well-equipped MIDI studio, you need the following to begin producing music for industrial videos:

- At least one MIDI sequencer with SMPTE lockup capability
- A SMPTE-to-MIDI conversion box
- A color TV monitor

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1989 NOMINEE

■ A VCR with fast forward and reverse scan capability, preferably with a feature that allows you to record audio tracks independently of the video tracks (not all can). This is commonly referred to as "audio dub capability." You may also need access to a second VCR for the final mixdown.

■ A good mastering format for your final product.

You may notice there is no multitrack tape deck listed. Because I simultaneously record all the sequenced synths directly onto stereo or mono tracks, I no longer use multitrack tape unless a producer specifies it as a master format. A multitrack deck is nice to have around, but it is not a necessity.

The last two items on the list have caused the biggest headaches. Different projects call for different mastering formats. Most professional industrial work is done on  $\frac{3}{4}$ -inch videocassette, and many producers want the final product mastered in this format—meaning the music must be recorded, or dubbed, onto the videocassette tape. Because I don't own a  $\frac{3}{4}$ -inch VCR, this means borrowing or renting a deck to make the final master. The process involves taking the video output from the first video machine, synching the sequencer to SMPTE time code striped onto the audio track of the first deck, and then running the video output synchronized to a stereo audio mix of the sequence and recording it all onto the second VCR.

Some directors don't care whether I give them the audio with the picture or not and have specified masters on everything from chrome audio cassette to  $\frac{1}{4}$ -inch tape. In fact, many of the producers I've worked with simply drop in the music the best they can during final assembly of the video master. In those cases, I just took the place of the pre-recorded music they would've otherwise bought from a music library.

### MAKING THE RIGHT CONNECTIONS

As in other areas of the music business, you need to hand out demo cassettes to get work. It's important to produce the demo in your own studio so the prospective client gets a realistic idea of what you can deliver. Include a diverse collection of musical styles in very short selections and a play list to explain the context for each selection. (Example: "This cut was used to underscore a high-tech product demo.")

Audio cassettes are all you need for

demos, but it's nice to show a video of some past project. If you've never scored for a video before, it's easy to gain experience. There are many student producers in the video/film departments of large universities. To get my first video experience, I put up a sign at a local university that said, "Composer willing to write original electronic score for your film or video." My first few projects were for student producers, and my only compensation was a  $\frac{1}{2}$ -inch VHS copy of the final product, but I had video copies to show potential employers.

As an added benefit, those student producers graduated and went to work. They passed my name around, and suddenly I was getting paid to write music.

Some of my best contacts came from those projects. I have always relied on personal contact to find jobs and have never mailed out unsolicited demo cassettes, but an independent producer I know gives the following suggestions:

Most large companies have their own media/video production facilities and personnel. Contact these companies by telephone or letter. Convince the in-house producer that you can provide a valuable, inexpensive service. Ask if you can send a demo tape and cover letter.

Many smaller companies will subcontract a video project to an independent production company. Lists of such companies are in a variety of trade journals. Try *The Reporter Studio Blue Book* (\$50),

## MIDI SYNC, MIDI TIME CODE, AND DIRECT TIME LOCK

**L**ocking your sequencer to SMPTE time code requires a SMPTE-to-MIDI conversion box. This device operates using one of three different techniques.

**MIDI sync:** Such older devices as the Roland SBX-80 sync box and various drum machines were among the first SMPTE-to-MIDI converters. These devices are able to generate or read SMPTE, then convert it into MIDI song position pointer data followed by the sequence continue message. You place your sequencer in external sync so it is slaved to the "master conductor" (the SBX-80 or drum machine). The synchronizer contains all the tempo mapping information (conversions between SMPTE's absolute time and MIDI's music-related time) for the song. MIDI sync works well for music, but is somewhat imprecise for Foley effects. Musical events (notes) are locked to SMPTE indirectly; any change of the tempo map moves notes away from the specifically intended frames.

**MIDI Time Code (MTC):** In 1987, the MIDI Manufacturers' Association adopted a specification for communicating SMPTE over the MIDI data stream. All tempo maps can be internal to the sequencing

package, so there is a one-to-one correspondence between SMPTE frame number and a particular beat. MTC sends a total of eight MIDI bytes to define one frame of SMPTE. MTC uses up a bit of MIDI's bandwidth, which can slow things down, but synching a sequence to tape while performing live over the top is rarely a problem (unless you can play lots of notes *really* fast). The MIDI specification does not recommend this, however, because of the fine resolution of MIDI Time Code—ideally, MTC should have its own dedicated MIDI line.

**Direct Time Lock:** This nonstandard technique for locking SMPTE to MIDI grew from a collaboration of Southworth and Mark of the Unicorn. Although it is not part of the MIDI specification, many software and hardware manufacturers have recognized its widespread application and made their products compatible. There is a one-to-one correspondence between SMPTE and MIDI, and it appears to use only 1% of the MIDI bandwidth. Unlike MTC, sequencers using Direct Time Lock must be put back into play mode each time the sequencer is stopped before sync signals will be received and responded to.



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## ● MUSIC FOR VIDEOS

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## A STOP-BY-STOP PRODUCTION SCENARIO

The first thing to remember is that you work for the producer/director (frequently the same person), who will call you back if you do a good job. Each project and director brings a different set of challenges and expectations. Some directors scrutinize every detail, while others give you free rein.

Scenarios for specific productions are different each time, but here's what to expect.

1. Initial telephone contact with producer/director.
2. You deliver a demo tape(s).
3. The producer/director selects you for the project and notifies you. Production schedules are discussed, fees are negotiated, and scripts are mailed.
4. You have the first meeting with the director for brainstorming, discussion, and script revisions. (Shooting has not yet begun.)
5. After shooting, the director delivers rough cuts.
6. You begin composing music synched to rough cuts.
7. The director hears the music in progress (synched to rough cuts) and discusses revisions.
8. The director delivers the final, timed cuts.
9. You revise the music to sync to the final cuts.
10. You deliver the music in specified final format. (Your job is done at this point.)
11. The director goes online to mix/edit final project.

That's what normally happens, but there are exceptions, such as the frantic director who calls out of the blue and wants a two-day turnaround for a fifteen-minute video. Or there's the director who says, "We've inserted another segment. I can't get the video to you, but I'll describe it over the phone and give you the exact timings." You have to be flexible enough to deal with these situations.

## FOR THE BEGINNER SMPTE/EBU Time Code

**S**MPT E time code was originally developed by NASA for precise time stamping of film and video frames shot during rocket launches. It was later adapted by the Society of Motion Picture and Television Engineers (SMPTE) and the European Broadcasting Union (EBU), hence the name SMPTE/EBU time code.

Every frame of a time-coded video or film has an 80-bit "word" of SMPTE data assigned to it. Each word is subdivided into bits that specify the hour, the minute, the second, the frame number, some sync bits (to determine the direction of play), and several user-defined bits.

Two kinds of time code are used in video production, *vertical interval* time code (VITC) and *longitudinal* time code. Vertical interval time code is an inaudible signal embedded in the picture information on videotape and, unlike longitudinal SMPTE, can be read even when the tape is stopped. However, until the cost of using VITC starts to fall, you needn't worry about it for your work in the MIDI studio.

Longitudinal time code, more common than VITC, is a high-pitched digital tone (the sound of SMPTE's digital bits whizzing by) recorded on one of the stereo audio tracks or, on some machines, on an address track. It is a serial form of data transmission, written and read one bit at a time.

There are several different standards for time code that relate to film and video frame speed:

1. The 24 frames-per-second (fps) standard is used for film.
2. The 25 fps standard is used in European video.
3. The 30 fps (non-drop) standard is used in recording studios and for black-and-white video production.
4. The 29.97 fps (drop frame) standard is used in NTSC (National Television Standards Committee) color video work.

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### • MUSIC FOR VIDEOS

#### WHISTLING IN THE KEY OF SMPTE

As a MIDI composer, I use SMPTE time code (see "SMPTE/EBU Time Code" sidebar) to lock my sequencer to the events on the videotape. I've had some problem communicating with directors about how I use SMPTE and what I need. If you tell them you need a videotape with time code recorded on it, they may assume that you want them to "burn" a time code window. This puts a small box or window usually in the lower corner of the video picture, which displays the timing information contained within SMPTE (i.e., hours:minutes:seconds:frames:subframes). One director burned a window, which also put SMPTE onto the longitudinal audio tracks, and then dutifully erased the nasty tone off the audio track (oops). The window is nice, but you don't really need it.

So be specific. Be sure you know which SMPTE format the director is supplying. You want longitudinal SMPTE time code, at a VU level of -5 to -12 dB, recorded on an empty audio track. Many people involved in video think the hotter the SMPTE signal, the better, but this is definitely not the case. If it is distorted, the SMPTE converter box will not be able to read the tone, and you will be unable to synchronize.

In general, I have concluded that if the director does not want SMPTE on your master, it is much easier to "stripe" (record SMPTE onto) the tape yourself, using the audio dub feature, as it is only a reference for you.

#### GET ROLLING

Okay, you have the job, and you've watched the videotape a hundred times. With the help of a SMPTE-to-MIDI converter your sequencer is synching to the VCR like a champ. Now, staring at the CRT waiting for the beleaguered muse to come, you wonder, "How does one write music for video?"

I say divide and conquer. Divide the video into a series of scenes, with each scene made up of a sequence of cuts. Make a list of these scenes, and start working on them one at a time. Try to keep the music simple; it should not distract attention from what's happening. Look for places where the viewer's attention span is apt to wander and try to use music to keep attention focused on the scene. Look for places where music can help smooth scene transitions.

When I work on an individual scene, I

go through the video and make a hit list of all the visual events that should be accompanied by musical gestures (hits). Once I know the times, I record those gestures in the sequencer. Then I go back and watch the scene again, listening to those events and trying to create a cohesive musical background that ties hits together.

I frequently use a leitmotiv (a short, constantly recurring musical theme used to represent an idea, person, or thing) for recurring visual themes. In a recent video project I used such a theme (sound effect) for a particular character. Every time this character appeared, I played the sound.

#### COMMON DERAILERS

Once directors realize you can synchronize musical events on exact visual cues, and they see you have a sampler, they become very tempted to have you add Foley (synchronized sounds, usually added after filming that accompany any onscreen actions, such as footsteps, knocking on doors, etc.) and other effects. I usually don't mind adding a few sound effects here and there, but you can get very overburdened doing this. When this happens, I try to remind directors that they contracted me to write music, not add sound effects.

Also keep in mind that most people will be listening to your music in mono, over a very small speaker. To make matters worse, in many places the director/producer will mix your music in the background underneath dialog, at a very low level. It's a good idea to keep your levels low while you work. If you can, monitor in mono on small speakers to get a better idea of what your music will sound like in the final product.

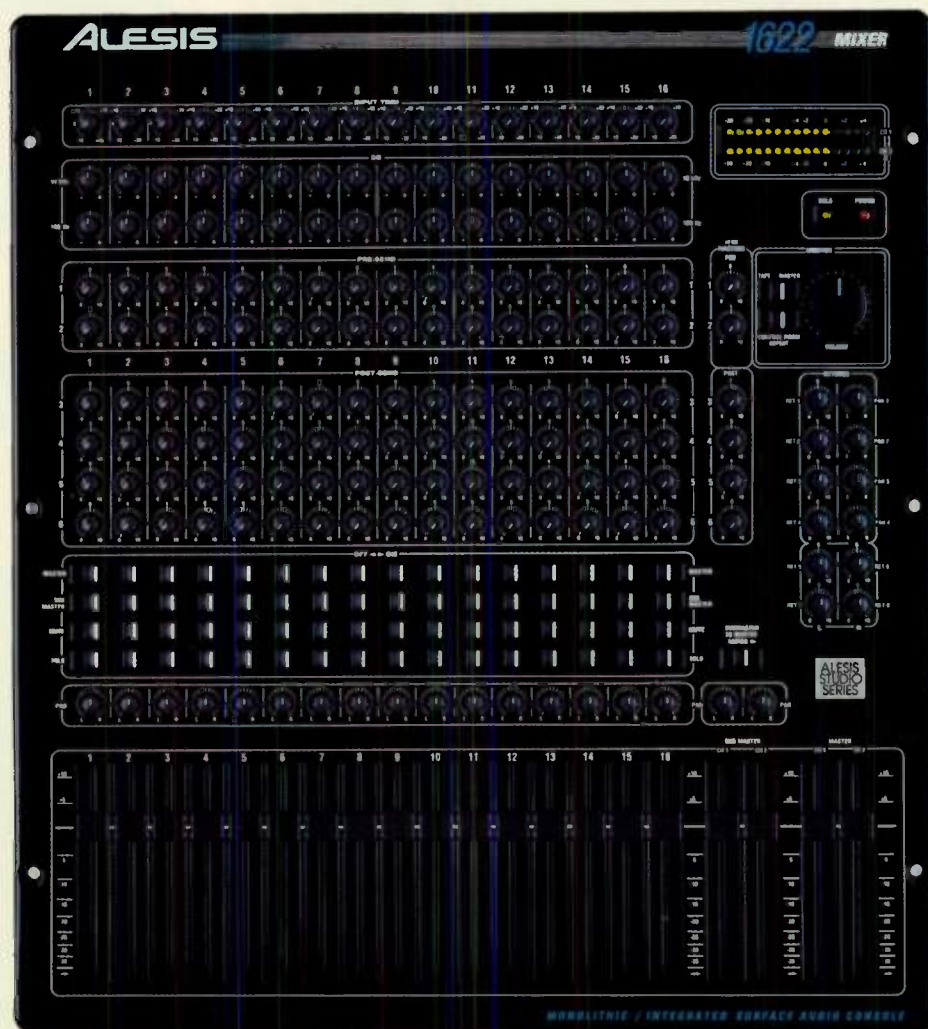
#### END OF THE LINE

I hope I've been able to demystify the process of doing an industrial video. Spending your spare time making music is even better when you can make some money doing it, and besides, being part of putting better video projects into the world is a worthwhile goal. Good luck!

(Thanks to Jim Cooper and Richard Krzemien for their help.)

**David Bradfield** is co-director of the Audio Recording and Music Synthesis program at California State University-Dominguez Hills. He has successfully MIDIed his fishing gear and now wishes to implement the MIDI Tuna Request message.

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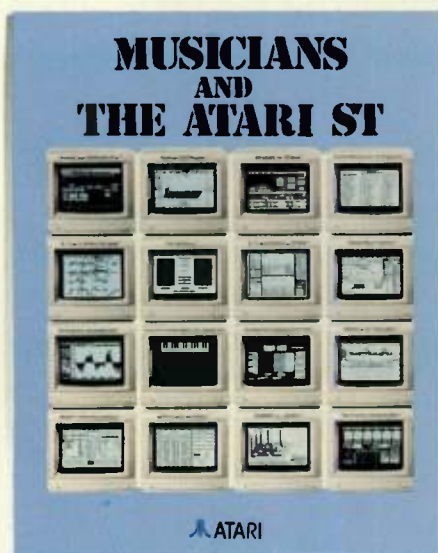




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Our ground rules were few: no books, videos, cartridges, sound disks, sample CDs/tapes, or patches (most are under \$100 anyway), no attempt at comprehensiveness, and no particular order. We also limited things to one product per company, so for example, even though a company may only have one editor/librarian software package listed, they may sell several versions for different instruments. The one bias we will admit is toward some of the smaller operations who might otherwise get lost in the shuffle.

Prices do not include shipping on those items sold direct, and in accordance with the most universal axiom of life, any of the below is subject to change without notice. Phone numbers are included so you can call for more information; we also recommend COD or credit card orders if ordering direct. Please note that inclusion in the list does not necessarily constitute an endorsement by **EM**'s staff, though many of these items really are cool.

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**MidiVU** (\$29.95; *Diemer Development*; tel. [818] 762-0804). This Amiga MIDI recording program is a "MIDI notepad": record sysex data or one track, in real time, from a MIDI instrument. Did you get an idea for a tune while working on something else? Want to save a patch bank? Use MidiVU.

**Prism** (\$99; *Magnetic Music*; tel. [203] 775-7832). A 16-track IBM PC sequencer with high-resolution color graphics and mouse

support, Prism reads *Texture* song files and features "drawing" of data curves and modular sequencing architecture.

**Superconductor** (\$60; *DW Labs*; tel. [800] 542-2454 or [201] 376-8453). A low-noise preamp that adds clarity to an instrument's sound by permitting the full frequency range of a signal, generally lost to instrument cables, to be passed to the amplifier. It offers boosts of either 2 dB or 12 dB.

**MIDIBOSS** (\$99.95; *Johnsware*; tel. [301] 927-1947). Atari ST MIDI system setup software saves and loads MIDI system configurations, i.e., the program changes,

instrument names, sysex data, and other parameters necessary to set up a MIDI system.

**Pocket Merge** (\$99.99; *Anatek*; tel. [604] 980-6850). No batteries are required for this 2-in, 1-out, mini MIDI merger. Don't let the price fool you. If you don't have a merger, this will do the job.

**Harmony Grid** (\$99; *Hip Software*; tel. [617] 661-2HIP). Mac software with a pleasant identity crisis: It's a toy, it's a teaching tool, it's a live performance instrument—and it's a novel way to experience and learn about harmony while doing any of the above.

**HR-16 Librarian** (\$40; *Triangle Audio*; tel. [703] 437-5162). Saves and loads HR-16 patterns and songs with a Commodore 64.

This page: DW Labs Superconductor. Opposite page: Crown Sound Grabber.





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#### **SSM-2120 Dynamic Range Processor**

(\$6.50; *PMI/SSM Audio Products*; tel. [800] 843-1515 or [408] 727-0917). This 22-pin integrated circuit is ideal for stereo limiter,

compressor, noise gate, and noise reduction designs. Includes two Class A VCAs and two precision level detectors.

#### **EPS-Sense**

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samples. Also shows envelopes and wavesamples graphically.

#### **Banana Keyboard Chord Computer**

(\$49; *Valhala*; tel. [313] 548-9360). Pocket calculator-sized device with LCD "keyboard" shows common chords and inversions, scale notes, diminished chords, and more; just enter the key and mode. Also shows transpositions.

#### **Midicaster**

(\$49.95; *The MIDI Connection*; tel. [503] 643-7286). Alternate operating system for the Mirage provides sysex data storage on Mirage diskettes, easier/faster disk formatting and copying, and waveform drawing. Also downloads sequences of up to 20,000 notes from an external sequencer for playback.

#### **Gen**

(\$99.29; *CMRG*; tel. [800] 289-2674). IBM-compatible, generic patch librarian stores up to 23 banks of MIDI device sysex data, with mouse/printer support and keyboard macros.

#### **MX-285**

(\$89; *Digital Music Corpo-*

## Seeds for the Record Plant.

Once those tapes are on their way, chances are your career is, too. Because if you do your demo on a Yamaha MT3X multitrack cassette recorder, nothing but the big time sounds better.

How could it when you've got dual tape speed transport working for you, with high frequency response to 18kHz. The ability to record on four tracks simultaneously, or in any combination. Six inputs, each with two aux sends and dual band EQ. Built-in, switchable dbx™ noise reduction. Auto punch in/out. Extensive monitoring capabilities. Plus easy hook-up to MIDI sequence recorders, digital rhythm programmers and MIDI computers for an even tighter sound.

The Yamaha MT3X multitrack cassette recorder, available at your nearest Professional Audio dealer. It doesn't just mean big sound, but maybe the big time, too.

™dbx is a registered trademark of dbx Incorporated.  
Many thanks to Record Plant Recording Studios, Los Angeles

*Personal Studio Series™*

**YAMAHA**

Professional Audio Division



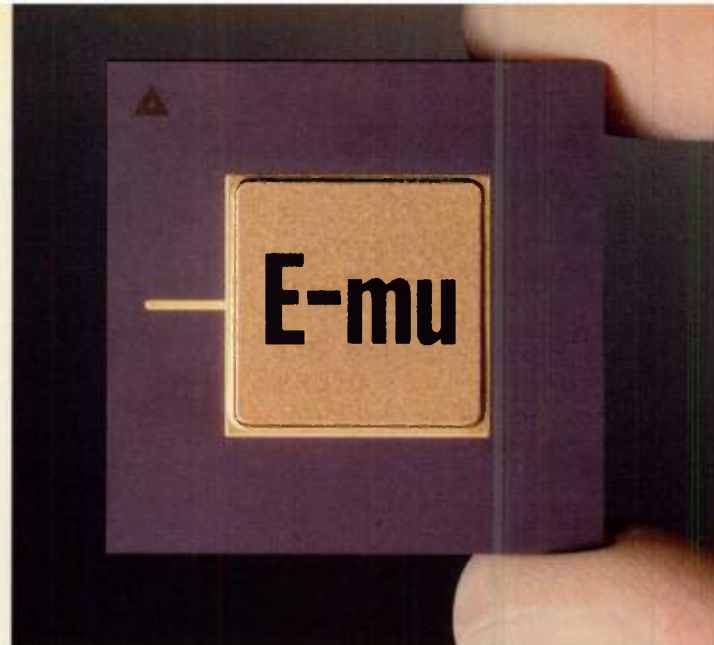


# THIS WILL CHANGE THE TUNE OF THE MUSIC INDUSTRY.

They're already singing the praises.

"The cleanest, clearest, quietest electronic instrument I've ever heard," reports *Electronic Musician*. A top contender for "Technological Innovation of the Year," says *Keyboard*.

What's elicited this chorus of raves is Proteus™ —



provides real-time access to over 40 performance parameters. So you'll never have trouble expressing yourself again.

To handle your most complex compositions,

Proteus' 32-voice polyphony responds multi-timbrally to all 16 MIDI

channels simultaneously. There are also six programmable stereo polyphonic outputs with integral effect send/returns for on-board mix-down.

Designed and supported in the U.S. by the people who pioneered sampling, Proteus is incredibly easy to use. Yet will satisfy even the most power-hungry programmer.

To hear the new sound of music, simply visit your local E-mu dealer.

Where Proteus is available for a song.

E-mu Systems, Inc.  
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*How can we deliver the uncompromised sound quality of the EIII for under \$1000? That's the \$10,000 question.*

E-mu's new 16-bit digital multi-timbral sound module.

And what makes Proteus such a noteworthy achievement is our G chip. A sliver of silicon that combines the legendary sound quality of the Emulator™ III with total, unfettered creative freedom.

For under \$1000.

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*With 192 different presets, you can loot your own horn and then some. Our Proteus XR version has an additional 192 user presets.*

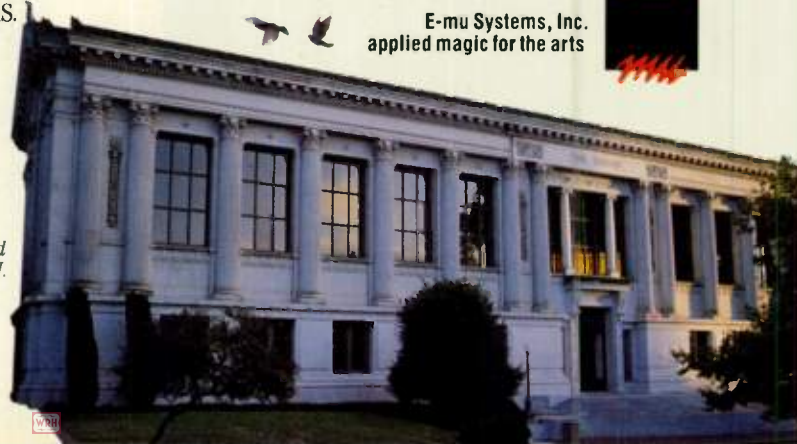
Megabytes (internally expandable to 8 MB) of multi-sampled acoustic

and electronic instruments selected from the EIII library. Plus a rich palette of digital waveforms. All stored in ROM and available simply at the touch of a button.

With Proteus' extensive programmability, you can reshape and reassemble sound endlessly. Our unique MidiPatch™ modulation system

*Proteus is your library card to the world's most revered sound library: the Emulator III.*

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## ● 100 PRODUCTS

ration; tel. [818] 991-3881). A basic, 2 x 8 MIDI data router and patcher. Now there's less reason than ever to keep plugging and unplugging MIDI cables when you want to reconfigure your setup.

**M1 Librarian** (\$99; Opcode; tel. [415] 321-8977). Save and recall your sounds for the workstation *underkind* with this program and desk accessory for the Macintosh. Like all Opcode librarians, this package also includes Patch Factory, a patch-generating feature.

**cMIDI 1.2 for the PC** (\$80 for complete, two-part package; cMIDI; tel. [517] 337-2569). Want to try creating your own MIDI programs? With this C-based language for the IBM PC you'll find the necessary tools for creating MIDI sequences and more.

**Red Box Cabinetulator** (\$99; Hughes & Kettner; tel. [215] 558-0345). You don't always have to mic an amp. This active direct box connects your guitar amp to tape recorders or mixers and includes speaker cabinet simulator circuitry.

**K1-VDS** (\$89; Musicode; tel. [800] 448-3601). Kawai K1 owners take note: K1-VDS is a full-function editor/librarian for the Atari ST. It includes a small sequencer.

**Studio Reference Disc** (\$69.95; Prosonus; tel. [800] 999-6191). Just about every test tone you'll ever need—70 minutes' worth—to tweak and calibrate your studio, all on a single compact disc. With extensive documentation.

**Keyboard Jazz Harmonies** (\$79.95; Electronic Courseware Systems; tel. [217] 359-7099). Learn the intricacies of Duke, Monk, and more with this MIDI-

equipped educational package, available for the Commodore 64/128, Apple II family, IBM PC and compatibles, and the Atari ST.

**Sideman** (\$59.95 Industrial Strength Industries; tel. [800] 537-5199 or [213] 921-2341).

A headphone practice amp that lets you play along with cassettes, drum machines, tuners, CD players, etc. With overdrive, mix, and level controls.



**Laser Music Processor** (\$99.95; TEACH Services; tel. [518] 358-2125). Music notation program for the IBM PC supports MIDI transcription, HP LaserJet or Epson dot-matrix printers, and standard MIDI files. Includes over 300 musical symbols and two laser fonts.

**Pop Filters** (\$89 w/ clamp; Popless Voice Screens; tel. [315] 492-1149). Even good close-mic technique can't always prevent explosive "p," "f," and "t" sounds from causing low-frequency pops. This acoustically transparent shield can reduce excessive breath sounds.

**Zen-On Chromatina 331** (\$79.95; MIDCO International; tel. [217] 342-9211). 84-note chromatic quartz tuner has eight variable pitch references, from A4=438.0 to 445.0 Hz. With mic and line inputs.

**MacDrums** (\$59.95; Coda Music Software; tel. [800] 843-2066). Turn your Mac into a drum machine, with a Roland-style programming grid and passable drum sounds. MacDrums doesn't offer sync capabilities, but you can map beats to specific MIDI notes when driving external drum machines. Good for amateur drummers and computer hackers who want to make drum parts without spending a bundle.

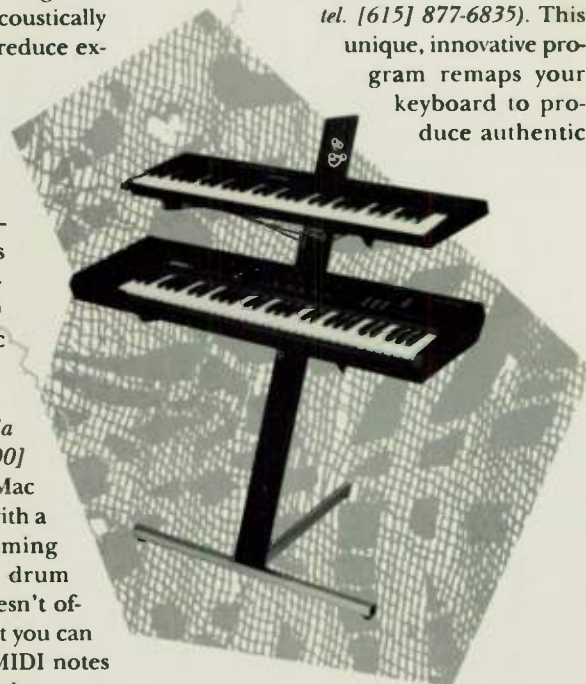
**PL-68S** (\$87.10; Electro-Voice; tel. [616] 695-6831). Geared toward live performance applications, this low-impedance, dynamic microphone (high-impedance version also available) comes with a clip, a carrying pouch, and a lifetime warranty.

**Personal Music Librarian** (\$55; Personal Database Applications; tel. [404] 242-0887). Organ-

izes recorded music and sheet music collections on the IBM or Atari ST. Stores up to twenty pages of text per entry; reporting functions create labels and reports.

**2-In, 6-Out Mac MIDI Interface** (\$99.95; Computers & Music; tel. [800] 767-6161 or [415] 543-1642). Two inputs let you use printer and modem ports (if your software supports them). The unit comes with connecting cables.

**KeyFrets** (\$35 Mac, \$15 C-64, \$25 Apple II; James Chandler; tel. [615] 877-6835). This unique, innovative program remaps your keyboard to produce authentic



From top to bottom: Zen-on Chromatina 331, Peavey Accelerator Overdrive, Ultimate Support Systems Deltex Stand.



## ● 100 PRODUCTS

guitar voicings, with fingerings shown onscreen. It's not often you find a program this good for this little.

**Just Intonation Calculator** (\$10; *Soundscape Productions; PO Box 8891, Stanford, CA 94309*). Mac HyperCard stack is a toolkit for just intonation tuning enthusiasts. Handles up to 48 notes per scale and supports MIDI tuning dumps to DX7II/TX802 series and TX81Z-compatible synthesizers. Also supports the original DX7 with E!

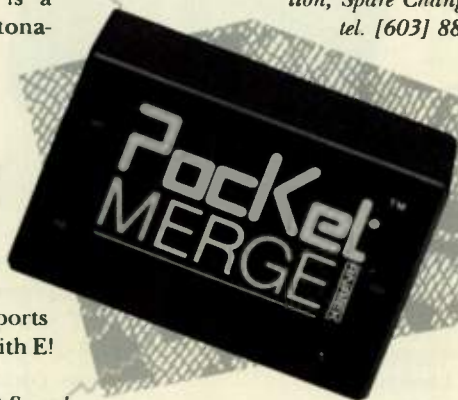
**EBow** (\$99.95; *Heel Sound Products; tel. [213] 687-9946*). This handheld, "poor man's guitar synthesizer" drives single guitar strings into infinite sustain. Great for raunchy feedback, but also

gives (among other things) cello and woodwind sounds. (Incidentally, when we called to verify the price and availability, the owner said that as a favor to **EM** readers he'd take \$20 off the list price.)

**TZQUAD** (\$99.95 without installation; *Spare Change Music Products; tel. [603] 882-8711*). Increase your TX81Z's

memory capacity four-fold, to 128 voices and 96 performances, by adding this retrofit RAM board. User-installable by those familiar with electronics.

There are a limited number of 4x expanders left, as the company is switching to 5x expanders (\$119.95).



**MidiDraw** (\$69; *Intelligent Music; tel. [518] 434-4110*). Ever pondered the philosophical dilemma of how paintings relate to music? This ST program lets you use your mouse as a MIDI controller. While you sketch with the mouse, your movements are converted to MIDI data. You can record up to four "players" at once and save your pieces as standard MIDI files.

**Pedal Organizer** (\$29.95 for 22-inch length; *Sound Logic; tel. [619] 789-6558*). Includes a nonskid aluminum base plate and velcro strips to secure floor effects and "stomp boxes" in any desired order.

**Practice Amp** (\$53.30; *GHS Strings; tel. [616] 968-3351*). No-frills headphone practice amp for guitarists

This page: Anatek Pocket Merge. Opposite page: Benchmark HPA-1 Headphone Amplifier.



includes headphones, battery, and two volume controls for clean or distorted sounds. With clip for belt or strap.

