2 New Columns: Recording Musician & Working Musician • Reviews of Alesis D4, MTU MicroSound and 5 More

Electronic Musician

U.S. $3.95/Canada $4.95
February 1992

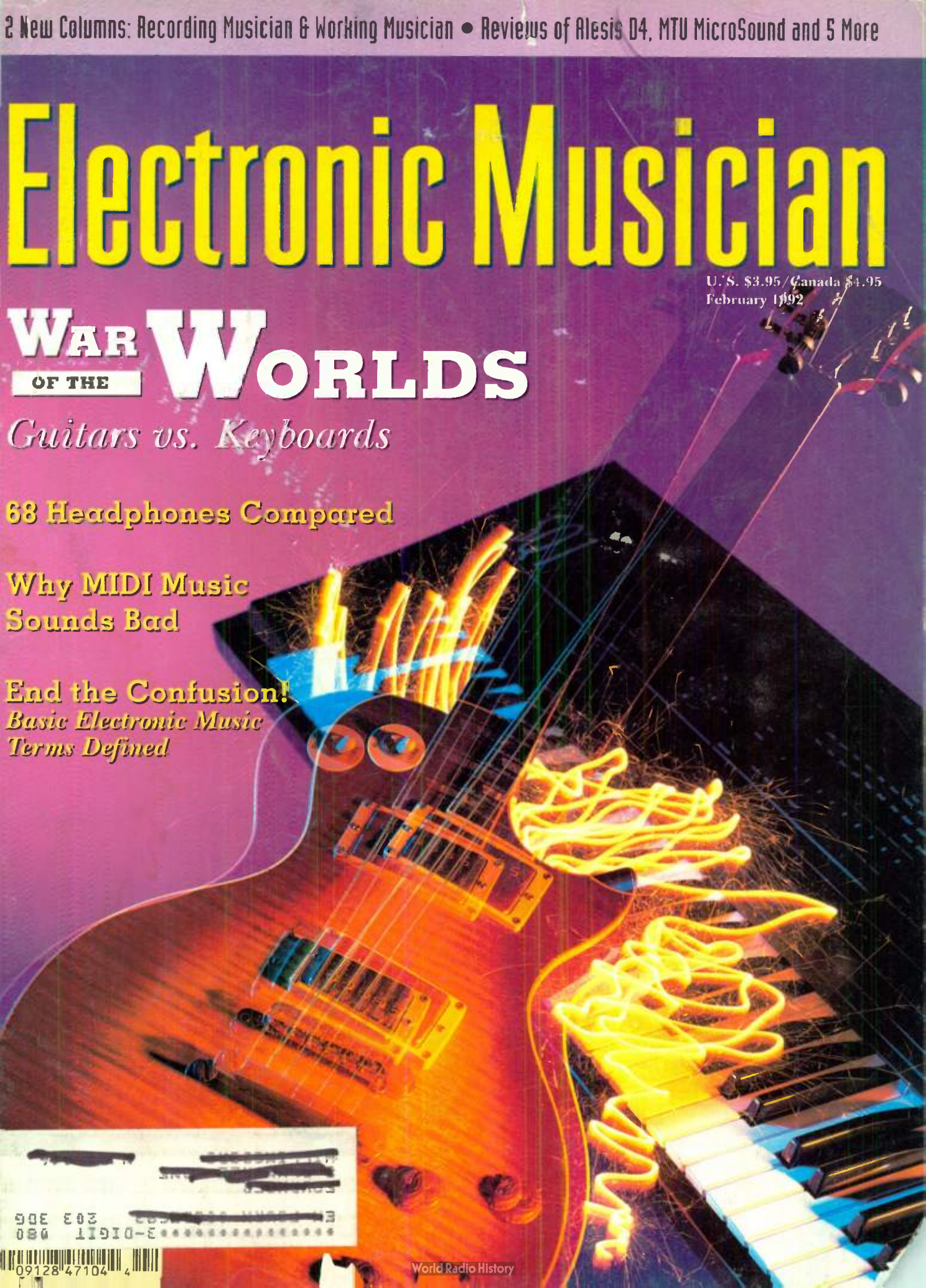
War of the Worlds

Guitars vs. Keyboards

68 Headphones Compared

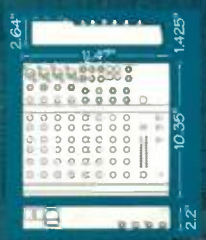
Why MIDI Music Sounds Bad

End the Confusion!
Basic Electronic Music Terms Defined



NEW! MicroSeries 1202

Mackie design and manufacturing technology creates a $399 mixer without compromises! In the past, small mixer specifications and quality dropped in direct proportion to price, making lower cost models unacceptable for serious recording, broadcast or sound reinforcement. But with the **MicroSeries 1202**, you get the same high performance electronics and rugged all-steel construction as its famous big brother, the CR-1604. The result is a rare combination of performance and reliability in a small, very affordable mixer.



From the noise and distortion specs, you'd think it was a big studio console. After all, it has discrete mic preamps, +28dBu balanced output drivers, and a 90dB working S/N ratio.

The **MicroSeries 1202**'s footprint is under one square foot, yet it packs an amazing total of 20 inputs, all designed to work with any level, from instrument level, to semi-pro –10, to professional +4 levels. With performance equal to the proven CR-1604, the rack-mountable **MicroSeries 1202** excels in applications where other small mixers can't measure up:

Mini recording mixer
Broadcast remotes
8-track monitor mixer
AUX inputs for a bigger console
Headphone or cue mix
Compact keyboard mixer
Small church or school systems
Impedance/level converter

Four +48V phantom-powered mic preamps. Like the CR-1604, the new 1202's preamps are designed to handle screaming vocals or close-miked drums without overload — yet can capture the subtle nuances of delicate strings or woodwinds with the extraordinary fidelity of the best studio mic preamps... Specs like these have never before been available on a $399 mixer: –128 dBm E.I.N., 0.005% THD, +14dBu max input.

4 stereo channels w/separate L/R inputs (along with 4 mic & 4 mono lines, 20 inputs total!)