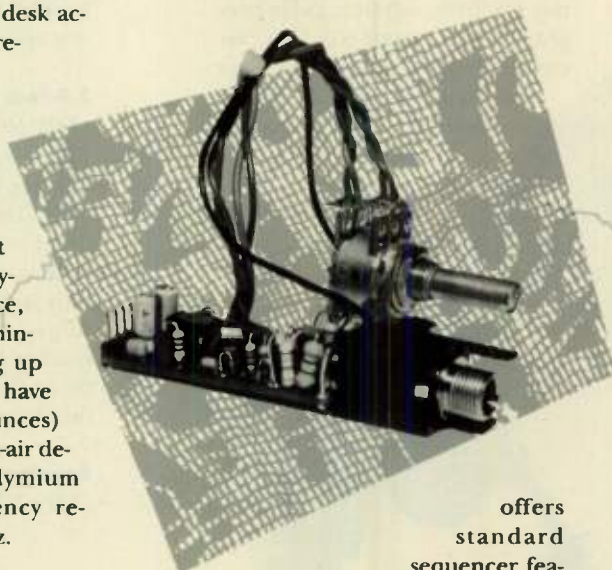
**Sys-Ex Filer** (\$79.95; *Altech Systems*; tel. [318] 226-1702). Mac desk accessory lets you send and receive any bulk MIDI data without quitting your sequencer.

**HD-450 Headphones** (\$79; *Sennheiser*; tel. [203] 434-9190). It's 3 a.m. at your home studio. Everybody's here but the police, and they'll be here any minute. Instead of cranking up the speakers, you should have used lightweight (4.7 ounces) headphones with an open-air design, high output, neodymium magnets, and a frequency response of 20 Hz to 20 kHz.

**MIDI Interface** (\$99; *Apple Computers*; tel. [408] 996-1010). It's only 1-

in and 1-out, but it's available from Apple dealers and has the Apple logo.

**GFMusic** (\$79; *GFMusic*; tel. [813] 961-9207). IBM sequencer



offers standard sequencer features in a budget package: looping, merging,

mute/solo, quantizing, copy/cut/paste editing, 255 tracks, many editing functions available in real time, and more.

**Roland D-50 Librarian Desk Accessory** (\$99; *Zero One Research*; tel. [415] 467-5007). Transfer individual patches, just the upper or lower tones, or entire banks to and from your Mac, without quitting another program (e.g., a sequencer).

**MA-10 Amp** (\$33; *Fender*; tel. [714] 990-0909). This 6-inch-tall replica of a Fender amp drives its speaker with up to 4 watts of power. Perfect for practicing on the road or tuning up backstage.

**FX-35 Octoplus** (\$99.95; *DOD/DigiTech*; tel. [801] 268-8400). Add the depth and power of a downwardly pitch-shifted octave to every note you play on your guitar (or synth) with this compact pedal effect.

## NOW YOU DON'T HAVE TO GO TO PIECES TO GET SOPHISTICATED 8-TRACK PRODUCTION.

Up to now, to achieve 8-track recording you needed a room full of equipment, four arms, and more wires than the phone company.

Enter the Tascam 688 midi-studio. A completely integrated 8-track production system with all the capabilities of a recorder, mixer and synchronizer.

And at \$3295,\* it costs less than buying components individually.

There are twenty inputs for you to work with, four of them stereo. Plus, an Automatic Mixer Routing system that simplifies multi-track mixing.

By recording onto standard audio cassettes, the 688 offers convenience at a cost savings. And you won't believe how good it sounds. With sonic capabilities that go head-to-head with any 8-track reel-to-reel.

So get down to your local Tascam dealer and hear the new 688 for yourself. You'll see we've got it all together.

# TASCAM®

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\*Manufacturers suggested retail price.



## ● 100 PRODUCTS

**Korg M1 Dust Cover** (\$20; *Gotcha Covered*; tel. [800] 348-5003 or [800] 321-8391 in Indiana). Protect your keyboard with a cover to keep dust and dirt out of its delicate innards. Also available for D-50, DX7II, Ensoniq products, Emax, KX88, K1000, K1, etc.

**GM-70 Companion Editor/Librarian** (\$99.99; *Snap Software*; tel. [619] 490-8038). This IBM program lifts the veil of mystery from the GM-70's display, showing all parameters on screen. Edit patches or save/load patches and banks.

**DT-2** (\$79; *Korg*; tel. [516] 333-9100). This digital, chromatic tuner is available in a choice of five colors. The unit offers a built-in con-

denser mic, a line input, and a bypass line output.

**Tweak It!** (\$69.95; *MIDImouse Music*; tel. [503] 622-4034). Control up to sixteen MIDI devices with this hip little software fader program for the Atari ST. You can create multiple groups of faders and assign any of them to send any type of MIDI message, including sysex.

**3-M Ear Plugs**  
(ten pair/\$6;  
*EM Book-*



shelf; tel. [800] 233-9604 or [415] 653-3307). The most inexpensive item on the list is also one of the most important. These form-fitting plugs offer a broadband 31 dB reduction in gain, letting you hear all the sound you need, but at a lower volume. Save your ears.

**3.5-inch Double-Sided Diskettes** (\$49/100; *MEI/Micro Center*; tel. [800] 634-3478). Yes, you can actually get 100 products for under \$100. These generic disks are certified error-free and have a lifetime warranty. They're available only in lots of 25, and prices are subject to change according to market conditions; call first. At this price, backing up is cheap data insurance.

**Overtone** (\$99.95; *Syntonyx*; tel. [703] 777-1933). A Kawai K5 voice

This page: Popper Stopper,  
Opposite page: Beyer DT 325  
Headphones.



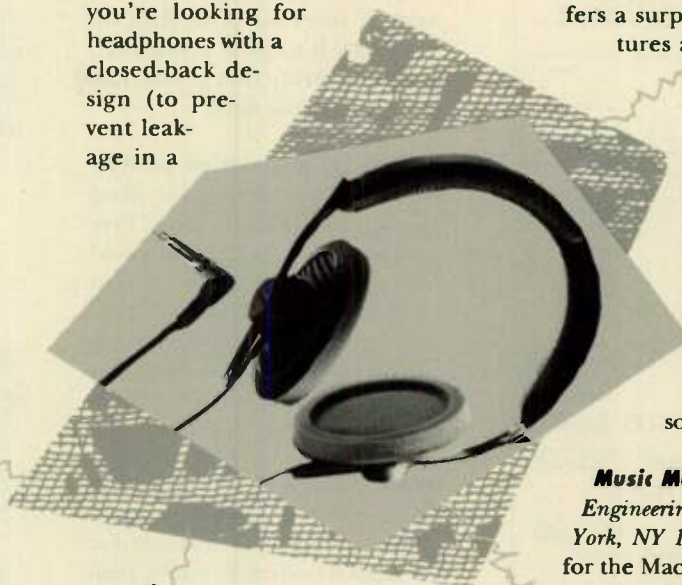
editor/librarian for the PC and compatibles that, in addition to standard features, allows you to take a segment of a sample from sample files and convert it into an additive waveform in K5 format.

**Rack Bags** (most sizes \$72 to \$96; *Hybrid Cases*; tel. [516] 563-1181). These lightweight cases for rack-mount equipment are constructed of 1/4-inch plywood, padded with foam, and covered with waterproof, rip-proof nylon cordura. Sizes range from one to four rack spaces in 11-, 14-, and 18-inch depths.

**The Anything Box** (\$69; *Music Mind Magic*; tel. [612] 891-4115). This MIDI programming language for the PC allows you to put together your own MIDI processing programs and more. Requires an MPU-401 or compatible interface.

**ATH910** (\$99.95; *Audio-Technica*;

tel. [216] 686-2600). If you're looking for headphones with a closed-back design (to prevent leakage in a



recording situation), these may meet your needs.

**Twelve** (\$89; *Steinberg/Jones*; tel. [818] 993-4091). A slightly cut-down version of Steinberg's Pro-

24 sequencer, this ST package offers a surprising amount of features and editing functions for the buck.

**HM-2 Heavy Metal Distortion Pedal** (\$99.50; *Roland Corp.*; tel. [213] 685-5141).

Turn yourself into a speed metal freak with a quick touch of the foot, using this very crunchy-sounding stomp box.

**Music Mouse** (\$79.95; *Aesthetic Engineering*; 175 Duane St., New York, NY 10013). Now available for the Mac, Amiga, and Atari ST, this "intelligent instrument" lets you play multipart harmonies in several different styles, all without hitting any "wrong" notes, simply by moving a mouse. Mac and Amiga owners can use the computer's sounds; Mac, Amiga, and

## YOU CAN JUDGE A KEYBOARD MIXER BY THE NUMBER OF PLUGS IT RECEIVES.

Twenty eight. Count 'em, twenty eight different inputs into the MM-1 keyboard mixer from Tascam.

That includes 12 mono channels, 4 stereo channels, 4 effect sends and 4 stereo returns. You're not going to run out of channels any time soon with the MM-1.

Once you've got the input inside, the rack-mountable MM-1 gives you full EQ on all channels. That's the kind of fine tuning control that other keyboard

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

In addition, the MM-1 can memorize up to 100 channel-muting settings, or "scenes," which are then MIDI-addressable for instant recall right from your keyboard.

See the rugged, compact MM-1 at your Tascam dealer.

And then take a look at the incredible suggested retail price of \$1095.

At that price the only question is, when will you plug in the MM-1?



# TASCAM



## Editor/Librarians

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MS3000

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**KEEP YOUR EARS PEELED.**

We're about to redefine what the synthesizer is. And what it sounds like.

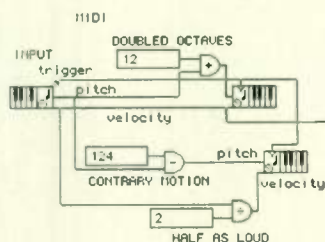
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**EM's Reader Service**  
**cards on page 138.**

Now anyone can create  
real-time music algorithms, and...  
(continued on page 112)



**HookUp!**  
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\$149

As seen in *MacWorld* and  
*Computer Music Journal*.

Call (617) 661-2HIP  
for a demonstration disk.

## ● 100 PRODUCTS

**CodeHead's MIDIMAX** (\$49; Code-Head Software; tel. [213] 386-5735). Create MIDI macros; do real-time, multivoice, multichannel harmonization; and turn your Atari ST into an intelligent MIDI thru box with unlimited splitting, filtering, and remapping via this GEM desk accessory or stand-alone program.

**Deltex** (\$99.99; Ultimate Support Systems; tel. [303] 493-4488). A less-expensive version of the company's Apex keyboard stand, the Deltex offers space for two keyboards in a small, good-looking, easily portable package.

**ABS-1 A/B Box** (\$99.95; Pro Co Sound; tel. [800] 253-7360 or [616] 388-9675). Need an easy way to quickly switch between two audio sources? Using this rugged A/B box might be just the ticket.

**Tiger Cub** (\$99; Dr. T's Music Software; tel. [617] 244-6954). This icon-based, 12-track sequencer/editor/notation program for the Atari ST and Commodore Amiga includes 384 ppqn resolution; real-time and step-time recording; SMF support; basic notation and score printing; and extensive, interactive (real-time), graphic editing.

**SK-2** (\$99.95; Casio; tel. [201] 361-5400). The successor to the tremendously fun SK-1 sampler, the SK-2 offers fewer preset tones and rhythms than its suc-

cessor but still has the ability to loop and reverse samples as well as create waveforms with very crude additive synthesis.

**Listen** (\$99; CTM Development; tel. [415] 573-8945). Increase the musical aptitude of your ear with this nifty Macintosh ear-training program. In addition to MIDI input and output capabilities, Listen supports the Mac's internal sounds and shows chord fingerings for keyboard and guitar.

**Vocoder Kit** (\$99.95; front panel additional; PAiA; tel. [405] 340-6300). Why pay for



assembled products when you can build them yourself? In fact, it's hard to find a decent, already-assembled vocoder, especially one with sound quality this good.

**Algy** (\$25; Music from the Cabin; tel. [414] 736-9434). Turn your Commodore 64 into an algorithmic composition tool with this basic, low-cost package. In addition to adjusting note parameters, the program lets you send lists of MIDI messages (such as controller changes) in midstream.

**Real-Time Microtonal Disk** (\$39.95; Upward Concepts; tel. [603] 659-2721). Provides the Ensoniq Mirage with polyphonic, dynamic, real-time microtonal tuning via MIDI (with MIDI volume). The



From top: Four Designs Rack-drawer, Hybrid Cases Rack Bags.



L.A. East Studios, Salt Lake City, Utah

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Introducing the DSP-256. A High performance, multi-effect digital signal processor with features like: 20 HZ to 20 KHZ bandwidth, 16-bit resolution featuring 24 different effect configurations, plus 128 factory programs and 128 user programs, effect routing and full MIDI mapping capability. Now that's power.

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*Studio remote included.*

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# Feature Shock!

Otari's new MX-50. Built around the premise that you can have everything you ever wanted in a two-track tape machine, and still stay within your budget. For example:

## The Transport

—DC quartz PLL capstan motor with front panel selection of operating speeds (from either a 15/7.5 or 7.5/3.75 ips speed pair).

—Capstan speed variable by  $\pm 7\%$  from the front panel, and by  $\pm 50\%$  from SMPTE

time-code external controllers via an Otari-standard 37-pin connector.

—Optional remote control.

## The Electronics

—Lighted VU meters with peak-reading LED indicators.

—Transformerless active balanced inputs with X1-type connectors.

—Optional Voice Editing Module (VEM) for twice normal play speed with normal pitch.



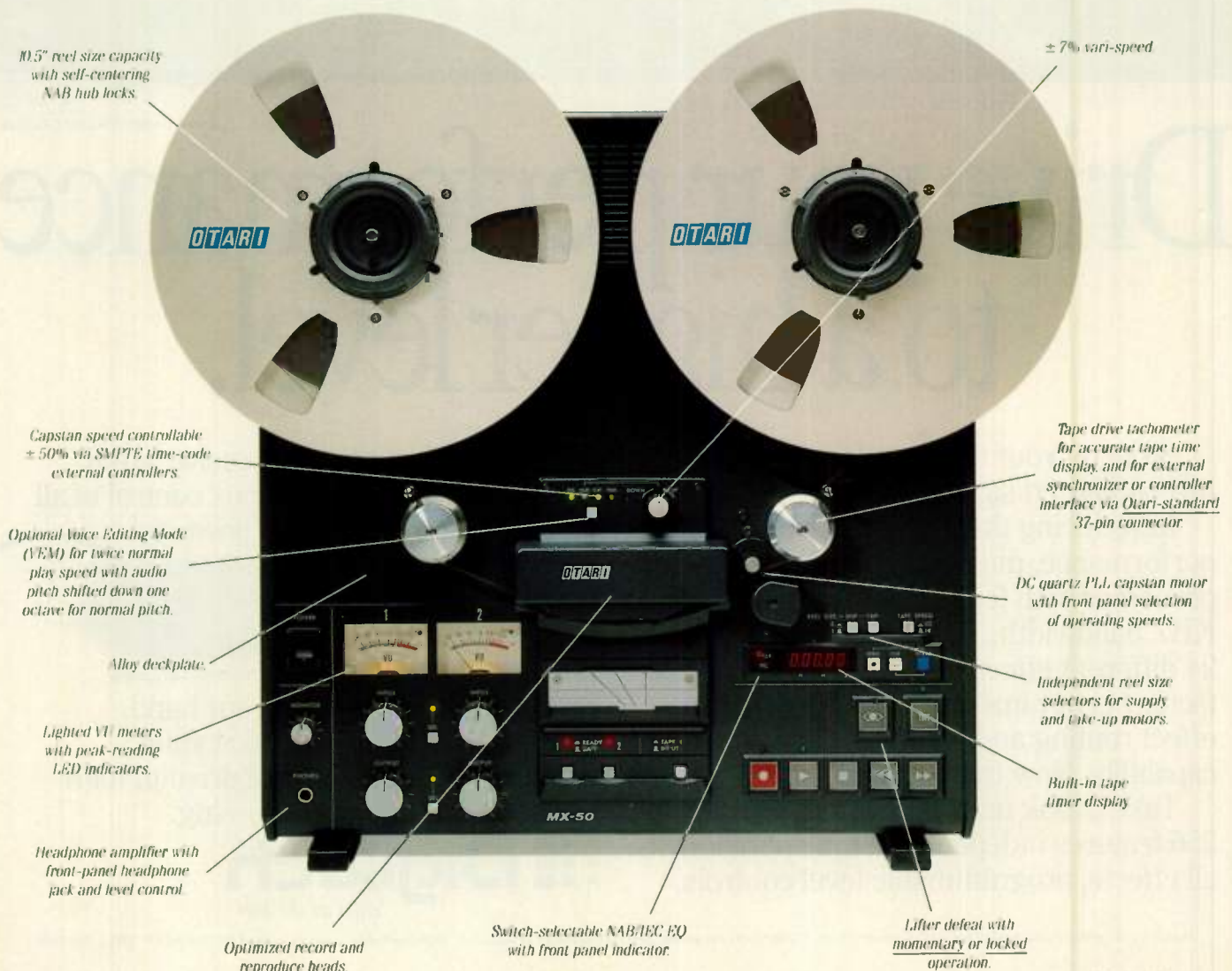
A built-in tape timer displays current tape position in hours, minutes, and seconds, and includes a search-to-cue locator with cue point and zero location memories.

Otari's MX-50. For whenever or wherever you need a professional

audio machine at an affordable price.

For more information, call your nearest Otari professional audio dealer, or Otari Corporation at (415) 341-5900.

# OTARI®



## ● 100 PRODUCTS

company makes several other alternate operating systems in the same price range.

**Different Drummer** (\$99.95; Primavera Software; tel. [206] 868-6360). The onboard sounds in this Mac program are unimpressive, but programming drum parts (on a Roland-style grid) is easy and fast, and completed parts—including looped sections—can be saved as standard MIDI files for transfer to pro sequencers or drum machines.

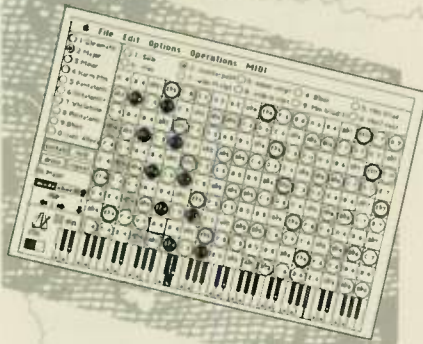
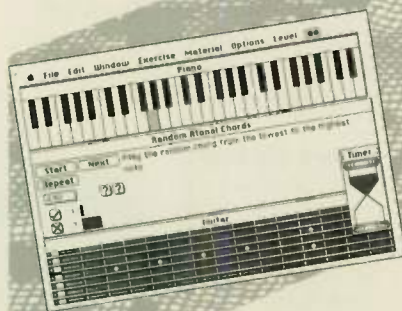
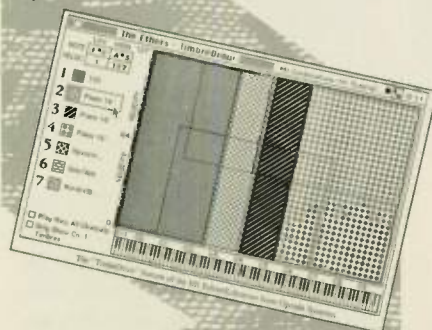
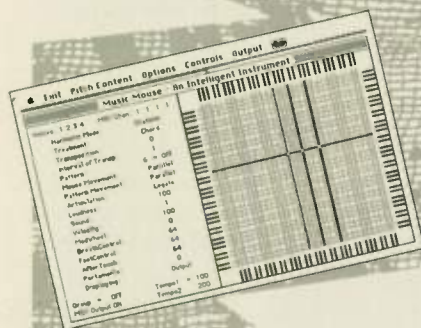
**MN-50** (\$75; Fostex; tel. [213] 921-1112). Home recording enthusiasts looking for handy little accessories that extend the capabilities of their studios should be knocked out by this 5 × 1 line mixer, which includes a built-in compressor.

**Sound File ESQ** (\$95; Blank Software; tel. [415] 863-9224). This Macintosh librarian lets you store banks and banks of your Ensoniq ESQ-1/SQ-80 patches and also permits you to store, name, and transfer sequences generated on the instruments.

**Guitar Wizard** (\$34.95; Baudville; tel. [616] 698-0888). Turn your Mac into a guitar teacher with this educational software package. The fretboard display teaches notes, scales, chords, and appropriate fingerings for all of the above.

**GlassTracks** (\$69.95 for C-64, \$99.95 for Apple II family; Softpac; tel. [800] 336-SOFT or [818] 702-8963). Commodore 64 and Apple II owners, take heart. This basic sequencer program offers eight tracks per sequence, quantization, track bouncing and transposition, and several demo songs in different musical styles.

**MonKEE Test Monitor Program** (\$29.95; Kee Electronic Enterprises; tel. [800] 533-6434). IBM-compatible program monitors and displays MIDI input and can output sequences of MIDI code for testing.



From top: Steinberg Twelve, Aesthetic Engineering Music Mouse, Opcode M1 Librarian, CTM Development Listen, Hip Software Harmony Grid.

**MiniMixer** (\$99.95; MusicSoft; tel. [818] 449-8838). Here's a pocket-sized, battery-powered mixer that is configurable as a dual-input 4 × 2 or an 8 × 1. Frequency response is reported to be 20 Hz to 20 kHz (±3 dB), with a signal-to-noise ratio of 90 dB (-dBm signal in unity gain mode).

**MusicEase** (\$99.95; Grandmaster, Inc.; tel. [509] 747-6773). A WYSIWYG notation program for the IBM PC and compatibles, MusicEase includes support for an unlimited number of staves and offers input from the computer keyboard or via MIDI. It requires a CGA or EGA graphics adaptor.

**Prologue Model 22-L Mic** (\$76.50; Shure; tel. [800] 257-4873). This supercardioid, low-impedance, dynamic microphone offers good feedback rejection and a frequency response tailored for vocal intelligibility and crispness. A high-impedance version is also available.

**Cat Tracks** (\$79.95; Quiet Lion; tel. [818] 765-6224). Intended as a companion program to the company's Music Printer GS notation package, this new C-64 sequencer offers eight tracks, individual event editing, and compatibility with Sonus and Syntech file formats.

**Deluxe Music Construction Set for Amiga** (\$99.95; Electronic Arts; tel. [415] 572-ARTS). One of the early mainstays of computer notation programs is still available for under a "C-note" in its Amiga incarnation. The program supports up to eight staves, allows step-time MIDI input, and will play back scores with the Amiga's internal sounds or over MIDI.

**Pocket Rock-It** (\$69.95; CB Labs; tel. [203] 335-1093). Tiny practice amp for guitarists features clean/edge/distortion and tone switches along with a volume control. A bass version is also available.

**Take Note** (\$79.95; Take Note Software; tel. [415] 431-9495). Use this



## ● 100 PRODUCTS

Atari/Amiga ear-training software to improve your listening skills without going back to school. Features include MIDI and internal sound chip playback, and keyboard and guitar fingerboard displays.



### **BLS/81**

(\$49.95; Bartleby Software; tel. [214] 363-2967). More than a Yamaha TX81Z editor/librarian for the IBM PC and compatibles (with DOS 2.1 or later), this handy little program includes context-sensitive help for every field and function and utilities that allow quick data-loading and convert banks in other formats to BLS/81 format.

**D70ME** (\$85; AKG; tel. [800] 243-7885 or [203] 348-2121). A dynamic microphone with a cardioid pick-up pattern and an XLR connector, the D70ME should work well in any home studio on a budget.

**DT 325** (\$65; BeyerDynamic, Inc.; tel. [516] 935-8000). Lightweight (2.3 oz.), large-diaphragm headphones with a full frequency response and a choice of mini-plug or 1/4-inch jack connections. We would be remiss if we didn't also mention that the foam cushions are available in a choice of three colors.

**EditTrack II** (\$99; Hybrid Arts; tel. [213] 841-0340). A 60-track sequencer for the Atari, this program features graphic editing of notes and controllers, sophisticated quantization, linear and

drum machine-style recording, support for standard MIDI files, and more.

**BasicMIDI** (\$99; Optronics Technology; tel. [503] 488-5040). MIDI interface card for the PC and compatibles offers in, out, and thru ports. It's not MPU-401 compatible, but there are several programs that currently support it, and more are in the works.

**HyperMIDI** (\$35; EarLevel Engineering; tel. [213] 316-2939). Add MIDI to HyperCard with the XCMD and XFCN resources included here. Once you do, you'll be well on your way to creating your own non-real-time MIDI applications (editor/librarians, etc.) for your Mac.

**ES-100 Effects Shelf** (\$29.95; 360 Systems; tel. [818] 342-3127). Can't seem to find a place in your studio for those guitar floor pedals, tuners, drum machines, and other accessories? Make use of this very handy 3U, angled, rack-mount shelf. It even comes with Velcro fasteners.

### **Rhythm Machine**

(\$65; Gateway Software; tel. [216] 533-9024). Specifically geared toward the creation of drum patterns, this program for the PC and compatibles includes pattern generation functions, editing, and real-time controls.

**Accelerator** (\$82.99; Peavey Electronics; tel. [601] 483-5365). The Accelerator pedal offers "tube-style" overdrive and sustain; sensitivity, output-level, and drive controls; and an LED "on" indicator.

It operates with either a battery or an optional AC adapter.

**THP-220 Headphones** (\$60; Tascam; tel. [213] 726-0303). These lightweight, open-air headphones deliver a clean, full sound for a budget price.

**HPA-1 Headphone Amplifier** (\$60; Benchmark Media Systems; tel. [315] 452-0400). Try installing this module to add a stereo headphone amp to a mixer or other audio gear. The HPA-1 drives high-impedance (60 to 600Ω) headphones but will also drive 8Ω headphones and includes a 10 kΩ unbalanced input. Bandwidth is greater than 60 kHz, and THD (at 2 kHz) ≤0.05%.

**Sound Grabber Microphone** (\$99; Crown International; tel. [219] 294-8000). Pressure zone microphones are great not only for musical applications, but for interviews or home videos. The Sound Grabber can be handheld or placed on a floor, table, etc. It contains a battery but cannot be phantom powered.

**EM Subscription** (\$14.95; Electronic Musician; tel. [800] 334-8152 or [800] 255-3302). Would we dare

end on a shameless plug? Well, yes, but we think there's a good reason for it. If you want to stay on top of



development in this rapidly changing industry and learn how to take advantage of the equipment you own, you need to receive a high-quality, entertaining source of information on a regular basis. As far as we're concerned, you're now reading the best one available.

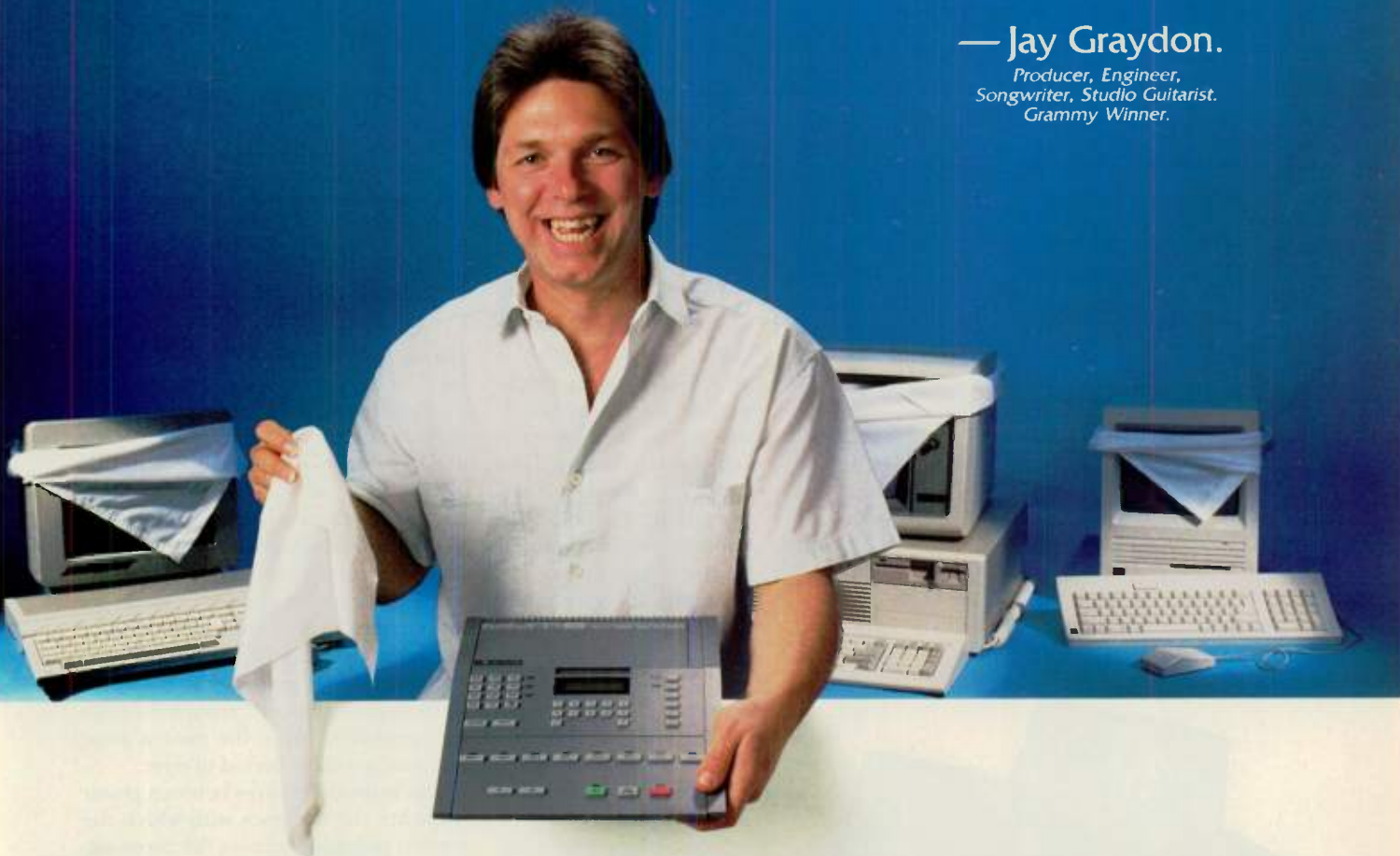
*Have a joyous holiday season.*

Top: Get Organized Cord Control. Bottom: MusicSoft Mini-Mixer.

***"In blindfold listening tests with the best software sequencers, the Alesis MMT-8 won hands down for the best feel."***

**— Jay Graydon.**

*Producer, Engineer,  
Songwriter, Studio Guitarist,  
Grammy Winner.*



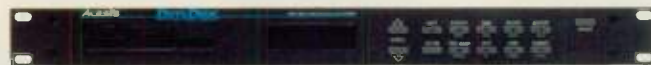
Personal computers are great for editing notes and sorting out the MIDI spaghetti in a complex composition. But when it's time to play your latest song they often miss the beat.

There's a reason. Personal computers have to deal with many tasks simultaneously. The notes in your composition have to fight for time on a computer that's busy updating a screen, checking a mouse, and doing other non-musical tasks. Even if you quantize your music, this results in random timing errors during playback, which is readily perceived as a loss of feel. We call it *MIDI slop*. You wouldn't accept sloppy playing from a triple-scale studio band, so why accept it from your computer?

The MMT-8, on the other hand, is the best sequencer you can own because it was designed to perform only one task: making music. It plays back notes exactly as you played them in, or exactly how you want them quantized. All with pin-point accuracy, so your songs will have the exact rhythmic feel you intended. The same *meaning*.

At less than the price of the average sequencer software, you can't afford not to add the MMT-8 to your MIDI studio. Plus, its logical 8-track layout and tape recorder style controls will keep you gravitating to the MMT-8 for all your songwriting. And some astonishingly comprehensive editing too.

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a demonstration.





# P ower

**Big, boring, black boxes? Not quite. The differences between today's power amps can be significant, so it pays to know what's watt when you're looking for the right amp.**

## mplifiers

Basic Studio Series, Part 2

A decent power amplifier is an essential part of a high-quality home studio. It may not be the most exciting piece of equipment you'll ever buy, but it will have a profound influence on the sounds you'll be able to hear.