Trim matches any signal, including instrument levels, –10 semi-pro and –4 pro gear.

Two AUX sends with plenty of gain for special effects and center detent at unity gain.

EQ at musically useful frequencies: 80Hz (more real thump than 100) and 12.5kHz (more sizzle than 10k).

Inside: Less than **0.025%** THD 20-20kHz; **90dB** S/N ratio (ref +4dBu), **108dB** dynamic range.

UnityPlus channel gain controls minimize noise, maximize headroom. 20dB gain above unity reduces need to constantly re-adjust trims during performance.

No wall wart! Like the CR-1604, our new MicroSeries 1202 has an internal power supply.

Rugged and reliable...all-steel, heavy-duty construction; double-sided, through-hole-plated fiberglass circuit boards for maximum durability and full electronic protection for input/output circuitry from power surges, static discharges, misuse and impedance mis-match.

N°3 IN A SERIES

PRO SPECS FEATURES & PERFORMANCE IN A COMPACT, RELIABLE PACKAGE.

THE NEW MICROSERIES 1202 FROM MACKIE.

AUX Outputs for stage monitoring, effects, recording, 22dBu max out.

Stereo AUX Returns. Separate left and right inputs & 20dB gain for effects, tape playback, extra line inputs, etc.

Bal./unbal. mono line inputs

"Phono" style **tape input and output** connectors for recording and playback.

Lurking in the shadows: The MicroSeries 1202's big brother, the **CR-1604** 16-channel Mic/Line Mixer. Road and studio-proven by professional musicians, producers, sound contractors and broadcasters worldwide and rave reviewed by major pro audio publications. Naturally, the new 1202 has the same great sound, specifications and performance.

Main Outs. TRS output drives balanced or unbalanced inputs. Max bal out = +28dB, unbal.=+22dB.

3-Year Warranty

Stereo AUX returns have enough gain to work with all levels, are ultra quiet with super-high headroom.

Tape monitor switch brings tape inputs up in AUX 2 so you have level control.

12-segment LED VU meters. Via Ch. Metering button, display reads main output levels, mic input levels, or line input levels for far more accuracy and detail than mere overload LEDs.