Amplifiers have many jobs, but one essential purpose: to increase the strength—either voltage level, current-delivering capacity, or both—of an audio signal. *Preamplifiers* take the relatively tiny voltages from transducers (such as microphones, phono cartridges, and magnetic tape heads) and increase them (hopefully with little measurable

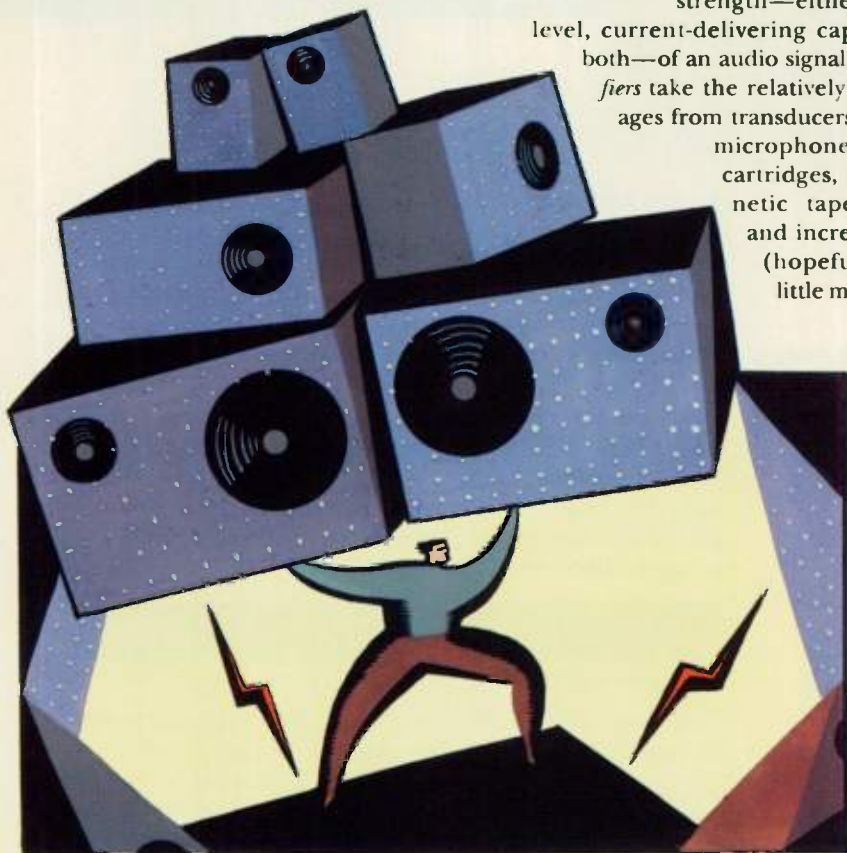
change) so that they can be manipulated or patched to other, higher-level equipment. *Power amplifiers* increase a signal's ability to deliver large amounts of current to a load, such as a speaker.

Explained in simple terms, speakers require a great deal of electrical current to convert audio signals into variations in air pressure; a power amp serves as a huge reservoir of current, delivering that current to the loudspeaker according to variations in the input signal. For example, if the input signal exhibits a sudden peak, current rushes through the speaker to move the cone a great distance in a short period of time.

The main differences between power amps are the accuracy with which the current pumping mimics the input signal, the efficiency (i.e., how much energy is lost during the pumping process), and the reservoir's ability to rapidly regain its full capacity after delivering huge amounts of current.

Although amplifiers are sometimes used as signal processors (for example, guitarists routinely drive their amps into distortion), in the studio you want your main monitoring amp to be as sonically pure and accurate as possible. It must be able to increase the signal originating from mixer/consoles, tape decks, or musical instruments to the highest levels required and do so without even an audible trace of amplifier-induced distortion.

You might think that choosing an amplifier for your own studio setup would be a simple task—after all, a watt's a watt—but there is a bewildering array of competing technologies. Fortunately, most modern power amplifiers boast



By Daniel Kumin

pretty respectable specs, so it's hard to go too far wrong; but subtle variations may favor one type of technology over another for your particular setup, as we'll soon see.

#### POWER AND LOADING

Amplifier power, the number most people ask about first, is usually stated in *watts per channel (W/ch)*. In itself, this is a fairly meaningless spec; power ratings must be given in continuous average, or "RMS" (root-mean-square) watts per channel; with both channels driven (most amps can produce more clean power in a single channel at a time); within a known frequency range; at a specified distortion level; and with a specified load. For example, a typical "100-watt" amp might be rated "100W/ch (both channels driven) into 8-ohm loads, at less than 0.05% total harmonic distortion, 20 Hz to 20 kHz  $\pm 1$  dB."

The load in this example is the impedance, expressed in ohms, seen by the amplifier's speaker terminals. Many loudspeakers are rated as "nominal" 8-ohm loads. Actual speaker impedance commonly dips much lower, depending on the frequency content and level of the signal. An amplifier's behavior when driving low impedances can tell a lot about the current reservoir's pumping capacity. If a given amp's 4-ohm continuous power rating is substantially higher than its 8-ohm rating, it's a good sign.

Some stereo amplifiers also offer "bridged" operation, which lets you interconnect the two stereo channels to form one monster mono amp that delivers (usually) the sum of the stereo channels' power. If you're going to use your amp to drive your monitors and then take it out on the road to drive a speaker stack for your bass, make sure your amp has bridging capabilities.

#### THE TWO MAIN TYPES OF DISTORTION

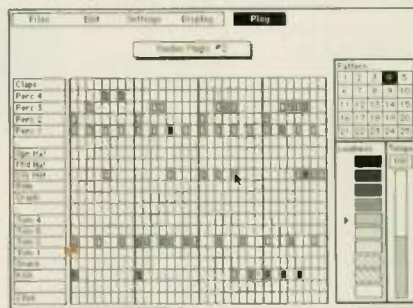
*Total harmonic distortion (THD)* is a key amplifier specification. All amps produce a certain amount of harmonic distortion or "ghost" signals at multiples of the desired frequencies, and the THD spec expresses them as a percent of the total output, usually measured at the model's full rated power at a specific frequency (or over a specific frequency range).

Probably the most objectionable form of THD is *clipping*, which occurs when the amp is asked for more current than it can deliver. This cuts off the tops and

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bottoms of a waveform's peaks, generating distortion. (This is the basis of fuzzes, for example.) The amount of clipping depends on just how radically overdriven the amp is, the nature of the input signal, and the amplifier's design. Clipping has two nasty side effects: it dramatically increases the average power applied to the speaker, thus causing possible overheating; and it creates high-frequency harmonics capable of frying tweeters (which were never intended to receive such high-amplitude signals).

*Intermodulation distortion (IM)* is characterized by frequencies equal to the sums and differences of two or more input signals. This type of distortion is more audible and annoying than harmonic distortion; fortunately, most amp manufacturers place a high priority on minimizing IM. IM distortion is usually specified according to a measuring method developed by SMPTE (Society of Motion Picture and Television Engineers) that uses specific tones measured in a specific way. Distortion measured in

this manner will be indicated as IM (SMPTE), expressed as a percentage.

Most people won't overtly hear simple THD below about 1%, but any decent amplifier design will perform far, far better. (Listen to Clapton's guitar on "Crossroads" for an example of a tube amp at about 50% THD.) A THD spec of

0.1% or lower is quite adequate, and ratings of 0.01% and lower are common. IM figures should be lower than THD.

## FREQUENCY RESPONSE

Frequency response describes how low in the bass and how high in the treble (actually ultrasonic regions) the amp

From top: Carver PM-1.5 and Bryston.



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will reproduce signals. Flat frequency response over a given range means that for a given input signal, the output signal will be of a constant level regardless of the input signal frequency.

The minimum requirement is the range of the audio band—20 Hz (a bit beyond an octave below the lowest note on a bass guitar) to 20 kHz (20,000 Hz, two-plus octaves above the highest key on an acoustic piano). Frequency response is usually specified at a nominal power level, such as 1W, and—this is critical—within a plus/minus range of decibels (dB) to indicate how much the response deviates from the “flat” ideal. Variations of less than a dB or two are difficult for most people to hear. Most good amps will be well within  $\pm 1$  dB.

While 20 Hz to 20 kHz is more or less standard, many amps publish frequency response well beyond these limits. Some are rated “down to DC,” or 0 Hz, at the low-frequency end. This isn’t really crucial, and it’s potentially speaker-damaging if any DC offset (a small DC voltage that appears at the amplifier’s output stage) finds its way to the speakers. Most such designs include protection circuits

that disconnect the amp’s load if any DC is detected at the output terminals. (Offset is a problem because speakers exhibit such low resistance that even a small, constant voltage can pump a fair amount of current through the speaker, at best offsetting the driver from its center resting position and at worst heating the voice coil.)

At the other end, response out to 40 kHz and beyond is not uncommon. While not directly musically useful, such extended bandwidth often indicates a

design that is “linear”—non-distorting—at very high frequencies.

## NOISE AND SLEW RATE

Noise is seldom a real problem in modern power amps designs. The signal-to-noise ratio (S/N) spec states the residual noise an amp produces below a certain output level. Often, you’ll see a simple spec such as “S/N: 90 dB.” This doesn’t really tell the story: 90 dB below what? The most useful noise spec is something like “90 dB below 1 watt, with

## MEET THE MOSFET

**A** serious problem with conventional, bipolar transistors is that as they heat up, their resistance lowers, thus allowing more current to flow through them, which heats them up even more, and so on. This is called *thermal runaway* and is prevented by elaborate protective circuitry. A different member of the transistor family, the MOSFET, distorts in a manner more similar to tubes and unlike bipolar transistors, does not require elaborate protection circuitry. As a MOSFET heats up, its resistance *increases*, which automatically reduces the current. Some say that MOSFETs sound better than transistors. Perhaps this is because they can be biased more heavily, allowing them to operate in a more linear or distortion-free region. Although very early MOSFETs were rumored to have reliability problems, these have been ironed out over the years.

—Craig Anderton

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## ● POWER AMPS

1 kilohm input termination"—a good power amp spec. This says that noise should be inaudible in a real-world situation; 1 watt is (surprisingly) an average power level for music listening at modest volume, and the specified 1 kilohm characteristic approximates the typical hookup to a preamp or mixer. (Often, noise is measured with the input shorted. This will yield slightly better figures, since resistances themselves generate a small amount of noise, but is not necessarily real-world.)

S/N ratios will often be *A-weighted*,

which references measurements to noise occurring in the most audible portion of the frequency spectrum; an unweighted figure includes all noise components, even ones beyond or below the range of hearing. Therefore, given two equal S/N ratios, the unweighted one will indicate a quieter amp.

*Slew rate*, a more arcane amp spec, refers to an amp's ability to reproduce steeply rising or falling waveforms, such as square waves. Slew rate is specified in volts/microsecond (i.e., in response to an instantaneous change in input level

**Too much**

**power is less**

**dangerous than**

**insufficient**

**power.**

from 0 to maximum, how high the output will go in one microsecond); the higher the number, the "faster" the amplifier, and potentially, the better its very high-frequency distortion characteristics. High slew rate is most important when delivering musical transients and complex waveforms at high power levels, and is therefore most important with P.A. amps. However, since more powerful amplifiers must swing many more volts across their outputs than less powerful ones, no single standard for comparison can be suggested.

### DAMPING

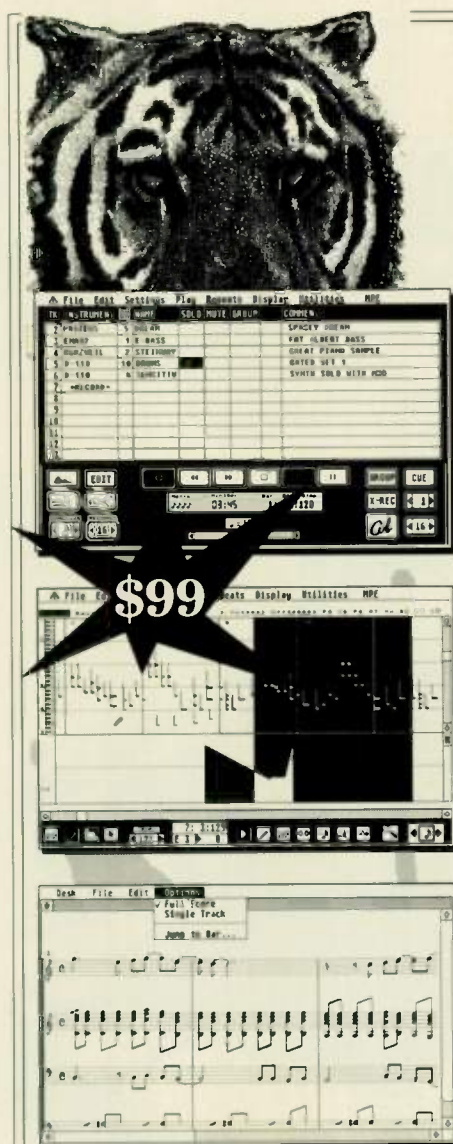
*Damping factor* denotes the ability of an amplifier to tightly control a speaker's motion. It is expressed as a ratio of the load impedance to the amplifier's output impedance. The amp's output impedance should be as small as possible, resulting in a high damping factor. Although not exactly the most important spec associated with a power amp, some people feel that damping does have an effect on sound quality.

### WHICH IS THE AMP FOR YOU?

Power amps intended for either the pro musician or consumer hi-fi market both deserve consideration. Pro amps will often provide more rugged construction, beefier protection circuitry, and a longer warranty—for a price. Consumer power amps, on the other hand, may offer an attractive value and tempting power-per-dollar ratios. Explore both camps.

The overriding question is how much power? Answer: the more the merrier. In the hands of a responsible adult, too much power alone rarely damages loudspeakers. In fact, insufficient power is far more dangerous. An amp with inadequate whomp is much more likely to be overdriven; the clipping that results, rather than clean power, is what cooks tweeters and voice coils.

On the other hand, there is no sense



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Edit/Chord[1]/Note  
F#: Note=J/J/J/J

The U-20 can store 8 chord "sets," each consisting of a different chord assigned to each pitch in the octave.

I-R3: Electric Set U:0  
C#3: I-128 So:C#3 Mu:Off

If you're considering composing, consider this: The U-20 can store four different drum and percussion arrangements, each with its own key assignment, level, panning and tuning.

Edit/Sound/Effect/Chorus  
Out=Pre Rev Level=17

Each of the 64 sound patches can have its own reverb and chorus parameters, with each part being assignable to just reverb, just chorus, or both.

Edit/Timbre[1]/Tone  
Tone = 03-018 BARAFON 4

While any of the 128 preset tones can be assigned to any of the 128 timbre locations, more exotic instruments can be accessed via U-Series ROM cards.

Edit/Sound/Part4/Output  
Asgn=Rev Lvl=127 Pan=3

Each of the six parts can have its own effects on/off, level, and pan setting.

Edit/Sound/Part2/Timbre  
Timbre=B35:JP8.Brass

Any internal timbre can be assigned to one of six parts. This keyboard, by the way, is multi-timbral with a 30-voice polyphony, making it ideal for live performances.

Rx|01|02|03|04|05|06|10  
I-88 #064 : Worlds Apart

Since the U-20 will simultaneously receive on up to six MIDI channels plus a rhythm channel, you can create entire arrangements with an external sequencer, and split or layer up to six sounds on the keyboard.

Edit/Timbre[5]/Pitch  
Bender Range=7-36 2

Each of the 128 user-definable timbres has its own flat and sharp bender range, making things like "whammy bar" solos as easy as the proverbial flick of a wrist.

# One size fits all.

If we were to tell you that our new U-20 RS-PCM Multi-Timbral keyboard was perfect for any kind of performing, you'd probably mutter something about truth in advertising and go on about your business. So instead of telling you this, we'll let you come to that conclusion all by yourself.

And the reason we expect you to is this: The U-20 possesses an extraordinary diversity of sounds—to the tune of 128 multi-sampled tones, including both acoustic instruments and popular synth sounds, as well as a staggering array of drum and percussion sounds.

And since these sounds are the product of a Re-Synthesized Pulse Code Modulation technology, their quality is remarkable. (Basically, RS-PCM allows sam-

pled sounds, which normally require massive amounts of data, to be re-synthesized so that they deliver great sound quality without taking up a great deal of memory.)

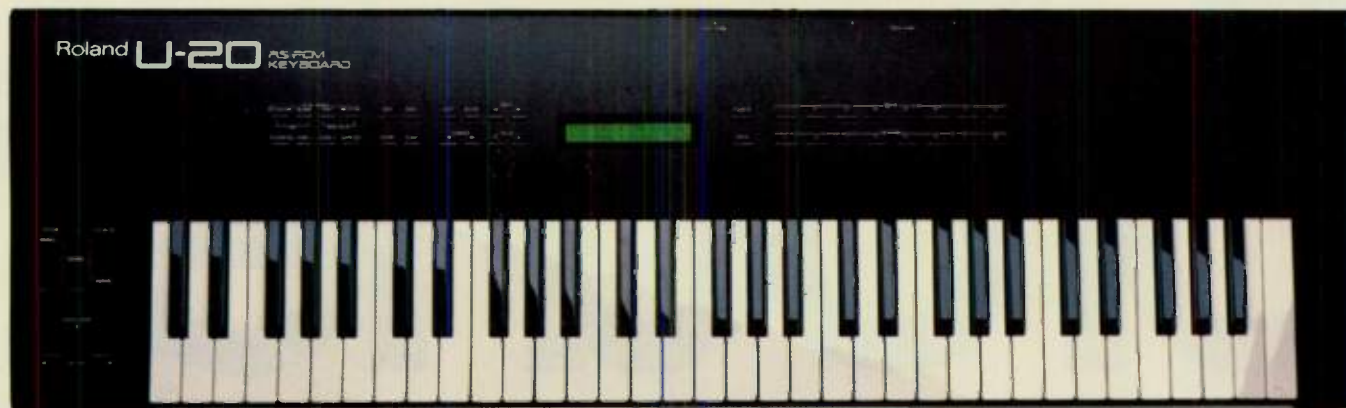
And because of a new, high quality signal processing, you can be as expressive with the sounds as you wish. The Roland U-20, unlike most sample playback machines, offers attack and spectra sounds that enable you to actually "synthesize" your own sounds.

All of which led one magazine to suggest, "... the only problem you'll probably have with the U-20 is finding enough time to explore everything it has to offer!"

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*Yaron Gershovsky  
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## ● POWER AMPS

spending a kilobuck for a kilowatt you don't require. Before calculating how many watts, ask yourself, how loud? Some people routinely monitor at very high levels—110 dB SPL and higher. We hope you do not! Super high-level listening is a sort of audio dope: When you start out, it sounds great. After a few months or years, your high-frequency hearing acuity starts to go, so you turn up the amp to get that "sparkle" back, which damages your hearing even further, and so on in a vicious cycle.

Let's figure you want a maximum of about 100 dB SPL peak. (SPL is short for sound pressure level. Don't confuse SPL ratings with other dB specs. SPL figures are absolute numbers; other dB specs are ratios of one power to another.) Your monitor speakers, a small, near-field pair, will be placed about a yard (1 meter) from your head on each side. All speakers have a sensitivity (or "efficiency") rating: Let's say yours is 90 dB SPL at 1 watt at 1 meter. A 1W/ch power amp will supply a 90 dB SPL peak. Since ten times the power increases the speaker's output by 10 dB SPL, 10W/ch gets you 100 dB SPL; 100W/ch, 110 dB SPL. Merely doubling amplifier power will produce (approximately) an additional 3 dB SPL.

We're talking peak here, however. Unfortunately, unlike the sine waves employed to test amplifier power, typical music has a peak-to-average ratio of about six-to-one. So to achieve an average of 90 dB SPL with music, while maintaining clean peaks, you would need perhaps 500 times the power needed to reach 90 dB SPL peak—say, 500W/ch in our example. A big amp, indeed.

Fortunately, two factors come to the rescue. First, a 90 dB SPL is just too darned loud. Second, most power amplifier designs can produce substantially more power in the short term—a half-second or less—than they can put out continuously. Since most musical peaks, such as percussion transients and pitched instrument attacks, last substantially less than this, short-term power can prove exceptionally useful.

This temporal power capability is defined as *dynamic headroom*. The common measure is the IHF dynamic headroom spec, which tells how much power above its continuous rating an amp can produce when driven by a tone burst lasting 20 ms every half-second. (IHF is the acronym for The Institute of High Fidel-

## DOWN TO THE WIRE

**S**peaker wire is not something most musicians spend a great deal of time worrying about. Nevertheless, it could be a mistake to sink significant cash into a new amp and speakers, only to limit their performance by the interconnection.

Two schools of thought exist regarding speaker wire. One maintains that "ordinary" speaker wire, or even hardware store "zip" cord does the job just fine. Rather than debate the point, I'll simply provide some guidelines. However long your speaker cable runs, in no case use wire lighter than 16 gauge. For runs over about 15 feet, choose 14 gauge or heavier. Look for a cable with more numerous fine strands, rather than thicker, fewer ones: audio frequencies tend to travel on the surface of a conductor, which is called the "skin effect."

The second school favors specialty speaker cables. These come in a bewildering array of shapes, sizes, and thickness, some of which approach garden hose proportions. Various interesting wire materials, with correspondingly intriguing claims of improved performance, reduced phase shift, lower distortion, and the like are available.

Most offer some basic worthy features: very low resistance, low capacitance, flexibility, and a wide choice of terminating connectors. Specialty cables are expensive—as much as \$10 a foot—but they provide at the very least peace of mind; you know you're giving the amp's signal the

best route to the speakers.

To terminate the cables you might just leave bare wire, clamped by the amp and speaker connectors. Another choice is straight pins or spade lugs crimped or soldered to the wire. My own choice is the classic dual-banana pair, available for pocket change at any respectable electronics supply house. These are almost universally accepted on pro market gear. They provide reliable, tight connection, are clearly coded for ground and hot, and are quick and simple to remove when you want to bring your amp or speakers elsewhere for a temporary session, or—heaven forbid!—for service.

Gold-plated connectors are widely touted these days. The gold surface may nominally reduce interconnect resistance and is certainly very corrosion resistant. But most such platings are extremely thin, and after a few pluggings and unpluggings the useful layer on the actual contact surfaces tends to wear off.

Whatever speaker cable you end up with, keep the runs as short as possible. You may even want to place the amplifier some distance from the rest of the system, adjacent to the speakers. Run long, high-quality, line-level interconnects back to the preamp or board. (Many pro studios use this approach, usually running balanced lines to the amp.) Remember, you want the amp's power to drive loudspeakers and make music, not to heat 100 feet of speaker cable. —DK

ity, which sets audio measurement standards.) A 3 dB dynamic headroom spec would mean a 100W/ch amp could put out momentary bursts of 200 watts under these conditions.

A 200W/channel amp with 0 dynamic headroom would perform identically in the real world. And in fact, most "pro" power amps favor this sort of massive, highly regulated design. However, many consumer power amplifier designs do offer significant amounts of dynamic headroom, often at attractive rates.

Going back to our original question—how much power?—we can complete the equation. For our 90 dB SPL at 1W/meter sensitivity monitors, 100 watts per channel will easily provide over 100 dB SPL peaks at the ears, with ample headroom above that point. This really should be adequate. Of course, if you choose monitors that are less (or more) sensitive, the equation will be radically different. (A monitor rated 87 dB SPL at 1W/meter would require 200W/channel for the same performance.) And if



## ● POWER AMPS

you choose to monitor from further out, the power requirements will climb dramatically.

### TUBES, TRANSISTORS, AND CLASS WARS

Of course, considerations other than sheer power are bound to arise. The debate between proponents of tube- and transistor-based amplifiers continues even today. Some folks believe that tube designs sound intrinsically better under extremely critical listening. This may arise from a historical prejudice: Tube designs are by nature relatively immune to the problems of driving very low-impedance, highly reactive loads such as those presented by many varieties of audiophile speakers.

Nowadays, transistor amps that can effectively drive nearly any speaker load

are common. Furthermore, most studio monitors present comparatively benign loads. Transistor designs are common because of their greater efficiency, reliability, and economy. Also, tube amplifiers are by nature slightly higher-noise

devices; studio designers generally go to great lengths to avoid any added noise in the monitoring system.

An amp's class of operation describes how its output devices—tubes, transistors, or whatever—are utilized. Class A designs, generally found only in high-end audiophile products and headphone amps, are very inefficient. Consequently, they run hot, require extensive "over-engineering," and are often fabulously expensive. The advantage of Class A design is the elimination of most negative feedback and a consequent reduction of a fairly obscure distortion mechanism called TIM—transient intermodulation distortion. This can occur with very fast-rising waveforms such as percussion and sharp attacks.

Today, most studio power amp designs are Class A/B, or a variation. This topology is much more efficient, relatively cool running, and cost-effective, but it traditionally demands fairly high amounts of negative feedback in the overall gain loop.

However, the current generation of well-designed, modern, solid-state Class A/B amplifiers have largely tamed the TIM issue with higher-speed circuits and sophisticated design techniques. (These include a trend toward local circuit negative feedback in place of global negative feedback.) They are eminently suited for the most critical listening. They're also more robust and less thermally extreme, better-suited them to the typical studio environment.

### THE DETAILS

Once you have identified an amp that meets your needs, a surprising number of points remain to be considered.

■ **Power switch.** Many power amps do not include a power switch, assuming that you'll plug it into a switched outlet or



From top: Crown Macro-tech 2400 and BGW 6500.

## ALTERNATIVE AMPLIFIER DESIGNS

**T**raditional Class A/B designs are not the only kids on the block. For years Carver has made amps using what it calls "Magnetic Field technology," and Peavey has been making its line of DECA (Digital Energy Conversion Amplification) power amplifiers. Both, in very simplified terms, essentially eliminate the dividing line between amplifier and power supply by "modulating" the power supply, albeit in different ways. In a sense, the power supply is the amplifier.

The Peavey approach uses a digitized analog signal ("sampled" at an extremely high clock rate) to control the way in which current is pumped to the load. The Carver switches the power supply to pour on the power when needed and sit idly when not. This is due to its low-impedance transformer that can deliver current immediately on demand and a triac switching system that switches between different power supply voltages so that no more energy needs to be dissipated than is absolutely necessary. Also, one channel can "borrow" power from the other channel if there is an imbalance in power requirements between channels—something conceptually similar to dynamic allocation in

synthesizers, except that power, not voices, is allocated as needed. Carver amps also tend to be well-protected; for example, comparator circuits compare the inputs and outputs, automatically lowering the input when clipping is sensed, and there are speaker protection circuits as well.

Both types of amp are very efficient. In particular, the DECA amps are rated by the company at 90% efficiency, but I've heard of bench test figures exceeding that. Compare this with a typical Class A/B amp design, where as much (or more) power is dissipated in the form of heat as is delivered to the load. The DECA also has unique protection circuitry that senses distortion and automatically activates compression as needed to prevent clipping. Neither type needs or uses extensive heat sinking; both are comparatively small and light.

An interesting point about the DECA is that there is little RF shielding and apparently no need for it—it's a pretty clean device, and not just in audio terms. For what it's worth, I've been using a DECA 700-watt amp for years with no breakdowns, no fan, no heat, and no headaches.

—Craig Anderton



# LIONEL HAMPTON ON VIBES.



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### ● POWER AMPS

terminal strip. Plan ahead.

■ **Level controls.** Not only can these match the amp to your setup, they can also be set to restrict the maximum output to something safe for your monitors, guarding them against ham-handed visitors to your studio.

■ **Hum radiation.** Try placing a cassette deck next to the amp, and record over a silent tape. If you notice any hum at all on playback, plan to place the amp well away from your other studio gear. A guitar pickup can also check for AC fields

Typical, mild clipping doesn't sound like Hendrix trashing his stack. Rather, it causes a slight hardness and muddying of the sound. When in doubt, turn it down a touch.

■ **Input/output connections.** Some pro designs offer both unbalanced 1/4-inch and balanced (XLR connectors, usually) line input jacks. Some also include unbalanced, "consumer"-level RCA inputs. "Pro" inputs expect to see a higher input voltage (2 to 4 volts) to drive the amp to its full rated power than will consumer-

From top: Peavey DECA/1200 and QSC MX 2000.



(just listen to its output). And never put your tapes on top of a power amp!

■ **Rack-mounting.** If you plan to rack-mount your amp, see how much heat it generates and leave an appropriate amount of ventilation space above and/or below the amp.

■ **Fans.** No, not the ones asking for your autograph, but the kind that force air over the parts that heat up. Fans are noisy, so some amps have "on-demand" fans that turn on only if the heat build-up merits it; others have two- or three-position fans so you can choose a noise level commensurate with the amount of power being used. Even if they are a bit noisy, fans are effective thermal insurance.

■ **Meters.** Mechanical power amp meters are essentially useless. Amplifier clipping is ordinarily momentary in nature, occurring much faster than meters can display or eyes perceive. LED meters with a peak hold function can catch transients and stretch them beyond your persistence of vision, and are preferred. With mechanical meters, trust your ears.

type RCA jacks (usually, 1 to 1.5 volts). Make sure the amp you choose offers the appropriate choice for your upstream studio setup.

Output connectors are also worth checking. Some consumer amps may offer only push connectors that accept bare wire. A better choice is "5-way" binding post pairs. These take wire, banana plugs, spade lugs, and just about anything else.

One last, but very important, piece of advice: When you finally get your shiny, new, megawatt amp home and installed in your studio, learn the habit of turning it on last and turning it off first. That way, those weird high-frequency turn-on transients from your synths, samplers, and drum boxes won't launch your tweeters past your ear before you can turn around.

**Daniel Kumin** writes on consumer and pro audio for several national publications. He is technical editor of *CD Review* magazine. A composer in his spare time, he has written over eleven bars this year alone.

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## Questions and Answers

Problems with the Ensoniq EPS, ADA MC-1, and Kurzweil K1000 are addressed and resolved by our resident service expert.

*By Alan Gary Campbell*



**Q.** My Ensoniq EPS sampler went totally dead. When I opened it up, two fuses were blown, and there was a small, rectangular piece of metal resting on the power supply board. I replaced the fuses, and the EPS works fine, but is the metal piece part of the EPS, and if so, where does it go?

**A.** Some early EPS key-boards have disk drives with various service problems, including ID plates that can come unglued. The loose ID plate can be discarded; however, the drive should be replaced. (Chronic drive error messages, such as "Data Corrupted," "Disk Error," and "Not an EPS Disk,"

also indicate possible drive defects. The drives are manufactured by outside sources, not by Ensoniq.)

To determine if an EPS contains a suspect disk drive, remove the four top panel screws, and the four bottom panel screws that secure the left-hand controller/disk drive assembly. Raise the top panel and gently lift up the controller/disk drive assembly. Remove the four Phillips screws that secure the drive (take care not to lose the lockwashers). Check the datecode label on top; if the datecode is below 8801, replace the drive. If the datecode is 8801, check the serial number label on the side. If the serial number is below 1035801, replace the drive.

Replacement of affected drives and repair of instruments damaged by loose

plates are provided at no charge, to the original owner, whether the EPS is in warranty or not. Nonetheless, in-warranty units with relevant symptoms should be referred to an Ensoniq service center for drive inspection.

**Q.** I have an ADA MC-1 MIDI footswitch that can be phantom-powered from the ADA MQ-1 programmable graphic EQ via a special cable. Is there a way to modify the MC-1 to receive phantom power from an Alesis Quadraverb or a similar unit?

**A.** The MC-1 can be used with a special MIDI cable that receives DC power, but the power is still provided by the MC-1's AC adapter, which connects to a jack on the back panel of the MQ-1. Thus, the MC-1 really isn't phantom-powered by the MQ-1.

Some effects units may have enough power supply headroom to phantom-power an external device, but those that operate from an external AC adapter or transformer (e.g., the Alesis Quadraverb) probably don't. It's much safer to build an interface box to power the MC-1 from its adapter via the MIDI cable.

The special ADA cable incorporates 7-pin DIN plugs that match the 7-pin MC-1 MIDI out and MQ-1 MIDI in jacks. (Conveniently, 7-pin jacks work with 5-pin plugs, but not vice versa.) The two extra pins carry the DC power, a conservative engineering scheme that meets the MIDI Specification. Specs aside, the MC-1 can be easily modified to receive DC power via a standard, 5-conductor cable. The modified MC-1 will still function with the adapter connected directly.