Same long-life, contamination-resistant **sealed rotary potentiometers** as CR-1604.

High output headphone amp drives headphones to max level.

Made in Woodinville, WA, USA.

Channel Inserts provide both uninterruped and interrupted direct outputs as well as pre-fader & post-fader effect loop channel patching for equalizers, compressors, limiters etc.

MicroSeries 1202 12-Channel Mic/Line Mixer – Suggested Retail $399

MACKIE

MACKIE DESIGNS INC • 16130 WOODINVILLE-REDMOND ROAD NE, N°2 • WOODINVILLE WA 98072 • U.S.A. • 1-800-258-6883

LX Returns. 4 stereo inputs
or effects, tape playback, extra
ne inputs. Mono-able in pairs
or up to 8 mono inputs.

Multiple AUX Outputs for
age monitoring, effects,
cording. 22dBu max out.

Trim matches any signal, incl
ng instrument levels, -10 se
pro and +4 pro gear.

Channel Access/Direct Out
combination TRS connectors
provide direct outputs and channel
patching for equalizers,
compressors, limiters &

ain Outs. TRS output
ves ba anced or un-
anced inputs. Max bal out
+28dB, unbal.=+22dB.

Main Buss Insert for external pre-
master fader processing.

Mono output for PA, to use left &
right masters as submasters.

**Up to 16 mic inputs in as
w as 7 rack spaces!**

If you need them, the
XLR10 expander adds ten
more discrete,
studio-grade,
antom-powered mic
eamps to the CR-1604 **for
Total of 16.** It mounts
ectly to the bottom of the
R-1604 jack "pod" and
comes an integral part of
mixer itself. No external
ng is required and all
unting hardware is
luded. **($349)**

NEW! XLR10

Sends. 4 knobs feed 7
parate outputs. Plenty of
n for special effects with
uter detent at unity gain.
e any 4 sends per ch.: Aux 1
witchee to either pre (monitor)
post (effects). SHIFT
anges AUX3 & 4 to AUX 5 & 6.

band EQ. Really useful
equencies: 80Hz (more real
ump than 100), 2.5kHz (not a
"volume control"), 12kHz
ore sizzle than 10k).

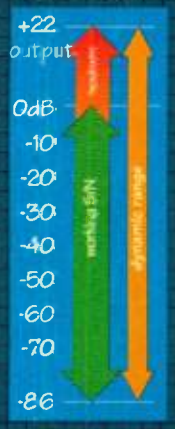
ute/3-4 mutes channels by
signing to 3rd & 4th buss.

e key to maximum headroom:
lo electronically switches
ering to channel being
oad so you can accurately
t trim level, or monitor
erating level at any time.

ak LEDs use multiple
tectors to sense overload
where in input channel.