Remove the bottom panel from the MC-1 and dismount the unit's PC board. Tack-solder a jumper from pin 6 on the MIDI out jack to pin 1; solder a second jumper from pin 7 to pin 3. This connects the negative supply input (the tip connection on the AC adapter plug) to



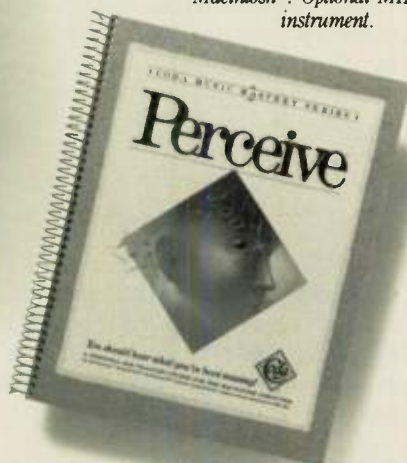
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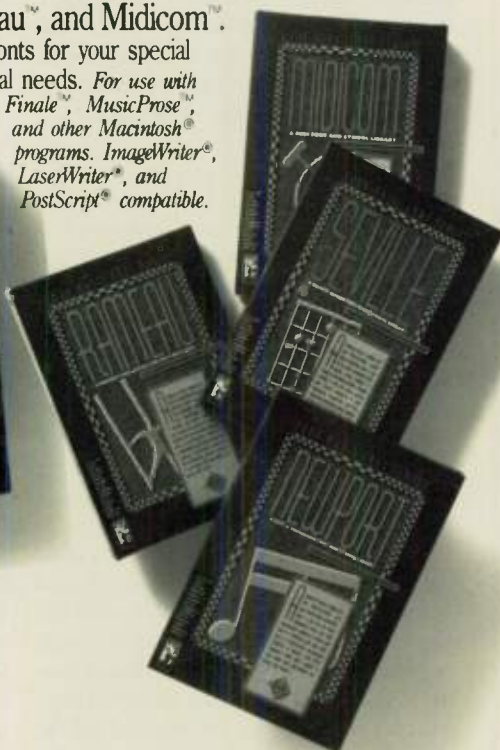


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pin 1 and the positive supply input (the ring connection) to pin 3. Check your work, then reassemble the MC-1.

Next, construct the interface, using the schematic in Fig. 1. (Radio Shack part numbers are given in parenthesis.) The circuit mounts readily in a small project box. The DC power jack indicated is an easy-to-install, panel-mount type. Triple-check your wiring; make sure that the DC polarity is correct. Mount the interface in a convenient location.

Note that the interface won't function unless a 5-conductor MIDI cable (i.e., a standard cable with all five pins connected) is used between the interface and modified MC-1. Conquest, Rapco, Axtron, Hosa, and some other cables will work. A standard, 3-conductor cable can be used between the effects input and interface output.

**Q. My Kurzweil K1000 synth has static in one output that gets worse if I press on the plug connected to that jack. Could this just be a cold solder joint, or is it something else?**

**Q. The keys on the low end of my K1000 keyboard have lost their velocity response, and low E sometimes doesn't play at all. I thought I noticed a difference at the low end of the keyboard when I first got the instrument, but I wasn't sure. Since then, it's gotten steadily worse. What gives?**

**A.** "Crackles," "pops," and intermittent output in K1000 (and 1000-series module) line outputs can be caused by a defective output-control relay or cold or cracked solder joints at the relay or output jacks. (To aid in diagnosis, note that these problems do not affect the headphone outputs.) Matsushita relays have reliability problems and should be replaced. With other relays, resoldering the connections will fix the problem, but don't overdo it; the relay coil leads are heat-sensitive.

The jacks present a secondary problem. The PC board pass-through holes are oversized, and the considerable air gap between the jack pins and PC pads encourages convection effects that disturb the joints during resoldering, which can result in resoldered joints that are weaker than the originals. To avoid this, remove the original solder mass from the jack pins with a vacuum desoldering device or solder-wick, crimp a short piece of 18 gauge, solid wire around the pin to fill the gap, then

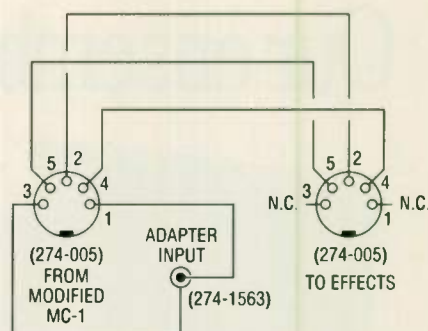


FIG. 1: MC-1 phantom power interface.

resolder. Use this mod only on instruments that exhibit the problem.

Digital "buzzes" and other odd sounds in the line and headphone outputs are generally caused by defects in the D/A converter or Arnold circuits (proprietary VLSI resampling ICs), which can sometimes be isolated via the K1000 diagnostics. Especially helpful are the Arnold 0, Arnold 1, and One Sample Test routines.

With regard to keyboard problems, on some early K1000s the left-rear keyboard support bracket is formed at a slightly incorrect angle. This puts pressure on the keyboard frame, which can, over time, cause the bottom of the keyboard to bend in a convex shape. If this happens, the increased distance between the actuators and membrane switches can cause loss of velocity response and dead keys.

The fix is simple. Disassemble the unit and unplug and remove the keyboard. Remove the screws that secure the membrane-switch PC board beneath the affected end. Gently bend the keyboard back into shape; it should be as flat and uniform as possible. Remount the membrane-switch PC board. Take care to align the membrane cells with the cutouts in the keyboard.

Place the K1000 on a flat, level surface, with all four rubber feet firmly supported. Temporarily reinstall the keyboard and line up the keyboard-bracket holes, as closely as possible, with the holes in the case bottom. Note the extent to which the hole in the left-rear bracket falls short of matching up with the corresponding hole in the case.

Remove the keyboard once more and dismount the left-rear bracket. Reform the bracket in a vise to produce the correct shape. Remount the bracket and test-fit. If it's a match, reassemble the unit, and you're done.



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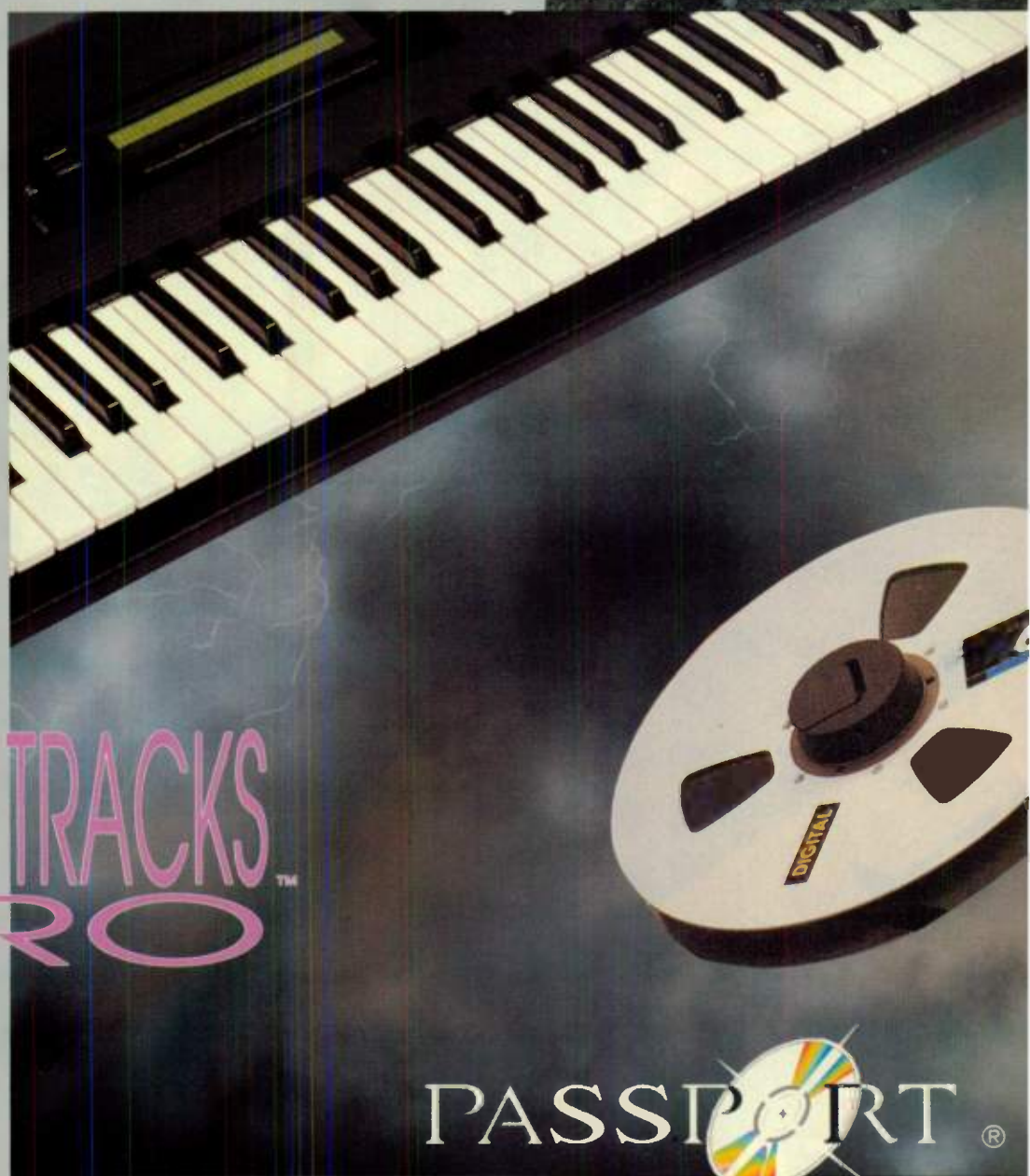
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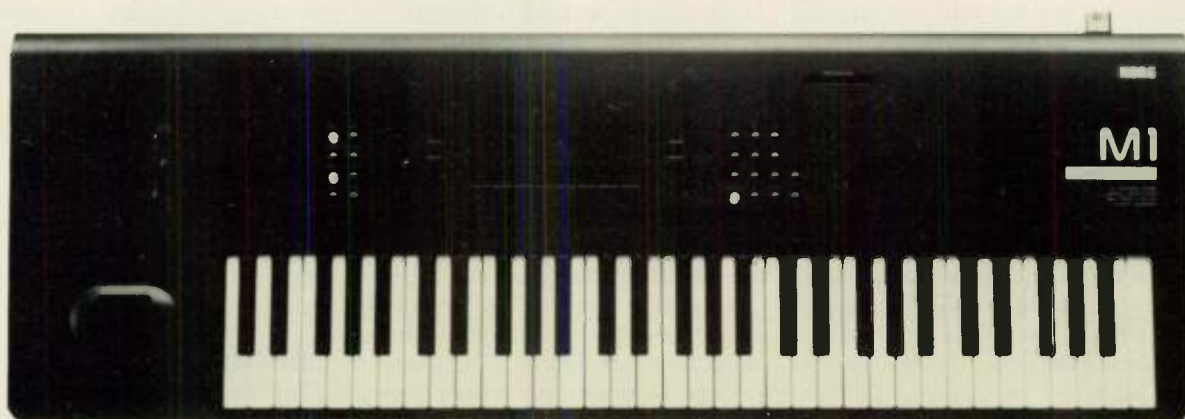
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## The Korg M1: Drum Machine of the Gods?

Lurking beneath the sexy black exterior of Korg's successful synth is an impressive drum machine and percussion sound source, waiting to be explored.

*By Jim Johnson*



**B**y now, everyone knows how hot the Korg M1 is, even if they don't own one. Though billed as a "music workstation," I tend to agree with our fearless editor's assessment that it's really more a great synthesizer than a great workstation. It has a fairly minimal sequencer, a pedestrian but adequate synthesizer architecture, an absolutely phenomenal effects- and output-routing section, and lots of beautiful, sampled waveforms, including 44 different percussion samples.

With everything the M1 has going for it, it's not surprising that little has been said about those excellent drum samples. Yet, consider the following notion: if you add up the cost of a good MIDI drum machine (say, the HR-16, at about \$500) and two separate multi-effects units (also around \$500 each), and multiply the total by some fudge factor to compensate for the M1's extra capabilities (Isaac Newton did it, so I should be able to), the resulting figure is not far off from the M1's "nominal" price of \$2,500. In other words, if you want to use the M1 as an absolutely killer dedicated drum machine, you wouldn't exactly be throwing your money away. And even if you don't, a lot can be done to enhance

the M1's drum samples and its ability to function as a percussion sound source. I'll show you how it's done.

### LITTLE KITS

The M1's four drum kits can each contain up to 30 instruments. However, a substantial proportion of drum programmers would probably agree that most of the time, fewer drums can work better than more drums. In these instances, you won't need all thirty drum assignments, but there are ways that you can make use of these extra slots to create a more natural-sounding smaller kit.

Fig. 1 shows such a drum kit. (The figures used in this article are Atari ST screen shots from Dr. T's Caged Artist M1 Editor.) It is a simulation of a typical acoustic kit: one snare and kick drum, four toms, a hi-hat, two crash cymbals, and a ride cymbal. All of the drums are assigned to two or more white keys, with various slight tuning differences between each drum. (Assigning multiple instrument numbers to a single sound on adjacent keys, rather than a single instrument number to several keys, prevents the dreaded "equal-tempered drums" syndrome.) The toms are further split into four distinct instruments,

each in a different pitch range, and assigned to two adjacent white keys, with the crash cymbals being similarly split. This arrangement facilitates the creation of natural-sounding rolls and other fast drum parts. By alternating keys within each drum as you lay down your patterns, you can make the drum texture move around just a tiny amount, which helps humanize the music.

### BIG KITS

Sometimes you may come up against the other end of the spectrum: the need to squeeze more than 30 drums on the M1's keyboard. This is impossible within a single drum kit; however, by using the M1's four separate drum kits in conjunction with the instrument's Combination mode and synth program parameters, it's possible to set up enormous kits, where just about every key on the keyboard plays a different drum sound.

Fig. 2 shows a combination that does this. The combination type is "Multi," which is Korg's term for a multitimbral setup. (I recommend you use the Multi combination type for all your combinations, simply because it is the most versatile of the bunch. All the other combination types are just subsets of the Multi



## ● KORG M1 DRUMS

Instrument	key	time	lev	dec	pan
1 Kick	C2	1	0	0	5/5
2 Kick 2	C2	1	0	0	5/5
3 Kick 3	C2	1	0	0	5/5
4 Snare	F2	1	0	0	5/5
5 Snare 1	C2	1	0	0	5/5
6 c. hi-hat	F2	1	0	0	5/5
7 c. hi-hat	C3	1	0	0	5/5
8 c. hi-hat	F3	1	0	0	5/5
9 c. hi-hat	F3	1	0	0	5/5
10 c. hi-hat	F3	1	0	0	5/5
11 tom 2	C3	1	0	0	5/5
12 tom 2	C3	1	0	0	5/5
13 tom 1	C3	1	0	0	5/5
14 tom 1	C4	1	0	0	5/5

FIG. 1: An M1 drum kit that re-creates a normal acoustic set.

combination.) In this combination, the keyboard is divided into four distinct ranges, each of which uses its own program. The low octave consists of a kit with several toms and kicks tuned way down. The next section of the keyboard, from C3 to F#5, contains a normal 30-drum kit that includes whatever instruments you like. The octave-and-a-half above that is filled with gongs, perhaps created with a combination of slow cymbals and tubular bells. Finally, the top of the keyboard contains a program that does some exotic synth processing of its drum kit.

There's another memory-save implied in this combination that might not be obvious at first glance. Even though it uses four programs, it only requires two drum kits, because timbres 1, 3, and 4 can share the same kit. As long as your combinations don't use overlapping ranges, it's more efficient to configure a single drum kit to work for all three programs.

### DRUMS YOU'VE NEVER HEARD

One of the hippest things about the M1's drums is that they can be processed in the synthesizer section of the instrument, just like any other waveshape (or "multisound," in Korg's terminology). Have you ever wanted a cowbell with vibrato? How about a snare with a velocity-sensitive pitch bend? These are pretty grotesque examples, but there are many more subtle effects that can be obtained with the program parameters. For example, try using the pitch envelope generator to add a very fast initial pitch bend to a cymbal (set the start level to 99, the attack time to 1, and all other PEG parameters to 0), adding a little "tick" to the attack of the sound. I'd never use vibrato on a cowbell, but it does sound nice on the tubular bells (set the MG frequency to approximately 58 and the intensity to 5 or less). You can create reversed cymbals by setting the Hold switch (on the OSC BASIC page)

to "on" and using a VDA envelope with a long attack, fast decay, and zero sustain level. It's not a perfect reversed cymbal, because the looping in the cymbal sample is quite pronounced when Hold is turned on, but it will get the job done.

Unfortunately, when you set up a pitch envelope or some other synthesizer effect on a drum kit, it affects all the drums in that kit, not just one. If you want to use a drum with some unusual synth-based effect in an otherwise normal drum setup, you'll need to combine two programs, as described earlier.

The M1's filters are a good way to add lifelike dynamics to the sampled drums. Like all other instruments, the timbre of a drum will change depending on how hard it is hit, generally becoming brighter when hit harder. A velocity-sensitive VDF envelope is the key here. All drum programs in the M1's factory sounds use this technique.

One important fact to remember about the M1's drum kits is that the key assignments displayed for the drum kits are only accurate if the drum's octave is set to 8' and any combination transposition is set to 0. The individual factory drum programs don't match up with their drum kits because the octaves are set to 16' in the individual programs.

### LAYERING DRUMS

You can't assign more than one drum to any key when using a single drum kit, but it is possible to layer drums using

combinations. Because you'll usually need to use different drum kits (and therefore different programs) for each layer in the combination, there's also an opportunity to do lots of tricks with the synthesizer parameters in each program. For example, you can set the velocity sensitivity of one program much higher than that of another program for a sound that changes radically as you strike it harder.

Fig. 3 shows a combination in which part of a drum kit is layered with itself, and slightly detuned. This creates a light pseudoflange on the drums from C4 through A4, without tying up the M1's internal effects. Another neat trick is to layer a ride cymbal with a velocity-switched "pole" sample (add the pole at a velocity of 90, mixed at a level of about 17—compared to the cymbal's 99—and tuned to taste), adding a "bell" sound to the ride and simulating changes in stick placement.

### EFFECTS PROCESSING

The effects and output routing in the M1 can be pretty scary at first. In fact, they're so complex they really could be the subject of an article in themselves, but I'll work through the basics here.

To make the best use of the M1's effects, you'll first need to consider two things: the number of outputs you are using and what other effects you have. For example, if you have a good reverb and plenty of mixer inputs, you'll normally want to run the effects in parallel, using all four of the M1's outputs, and use the effects for delays, flanging, and other non-reverb applications. If, on the other hand, you can only spare two mixer inputs, and you don't have an external reverb (or it's tied up), you may want to connect the effects in series and use effect 2 as your reverb unit, as shown in Fig. 4.

This setup has several advantages. Any drums assigned to channels C or D will be unaffected, except for reverb, which, in this case, would probably be used as a "natural" reverb. In addition, because one of the dual effects (delay/flanger) is being used for effect 1, channels A and B have their own independent effects. In this case, you might assign the hi-hat and cymbals to channel B (for flanging), the snare and/or kick to channel A (for rhythmic echoes), and the other drums to channels C and D.

Any time you use channels C and D, however, the problem of understanding

Instrument	key	time	lev	dec	pan
1 152: Low Drums	on	99	5/5	0	0
2 152: Tight Kit	on	99	5/5	0	0
3 152: Umpa	on	99	5/5	0	0
4 154: SynthDrums	on	99	5/5	0	0
5 155: Basic	off	0	5/5	0	0
6 155: Basic	off	0	5/5	0	0
7 155: Basic	off	0	5/5	0	0
8 155: Basic	off	0	5/5	0	0

FIG. 2: A huge drum combination with a different sound on every key.

Instrument	key	time	lev	dec	pan
1 150: Small Kit	on	99	5/5	0	0
2 150: Small Kit	on	99	5/5	0	0
3 150: Small Kit	on	99	5/5	0	0
4 150: Small Kit	on	99	5/5	0	0
5 155: Basic	off	0	5/5	0	0
6 155: Basic	off	0	5/5	0	0
7 155: Basic	off	0	5/5	0	0
8 155: Basic	off	0	5/5	0	0

FIG. 3: A drum combination that layers different kits.



the M1's output panning rears its ugly head. It's important to remember that pan 3 and pan 4 are partially dependent on the pan settings in the drum kits; they only affect sounds panned to outputs C and D. (It would have been better, in my view, to call these "pan C" and "pan D.") If you are using pan 3 and pan 4 to mix channels C and D into the stereo outputs, think of each channel in terms of how it will be panned; for example, send all the drums you want panned mostly to the left to channel C and all those that will go mostly to the right to channel D. Bear in mind that when programming drums, the pan settings in the combination are completely irrelevant—the pan settings in the drum kit take precedence. Also, if you connect the effects in series and pan 3 and 4 are turned off, the C and D outputs can be used as independent dry outputs.

### TRULY STRANGE SOUNDS

If you've used a patch randomizer for the M1, such as the one presented by David Snow in the August 1989 issue of *EM*, you may have wondered about the occasional silent programs, which sometimes have a few mondo-bizarre sounds on one or two keys. These occur when the current program is a drum program, yet the drum kit number is something greater than four, a situation that can only happen if the program is sent to the M1 via MIDI system exclusive (sysex) messages. (The M1 prevents this when changing drum kits from its front panel.) Because the M1 wasn't told where to look for those drum kits, it ends up reading samples out of unintended portions of its memory. Most of these are silent, but a few end up being in the middle of a sample table for some other instrument, or in even stranger areas. If you have some way of sending the proper sysex messages for parameter changes, you can access these illegal wavesamples yourself. I've mapped out a few of them, including the multisound

Multisound	Key Range	Octave
196	C6	4'
127	D5	16'
117	G2	16'
114	A6	8'
192	C#5-D#6	4'
115	C6-C7	4'

number that must be sent for oscillator 1 and the key range and octave setting. The first in the list is the most useful, though boring in itself: a very dirty pink noise source (perhaps "brown noise" would be a more accurate term). The others are best for dirt-cheap science fiction movies, if used *once* and then discarded. In any case, they are hilarious.

### THUNDER AND LIGHTNING

Finally, for those of you looking for more sound effects and "natural" percussion, here are a few additional tips. Several years ago, *Polyphony* (the magazine that eventually evolved into *Electronic Musician*) ran some articles on how to create convincing thunder with a modular synthesizer. It was hard to do then, and it's still hard to do with a synthesizer or standard drum machine, but it's child's play with the M1. The trick lies in the M1's ability to play drum samples at much slower speeds than they were originally recorded. Remember that when a drum sample is assigned to a key, it is also assigned to all unassigned keys below that one and is transposed accordingly. If you set up a drum kit with a single kick drum or tom (Kick 1, Tom 2, and Claps, surprisingly, seem to work best) assigned to the top note on the keyboard and play clusters of notes, arpeggios, etc., in the lowest two octaves, you'll get pretty good thunder. Of course, the effects settings are critical for this as well; I like to use the Cross Delay in series with Live Stage, with long reverb and delay times and plenty of feedback and low EQ boost. Be careful about playing this at high volumes, because the low frequencies generated could easily take out your speakers.

Lightning is easy to do, too. Start with a standard U.S.-model M1 (wired for 110 volts), then take it to Europe and plug it into a 220-volt line. Unfortunately, you can only do this effect once.

**Jim Johnson** is a freelance musician/programmer/writer who is living happily ever after with Sheila (his wife) and Cuddles (his beagle).

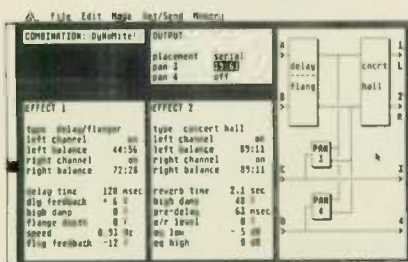


FIG. 4: The serial routing of effects for use with the M1's stereo outputs.

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## Better Samples Through Digital Limiting

Give your samples more punch and level with this simple but extremely effective technique.

By Craig Anderton

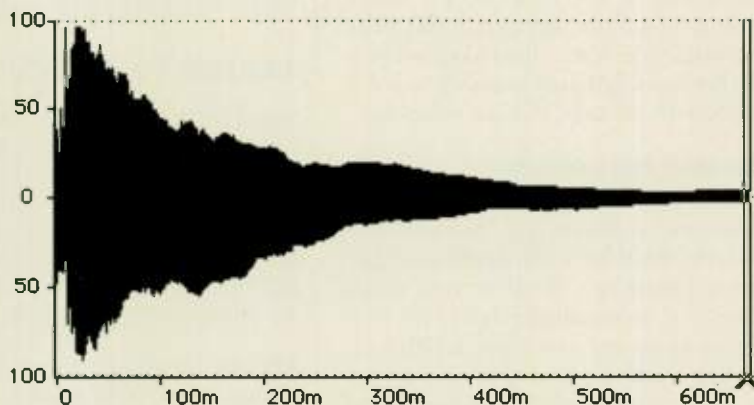


FIG. 1: A typical piano waveform, as displayed on a sample-editing program.

**W**hen sampling, it always seems that there's never quite enough headroom. This is particularly true of plucked acoustic instruments, such as guitar and piano, which start out with a short, high-level transient and then settle down within a few hundred milliseconds to a much lower level. Fig. 1 shows a typical piano waveform; if we set the record level to accommodate the attack peak, the decay is pretty low-level. This makes for a low average signal level and a generally weak sound, especially compared to samples with higher average signal levels.

One solution is to reduce the peaks by limiting the signal being sampled. Unfortunately, using a conventional analog limiter often will alter the sound quality, giving a "squeezed" effect on the attack and bringing up noise on the decay. Some distortion may also be evident. Besides, this technique won't work with existing samples unless you play back a sample from one sampler, limit it, then record it into another sampler—an inconvenient approach at best.

A better option is digitally limiting the sound with a sample-editing program (such as Blank Software's *Alchemy*, which

I used to generate the accompanying figures). Digital limiting not only provides better sound quality than analog limiting, but can be applied to existing samples.

### LET'S GET NORMAL

Many sample editing programs allow for *gain normalization*, which lets you set a particular threshold to which a sample's level will be scaled. This usually is used to bring a low-level sample up in volume. For example, if the peaks of a sample only reach half the available dynamic range, you first would set the threshold as high as possible. Upon normalization, all sample values would be increased by the same amount, but no more than the amount necessary for the peaks to equal the threshold level.

You can also use normalization to reduce signal levels to a specific threshold. This technique is usually used when mixing samples; prior to mixing, both samples are normalized "downward" so that upon being added together, the sum of the two signals doesn't exceed the maximum available dynamic range.

Fig. 2 shows the same waveform as Fig. 1, but with a threshold set to about

60% of the total dynamic range. We're going to normalize *each individual half-cycle* that exceeds the threshold to that level. This limits the peaks. Then we'll normalize the entire signal back to the maximum available level. This produces a much punchier signal with a higher average volume.

Fig. 3 shows a cycle about to be normalized. The cycles to the left of the shaded area have already been normalized (limited) to the threshold; the cycles to the right of the shaded area have not yet been normalized. The shaded half-cycle has been defined as a region and is about to be normalized. You must go through the sample a half-cycle at a time, normalizing each one to the threshold. This is somewhat tedious (well, *highly* tedious, actually), but the results are worth it.

As you scroll further down the waveform, eventually you'll reach a point where the cycles no longer exceed the threshold. The hard work is done, be-

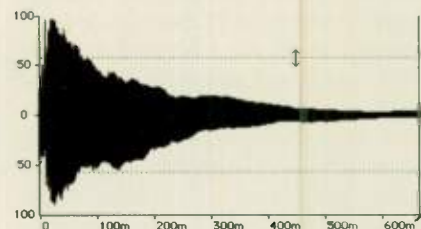


FIG. 2: Setting a threshold to which the peaks will be clamped.

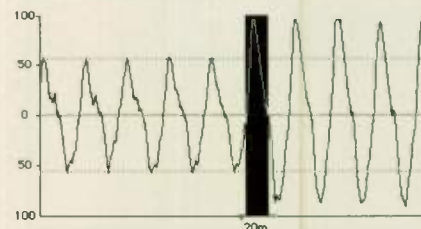


FIG. 3: Half-cycles being normalized to the threshold.

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## ● SAMPLE LIMITING

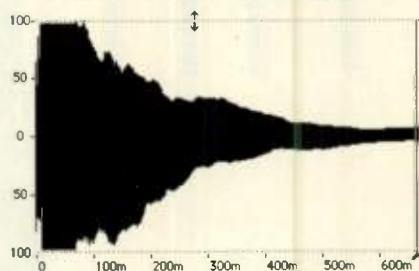


FIG. 4: The same waveform as Fig. 1 after normalizing each half-cycle to the threshold in Fig. 2, then renormalizing the entire signal back up to the maximum available dynamic range.

cause you need not worry about cycles that fall below the threshold.

Fig. 4 shows the waveform from Fig. 1 after limiting and renormalization up to the maximum available level. Note that the peaks have been completely flattened—perfectly limited, without distortion, “pumping,” or other problems associated with conventional limiters. In addition, the average signal level is clearly quite a bit higher than it was prior to limiting, as shown in Fig. 1.

## PUSHING THE ENVELOPE

Now that we have the limited signal, there are two options on how to process it using the sampler's VCA and enveloping capabilities. One is to simply leave the signal alone and let the limiting add some extra “punch.” This can sound pretty good, unless you're aiming for the most realistic effect; limiting can lend an unnatural quality.

The second option is to use the envelope to restore some of the original attack and decay characteristics. I set up the piano sample so that by changing the initial decay, I can choose a limited or straight piano sound or, for that matter, anything in between.

You can take this technique even further and normalize every cycle to a maximum level, doing *all* your amplitude changes with enveloping. The only problem you might encounter is that normalizing extremely low-level signals will also bring up noise; however, judicious amplitude and filter envelope shaping can minimize that problem.

This sample limiting technique works exceptionally well with guitars, drums, pianos, and other percussive instruments. Give it a try—you'll end up with better-sounding, punchier, LOUDER samples. ■



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## Build the Studio Amplifier for Guitar

Have a blast—without blasting your neighbors—with this guitar practice amp that's loaded with features.

By Thomas Henry



Front view of the completed Studio Amp.

I've built several mini-amplifiers for guitar in the past, but have never been very happy with them. Their sound was always a bit thin and emphasized the midrange at the expense of the bass and treble. While amplifiers of this sort are okay for rehearsal, even in that case, the weak sound is sometimes a turnoff and takes the sparkle out of practice. And of course, using this type of amplifier for recording is a disaster.

Enter the Studio Amplifier. This compact guitar amplifier packs a real wallop for four watts of power, and features a two-way speaker system (with crossover) good for a frequency response of 30 Hz up to 20 kHz. A versatile preamplifier stage boasts a 3-band equalizer, an overdrive control, a brightness switch, a preamp out jack for direct recording applications, and a master volume control. My design goal was a unit that sounds just as good as my large Music Man guitar amp, but with less power. The Studio Amplifier meets this goal

with its portability and clean sound—perfect for rehearsal and recording.

This is a fairly large project, requiring a weekend or so to complete. None of the construction steps is particularly difficult, but you must be patient and take your time. If you do, you will end up with an amplifier that not only sounds great, but looks great as well.

### GETTING STARTED

This project consists of four parts: preamp, power amp, power supply, and speaker cabinet.

Fig. 1 shows the preamplifier stage, which is almost the same as the preamp used in Jim Fiore's Pocket Rockit (June 1987 *EM*). Rather than waste time trying to improve this (almost) perfect guitar preamp, I took advantage of Jim's hard work. I did make a number of small changes, though, mainly in the tuning of the equalizer; I urge you to try this circuit with these changes, since they really make the bass boom, the mid-

range meow, and the treble sparkle.

Before leaving the preamplifier, let's cover the controls. Your guitar (or other source) plugs into J1. The Overdrive control, R18, increases the amount of distortion added to the signal, giving a pleasant tube amplifier sound. The EQ controls, Bass, Mid, and Treble (R17, R16, and R15, respectively) cut or boost any of these bands as desired. Volume control R5 determines the amplitude of the final processed signal going to the power amplifier (described next). J2, the Preamp Out, can send the processed signal directly to a recorder or other electronic gear.

### THE POWER AMP

Referring to Fig. 2, I selected National Semiconductor's easy-to-use LM384 as the main power amp chip. C20 couples the input signal to the inverting input via voltage divider R26 and R27. C16 dumps any RF (radio frequency) noise to ground. Closing S1, the Brightness switch, connects filter capacitor C17 to the circuit; this attenuates some of the high end, producing a more muted sound.

C18 and R25 stabilize the LM384's output, leading to more reliable operation. C22 couples the output to the speaker system. J3, a 1/8-inch, closed-circuit stereo jack, allows the use of headphones with the Studio Amplifier; in-



Rear view of the completed Studio Amp.



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## ● STUDIO AMP

serting a plug disables the crossover and associated internal speakers.

### THE POWER SUPPLY

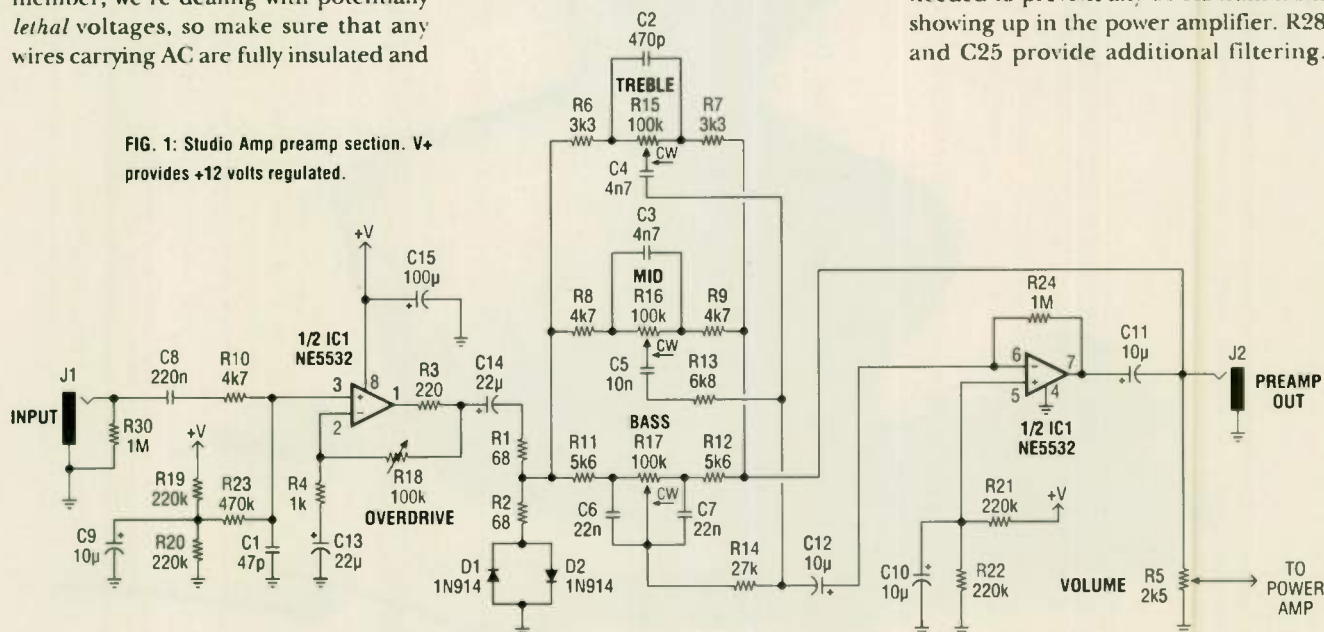
Fig. 3 shows the AC power supply. Remember, we're dealing with potentially lethal voltages, so make sure that any wires carrying AC are fully insulated and

dressed well away from other wires or the chassis.

J4 plugs into the wall and sends the AC current through circuit breaker F1 and switch S2. (You can also use a fuse

for F1.) Transformer T1 steps the voltage down to 12.6V RMS. Bridge rectifier D3 converts the AC to pulsating DC, and filter capacitor C26 smooths out the pulses. This large-size capacitor is needed to prevent any 60 Hz hum from showing up in the power amplifier. R28 and C25 provide additional filtering.

FIG. 1: Studio Amp preamp section. V+ provides +12 volts regulated.



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The +18V output is not regulated, but what's important for a power amp is lack of hum rather than tight regulation. Note that R28 *must* be a 5-watt unit.

The preamp prefers a well-regulated supply, so C26 also feeds IC3, a 7812 voltage regulator. C23 stabilizes the regulator input, while C24 provides output stability. R29 and LED D4 give positive indication that the Studio Amplifier is turned on. No heat sink is required for the 7812.

Make sure you don't confuse the low-power +12V line and high-power +18V line. Furthermore, run separate ground lines from the power supply to the preamp and to the power amp to reduce the possibility of ground loops and spurious oscillations. This is a small point, but an extremely important one.

#### BUILDING IT

So much for theory; let's build it. Most of these parts are easy to find and not very expensive, but here are some tips. I picked up a number of the components from Radio Shack, which, while not the cheapest source, is very convenient. Radio Shack part numbers are: transformer T1, 273-1352; two-way crossover, 40-1296A; 4-inch woofer, 40-1022A; 3-inch midrange tweeter, 40-1289; headphone jack J3, 274-250.

You'll also need some materials to complete the speaker cabinet. I used Radio Shack's 42-1082 fiberglass insulation for damping material, and 40-1935

grille cloth. Finally, I built the preamp, power amp, and power supply on three separate circuit boards, using the Radio Shack 276-168 Universal IC PC Board for this purpose.

All of the other parts can be purchased from a mail order house, but you'll also need to make a trip to the lumber yard to pick up wood, corners, handles, and all of that sort of stuff.

Using the schematics presented earlier as a guide, build up the preamplifier, power amplifier, and power supply. I recommend that you test these modules as you go along. So, build the power supply first, and test it for the two required voltages. Next, build the power amp and, using clip leads to connect it to the supply and a speaker, confirm that it puts out an audible signal. Fig. 4 shows these two modules (with the store-bought crossover in the background). Finally, build the preamplifier section, and again, by clipping things together temporarily, confirm that it functions as desired. Figs. 5 and 6 show the preamp mounted behind a panel, ready for testing. Speaking of the panel, Fig. 7 shows a recommended layout that worked well for me.

#### FABRICATING THE SPEAKER CABINET

Since we're making an integrated amplifier/speaker we need to think about how to mount the electronics in it, as well as the crossover and speakers. I opted for a ducted-port, bass reflex type of enclosure; a fair amount of calculation went into the design, so I think you'll find the measurements (presented in the figures) to be a big help.

Fig. 8 shows how four pieces of good quality pine make up the frame. I started with 1 x 10-inch select-grade pine stock and cut the depth down to 7 inches. (Remember, in lumber yard terms, a 1 x 10 is actually 3/4-inch thick.) Save the left-over scrap to form the rails that support the front and back panels.

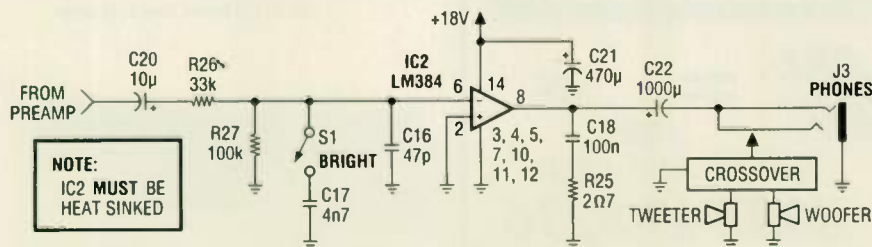


FIG. 2: Studio Amp power amp section. Note that IC2 *must* be heat sunk.

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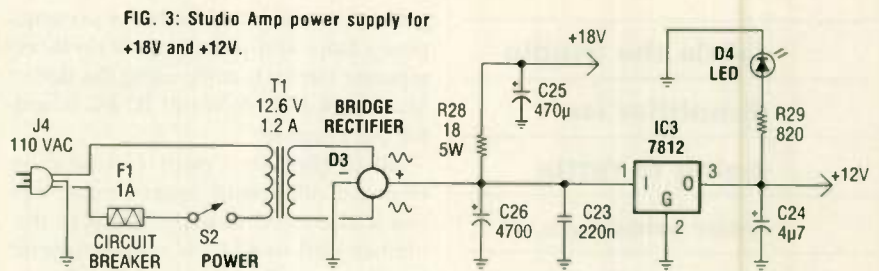
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## ● STUDIO AMP

For the most attractive appearance, use a 45-degree cut for the edges. After making all of the cuts, glue the four pieces together and secure the joints with finishing nails. Next, cover the entire box with vinyl fabric, available from most large fabric stores, using Elmer's glue and a staple gun. If you've never covered a cabinet before, refer to my article, "Do-It-Yourself Rack Enclosures" (September 1985 *EM*), which describes how to make professional-looking boxes. Take the time to cover your box with vinyl; it looks positively smashing



and wears extremely well.

Next, fabricate a speaker panel; I used premium-grade, 1/2-inch plywood, fac-

tory sanded on one side (see Fig. 9 for dimensions). If you have covered your box frame with vinyl, then subtract 1/8-inch from both the length and width measurements to allow room for the panel to squeeze in snugly against the covered box.

After cutting the basic panel, make the openings for the various components. The front panel slot allows room for the circuit board as well as the jacks, pots, and switches to slide through. The dimensions for the woofer and tweeter, as well as the ducted port, apply only if you are using the Radio Shack loudspeakers mentioned earlier. Change these dimensions as required to accommodate whatever speakers you're using.

I used a 2-inch tube, 4 1/2-inches long, for my ducted port; the tube was scavenged, as the vinyl fabric came rolled around it. Any type of tubular carboard (e.g., a mailing tube) will work.

Now let's talk about mounting everything to the speaker panel. The woofer

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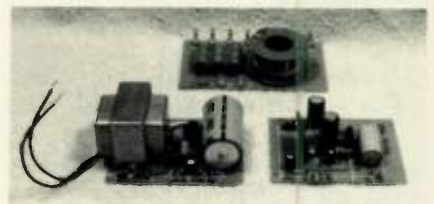


FIG. 4: The finished submodules with commercial crossover.



FIG. 5: The Studio Amp front panel.



FIG. 6: Rear view of the Studio Amp front panel.

and the tweeter are front-mounted, meaning they slip into their respective openings from the front. If your speaker didn't come with a gasket, squirt a bead of silicon bathtub caulking around the perimeter of the speaker before mounting it and affixing it in place with four flat head wood screws; otherwise, simply attach the speaker in place. Slip the tube duct into its opening so that its front lip is flush with the front of the panel, then glue the duct into place with silicone adhesive.

Mount the electronics front panel with four cup washers and four #4, 1/2-inch, oval head wood screws. Finally, secure the crossover in some leftover room on the panel with two flat head wood screws. Fig. 10 shows the completed panel prior to mounting in the box. Before calling it quits on this phase, however, give everything a quick check and make sure that any cracks or leaks have been plugged with silicon caulking—we want things as airtight as possible.

To mount the panel, first use 3/4 x 3/4-inch scraps to make some rails. Mount

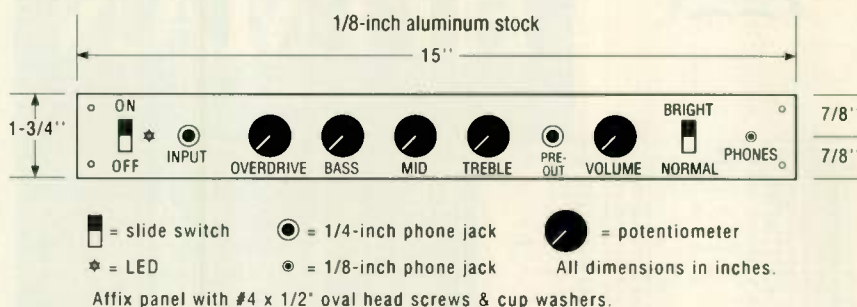


FIG. 7: Suggested front panel layout.

the rails along all four edges, both back and front. Swing the panel into place and secure with Elmer's glue and finishing nails. Again, caulk any leaky seams.

### THE SPEAKER GRILLE

Now it's time to make the speaker grille (Fig. 11). The panel height is 1 3/4-inch shorter, which allows it to cover the speakers and butt up against the lower edge of the electronics front panel. (Don't forget to subtract 1/8-inch if you covered the box with vinyl.) After cutting the board, give it a quick spray

painting with flat black so that the pale wood doesn't show through the grille cloth.

After the paint has dried, cut a piece of grille cloth about two inches larger in both the length and width and fold it over the front of the panel. While stretching the cloth tightly, staple it into place on the back side. Trim off any unsightly folds or sags around the corners. You can now mount the speaker grille over the speaker panel using cup washers and #10, 3/4-inch, oval head wood screws.

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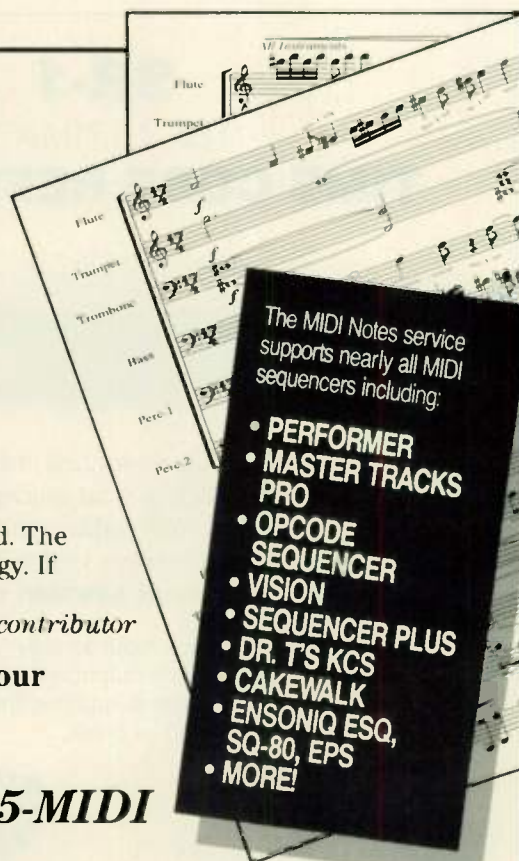
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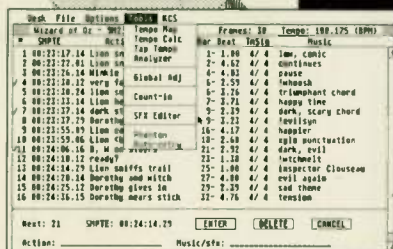
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## STUDIO AMP

To complete our woodworking, Fig. 12 shows how to make the back panel. (If you are using vinyl covering, cut the board 1/4-inch smaller in both directions this time, assuming that both the frame and this panel are to be covered.) The small metal panel in the lower right hand corner, which allows you to mount the circuit breaker and a grommet for the power cord, is cut from 1/16-inch aluminum stock and secured to the back panel with cup washers and #4, 1/2-inch, oval head wood screws. Of course, you will need to cut out an opening in the back panel to match this.

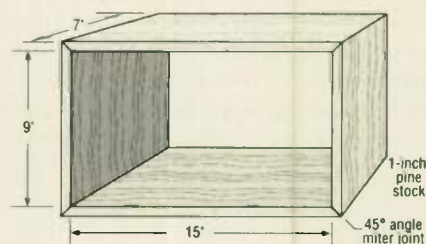


FIG. 8: Speaker cabinet box frame.

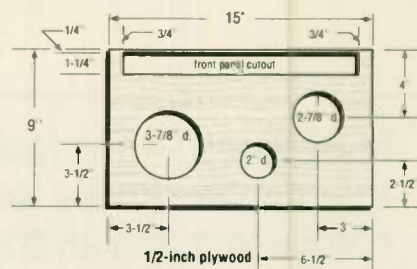


FIG. 9: Speaker panel.

The two knobs mounted toward the center of the back panel are gold-colored metal drawer pulls (available from any hardware store). These provide some convenient pegs around which we can wrap the power cord when the Studio Amplifier is in transit.

## FINAL ASSEMBLY

At this point, follow the schematics and finish up the final wiring. In the case of the crossover, obey the printed instructions that come with the unit. By the way, I used the 2,000 Hz crossover tap, which seemed about right for the specified speakers.

Note that the cable connecting J1 to the preamplifier should be shielded. Ground both sides of the shielding; this is the only place where a ground connection is made to the front panel. Also,

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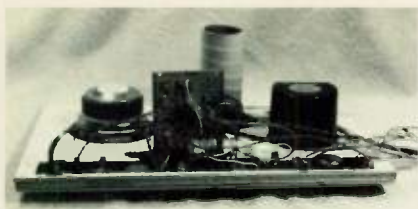


FIG. 10: The completed speaker panel, with submodules mounted in place.

the connection between R5 (preamp output) and C20 (power amp input) should be shielded, but only ground the preamp side connection. Finally, the brightness switch leads should also be shielded, again grounded on one side only. If all of the other connections are kept short and neat, then regular 22-gauge wire is acceptable.

After completing the wiring and double-checking for any solder bridges, loose parts, etc., finish up the box. Affix a nice handle to the top, and throw on eight metal corner covers. The two views on page 88 show the finished product.

#### TIME TO BOOGIE!

While the Studio Amplifier isn't going to rattle your windows, it does sound good. (If you turn up the volume control too far, of course, the LM384 will go into distortion. Some might prefer this, but most people would probably be willing to sacrifice lower volume for clean sound.) The controls are extremely versatile and give a broad range of effects. Also, the speakers are good

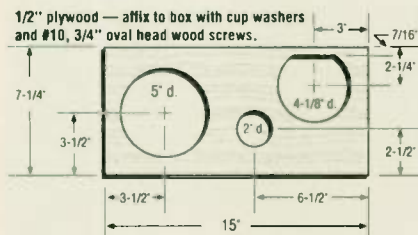


FIG. 11: Speaker cabinet grille panel (cover with speaker grille cloth).

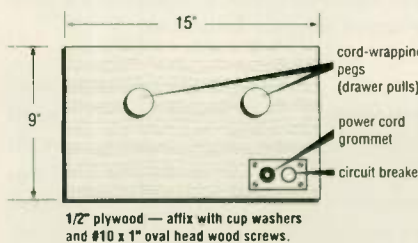


FIG. 12: Speaker cabinet back panel.



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R18	100k audio pot
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C8, C23	220n mylar (0.22 $\mu$ F)

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C15	100 $\mu$ F electrolytic
C18	100n mylar (0.1 $\mu$ F)
C19, C20	10 $\mu$ F electrolytic
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S1, S2	SPST switches
Other:	Sockets, wire, solder, front panel, #4 hardware, LED holder, flea clips, grommet, heat shrink tubing, cup washers, #10 oval head screws, speaker crossover circuit, circuit boards, cable clamps, etc.

enough quality that bass guitar sounds good, too.

The cost is reasonable; even though I went wild on buying good quality parts for the Studio Amplifier, I still came away with only a \$70 total and a fun weekend in the shop. And the rewards? Well, apart from the fun I have had playing through the device, I have also enjoyed all of the compliments given by friends and colleagues with regard to the professional quality of the finished

product, and isn't that a major part of the satisfaction one receives from a do-it-yourself project? I think so!

**Thomas Henry**, who started writing electronic music articles in 1979, taught himself electronic design by poring over the pages of *Electronotes*. In 1984, he was awarded a master of arts degree in mathematics from Mankato State University. His outside interests include etymology, amateur astronomy, and bird watching.



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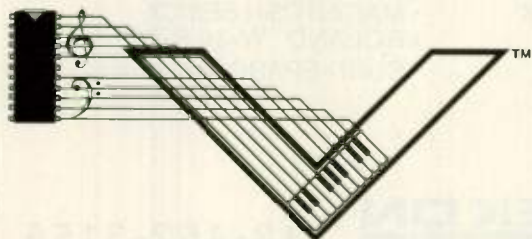
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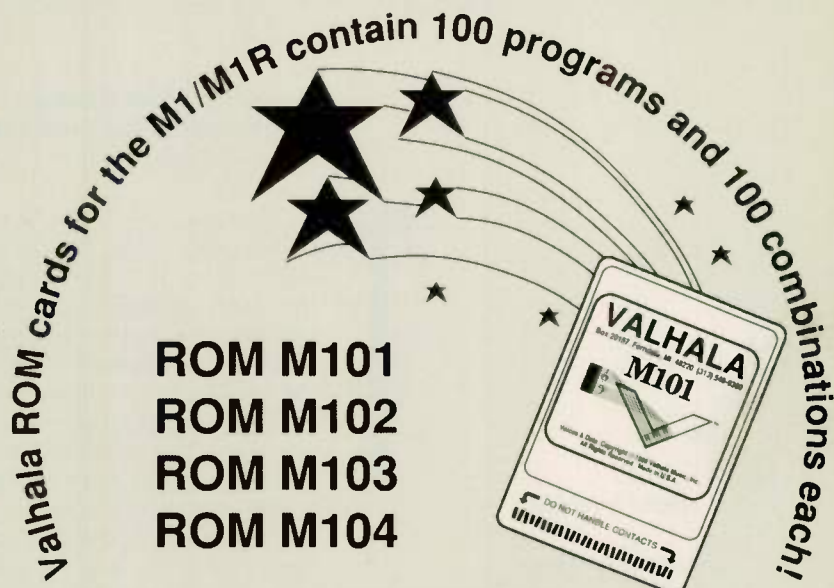


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## First Takes & Quick Picks

### Cheetah MS6 Analog Synthesizer Module (\$669)

By Steve Oppenheimer

*Two synths a-playing,  
one tape a-synching,  
one drummer  
drumming—and a  
cartridge for a CZ.*

**T**he Cheetah MS6, a British-made, 1U rack-mount, analog hybrid (i.e., with DCOs rather than VCOs) synthesizer, distributed in the U.S. by Jessico, isn't earthshaking, but the Richter scale is not the proper measure of the product's worth. Its 6-voice multitimbral architecture, front panel programmability, and powerful, Oberheim-like sound could provide a challenge to its competition.

MS6 instrument programming is easy; the limitations of the unit's relatively simple voice architecture provide the strength of accessibility. Two oscillators mix (adjustably) at a 4-pole filter with the usual resonance and cutoff frequency controls. Two envelope generators,

an LFO, and a VCA are supplied per voice. In addition, the module responds to velocity and channel aftertouch.

There are notable features of the envelope generators (EGs) that add programming flexibility. You can switch off the sustain phase of each EG so the envelope goes straight from the decay to the release stage. Velocity can separately modulate the amplitude and attack time of each EG. Either EG can modulate the mix (i.e., can sweep) between oscillators A and B. While these are not unheard of features, add them to the usual modulation routings (pulse-width, pitch, filter cutoff) of any decent analog synth, and you have some programming power.

The MS6 includes five ROM-based sound banks, each with 64 sounds. Banks 6 and 7 contain 64 and 32 RAM-based sounds, respectively. The manual asserts that for many users, these are "all the sounds you will ever require"; such users certainly must have limited requirements—many sounds are just minor variations—but the MS6 programs are solid and useful. The emphasis is on brass, strings, and Moog bass programs, cutting leads (using synched oscillators), and bass sounds designed with house and acid house music in mind.

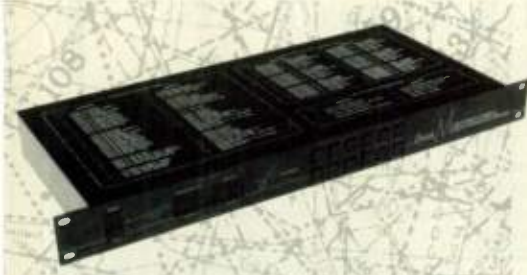
Bank 8 has 64 performance memories, mostly blank, that await an inspired programmer. The performance edit parameters of Bank 8 determine the bank, tone, number of voices, range, MIDI channel, and volume for each multitimbral instrument. Bank 8 also contains such utility functions as save, load, calibrate, global tuning, and basic (global) MIDI receive channel. Notable is a MIDI Overflow function, similar to the Oberheim Matrix series' Group mode, that, when all six MS6 voices are in use, channels all additional note data over MIDI to satellite synths. The MIDI features were a breeze to program; I set up a multitimbral program with custom-

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

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

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

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### ● FIRST TAKE

ized voices and controllers after my first glance through the manual.

Speaking of which, the manual is spartan. It could use a few more graphics, but the basic MIDI implementation chart is greatly complemented by a complete sysex format chart.

One of my biggest gripes about the MS6 is the absence of zero in the keypad. As a result, programs and parameters are numbered 11 to 19, 21 to 29, etc. Simultaneous, multiple parameter- and program-changing with several different instruments is hard enough because of differing numbering schemes; it was unnecessary to make things worse.

An obvious question is how the MS6 compares to the Oberheim Matrix-1000. Each synth has its strengths. The MS6, because of its mostly hard-wired architecture, has far more limited signal and control paths than matrix modulation offers. Nonetheless, because it is multitimbral, the Cheetah synth is capable of very sophisticated, dynamic timbres, albeit with a loss of voices. The MS6 is programmable from the front panel, a major advantage. Oberheim gives you more sounds and more RAM. The audio qualities of the two are similar—warm and rich—which is unsurprising, considering the voices of both synths emanate from CEM 3396 chips.

Jessico, Cheetah's U.S. distributor, believes at least one MS6 editor/librarian program will be forthcoming from Britain. Cheetah also needs to develop additional MS6 sounds that appeal to Americans. The "rival" Oberheim Matrix series has solid software support in the U.S., both with regard to editor/librarians and sounds. All in all, my suggestions and gripes are few; the MS6 is a sweet combination of hybrid analog synthesis and multitimbral technology.

(Thanks to *EM* author Charles Fischer for technical advice.)

**Steve O.**, assistant editor of *EM*, is fellow author *Larry the O's* older brother. He enjoys the confusion this creates.



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## Scorpion Systems sYbil (\$299)

By Larry (the O) Oppenheimer

**S**Ybil is a real-time MIDI data-processing program for the Macintosh that is aimed at allowing multiple instruments to be performed with and controlled from a single controller. In essence, the program adds a number of MIDI performance features, such as layering, velocity switches, note mapping, etc., to any controller by processing and augmenting a controller's outgoing MIDI data stream. Controller information (current versions support percussion and guitar controllers) is processed by user-configured maps, which can be exchanged between versions, to generate MIDI data on two levels of functionality: note events and control events. This is roughly analogous to the old analog modular synth approach where a patch consisted of two signal paths, audio and control, with sYbil's note events taking the place of audio signals.

In percussion version 1.09, which I reviewed, each controller or drum machine pad (up to a maximum of sixteen pads) can generate up to four simultaneous MIDI note events, each with its own channel, note number, volume (velocity scaling), and duration (gate time). A velocity switch feature (called "crossfade" by Scorpion) for each pad sends a different note event above a programmable velocity threshold. In this version, sYbil affects only incoming MIDI notes 51 through 66 on channel 1 (although it can generate the full range of MIDI notes), while other data is simply passed through.

Each pad can also generate a control event (simultaneously with note events), a "toggle" in Scorpion's parlance, of which there are several types. Transposition events move all the pads up or down by a number of half-steps. Sustain events cause notes to sustain until another pad is struck. A Program Change toggle cycles through four user-defined program change maps, each map having sixteen program changes (one per MIDI channel).

A complete definition of pads with all their associated note values (not control functions) is called an "identity map," of which, not surprisingly, sYbil has several. The Chain toggle cycles between four identity maps. Thankfully, there are also two types of reset events, 1/2 Step Reset,

which removes all transpositions applied by the transposition toggles, and Square One, which returns you to your starting point. Learning to plan and play maps that generate both note and control events from a single strike does take some mental effort.

Although it's easy to understand sYbil's individual components, the program is a new concept whose ramifications cannot be immediately grasped. The manual does not always help in this respect: There are no graphics illustrating the program's architecture, it is

never explicitly pointed out that a pad can simultaneously generate note and control events, and some information is not found in the most logical place. Still, the difficulty is less understanding what the program is doing than perceiving it holistically and applying it to your performance needs. There is also great promise in using sYbil with multiple players (merging data streams) or to control signal processing.

sYbil is a musically interesting idea and fun to play. However, although the program runs well, and I think the Hy-

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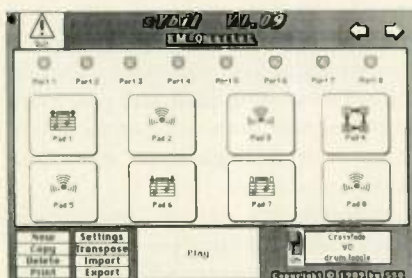


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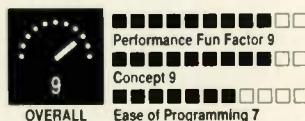
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## • FIRST TAKE



Scorpion Systems sYbil

*perCard* front end used by the program is a good idea, the user interface (which is really only used for programming sYbil) is not as streamlined as it could be, requiring much jumping between screens to edit maps in detail. This, combined with HyperCard's sluggishness, makes creating and editing maps painfully tedious. The program is still young and contains a few assumptions and limitations (such as requiring the up and down transposition events to use the same value) that may not be valid for everyone. Scorpion claims that virtually all my gripes are addressed in an update that may be available (free to registered owners) as you read this, and HyperCard should evolve into a faster beast "in the future." We should see sYbil develop into a very rich program for expanding MIDI performance capabilities.



**Scorpion Systems Group**  
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(technical info)

## MusicSoft MIDIMAN MIDI-to-Tape Interface (\$199.95)

By Alan Gary Campbell with Todd Souvignier

**S**tore and playback MIDI data on cassette tape, in *real time*? They must be kidding," I thought as I opened the box. After reading the entire manual, with its seemingly endless paragraphs of disclaimers, I didn't expect much. So, I plugged it into the nearest component cassette deck—a Sharp RT-100 with dirty heads—cranked the input level, turned off the Dolby, and let 'er rip. It worked perfectly

the first time. And the second. And every time since. They're not kidding.

MIDIMAN processes data using a modified version of Manchester encoding that reduces the bandwidth of incoming data without losing lots of information. The box worked flawlessly with simple, combo-type arrangements. However, there was a noticeable lag in tracks that were dense, datawise. On songs with lots of doubled parts and busy quantized drums, instruments would start to "fall out of the pocket."

To compensate for the situation, MIDIMAN assigns first priority to MIDI channel 10 (the Roland drum channel) and second priority to channel 1. This helps keep rhythm tracks locked in the groove; use other MIDI channels for tracks where precise timing is less critical, like pads and strings.

MIDIMAN is easy to use; there are MIDI in/out and tape out/in connections for recording MIDI data on tape or playing it back. Plug everything in (power is supplied by a 9-volt adapter; there's no on/off switch), set your deck to record, press the Write switch, and send MIDIMAN some MIDI data. Or send it quite a bit of data. You can save complete multitrack arrangements from your sequencer, with pitch bends, other controller data, program change commands, etc. To playback, just rewind the tape—or don't. MIDIMAN starts up perfectly, even in the middle of an encoded sequence and silences "hanging" notes wherever you stop.

A front panel, DIP switch selects various options. You can merge incoming MIDI data with encoded data during playback, filter MIDI clock data, filter aftertouch data (a good idea), halve the bandwidth for use with lower-quality tape decks, assign playback data to a single channel (1, 2, or 10), and duplicate data tapes using MIDIMAN as a processor between two decks.

MIDIMAN's ideal application is sequence playback on club gigs. No more lugging your expensive, theft-tempting sequencer or fragile, unwieldy computer to the gig—just MIDIMAN and a cassette deck.