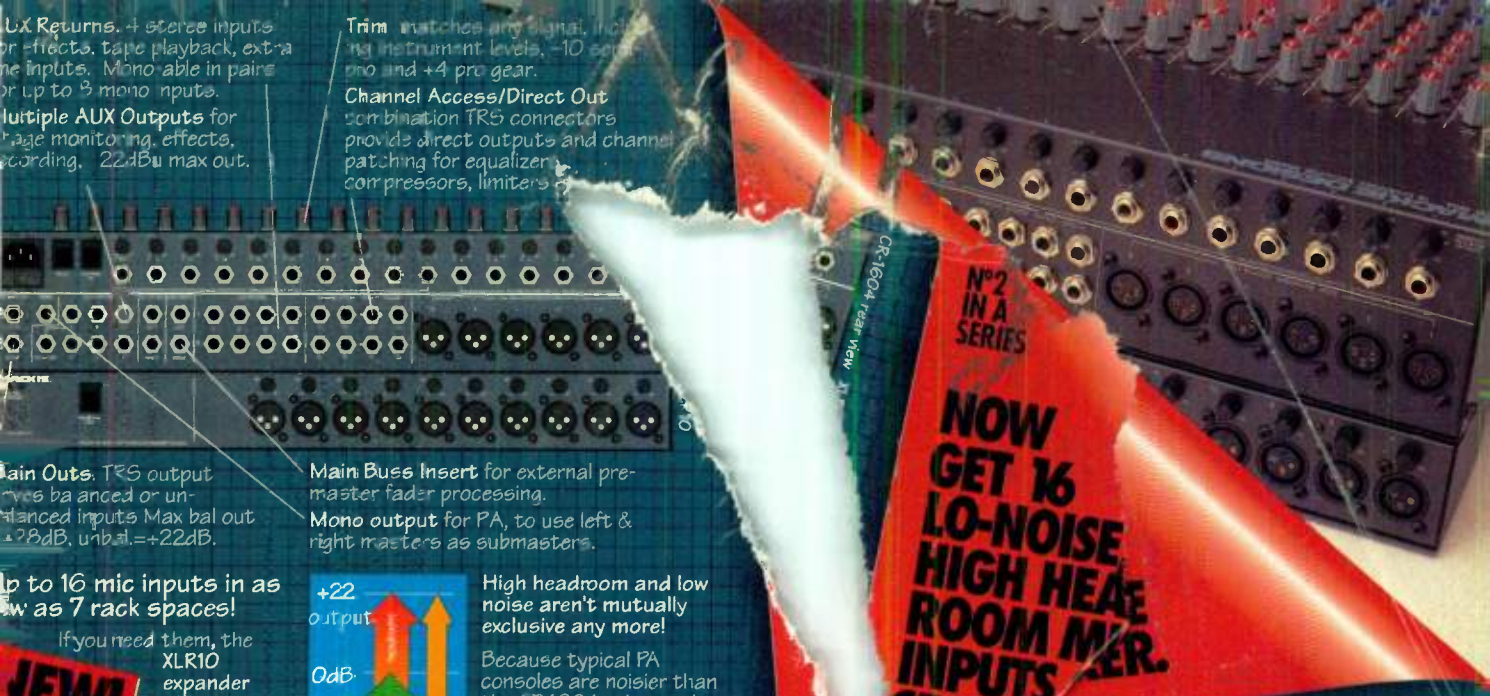
nityPlus faders minimize
ise, maximize headroom.
dB gain above unity reduces
d to constantly re-adjust
ms during performance.

ide: Less than **0.025%**
D 20-20kHz; **90dB**
N ratio (ref +4dBu).
8dB dynamic range.



High headroom and low noise aren't mutually exclusive any more!

Because typical PA consoles are noisier than the CR-1604, they make you set ch. levels by increasing gain until overload, then backing off until the overload light stops blinking. This "solves" their noise problem but results in insufficient headroom. Our metering system and gain structure allow levels to be set properly so the console can be run at 0dB, resulting in **22dB** of headroom while being noise-free.



the CR-1604 and XLR10 ider's mic pre-amps are designed to handle screaming vocals or close-miked drums without overload — yet can capture the subtle nuances of Greek pan pipes with all the audio fidelity of studio mic preamps. E.I.N. = -129 dBm, 0.005% THD, +14dBu max input.

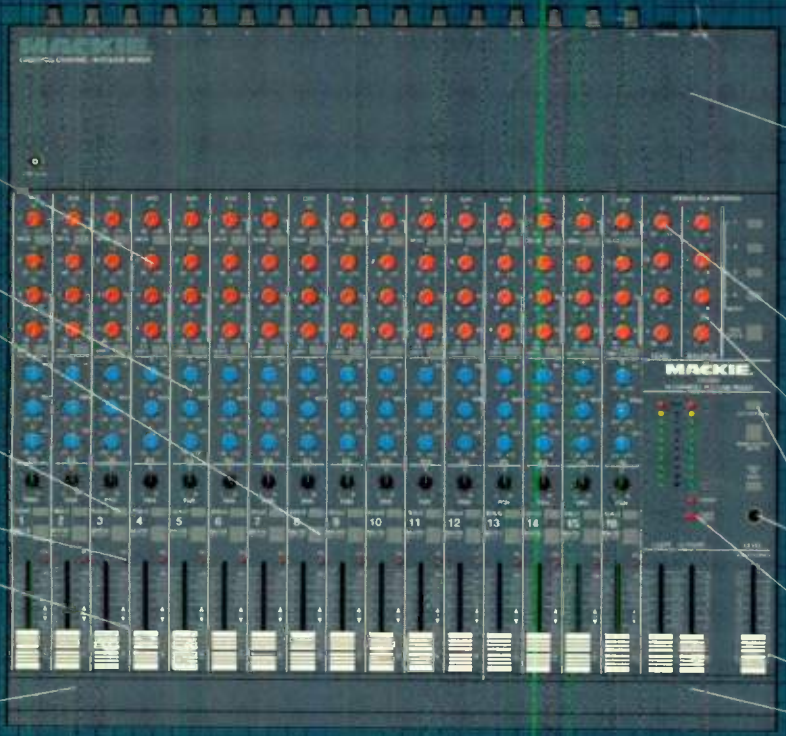
Rack mount OR table-top operation!