MusicSoft recommends highest-quality tape and recorder for best results, but the company's presequenced Casual Music tapes are standard ferric oxide. I tried MIDIMAN with every type of tape and component deck I could lay my hands on and it performed without a glitch. Of course, the better the tape

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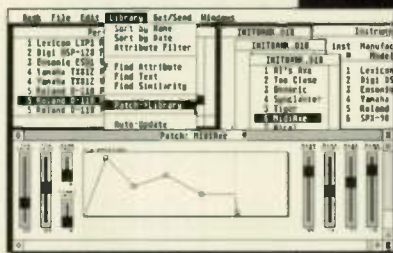
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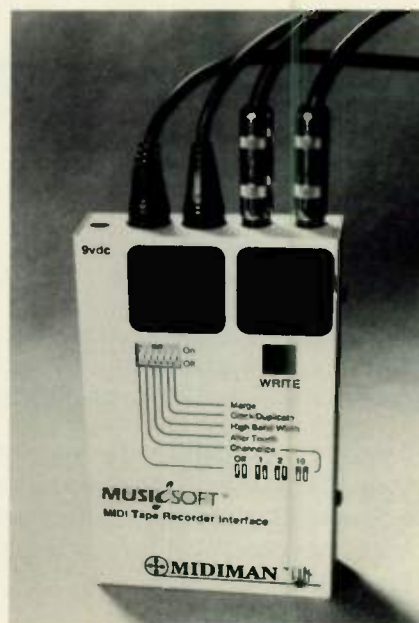
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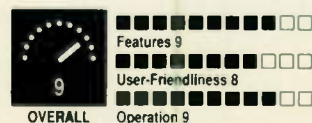
MusicSoft MIDIMan

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Now, wouldn't it be great if you could encode system exclusive program dumps? MusicSoft says it's working on a more expensive version with a 32K buffer and an upgrade for current units, so you will be able to do that. Moreover, MusicSoft uses the same circuitry in several spin-off products, including the TransMidi MIDI wireless system and SYNCMAN MIDI sync box. Put me down for one of each.

MIDIMAN is problem-solving, money-saving, sturdy, attractive, easy-to-use, and out-performs its specs. Did somebody say "engineering breakthrough?"

**Alan Gary Campbell** is owner of Musitech™, a consulting firm specializing in electronic music product design, service, and modification. **Todd Souvignier** is operations manager of the EM Bookshelf and plays bass in the group Full Dinner Jacket.



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## Sony TCD-D10PRO DAT (\$2,900)

By Daniel Kumin

**D**AT—digital audio tape—is opening new worlds for more than just studio mastering. Witness Sony's new TCD-D10PRO portable DAT recorder, a diminutive (10 x 2.25 x 7.6 inches, 4.5 pounds with battery) deck that provides recording capabilities and quality to rival most expensive, 2-track mastering decks—in a package that slips easily into your briefcase.

The TCD-D10PRO includes a pair of balanced XLR inputs switchable between mic and line functions, unbalanced RCA jack analog outputs, and a single digital I/O connector that does double-duty as a remote commander port. The supplied commander is a pistol grip with a mic-stand screw lock at the top, thus permitting you to hold a mic and operate the transport controls

pro digital recorders and DAT decks.

The unit's LCD can be backlit in an attractive blue, but since this cuts into battery life, the light is switchable. The display's most prominent element is a pair of bar graph meters with a 60 dB scale. DAT metering is important, because exceeding 0 dB results in hard distortion. The Sony's meters are first-rate, and the unit includes a defeatable limiter and low-cut, 20 dB pad switches for those unpredictable location jobs.

The display can also show accurate elapsed running time or remaining tape time (DAT cassettes automatically register their length with the machine) in hours/minutes/seconds, as well as the "index" points between selections that the deck automatically writes to the DAT subcode. (Additional index points can be written during the recording process.)

Another nifty subcode feature comes from the D10PRO's onboard clock/calendar. The unit automatically writes the running time/date of a recording to the subcode, which can be recalled during playback.

The one "must-have" accessory for the D10PRO is Sony's ECM-MS5 electret condenser stereo microphone (\$1,250; also requires the Sony DC-MS5 DC power supply, \$310), a mid-side stereo pickup in a single unit. Its directivity is adjustable from 0 to 127

degrees, providing a wide range of stereo patterns. The mic is flat within a couple of dB from about 100 Hz to 16 kHz or so, with good top end beyond that. Some trial recordings made in a nicely ambient acoustic space with the ECM-MS5 and the D10PRO were absolutely fabulous—open, spacious, detailed, and very quiet (though the deck's mic preamps don't seem entirely up to the S/N standards of the DAT medium).

The D10PRO's performance is little short of astonishing. Sony's specs (confirmed at the test bench) include better than 85 dB dynamic range, 20 Hz to 20 kHz frequency response ( $\pm 1$  dB), and THD below 0.06% at +4 dB input.

The TCD-D10PRO's operation is clear and logical, for the most part, and its jewel-like construction makes it a satisfying possession even when turned off. Its audio performance is such that those



Sony TCD-D10PRO DAT and ECM-MS5 microphone

with a single hand. Very neat.

The package includes digital input/output cables for digital dubbing to and from the two most common formats—AES/EBU (XLR) and Sony/Philips (RCA jack)—as well as two 1.5-hour battery packs, an AC supply/battery charger, and a carrying case and strap. (Optional accessories include external, 3-plus-hour battery packs and a 12-volt automobile power adapter.)

The deck's standard record sampling frequency is 48 kHz; this changes to 32 kHz when such a digital signal is detected at the digital input. With a prototype AES/EBU digital input connection, the D10PRO will also record at the CD-standard 44.1 kHz sampling rate—rejecting, of course, material with the copy-inhibit bit flag, such as most commercial CDs. But this does permit you to dub copies of master tapes from most

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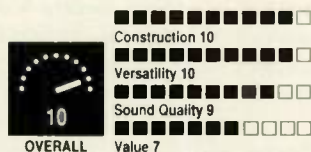
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## ● FIRST TAKE

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## Korg M3R (\$1,275)

By Bob O'Donnell

**T**ake a rack-mount M1, remove the sequencer, halve the ROM samples (leaving 2 MB), reduce the user interface to a smaller screen display, and squeeze everything into a single rack space, and you end up with Korg's newest spinoff of its popular M1 technology, the 16-voice, multitimbral M3R. The new instrument includes 100 great-sounding, new combinations and programs, maintains all the internal signal processing—33 effects, two of which can be used at once—and even the four outputs and headphone jack from the M1 or M1R. In addition, the M3R sports an M1-compatible PCM card slot and a ROM/RAM program card slot (which *isn't* M1 compatible).

The only thing that really suffers is the user interface, because the small LCD is a bit of a pain to get around. Korg recognized that fact, however, and has also introduced the RE1 Remote Editor (\$417). The RE1 features the same large LCD found on the M1, multiple sliders, buttons, and more. It appears that the RE1 will also work with future Korg products.

The M3R should give the Proteus and new Proteus XR (with expanded user memory) a decent run for the money. The Korg offers built-in effects and digital filtering versus the Proteus' greater polyphony and two additional outputs. If you've always loved the M1 sound but couldn't afford it (or want to add some more voices to an existing M1), the M3R is your instrument.

**Overall rating: 8. Korg USA, 89 Frost St., Westbury, NY 11590; tel. (516) 333-9100.**

## Lake Butler Sound Co. CFC-4 MIDI Control Pedals (\$295)

By Craig Anderton

**F**or those who want real-time pedal control over multiple MIDI parameters, this is it: Four plastic pedals mounted on a metal chassis can be assigned to generate MIDI data in response to pedal motion, using eight different curves. Three increase value (in linear, "log," and "anti-log" curves) as the pedal moves from heel to toe; three do the same thing, but from toe to heel; and two are switch curves that change between high and low extremes. Usually this data would transmit MIDI continuous controller data (volume, modulation, etc.), though any type of data—even program change and system exclusive—are supported, within each pedal's 48-byte capacity. A MIDI in merges incoming data. Power is provided by either a 9-volt battery (which lasts about 60 hours) or a 9-volt AC adapter (not included). The latter should have a positively polarized tip—something I didn't see mentioned in the manual.

Unlike Lake Butler's extremely user-friendly RFC-1 footswitch, you need to program the CFC-4 in hexadecimal on a small, alphanumeric LED display. This sounds more intimidating than it is; the manual helps to some degree, but MIDI literacy is required if you're going to master the CFC-4. Fortunately, once you've set up your pedal assignments, you don't have to think about it any more. An EEPROM that needs no battery backup stores the data.

Forty-eight bytes per pedal allows the CFC-4 to send controller information (which requires three bytes) to 16 channels simultaneously (just the thing for "master control" of a keyboard stack), or control multiple parameters at once over one or more channels. The manual also describes a clever way to use a pedal to select a particular program and then vary selected parameters with the same pedal.

You cannot store different sets of pedal programs. However, you can send sysex data to the CFC-4 and reconfigure the pedals, although this takes a bit of head-scratching to set up. Merging is disabled during sysex sends.

Overall, this is a well-built niche product that some musicians will find invaluable. Others will probably be intimi-

dated by the programming process. In any event, if you want four pedals of real-time MIDI control, this is the only option around—but fortunately, it may be the only option you really need.

**Overall:** 7. *Lake Butler Sound Co.*, 5331 West Lake Butler Rd., Windermere, FL 32786; tel. (407) 656-5515.

## CZ Orchestra and CZ Rainbow (\$34.95 each)

By Craig Anderton

**C**Z Orchestra does the improbable: It provides a set of 64 highly realistic imitative patches for the CZ series of synthesizers. Developed by Charles Lauria, these patches include excellent woodwinds, brass, strings, and percussion. A couple of the brass and massed string patches are weak, but overall, if you're looking for imitative sounds, I haven't heard anything better for the CZ—and some of the voices are exceptional by *any* standards. Just remember to play idiomatically and throw on some reverb.

CZ Rainbow (also 64 patches) is more of a mixed bag of impressionistic and imitative synthesis. While not as consistent to my ears as CZ Orchestra, the majority of patches are nonetheless very good, and quite a few hit the exceptional standards set by its companion set. The only real problem is that some patches sound just a little too "CZ-like"—something you'd expect from a toy, not a musical instrument. Still, there are some standout guitar, bass, and "ethnic" patches.

Each set is available for \$34.95 (\$59.95 for both) in data booklet form, on a 3.5-inch disk for Hybrid Arts' CZ-Android program for the ST, or loaded to a RAM cartridge you provide. A demo cassette of both patch sets is available for \$5, and I highly recommend it; it presents a very convincing case for the CZ Orchestra patches.

Since we're on the subject of the CZ series, here's one more tip: If you're into programming the CZ, check out Andrew Schlesinger's *Insider's Guide to Casio CZ Synthesizers* (Alfred Publishing). This book demystifies the CZ once and for all. It's interesting that long after the CZ's demise, new patches and support materials continue to appear.

**Overall ratings:** CZ Orchestra 10 and CZ Rainbow 8. Charles Lauria II, 17 Forest Place, Towaco, NJ 07082. ■



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## Tascam 688 MIDIStereo

By Bob O'Donnell

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One of the many benefits of MIDI's rapid growth and acceptance has been the evolution of home recording studios. Musicians of all types have discovered (and are discovering) the joys of having a place to sketch out song ideas, produce demo tapes, and even record finished works. Until recently, though, the tools offered to home recordists have not offered the same degree of technical sophistication as synthesizers and other MIDI-specific gear. With the release of Fostex's R-8 recorder and Tascam's new line of MIDIStereo, that situation is rapidly changing. The 688, in particular, offers a great deal of potential to the sophisticated home MIDI studio, as well as to professional operations looking for an all-in-one mixing/recording/MIDI synchronization system.

The 688 starts off with an 8-track cassette recorder and a 20-input mixer and adds an electronic switching/audio routing system, built-in MIDI-to-tape synchronization like that found on the company's MTS-30, capability for external transport sync, and some of the hip-

pest level meters around, all of which is housed in a gorgeous black package. No question about it, this is a Portastudio for the MIDI age.

### IT'S GOT CONNECTIONS

And lots of them. Behind the movable meter bridge, the 688 has ten balanced, XLR inputs (without phantom power); ten unbalanced, 1/4-inch inputs; ten insert points; MIDI jacks; a 15-pin, RS-232, serial I/O port for connection to computers or serial synchronizers; and more.

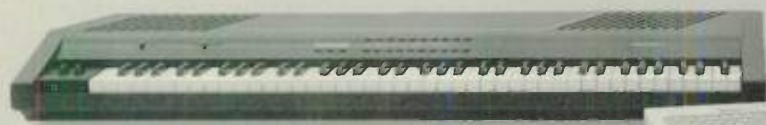
While I like the number of inputs, I don't really understand the choices. For example, if this is really intended for MIDI studios, I wonder why they chose to have so many XLR inputs. These are, of course, preferred if you're working with a lot of microphones, but I don't know of too many synths with XLR outputs. Similarly, I'm not quite sure why they chose to use RCA jacks for the main monitoring outputs; most power amps have XLR, or at least 1/4-inch input jacks. With a few adaptors, this admittedly becomes a moot point, but it's a strange design decision.

The 688's mixer is fairly sophisticated and offers a nice number of signal-flow options. There are ten main channels, each of which has a trim control and accompanying overload LED, 3-band EQ with sweepable mid, an insert point, a pan pot, and a fader, plus ten dual channels with a pan pot and a rotary level control each. In addition, there are two mono effects sends (with stereo returns) that can either be configured as two sends for the main channel, or one for each type of channel. If you want all twenty channels to be sent to the same effect, you have to use the Aux 1+2 summing control, which reduces things to a single effects send mix, (though there's nothing to prevent you from connecting



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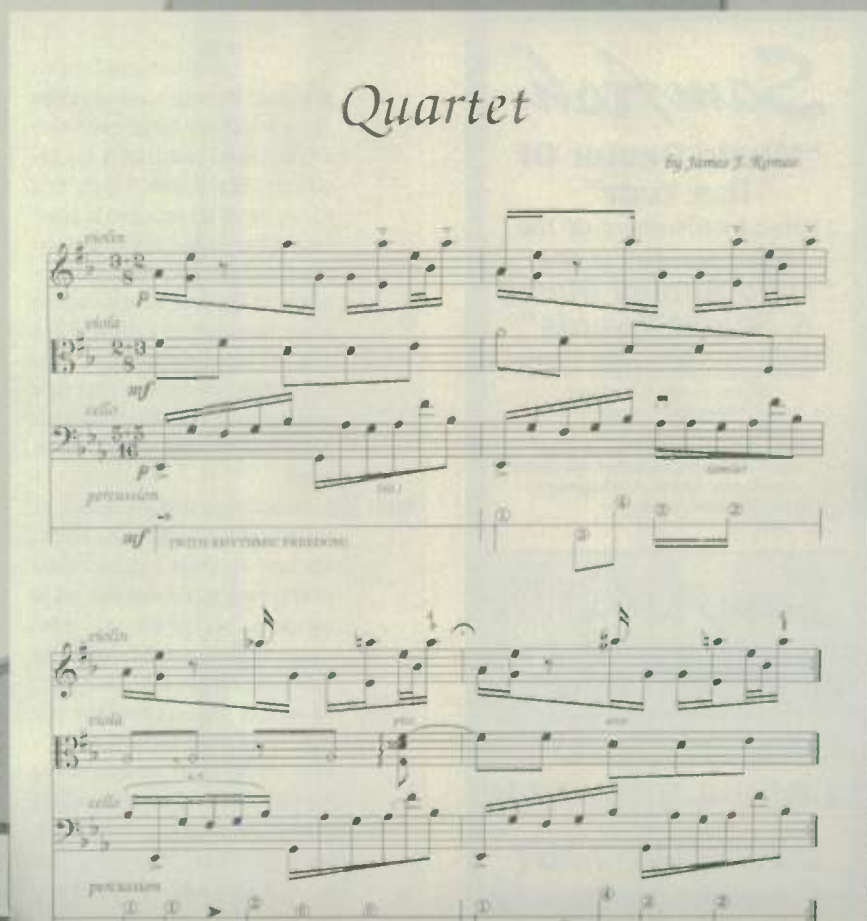
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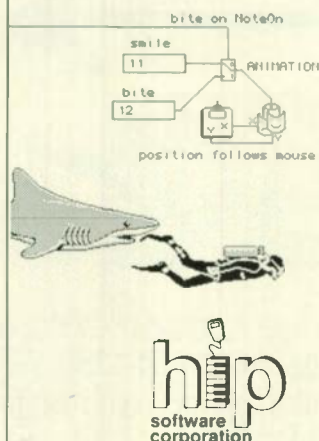


(continued from page 58)

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## ● TASCAM

both aux outs to different signal processors).

The bottom line is you have independent level, panning, and effects control over twenty input sources (either line, mic, or tape), though the dual channels essentially function as an independent 10 x 2 submixer that feeds into the main mixer via a linking function. Because of this architecture, Tascam suggests you can use the dual channels for purposes other than just extra line inputs, including tape monitoring (though a separate cue monitor section is also available on the 688, unlike the smaller 644) or, by making use of the pan control, as two additional effects sends for the main channels.

The only limitation I found while using the 688's mixer is the lack of solo buttons, a very unfortunate oversight. You can solo channels by setting up Scenes (described later) that permit you to hear individual channels and switch between them, but this isn't nearly the same thing. I also heard a bit of leak-

through between mixer channels while monitoring, but this didn't show up in recording. On the positive side, the 688's mixer incorporates an innovative, though initially rather perplexing, routing display.

### WHAT GOES WHERE AND HOW

Making use of an LCD somewhat similar to early Roland drum machines, the 688's graphic routing system is the real heart of the machine. This is where you assign the types of inputs that each channel will receive, what groups (and consequently, tracks) will receive or will be sent to what channels, and where the four effects returns will be routed. You can also mute individual channels and store that status. The assignments are made with a series of buttons that surround the display and the ten numbered keys beneath it. Once you figure out what you're seeing, it's really quite simple.

The settings for each of these parameters can be memorized in one of 99 avail-

### FOR THE BEGINNER Mixer Signal Flow

**F**iguring out the flow of signals through a sophisticated audio mixer can be an extremely difficult task, particularly for beginners. Essentially, inputs to a mixing board are assigned to *channels*, which in turn are often combined with other channels to form a *group*. In the case of combination mixer/recorders like the 644 and 688, the group signal then is sent to the different tracks of the tape recorder and to the different sets of outputs so that the signal can be heard.

What gets confusing is that the levels, or volume, of the signal being sent to the tape recorder and heard via headphones or a connected set of speakers are often set independently. Consequently, while the sound you hear might be very soft, its level to the tape might be just right. Even more fundamental, it's possible to assign an input to the monitor section (which is where you set the levels for the sounds you want to hear, or monitor) and not to a tape track. In that case,

even though you may be able to hear the sound you're playing while recording a track, you may not have actually recorded it. A similar problem arises if you assign an input to the wrong group or track—input 3 does not necessarily get assigned to group 3 or recorded on track 3; that depends on how you've set up the routing system.

The MIDISTudios attempt to simplify the routing process by removing the buttons and switches found on most mixing boards and replacing them with electronic switches that you control via the graphic display. Using a series of small rectangles, the display shows what inputs are assigned where and what's connected to what inside the mixer. These settings are stored as "Scenes," and you can switch between Scenes quickly and easily during the recording and mixing process. It's still not entirely intuitive, but once you figure the system out, it has a certain degree of logical elegance to it.

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## Product Summary

### PRODUCT:

Tascam 688 MIDIStereo

### TYPE:

8-track recording/20-input mixing system

### FEATURES:

Flexible mixer, built-in MIDI-to-tape synchronization, large meter bridge, electronic switching system

### PRICE:

\$3,295

### MANUFACTURER:

Tascam  
7733 Telegraph Rd.  
Montebello, CA 90640  
tel. (213) 726-0303



able Scenes. The first twelve contain factory presets for the most common recording, overdubbing, and mixdown routing assignments. During the recording and mixing process, you simply select the Scene with the appropriate routings and get on with your work. Scenes can be recalled via the panel buttons, a footswitch, or MIDI program change commands from any MIDI controller. The Scene contents can be stored conveniently on data tapes put into the recorder or via MIDI system exclusive messages. Thankfully, the process of switching Scenes is completely silent; you can even switch while monitoring or recording a channel's input with nary a glitch. You can also quickly mute and unmute channels with MIDI note on commands, a feature that can help reduce the noise level of any recordings done on the 688.

### EIGHT TRACKS ON 1/4-INCH TAPE

It's a slightly unusual way of thinking about the format, but the 688 uses the same 8-track cassette technology the company introduced with its 238 recorder. Tascam manages it with a recording head that combines two slightly offset groups of four recording tracks (see the 238 review in the November '88 issue of EM).

Despite the small size of the individual tracks, the recorder boasts pretty respectable specs, including a frequency

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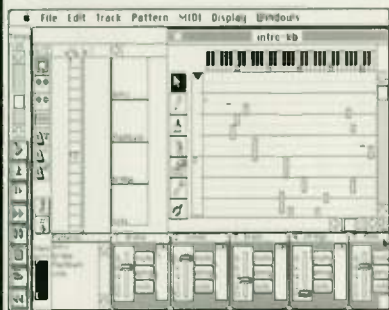
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response of 40 Hz to 16 kHz  $\pm 3$ dB without dbx, a signal-to-noise ratio of 93 dB with dbx, and crosstalk of 70 dB with dbx—identical to those found on the 644 and other high-quality, 4-track cassette recorders. More important, the 688 sounds amazingly good. The sound is very clean (and quiet, thanks to the built-in dbx Type I noise reduction), with a good high end and even a respectable bottom, though the low end didn't seem as punchy as I would've liked.

Recording and overdubbing tracks is very easy. The huge level meters found on the meter bridge come in handy, and they'll impress the hell out of your friends (or clients). Plus, the 688 includes a flexible, dedicated 8 x 2 cue monitor section that allows you to see and hear exactly what you need, whether you're laying down initial tracks, doing a punch-in, or mixing down. The only monitoring option I missed was an effects return button, but hey, you can't have everything.

The solid-feeling transport on both the 688 and 644 also incorporates some of the useful features found on the 238, including the ability to set two markers (other than zero) to which you can autolocate and a great little rehearsal and auto punch-in feature that will automatically cycle between two points for practicing and precise overdubbing. Other niceties of the recording section include a variable pitch control, a shuttle knob for incremental transport movement, and, via the serial port, the ability to be controlled by external synchronizers if you're working with multiple recorders or video.

## MIDI ON A TAPE RECORDER?

Yes, and it's quite useful, too, if you use a sequencer and want to take advantage of the virtual tracks concept. The built-in tape synchronization system allows you to plug the MIDI out of your sequencer into the 688's MIDI in, where it converts the timing data into an "intelligent" FSK sync tone that can be recorded automatically on track 8 (the dbx is defeated automatically on that track if you use this option). You don't have to worry about setting levels, hooking up cables, etc., which is great. The procedure could be a bit more automated, but nevertheless, it works. Because the 688 embeds song position pointer (SPP) information into the tone, you can start the tape at any point and, if your sequencer can respond to SPP messages, it



## A SMALLER HOME COMPANION: THE 644

If you like everything you've been reading about the 688 except the bottom line (or don't see the need for eight tracks), you'll want to check out its smaller sibling, the 644 (\$1,495). Offering four tracks and a 16-input mixer, but otherwise nearly identical features, the 644 stands well above any currently available 4-track recorder. The built-in MIDI synchronization is extraordinarily handy for MIDI-based home studios, and its external synchronization capability means it's equipped to move onto video projects and more whenever you are.

The 644 lacks the snazzy meter bridge and dedicated tape monitoring section of the 688, but it offers the same basic mixer topology, including EQ and effects returns, the same routing system, the same transport controls, the same MIDI features, and it actually has more 1/4-inch inputs (sixteen, plus two XLRs that override two of the line inputs). Level monitoring on the 644 is accomplished via the multipurpose routing panel; it's definitely not as slick as the 688, but it's more than functional. The 644's sound quality is excellent, and by making use of its sync capabilities, you can produce high-quality demos with up to three first-generation recorded tracks and thirteen virtual MIDI tracks. All told, it's a tremendous value. Overall rating: 9



Back panel of the Tascam 644 MIDI-Studio

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will link up. The time it takes to sync, however, is a little on the long side—my computer-based sequencer took between three and four seconds when the tape was randomly started from points in the middle of a song. In contrast, when I striped the tape with SMPTE from an Opcode Systems Studio 3 SMPTE-to-MIDI converter, lock-up time was less than a second.

In either case, as with any tape sync system on any recorder, very slight tempo deviations occur; sequenced parts recorded on tape, when monitored with the same part being played again by the sequencer, will be slightly flanged. It's not necessarily a big problem, but something you should be aware of.

One important point to keep in mind is that you don't have to be a MIDI freak to appreciate or make use of the advances found on the 688, but if you are, you can take advantage of these few specific features.

#### THE FINAL MIX

Working with the 688 was a pleasant experience, due in no small part to the beauty of its layout and the well-thought-out integration of its components. Tascam obviously put a fair amount of thought into planning this unit and its smaller sibling, the 644 (see sidebar). Though I ran into some minor limitations, I think Tascam deserves a lot of credit for pushing forward the concept of mixer/recorders.

The 688 may not have as flexible a signal routing system as an independent mixer with multiple, independent effects sends, nor will its specs match up with some larger format 8-track reel-to-reel recorders, but the 688 is an unquestionably excellent value. I would like to have seen even more—a built-in SMPTE-to-MIDI converter, for example, as well as some form of MIDI automation of levels, but that would probably have raised the price significantly. The fact is, this is one impressive Portastudio. If you have an average to large MIDI-based studio and you're looking for an all-in-one recording system that's capable of doing demos and finished works and is geared to your specific needs, the 688 is tough to beat. Good stuff.

**Bob O'Donnell**, *associate editor of EM*, has worked in the music magazine business for five years, but still wonders occasionally how certain issues ever get finished.

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By Jim Pierson-Perry

*One of the first programs to truly take advantage of the standard MIDI file format, this new offering can add graphic editing to nearly any ST sequencer.*

If you're tired of fighting through the underbrush of your sequencer's MIDI event lists, *TIGER*, Dr. T's state-of-the-art graphic interface for displaying and manipulating MIDI data, may prove an attractive, friendly beast.

*TIGER*, an acronym for The Interactive Graphical Editor, runs on all Atari ST/Mega systems with either color or monochrome monitors. The program uses key disk protection and easily installs on a hard disk. Following the new Dr. T's design philosophy, *TIGER* is fully GEM-compatible, making use of a menu bar, numerous screen buttons, and scroll bars, and allowing RAM disks and desk accessories.

*TIGER*'s forte is editing existing sequence data, but the program also serves as a MIDI player and step-entry sequencer. It reads ".ALL" files from Dr. T's *Keyboard Controlled Sequencer* (KCS), as well as standard MIDI file formats 0 and 1, giving compatibility with virtually

all sequencers that support either file format. The program runs either as a stand-alone application or, optimally, in conjunction with the KCS sequencer under Dr. T's *Multi-Program Environment* (MPE). The manual, by *EM* author Jim Johnson, is well-written, with numerous illustrations, and includes a section of hints/tips by some of the program's creators and testers.

### ORGANIZATION AND DISPLAY

Overall program organization follows the Track mode of the KCS, with sequence data oriented in up to 48 parallel, linear tracks. Each track should hold data from a single MIDI channel (for simplicity, not a requirement). *TIGER* automatically splits sequence data, by channel, to individual tracks when reading MIDI files, but lacks a way to do this for ".ALL" files. This forces you back to the KCS for reformatting, or you'll run the risk of rechannelizing your sequence data. While only an extra couple of steps under the MPE, it takes away from *TIGER*'s stand-alone ability. Track 1 serves as a conductor track; all tempo and meter events are stripped from other tracks and put into it automatically, regardless of input file type.

Fig. 1 shows *TIGER* on the prowl. All action occurs within a single work-screen. Various edit modes are invoked through icons at the screen bottom. *TIGER* is specific about which mouse button is used. In general, the left button is for selecting/editing multiple events, while the right button is for creating new events and manipulating single events. Some functions use command keys (Alt, Shift, Control) with the mouse to provide additional selections. At first, I had some difficulty keeping the mouse buttons straight and invariably wound up editing instead of drawing, or vice versa. The built-in Undo fea-

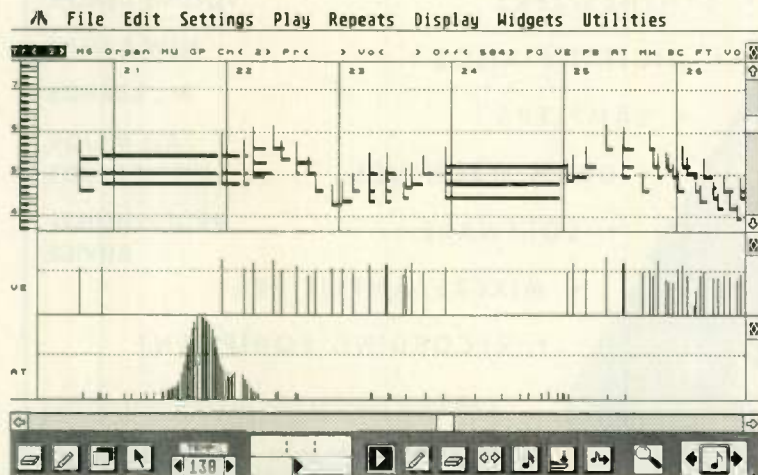


FIG. 1: A typical *TIGER* screen showing one track of note data, along with subwindows displaying note on velocities and aftertouch.

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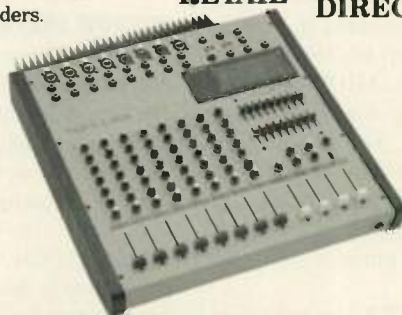
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## ● TIGER

ture quickly became a valued lifesaver. After a short break-in time, however, I found the interface to be quite smooth and much faster to use for most tasks than typing in an event list.

The upper window in Fig. 1 shows typical note data, with subwindows for note on velocity and channel aftertouch. Across the window top are controls governing the track's MIDI channel, (un)mute and group status (multiple-track, solo mode), initial program change and MIDI volume events, time offset of the first event in the track from the sequence start, and triggers to call up some of the more popular controller subwindows.

When started, TIGER can have multiple MIDI channel events in a single track. Changing the track MIDI channel rechannelizes all events to the new value and cannot be undone. Notes are shown as L-shaped symbols: stem height (optional) reflects note on velocity, the Y-axis position of the vertical bar marks pitch (against the keyboard icon to the left), and its length stands for duration. Clicking on the keyboard icon plays the designated note on the track's MIDI channel, useful to test patches or drum parts without actually recording. Similarly, clicking in the left-hand area of a subwindow sends corresponding con-

troller data. By convention, Track 1 (the conductor track) has two fixed windows, meter and tempo, and no other note or MIDI event types. Song tempo is displayed and edited as a continuous controller.

### WINDOW DRESSING

Up to three track windows can be displayed simultaneously, following "first on, last off" order. Subwindows, opened by the same logic, may display essentially any MIDI event type (one per window). Note off velocity and polyphonic aftertouch are the only significant MIDI events TIGER does not recognize, a shortcoming that I hope is corrected in future program versions. One approach might be to have velocity stems in the note display reflect either note on or off as a menu choice with poly aftertouch as a small envelope along the duration bar. It makes sense to me to tie these note-related events to their triggering pitch and keep the subwindows for "freestanding" controllers such as volume, program change, etc.

The number of track and associated subwindows depends on the screen layout and window sizes (subwindows can be opened at 1-times, 2-times, or 3-times height). Like the mouse buttons, it takes a little time to learn how to juggle screen displays to your liking. Dialog boxes, called through the command menu, let you explicitly set track and controller windows to be displayed. I found this to be the easiest way to get started, graduating to the keyboard command-equivalent shortcuts after gaining experience with display formatting. Fig. 2 shows a more involved piece, with three tracks displayed: drums, bass, and sax. Velocity stems were turned off from the note display, and the sax track has subwindows for pitch bend and breath controller.

### PLAYBACK AND ENTRY

Multiple playback options allow auditioning over any desired edit range, from single notes through multiple measures or the entire song. Playback can be one shot or continual looping, with virtually all of TIGER's functions accessible for interactive editing as the music plays. Program change and controller chasing (even while looping) keep the playback faithful to the original sequence.

TIGER supports step entry of MIDI data from a MIDI keyboard and/or the computer. New notes can be drawn on

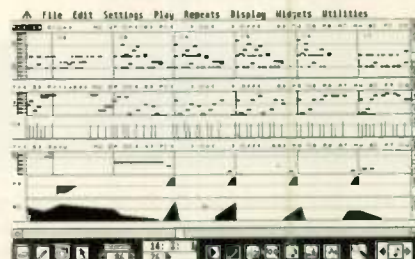


FIG. 2: A more complex display showing three different sequencer tracks, two of which feature connected subwindows with controller information.

the screen by clicking the left or right mouse buttons, using default velocity and duration values, or by clicking on the keyboard icon during playback. These also work in Paste mode by inserting copies of the paste buffer at desired points. During playback, TIGER can recognize note on events and velocity received from a MIDI controller and draw them into the selected track. All notes received are rechannelized to the track's MIDI channel with the default duration.

New controller events are entered with the mouse, whether a single value (e.g., program change or sustain pedal) or envelope (e.g., pitch bend or volume fade-in/out). An interpolate function automatically creates a linear ramp between the current mouse position and its closest neighbors on either side, if visible on screen. This is a simple but powerful way to build envelopes, as shown for breath control in Fig. 2. More complex envelopes, such as pitch bend, still require some artistic ability or trial and error. I would like to see the interpolate function extended to draw smooth curves. Clicking within the meter window of Track 1 calls a dialog box to insert a new time signature (multiple meters throughout a song are supported).

### TWEAKING AND TWEAKING...

The meat of the program is its ability to select and edit MIDI data. Selections can be single notes or controller events, multiple events (contiguous or not) or horizontal ranges of all events (notes and controllers) over a selected time period. All selections must be within a single track. In addition to mouse selection, menu commands provide for note selection by specific pitch, pitch threshold, pitch range, or scale position. In some early versions of the program, some eye-to-hand coordination was

## Product Summary

### PRODUCT:

TIGER

### TYPE:

Sequence editing software

### FEATURES:

Graphic editing of notes and controllers; GEM compatible; works with any standard MIDI file

### REQUIREMENTS:

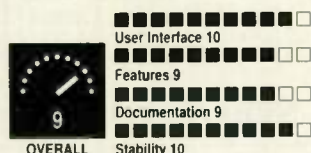
Atari 520/1040ST or Mega; color or monochrome monitor

### PRICE:

\$149

### MANUFACTURER:

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needed, as the mouse position indicator locked to the start of the selection and was not updated until you released the mouse button. Newer versions (with "Read Me" files dated 7/11/89 or later) have addressed this.

Editing operations fall into two classes: moving event times and altering event values. For a particular operation, available options may depend on whether you are editing a horizontal range or note/controller group. Examples of the first class are cut, copy, paste, insert, and delete. Selections also may be copied or split to another on-screen track.

Repetitive notes, controllers, or passages are a snap to build: make a selection, set the repeat time, and generate as many copies as you like. This produces anything from a 7-tuplet quarter note run to adding a major third pitch bend on the fourth beat of each measure in a given horizontal range. The Repeat feature also permits selection of notes separated by a fixed time interval (e.g., every first beat in a range of measures). A particularly neat stretch/shrink function

scales the time duration of a horizontal range. You can trick TIGER into performing this with simple pitch or controller selections by first copying the selection to an unused track, then making the selection a horizontal range. Scale the time duration, then cut out the pitch/controller selection and paste it back into the original track.

Once event values are chosen within a selection, various tools exist to alter them. Pitch, velocity, or duration may be adjusted individually for note selections without affecting the other components. The pitch move operation, for example, locks note duration and start time while you transpose the selection—a single note or group of notes—up and down the onscreen pitch axis.

Menu commands give even more detailed editing power. Pitch can be transposed, inverted, or set to a fixed value. These options also apply to velocity, duration, and controllers, as well as scaling by percentage, clipping (acts as a compressor), and deleting events below a threshold value. Pitches, controllers, or everything in the track can be time-

reversed within a defined range. Several types of quantization are available: straight duration, with a "swing factor" (acts on duration and velocity), and against a reference sequence (adjust to match the groove). For even more extensive editing, running TIGER under the MPE with the KCS Level II (V. 1.7) lets you take selections directly into the PVG or Master Editor modules.

## CONCLUSION

TIGER represents an extraordinary effort both in design and performance. Its ability to work with standard MIDI files makes it a natural partner for virtually all ST sequencers. Even better, its graphical tools proved an irresistible catalyst to experimenting with music data, tempting me to try ideas that previously would have been too troublesome to construct.

*A firm believer that "if it can't be put into math, it's not real," author Jim Piersen-Perry is developing differential equations to model the cryptofractal groove structure of "Louie, Louie." This, too, shall pass.*

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## LTA Productions Forte II

By Dennis Miller

*The latest version  
of this IBM  
sequencer includes  
numerous real-time  
editing options,  
sophisticated SMPTE  
support, and more.*

**T**ime was when picking a sequencer was a fairly simple endeavor. With just a handful to choose from, about the only thing that mattered was finding a program that fit your budget, worked with your MIDI interface, and had the features you absolutely could not live without. Today, there are over 30 commercial sequencers for the IBM PC alone, and they come in all sizes and flavors. *Forte II* Version 2.2, from LTA Productions, a full-featured, MPU-401-compatible sequencer for the IBM and compatibles, offers a wide range of features from the familiar to the unique. The program requires 256K of RAM, supports up to EGA resolution, is copy-protected, and retails for \$250. Unfortunately, there is no mouse support.

*Forte II* is laid out well, with a few exceptions, and uses both the popular piano-roll/track metaphor and a sophisticated pattern mode. It is divided into

nine distinct screens where different types of functions take place. The program relies heavily on function keys for maneuvering, which I find awkward at times, but an excellent macro-making utility lets you customize keystrokes to suit your preferences. You can also adjust the "look" and much of the "feel" of the program in an Options screen, where you are able to set the all-important interrupt level for your MIDI interface.

A session with *Forte II* normally starts in the Track screen. Here, you'll find three boxes, labeled "Track," "Metro," and "Location." You can't resize or move these boxes, which is too bad, because the screen can get cluttered. The Track box contains basic track functions such as naming, channel assignments, and patch selections, and it's also where you make changes, during playback, to quantization, transposition, velocity, programs, and output channel.

In the Metro box, you can set your meter and tempo, while the Location box is used to specify start and end points—even on a particular beat within a measure—for record and playback. A help window shows you which commands are available in the Track screen and a more thorough, context-sensitive help screen is also provided.

Thirty-two tracks are available for recording, but that's not as limiting as it seems, because each track can contain up to sixteen different channels of data. You can only record on one track at a time, but when you're done, you can extract the data from the track on a channel-by-channel basis and assign it to any unused track. If you happen to be running short, you can merge as many as 32 tracks and start over. *Forte II* first sends any incoming data to a record buffer, so you don't have to assign a track number for recording in advance. Unfortunately, the buffer holds 64 KB,

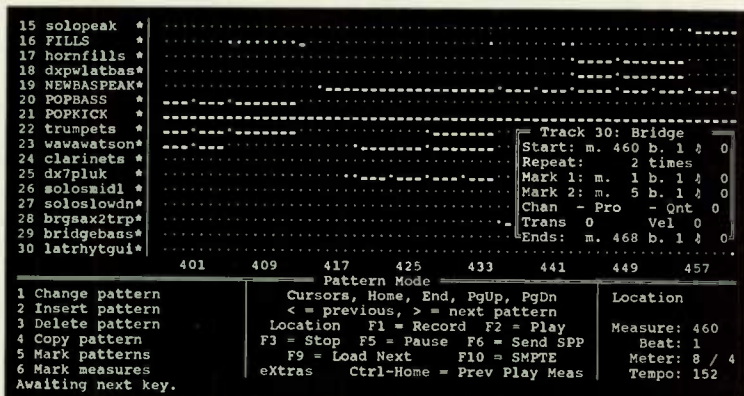


FIG 1: The pattern screen in *Forte II* allows you to see a composition's overall structure.

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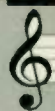
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Dr. T KCS Sequencer  
Dr. T Level II  
Dr. T Matrix 6/1000 Editor  
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## ● FORTE II

which means you could run out of headroom during a very long recording. (A new trend in sequencers is to record directly to your hard disk, giving you virtually unlimited recording space.) During recording, Forte II provides two punch-in options, an Automatic mode for predetermined in and out points, and a Manual mode, where you hit F4 both to start and stop recording.

Forte II supports reading and writing SMPTE with several of Music Quest's MPU-401-compatible interfaces or the Yamaha CI music computer. In addition, the super SMPTE Cue Point feature lets you set a SMPTE location and begin recording from there. You can assign ten different SMPTE locations, give them cue numbers, and use them for reference points throughout the program, e.g., for locating precise points for insertion of material or sysex events. Playback is also very straightforward; just set your start point, hit F2, and you're rolling.

## MARCHING IN STEP

Forte II's step sequencer is as sophisticated and versatile as any I've seen. While it takes a little getting used to, the flexibility it provides allows you to create as complex a sequence as you could imagine. Forte II's overall orientation is beats and measures, not long stretches of notes like some other sequencers, and working with the step sequencer involves setting a number of values which define exactly how your basic beat will be split up.

There are four of these settings: Base Note, the actual note value that is to be divided into smaller parts; Tuplet, the number of subdivisions the Base Note will be split into; Number of Tuplets, a value you use to increase the value of the Tuplet; and Number of Notes, a final subdividing factor. For example, let's say you wanted each note you're going to step-enter to be  $\frac{5}{16}$  long. You would set Base Note to  $\frac{1}{4}$ , Tuplet to  $\frac{1}{4}$ , Number of Tuplets to 5, and Number of Notes to 1. That gives you  $\frac{1}{4} \times \frac{1}{4} \times 5 \times 1$ , or  $\frac{5}{16}$ . Simple, right? But what if you wanted a value to make three notes fit into the time of each  $\frac{5}{16}$ ? Just change the last setting, Number of Notes, to 3, and each step will be one-third part of  $\frac{5}{16}$ . That may be a far more complicated rhythm than you'd ever use, but if you need it, it's there. Needless to say, complex cross-rhythms are easily created here.

Another work area of the program is



the Pattern mode (see Fig. 1), where you'll also find some fancy options. In general, you get data by recording a new track at the Pattern screen or by using a preexisting track as your source. You can build different patterns in any of your 32 tracks and set the number of repetitions, channel and patch numbers, quantization, transposition, and velocity offset for each pattern individually. Making large-scale changes to a pattern is a snap, and virtually every sort of move or copy operation you want is available. One final option is to convert a pattern track into a "linear" track, i.e., have the program write out the entire sequence of repetitions in any of your patterns and create a new track from it.

### PASS THE BATON

When you're ready to begin fine-tuning your music, your first stop will probably be Forte II's Conductor screen. While most of its functions are standard on today's sequencers, the fact that you can view them all in a single, separate screen is very useful.

When you arrive at the Conductor, you

see the same type of measure-by-measure, track-by-track data display that you will also find in the two Editor screens. Forte II's displays, like its function keys, are consistent throughout. A measure line just underneath the data area indicates which measures have a Conductor command, and a second area of the screen indicates what your command choices are. Forte II is very conscious of meter changes—it will even accent the downbeat for you with its metronome click—and you can add a meter change, from 1/1 to 99/16, or modify your

music's tempo, even for a single beat, by using simple, one-key commands. (Tempo values range from 8 bpm to 255 bpm.) One other option, which I find useful and unique, is the ability to do a block copy of an entire stretch of Conductor commands, then move or insert the whole thing elsewhere in the sequence. By the way, the Conductor can also handle time changes in the Pattern and Step sequencer modes, so you don't have to redo everything when you're working there.

Assuming you have your basic data

## Product Summary

### PRODUCT:

Forte II V. 2.2

### TYPE:

Sequencing software

### FEATURES:

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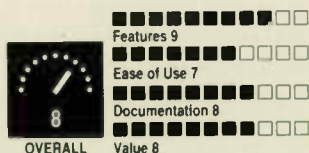
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## • FORTE II

and timings taken care of, you will no doubt head to the Editor screen (Fig. 2) to adjust individual tracks. Similar to the view screens found in other programs, Forte II's Editor represents a note's pitch by vertical placement, and its start time and duration by the horizontal position on the screen. All edits first go into a "new track area" (actually a buffer

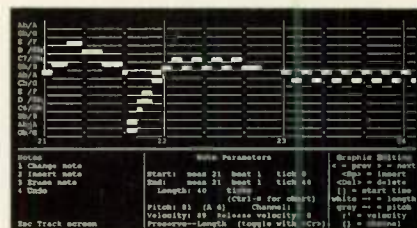


FIG 2 Editing individual notes within a track is accomplished on this graphic editing screen.

like the one used during recording), from which they are "transferred" to the track of your choice.

Editing functions are split into three subsections called Note, Block/Buffer, and MIDI Controllers. Familiar options such as retrograde, time compress/expand, scale or set note on velocities, and transpose are available, but you'll also find some novel choices. One of these is using a reference point other than the beginning of a measure for quantizing. This lets you define a quantization value, for example, a sixteenth note, then select a point anywhere within the measure as a reference, say, measure 1, beat 1, tick 6. The result would be steady sixteenth notes starting just a bit after the beginning of your track. (You could get a similar effect by offsetting a quantized track.) Also nice is an option to scale controllers; you could define a block, set a scaling value, then raise or lower all controller values in the block by the amount you choose. Or, you could just change all controllers from one type to another by using Convert Controllers.

The only thing that bothers me about the Editor is the way the various features of the block/buffer are allocated. To work on a block, you select the start and end point either by typing the points in, or moving the cursor to set the range; that's clear enough. The problem is, you can do some operations directly on that block, while other, similar functions can

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be done only by copying the block into a buffer, making your changes, then copying the buffer contents back out. For example, transposing and quantizing work either directly on the block or on buffers, while retrograding and inverting can be done only within the buffer. That strikes me as strange. There are also two separate Block Alteration menus, and I had to keep referring to the manual to remember where the feature I needed was located.

Large-scale edits take place in the Global Editor, where you can choose to work on either a single track or multiple tracks. The screen is easy to maneuver in; you can see sixteen tracks and 78 measures at a glance. You can also play back, but not record, in this area. Copying or deleting single measures or complete tracks is a snap, and offsetting up to a whole note's worth of ticks is another option.

#### THE CODA

A few other key points: Forte II reads and writes standard MIDI files—it was one of the first to do so—by way of a conversion program, included with the package. This feature is not well-documented, but it seems to work just fine. Forte II also provides an Information screen, which is a small text editor useful for keeping notes and comments while you work. Yamaha C.I. implementation is very thorough—all four SMPTE formats and the sliders are supported—and it's very easy to stripe a tape from almost anywhere in the program.

In the end, Forte II is a strong competitor, offering most of today's high-end sequencer features and more. It can serve as the centerpiece of a "software workstation" with its two companion programs, *TrackGenie* and *FWAP* (reviewed in the March 1989 *EM*), and it's an extremely useful tool regardless of what style of music you are making. It may not be the slickest package, and some of its displays have a downright "home-brew" quality to them, but if you are more concerned with substance than style, this one is worth a look.

**Dennis Miller** is associate professor of music at Northeastern University in Boston, where he coordinates the music theory and music industry programs. He is on an endless quest for the perfect computer music system.



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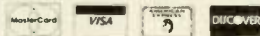
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## Steinberg/Jones Avalon

By Jim Pierson-Perry

*Let your Atari ST  
and sampler venture  
into the netherworlds of  
resynthesis via the fre-  
quency domain tricks  
made available by  
this powerful sample  
editing program.*

In Celtic mythology, Avalon is an island paradise. *Avalon*, the program from Steinberg/Jones, lives up to its name-sake as a sample editor combining aesthetic design with lots of horsepower. Besides the usual collection of digital sound manipulators, it provides numerous tools for handling stereo samples and sample resynthesis and can manage a network of up to ten samplers. Avalon comes with handlers for the Akai S900/1000, Casio FZ-1, Dynacord ADS, E-mu Emax, Ensoniq EPS, Sequential Prophet-2000, Roland S-50/550/330, Yamaha TX16W and the MIDI sample dump standard. Surprisingly absent are the Ensoniq Mirage and Korg DSS-1/DSM (Steinberg/Jones informs us that Version 1.1 will work with the Korg DSS family—BOD).

Avalon runs either as a stand-alone program or with compatible applications under the Steinberg M-ROS (MIDI Real-time Operating System) multi-tasking environment. For this review, I used Avalon in stand-alone mode under

GEM. The Switcher program used to launch M-ROS is not provided on the Avalon disk.

### IN THE BEGINNING

Avalon does its sample manipulations within computer memory rather than constantly referring to disk work files (in the manner of programs such as *Sound Designer*), and it requires at least 1 megabyte of memory. This reflects a tradeoff of program speed versus large memory requirement. Maximum sample size is about six seconds with a 1040 ST and about 37 seconds with a Mega 4 (sampled at 44.1 kHz). The program comes on a double-sided disk with standard Steinberg/Jones cartridge key copy protection. Although you can run the program from floppy drives, a hard drive is strongly recommended. Only monochrome monitors are supported, due to the required resolution for screen displays.

A forthcoming D/A hardware board from Steinberg/Jones will provide audio out (with 12-bit resolution) for auditioning sample edits and will accept digital, AES/EBU-format, stereo input. Support is already built into Avalon for the board, expected to ship this December. The Steinberg SMP24 interface board (V. 1.6 or higher) also is supported, providing another MIDI in and four more MIDI out ports.

The manual covers basic program operations adequately but tends to omit details. It needs a tutorial section and reference summary of program icons and command menus. The startup instructions do not agree with the actual program. Instead of opening to the GEM desktop, an undocumented auto-boot program on the program disk attempts to run a \*.PRG file on drive A, even if installed on a hard drive. My advice is to remove the file; it accomplishes little and could interfere with other pro-

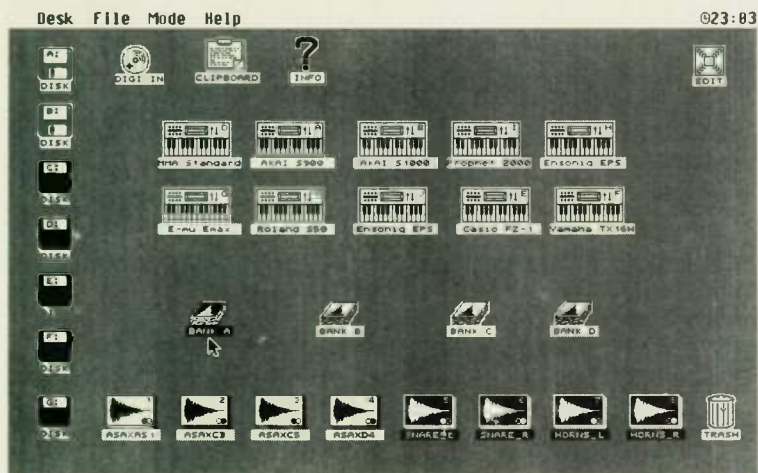


FIG. 1: Typical mapping page layout for Avalon showing icons for mass storage devices, assorted samplers, and samples. The DIGI IN icon reflects the forthcoming D/A hardware board.



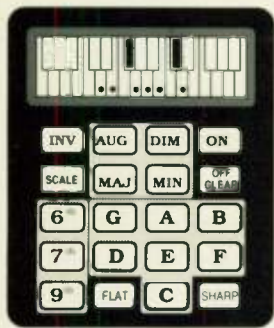
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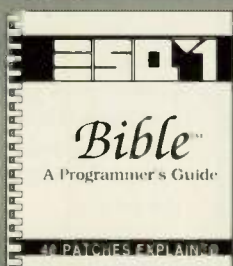
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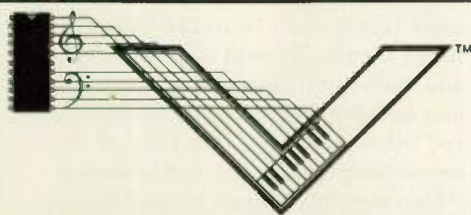
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## ● AVALON

grams in your Auto folder.

While Avalon happily coexists with most desk accessories or autorun programs, the version I tested bombed if either GDOS/G+PLUS or PINHED were installed in my Auto folder. PINHED (a popular load accelerator utility) is very similar to fastload routines used in Atari's new TOS 1.4 operating system. Steinberg/Jones admitted there was an incompatibility between the new TOS and M-ROS. This has been fixed with a new version of M-ROS; contact Steinberg/Jones if you need an update.

### THE SAMPLE SHUFFLE

Avalon is organized into three nested levels: the mapping page, a time domain sample editor, and a frequency domain editor. The mapping page controls your entire sampler network and samples loaded into computer memory. Memory is partitioned into four independent banks, each capable of holding up to eight monophonic samples (memory permitting). Only one bank is active at a time. Avalon uses a proprietary sample-file format but also imports/exports in Sound Designer format.

Pressing a function key (F1 through F8) from the mapping page plays the associated sample from the active bank. Samples can be auditioned through the internal monitor speaker or the Steinberg D/A board (when available). Existing 8-bit D/A cartridges such as Digisound or Replay 4 are not compatible with Avalon. Your best choice for now is to route the monitor speaker through a device like the Monitor Master (from Practical Solutions), which provides an audio out to your home amplifier. To hear the sample through the destination sampler instrument, you can play a MIDI keyboard display with the mouse.

I/O operations occur on the mapping page through a very smooth, icon-based interface, one of the best I've ever used. Icons are provided for all installed samplers, mass storage devices, a clipboard (for temporary storage), and Trash (to delete samples). These may be rearranged to suit your taste (see Fig. 1), and unused icons may be removed from the screen. Other niceties are a time display, auto screen saver, and mouse accelerator.

Dragging a source icon onto a destination icon loads a sample. Mass storage devices bring up a file selector box,

## Product Summary

### PRODUCT:

Avalon 1.0

### TYPE:

Sample editing software

### REQUIREMENTS:

Atari 1040 ST or Mega;  
monochrome monitor

### FEATURES:

Time and frequency domain  
sample editing; resynthesis;  
sample rate conversion,  
icon-based interface

### PRICE:

\$349

### MANUFACTURER:

Steinberg/Jones  
17700 Raymer St., Suite 1001  
Northridge, CA 91325  
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while sampler icons call personalized transfer dialog boxes. Entire sample banks may be loaded/saved in one step, but only as individual files. I found the easiest way to maintain banks was to create a separate folder for each. As the bank-load function automatically pulls in the first eight files displayed in a folder, this preserved bank integrity.

The same icon-based approach lets you swap samples between banks and make multiple copies of a single sample. Samples cannot be transferred directly between disk file and sampler, or between samplers; you must bring them into an open memory slot and from there to the destination. A nice, context-sensitive help icon provides quick information on sample files, samplers, and disk drives, with additional online help available from the command menu.

One of Avalon's strengths is its ability to handle stereo samples. Functions are provided for creating, editing, and unlinking stereo samples. Two independent, mono samples (not necessarily the same length) can be linked to form a stereo sample. To copy a stereo sample and maintain its integrity, the destination sample pair must be preset for stereo; otherwise, only one part of the source sample is copied. Unfortunately, stereo samples cannot be auditioned intact through the monitor speaker,



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## ● AVALON

even though the ST/Mega hardware is capable of playing two at once. While not true stereo output, hearing the samples together would be useful for editing.

### IT'S ABOUT TIME

After selecting a sample bank, you may enter the Time Domain editor, the heart of the program. Only the active bank is brought into the editor; to change banks, you must return to the mapping page. All eight samples from the active bank can be displayed and edited. A nice touch in the interface is a pop-up screen slider, which is available for editing numerical parameters and is much simpler than clicking on scroll arrows *ad infinitum*.

Avalon utilizes an impressive window-management scheme for sample displays. There are several types of displays: normal, zoom, stereo, and looping. Up to eight windows, one per sample, can be open at the same time. Each sample window is an independent entity with its own display mode and edit status. An overview strip (a miniature display of an entire sample) can be toggled on for each window, regardless of the display mode. Should you need better resolution, any window can be expanded to a full-screen view. Multiple display options to tailor the view include zoom, scale the Y-axis, and remove scale labels. In zoom mode, the matching area is highlighted on the overview strip (if on) for reference. Up to eight markers may either be set per sample to flag regions of interest, or used with a Goto command to move the editing cursor. Fig. 2 illustrates many

of these sample display modes.

Virtually all operations are selected through the toolbox icons, some of which call up secondary icon panels. Most can be applied to an entire sample or just a segment of it (a block). To create a block, you click on the block icon, then drag the mouse through the desired area of the sample. Samples can be played through the internal speaker, but you must return to the mapping page to send changes to the sampler. An undo command provides a safety net if

you change your mind after an editing operation.

All standard edit functions (and then some) are provided: cut/copy-and-paste, insert, delete, overwrite (replace existing sample data with new), add (merge existing data with new), replicate, erase, and draw (either new waveform data or a new envelope for the sample). An interesting addition is subtract block, intended to remove an extraneous sound from a sample. While that situation is rare, I found the func-



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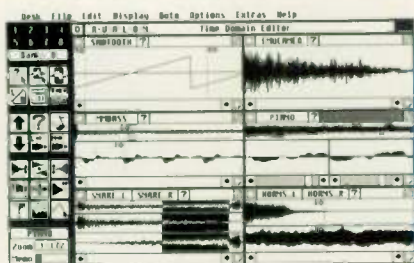
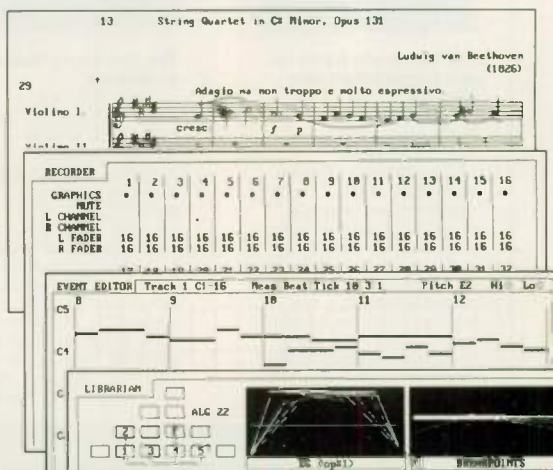


FIG. 2: A view from the time domain editor of all eight samples, showing a variety of view modes. The top two are zoom and normal. Middle left is zoom, with a marker point that appears in the zoom window and overview strip. Middle right is for setting a sustain loop. The bottom two are stereo samples.



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## ● AVALON

tion worth exploring in its own right and came up with several neat distortion effects. Adding a monophonic block into a stereo sample only adds to the left channel; with a stereo block, left adds to left and right to right. I would like to see this expanded to include panning control, both for block edits and as an overall tool for positioning a sample in the stereo field.

Other operations are invert phase, time reversal, fade in/out (linear, square root, and quadratic volume curves), adjust gain, and filtering (low-pass, highpass, notch, and bandpass). Additional tools handle display and linkage of stereo samples. These may be viewed and edited as dual waveforms in a single window or as individual channels in separate windows. A spectrum analyzer icon launches the frequency domain editor by computing the FFT of a sample block. You must define a block for analysis, anything from the entire sample to just a piece of it.

The major use for any sample editor is to help construct loops. Avalon can deal with up to eight independent loops and

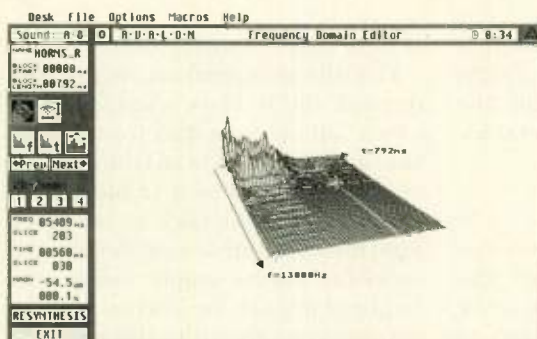


FIG. 3: FFT display upon entry into the frequency domain editor. The XY grid running through the display (crosshair at its intersection) is for selecting time and frequency slices.

provides two support algorithms: find loop and crossfade. The looping display mode shows an overview of the entire sample across the top, with two scrollable subwindows at the bottom zoomed in on the loop points. You can manually set a starting or ending point and have Avalon search for the matching loop point through the entire sample or just within a defined block. Alternatively, Avalon can be set on autopilot to find

both the start and end points. Once located, the crossfade algorithm may be invoked to smooth the loop points, with user control of the merge region's width. In practice, I ran into a few sporadic cases where loop points were not restricted within a block as specified. Clearing the loop and resetting the block seemed to correct the problem. Another glitch is that the sample is blanked from the overview strip after a loop algorithm finishes. Clicking

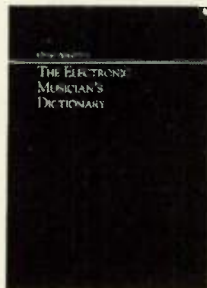
on any one of the scroll arrows restores the display. (*We're told by Steinberg/Jones that these problems are being addressed in Ver. 1.1.—BO'D*) Despite these minor irritations, I had no problem using Avalon to form good loops.

The resample operation is vital to Avalon's ability to send samples between samplers with different playback rates, as well as a means to reduce sample size. Its operation is a little awkward, as you

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must manually calculate and enter the resampling factor (new rate divided by old). Entering these values and having the program compute the factor would be more appropriate and in tune with the rest of the intuitive program design. Resampling to match a fixed playback rate causes a pitch shift (from basic sound theory) that can be adjusted with the frequency domain editor ( $\pm 2$  octaves). The pitch can be maintained, if resampling to reduce sample size, by allowing Avalon to alter the playback rate.

## FREQUENCY: THE ALTERNATE UNIVERSE

Traditional sample editors do all their manipulations in the time domain. You might get the obligatory FFT picture, but only to look at. Avalon is the first ST program to feature sample resynthesis: You can decompose the sample into frequency components, edit them, then reconstitute the sample. That alone may be worth the price of admission, but it

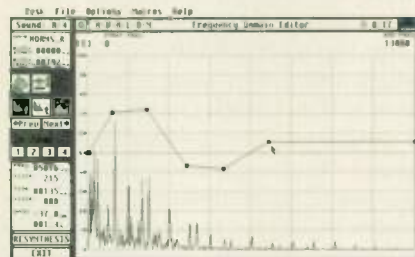


FIG. 4: A sample envelope applied to a time slice in the 2-D frequency plot.

gets even better by including several different types of frequency domain editing.

The frequency domain editor works with one sample at a time, providing three types of operations: display the 3-D FFT plot, display and edit any 2-D slice of the data (amplitude vs. frequency or amplitude vs. time), or perform a macro edit. When you finish, the results may be resynthesized back into normal sample data (overwriting the original block selected in the time domain editor). Macro edits transform the entire data set and can provide some incredible results. These include pitch shifting, 3-D digital filtering, frequency enhancement/animation (like a hardware exciter), and compression/expansion of frequency bands.

Fig. 3 shows a typical 3-D, FFT plot for a brass hit sample. Activating the positional icon lets you alter the view angles

(sideways and vertically) by moving the mouse. This is extremely well implemented, with a fast redraw. Note also an XY grid (there is a crosshair at its center point) superimposed on the FFT. Once the 3-D plot is positioned to your liking, the mouse controls grid placement. Clicking on a 2-D plot icon (frequency or time envelope) takes the corresponding slice through the 3-D image marked by the grid.

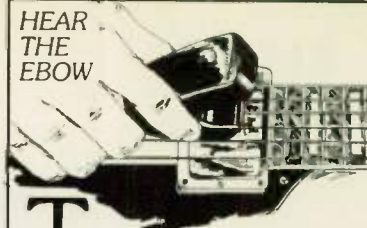
Actual editing is done in the 2-D plot modes. The frequency plot shows all frequencies at a particular time, while the time plot shows the amplitude envelope of a single frequency over time. Individual components may be altered one at a time or the entire plot remapped at once to follow a user-drawn envelope (shown in Fig. 4). A different envelope may be used for each time or frequency slice. A single envelope for each type of 2-D plot may be saved and used by the 3-D filtering macro. This takes a frequency envelope through the data, altering it as the time envelope changes. Very powerful stuff.

As an example of a 3-D filtering application, you can take a starting FFT (first saving it to disk) through one filter to remove/alter a given set of frequencies, resynthesize the results, then come back to the parent FFT and repeat the operation using a different set of frequencies. Finally, you can join the two samples in stereo. This is virgin territory for sonic explorers. Anybody can do "M-M-M-Max Headroom" with a splice block; with software like Avalon, we can start to manipulate all the raw materials of sound. Hopefully, future revisions will add more tools, such as block edits between multiple FFT samples and convolution (mathematical operations in the frequency domain that produce novel timbres from two existing sources).

## CONCLUSIONS

Avalon is a remarkable and powerful piece of software that lets you concentrate on the musical aspects of sound editing without program mechanics getting in your way. It redefines the state-of-the-art for sample editing on the ST/Mega, being the only such program to offer resynthesis. While there is room for growth in the stereo sample handling and resynthesis module, enough features are present and working well to keep you satiated for quite a while. The forthcoming D/A board will make Avalon even more impressive. ■

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## Books: Building and Recording in the Small Studio

Reviewed by David B. Doty

**Multi-Track Recording for Musicians**, by Brent Hurtig, with a contribution by J.D. Sharp (paperbound, 135 pp., \$17.95)

Whether you have a 4-track in your bedroom or you're thinking about building your own recording space, the principles addressed in these books may catch your eye (or ear).

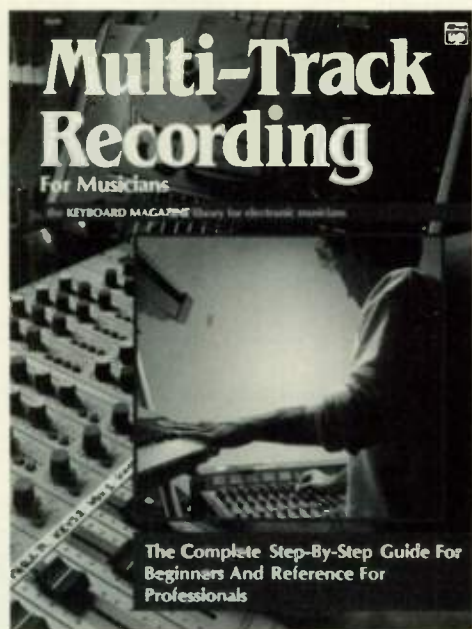
On its cover, *Multi-Track Recording for Musicians* is described as "The Complete Step-by-Step Guide for Beginners and Reference for Professionals." A little reflection ought to make clear to anyone that these two goals are in conflict, and any book that attempted to satisfy both of them (except, perhaps, by binding two distinct books between a single set of covers) would be likely to fail at one or both. In fact, this is not a reference for professionals and makes no evident attempt to be such, so perhaps this claim is the work of some overzealous marketing type at the publishing house, not the author. The book comes closer to being a step-by-step guide for beginners, but here, too, it falls somewhat short of the goal, largely because the author has failed to identify precisely what a typical beginner most needs to know. As a result, he gives every aspect of the field equal emphasis, from cassette multi-track decks to high-end professional equipment, resulting in a book that has a dense and cluttered feel.

A book aimed at beginners ought to devote a substantial percentage of its space to teaching fundamental principles. Less than twenty percent of *Multi-Track Recording for Musicians* is devoted to fundamentals. The bulk of the book is organized into chapters covering the different classes of studio equipment, e.g., tape decks, mixers, monitors, signal processors, etc. These chapters consist mostly of feature-by-feature and switch-by-switch examinations of various typical devices. Not

enough attention is devoted to distinguishing between critical concepts and trivial ones, nor is much of an attempt made to reinforce fundamental concepts. As a result, the reader is left to sink or swim in a sea of gray details.

This book also contains an excessive amount of what I call "spaghetti writing." (In the computer industry, the derogatory term "spaghetti code" refers to code written in older, unstructured languages such as BASIC or FORTRAN, which was full of opaque statements such as "ON 10 GOTO 3400," making it a torture to trace the flow of the program.) On virtually every page (and often two or three times per page), the reader is referred forward or back to a discussion of some other subject on some other page. It is inevitable that this will occur occasionally in a book on a complex subject such as multitrack recording, but when it occurs as frequently as it does here, it's a good sign that the book could be better organized along other lines.

Despite these criticisms, *Multi-Track Recording for Musicians* is not at all bad; in fact, it is typical of a large percentage of electronic music and recording books. It covers the various facets of its chosen topic with reasonable thoroughness and accuracy. (A second edition that cleans up several typos and other glitches is due to be released soon.—CA) These are both necessary conditions for a successful book, but they are not, by themselves, sufficient. What this book lacks is a well-defined point of view, a structure that will lead the reader through the maze of facts and concepts in a logical way, and a sense of enthusiasm for the material that might draw the reader in. *Multi-Track Recording for Musicians* is by no means unique in suffering from these problems (more's the pity). It just happens to





be the book that focused my attention on these problems, thereby becoming the target of criticisms that could apply equally to at least a dozen others.

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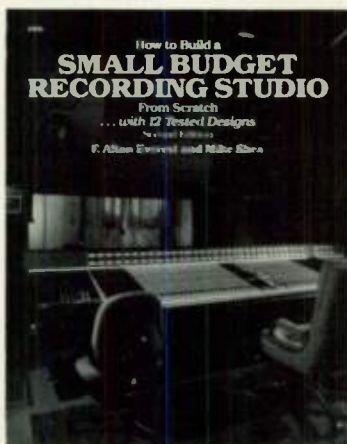
**How to Build a Small Budget Recording Studio From Scratch (2nd Ed.), by F. Alton Everest and Mike Shea (paperbound, 295 pp., \$14.95)**

**W**hether you will find this book useful depends mostly on what the phrase "small budget recording studio" means to you. If, when you hear these words, you think of a collection of synthesizers, samplers, drum machines, and computers linked together by MIDI and installed in your spare bedroom or garage, then you are probably best advised to pass this book by. If, on the other hand, you envision a traditional recording studio with an acoustically tuned and isolated main room, separate control room, sound-lock doors, and so forth, this may be the book for you.

*How to Build a Small Budget Recording Studio From Scratch* is literally a book about building a studio, whether in an existing structure or from the ground up. As the subtitle indicates, there are plans for twelve different studios, each designed for a specific purpose and built within a specific set of constraints. These include studios for campus and commercial radio, a video production studio, an ad agency studio for AV and radio jingle creation, and the always-popular multitrack-in-a-two-car-garage. Each design includes floor plans and elevations, plus detailed plans of specific structures required for acoustical control. The emphasis is on using absorbers and diffusers built from inexpensive materials to control unwanted room modes and obtain appropriate rever-

beration times. The electronic equipment that will later fill the space—and occupies so much of the typical EM reader's attention—receives hardly a mention. Only the design of the physical space is of concern here.

Practical design and construction techniques predominate, and theory is kept to a minimum. The authors are to be congratulated for not including yet another ten-page introduction to acoustics. There are, in fact, four short chapters of miscellaneous theoretical material at the end of the book, but they are neither well-organized, nor particularly cogent. In fact, they could have been omitted without significantly hindering the book from fulfilling its intended purpose. The book concludes with appendixes containing statistics on the absorption coefficients of various commercial building materials.



A few words need to be said about the "small budget" aspect of these designs. "Small budget" is a relative term. While I'm sure that most of these designs would cost a great deal less than is typically required for a high-end commercial studio, they may still prove too costly for most home studio applications. This is especially true if you're not a first-rate general carpenter and would have to pay someone

to do the construction. Still, even if you don't fully implement one of the book's designs, studying these plans can teach you a great deal about sound-proofing and controlling room acoustics.

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**David B. Doty** is a composer, synthesist, and professional technical writer. He is the editor of *1/1*, the quarterly journal of the *Just Intonation Network*, and the author of *Programmer's Guide to the Hercules Graphics Cards*. He considers cheap humor in author bios to be in poor taste.

(Some of the reviewed products are available from EM Bookshelf; see FYI page for details.)

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## Music: Class Dismissed

By Robert Carlberg

*I'm late! I'm late! For  
a very important date!  
No time to say "hello,"  
goodbye, I'm late, I'm  
late, I'm late!*



**Y**ou're lucky. This month there are so many noteworthy new releases that there wouldn't be room for another long, drawn-out introduction even if I had time to think of one. With your permission, we'll just skip the lecture and go straight to the goodies.

Djam Karet, *Reflections from the Firepool* (HC Productions 004). One of the nicest surprises in the mail was the new album (available on compact disc or extended-play cassette only) from the greatest undiscovered band in the world. Faithful, long-time readers (both of you) may remember that Djam Karet's *The Ritual Continues* was my choice for the second best album of 1988. Last year, in March, when the original review appeared, I wished for a CD of Djam Karet because their music really deserves the clarity and microscopic detail of the digital medium. Well, it's been a long time in prepara-

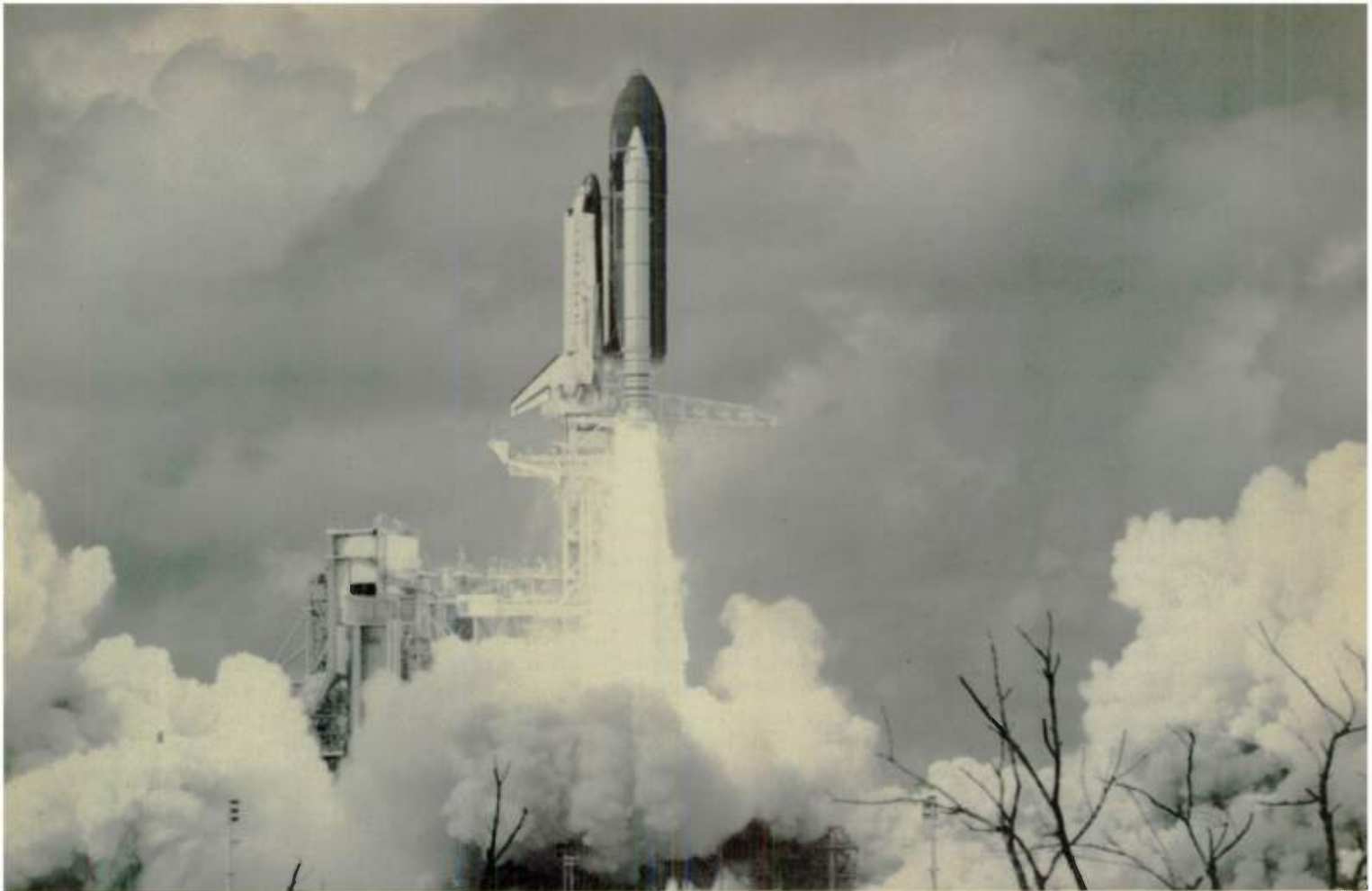
ting the recording just right, including studio overdubs for the first time in their recording career.

The music consists almost entirely of bass, drums, and guitar, with a few tracks built on rhythms from sequenced synthesizers (D-50, Mirage) and a few keyboard parts. The music is generally very intense: guitars on the edge of feedback, drums churning like a pool of piranha. Gayle Ellett's lead guitar is amazingly fluid, exploring the range of feedback styles from Jimi to Terry Kath (Chicago) to Tony Hill (High Tide), all the while playing easily but with real authority. Djam Karet sound a lot like nobody else, with their instrumental rock. There are enough sound effects and odd rhythms to pass for experimental, but the driving momentum and hard rock sonorities sound more mainstream. Perhaps it is this very "un-pigeonhole-ability" that has kept them from becoming the monster band I believe them to be. (\$13.50 CD, \$8.50 cassette post-paid from PO Box 883, Claremont, CA 91711.)

Michael Pluznick, *Where the Rain Is Born* (Sona Gaia ND-62756). Another fine surprise is this solo debut album from a young percussionist who plays (and I quote) "congas, djembe, bata, African talking drums, bongos, timbales, shekere, bells, hoop-

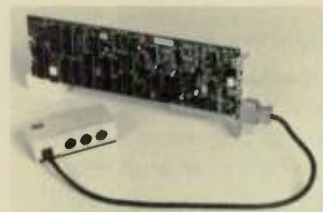
drum, dumbek, chimes, woodblocks, tambourine, hand drums, sand, marbles, eggs, rectangles, pot lids and miscellaneous toys." Percussionists do that. "I have a huge house, and it's completely filled with all these instruments," he says in the press release. Included among his "toys" is an Octapad MIDI setup, and about 60 percent of the percussion sounds are sampled. He is backed by an absolutely riveting keyboardist named Peter Scaturro on Emax, Kurzweil 250, and Roland D-50,

tion (seven months recording and one-and-a-half more mixing) and still they had to self-finance it, but the new album's finally here. At 65 minutes, they couldn't make it fit a single LP, but the CD and cassette make better presentations anyway. They've done a clever job on the graphics, making the cassette J-card and CD booklet out of the same master, just cut differently. When you're footing the bill, you think of stuff like that. The savings were plowed into get-



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## ● MUSIC

with trumpet, guitar, and vocals on select tracks. Pluznick's music is a wonderful mix of ethnic percussion and synthesis, not unlike Peter Gabriel's or David Van Tiegham's best work. "By combining opposites, such as ritual drums and modern synthesizers, you feel some unique tension-and-release sensations," he surmises. I think it's just good music. (Sona Gaia Productions, 1845 N. Farwell Ave., Milwaukee, WI 53202.)

**Montage**, *Colors on the Wind* (Scarlet Records SR 25704-2). In a completely different vein, I had the pleasure this month of writing liner notes for Montage's debut release. This acoustic trio (oboe, piano, and cello) writes most of their material at the synthesizer, using a computer and *Personal Composer* software to get it just right. When printed out and played back on their "real" instruments (they're all classically trained), the music is a unique blend of classical and jazz elements, light and frisky yet entirely composed. It reminds me a bit of the Roger Kellaway Cello Quartet, although, like Djam Karet, they have developed their own unique sound (which is *nothing* like Djam Karet). It's not exactly "electronic music" when it comes out, but the distinction is muddled by the method of generation. (Scarlet Records, 605 Ridgefield Rd., Wilton, CT 06897.)

**Scott Duncan**, *Contemporary Salon* (Visual Musik VMCD-900). In January 1987 I reviewed a cassette from Duncan, which apparently helped him contact the right people to get this album released. Back then I called his stuff "highly melodic instrumental rock," which still holds for the new one. Unfortunately, with every instrumentalist jumping on the new age bandwagon these days, Duncan's music sounds less original than it would have three years ago. Still, his tunes are more "melodic" and colorful than most, and he plays some nice acoustic guitars as well as keyboards (Roland S-50, D-50) and digital drumbox. If you're not already burned out on "new age," you could do worse. (Visual Musik, 9224 Raven Oaks, Omaha, NE 68152.)

**Richard Souther**, *Cross Currents* (Narada Equinox CD-3007). Similarly, Souther's Narada debut gets drowned in the new age tsunami. Souther had five fine solo albums on Meadowlark Records (three reviewed April 1986 and June 1987) in which he showed a flair for sentimental keyboard tunes of great beauty. However, in *Cross Currents* he seems to be attempting to broaden himself while simultaneously catching the new age wave, and I think he's trying to surf with a yacht. He's backed by a full band this time (mostly Meadowlark stablemates), including Justo Almario on soprano saxophone, and on a couple of the tracks Almario is in your face just like Kenny G. or Jessie Allen Cooper. On others, Souther's delicate compositions are weighted down with drumbox, popping bass, and overproduction. It's so "hip" it ends up with one foot in new age and one in pop/jazz, and Souther's marvelous compositions are only apparent on the third or fourth listening. (Narada Productions, 1845 North Farwell Ave., Milwaukee, WI 53202.)

**Stefan Tischler**, *In Florette's Room* (Generations Unlimited ST-LP01). **Peter Schaefer**, *Sundaes* (Farn FP18006), and **Rudiger Lorenz**, *Morning of the World* (Syncord RL007). All three gentlemen have been producing and financing their own electronic music as long as I've been doing this, and all three steadfastly refuse to sound like the current trends. Each is devoted to their analog setups, although occasionally a sample or FM voice creeps in. In 1981 Lorenz and Schaefer co-founded the cassette label Syntape (Lorenz with three releases, Schaefer with at least 17), though they have released LPs separately since (this is

## TEN BEST SO FAR

1. **Kit Watkins**  
*Azure* (November)
2. **Djam Karet**  
*Reflections from the Firepool* (December)
3. **Michael Pluznick**  
*Where the Rain Is Born* (December)
4. **Mark Isham**  
*The Beast* (June)
5. **Conrad Praetzel**  
*Between Present and Past* (November)
6. **Peter Gabriel**  
*Passion* (December)
7. **Najma Akhtar**  
*Qareeb* (June)
8. **Montage**  
*Colors on the Wind* (November)
9. **The Janus Ensemble**  
*The Janus Ensemble* (April)
10. **Arcane Device**  
*Engines of Myth* (August)



Lorenz's fifth, Schaefer's sixth). Tischler and his ex-partner Keith "Keeler" Walsh made up Port Said (founded in 1981), with four cassette albums and numerous compilation tracks released (Keeler is still active, too).

Schaefer's and Tischler's albums are mostly short tunes on synthesizer with percussion, running at a slow enough pace that they don't develop any sort of "groove." Lorenz's is almost tempo-less, with chords held suspended while percussion and sound effects dribble down

telling Walker he was "not a good idea for Geffen—or any other major, really"). If this sort of thing appeals to you—or if you're just curious—contact Doug at 191-32 116th Ave., St. Albans, NY 11412, or Audiofile at 209-25 18th Ave., Bayside, NY 11360.

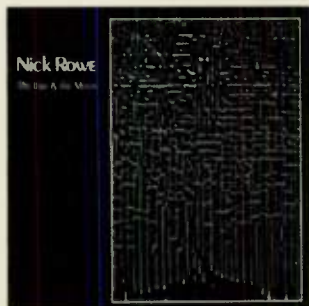
Monk Rowe, *Out Standing In His Field* (Monk's Funk Music CD), Nick Rowe, *The Fire & The Moon* (White Mountain Records WMRC-101-2), and Doug Hartline, *From the Heart* (NDRCD 771). Monk Rowe is a saxophonist who also plays

flute, piano, synthesizers, and programs a drum machine. He gets some nice, funky grooves going, and his straight-ahead jazz presents some convincing ensemble playing (even though it's only him on the majority of tracks). Nick Rowe plays flute

and synthesizer, backed by tabla, kalimba, waterphone, string bass, and acoustic guitar (Narada artist Ralf Illenberger on two of the tracks, Kostas Timbakianakis on another). His jazz is thoughtful, in an ECM/Narada sort of way. Guitarist Doug Hartline fits into this triad because one of his two synthesists is named Jay Rowe, and with a full ensemble backing (bass, drums, and occasional horn section), his smooth Metheny/Scofield jazz licks eat up the airwaves. All three are viable alternatives to sterile, major-label pop/jazz. (Monk Rowe, PO Box 652, Utica, NY 13503; White Mountain Records c/o Glodow & Coats Publicity, 4034 20th St., San Francisco, CA 94114; Doug Hartline, 91 Boulevard Dr., Danbury, CT 06810.)

Well, we're out of room. I didn't get to the Dan Schaaf Ensemble, William Parker, Greg Hurley, the Electronic Music Club of Edmonds C.C., Cusco, William Clearlake, Steve Vail, Kit Walker, or a dozen others including the great new Peter Gabriel. Maybe next month I can make do with less sleep.

**Robert Carlberg** has passed the stage of being a couch potato, vaulted into taking root, and is busily spawning hordes of offshoots. He's gotten a little soft and doesn't smell too good, either. Music for review should be sent to Review Spud, PO Box 16211, Seattle, WA 98116.



between them. All three recall the salad days when "electronic music" was a style, not just a buzzword. (Generations Unlimited, 199 Strathmore #5, Brighton, MA 02135; Syncord Productions, Binger Str. 6, D-6507 Ingelheim, West Germany; Farn Productions, C.L. Schleich Str. 5, D-7518 Bretten, West Germany. The last two may also be mail-ordered from Eurock Distribution, PO Box 13718, Portland, OR 97213.)

Dave Prescott, *Red Shift* (Audiofile Tapes AT37). Prescott was co-founder, with "Gen" Ken Montgomery, of the Generations Unlimited label (see above), home also to Conrad Schnitzler, Stefan Tischler, David Myers/Arcane Device, Charles Cohen (ex-Ghostwriters and ex-Anomali with our own Craig Anderton), and others. Doug Walker, who records under the name Alien Planetscapes, sent me a monster box of tapes from the Audiofile Tapes label, including three of his own, a couple of Mars Everywhere live recordings, and the David Prescott tape. All seem to share a similar, non-commercial "art-noise" orientation that again harkens back to the roots. Included with the tapes were an A.T. catalog (listing 90 tapes, five LPs, and paraphernalia), a 53-page catalog of over 2,000 live tapes Walker will trade or sell, and almost a dozen other pages of reviews and correspondence (including a classic response from Geffen Records

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**Two editors of MacUser magazine, John Anderson and Derek Van Alstyne, were among the victims of the recent San Francisco earthquake. The EM staff wishes to express condolences to their family, friends, and coworkers.**

## STILL ALIVE AND WELL

**T**hankfully, EM's staff suffered no physical injuries in the major earthquake that struck the San Francisco Bay Area on Oct. 17. Our office sustained no serious damage. We hope all our Bay Area friends and acquaintances fared as well. We ask you to be patient when doing business with Bay Area companies; it will take all of us time to recover.



## Releasing the Pressure Valve

Here we are, fellow travelers on the all-local-stops bus of life. Since we're stuck on this route anyway, we might as well make the best of the situation.

*By Craig Anderton*



It's real interesting to go through the mail around here. In addition to the reader suggestions that give us ideas for the future and the praise/appreciation that reminds us why we're doing this, we also get complaints. These range from truly constructive (and helpful) criticisms to, well, not-so-constructive criticisms.

I'm sure that into each of your lives a jerk occasionally intrudes. Maybe it's the guy who smashed into your car in a parking lot and then sped off, or the software company that went out of business, leaving you with an unreadable copy-protected disk. For us, it's the manufacturer who thinks reviews can be bought with advertising, the musician who doesn't understand that putting out a record might lead to a negative review, and, in particular, the general malcontent who's mad at the world—and wants us to know why.

Whenever someone has a problem with the magazine, or an ad, or a manufacturer, or whatever, it seems letters eventually show up on my desk. And I'm glad they do! It's important to know what people like and don't like, what problems they're having, and what we at

the magazine can do to make things better. Best of all, even very critical letters often display a helpful attitude, and sometimes, a bit of much-appreciated humor creeps in as well.

However, there is one very unfortunate element in some of the more negative letters. If you read between the lines, it seems that people often criticize others in order to make themselves feel better. Perhaps they feel so guilty about being imperfect that they delight in pointing out the imperfections of others. The rage they feel at their own imperfections gets transferred to any handy object—an employee, a politician, a musician, or even the staff of, in the grand scheme of things, a relatively small magazine dealing with relatively insignificant subject matter.

The solution? A few years ago it was suggested that people would feel better if they just believed that "I'm okay, you're okay." I'd suggest a different slogan: "I'm a jerk, and you're a jerk—but since we both are, that takes the pressure off." Let me explain.

Anybody can make mistakes, drop the ball, act selfishly, let down a friend, or fail to confront prejudices. We can either hate ourselves for this, or if that's too painful, hate other people instead as a convenient, self-satisfying safety valve. By putting up a front that we are okay, we let ourselves down every day by failing to meet that standard; by disliking ourselves, we project negativity to the world around us.

Assuming that we all have a bit of the jerk in us really takes the pressure off. If you make a mistake, so what? Everybody else does. If someone else makes a mistake, don't get mad—because before the day is out, you'll make one, too. I guess that's what tolerance is all about: to accept other people's flaws and, in the process, accept our own as well. No one individual has all the answers or

makes all the mistakes; the triumphs and failures in this world are the result of a group effort. Our collective little secret is that we are all error-prone and fragile creatures. In hoping other people don't discover that, we put up walls around ourselves and fail to take the steps needed to squarely confront our fears and flaws.

Which brings me back to the letters we receive. When people criticize out of love and concern, they demonstrate what's best about humanity: an ability to accept the imperfect and a willingness to help. Those who criticize out of fear or self-hatred augment the negative baggage we already carry.

It's time everyone lightened up a bit. Since we're all bozos on this bus, we might as well do whatever we can to make life easier for our traveling companions. Accepting, recognizing, and doing everything we can to eliminate our flaws, as well as those of other people, is a good first step—one which based on our mail, many **EM** readers have already decided to take.

▼▼▼

Speaking of people who do the right thing, it's time to pat Bob O'Donnell on the back. When we hired him last May, I felt like the bandleader who found a really great guitar player and somehow convinced him to join my band. In recognition of his many contributions, I'm very pleased to announce his promotion to senior editor. In addition, he'll be writing a new column, "The Front Page," where his provocative opinions will get wider forum than just after-hours bull sessions with the other editors. Gee, now that Bob's taking more of the load off me, maybe I'll even finally get to finish that DIY mixer project...



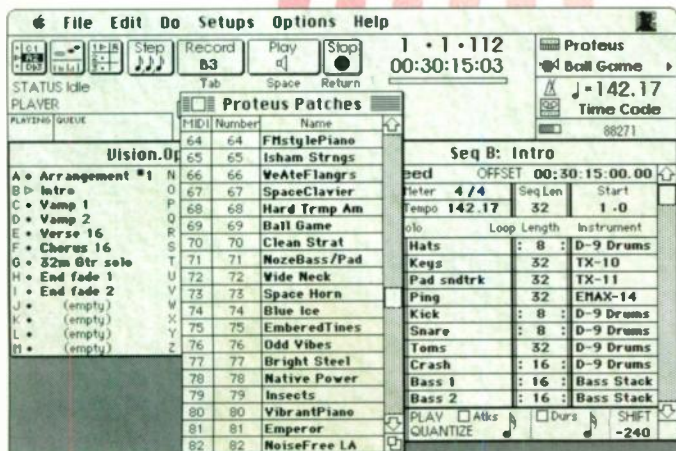
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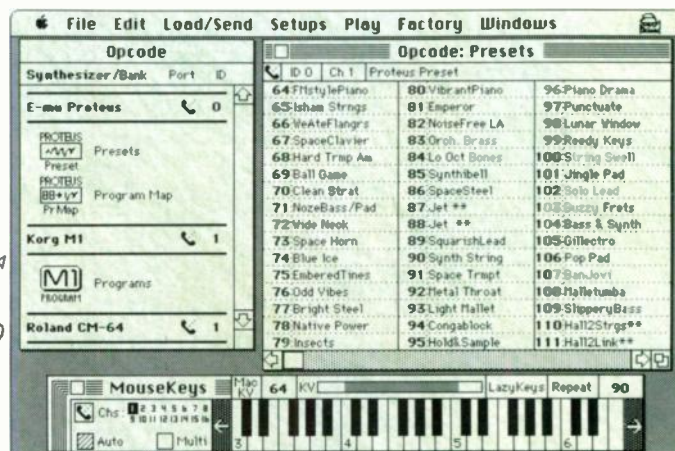
Galaxy™ stores data from any MIDI equipment with System Exclusive capabilities. We support over 70 MIDI devices. But you can easily create your own file type with our simple language called PatchTalk™. And Galaxy is a full featured Opcode Librarian, with Patch Factory™ for random patch generation, and you can get and send single patches, banks, or Bundles. As always, we don't compromise.



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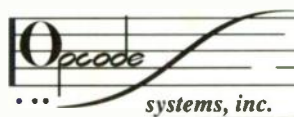


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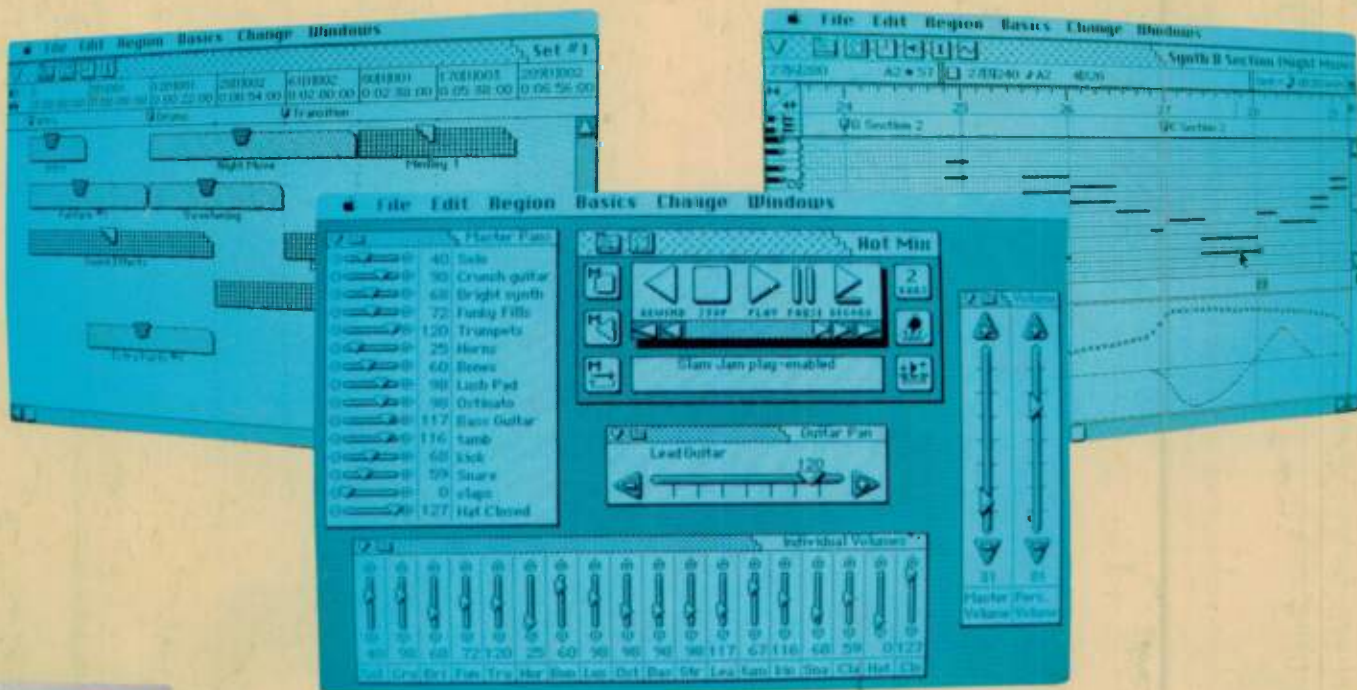
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