Rotatable pod & XLR10 change in minutes to:

7-space rack mount with jacks to rear

OR

Tabletop with jacks to back



Rugged construction and **protected electronics.** All-steel, heavy-duty construction; double-sided, through-hole-plated fiberglass circuit boards provide maximum reliability; all input/output electronics are fully protected from mis-use, power surges, static discharges & impedance mis-match.

Long-life **sealed rotary potentiometers** resist air-borne and liquid contamination.

4 **stereo AUX returns** have enough gain to work with all levels, are ultra quiet with super-high headroom.

ALT Preview solos all muted chs.

High output Headphone amp drives headphones to max level.

Large, RUDE, distracting **Solo light** definitely lets you know you're in Solo.

Dual-purpose **Headphone/Solo** level control.

3-Year Warranty at no extra charge.

CR-1604 Ultra-Compact 16-Ch. MIC/Line Mixer – Suggested Retail $1099

MACKIE

MACKIE DESIGNS INC • 16130 WOODINVILLE-REDMOND ROAD NE, N°2 • WOODINVILLE WA 98072 • U.S.A. • 1-800-258-6883

StudioVision™

Integrated Digital Audio Recording

Available at Your Authorized Opcode Dealer

Upgrade your Sequencer to Studio Vision: Only $500!

See your Authorized Studio Vision Dealer for details

15th ANNUAL KEYBOARD READERS POLL

WINNER
Software Innovation Of The Year

OPCODE

Opcode Systems, Inc. 3641 Haven Suite A Menlo Park, CA 94025-1010 (415) 369-8131

CONTENTS

FEATURES

COLUMNS

PAGE 30

Electronic Musician
FEBRUARY 1992 VOL. 8, NO. 2 - AN ACT III PUBLICATION

PAGE 62

REVIEWS

DEPARTMENTS

Cover: Photo By Anne Hamersky

A New World

Shifting interests are redefining what it means to be an electronic musician.

ANNE HAMBLEY

Electronic musicians have always been a flexible, resilient bunch. The genre's pioneers willfully enslaved themselves to time-shared, room-sized mainframe computers in order to hear short, very electronic-sounding compositions. Later devotees were blessed with analog synthesizer modules, which greatly eased the creation process but still required a great deal of programming effort to generate a limited range of sounds. Not until programmable digital synthesizers and MIDI arrived did enthusiasts have the tools to create any music imaginable.

Now, it seems, the electronic music universe is changing. It's not a dramatic reordering, but the notion of what it means to be an electronic musician and the basic focus of electronic music-making is shifting. Synthesizers, samplers, and other electronic instruments, which once comprised the core of electronic music-making, no longer command the unrivaled attention of many musicians. With the proliferation of great-sounding instruments, the glamour of new sound-creation technologies and the instruments that implement them has faded. Indeed, many musicians feel they have all the instruments they need to create the music they want to hear (hence, the recent decline in the keyboard market). In essence, they've become commodity items.

Most electronic musicians seem to be refocusing their interests on signal processing and recording. Not surprisingly, many manufacturers are responding by directing their product-development efforts towards creating these type of products. Impressive new synths and other MIDI products will continue to appear, of course, but the most passionate efforts seem to be in the realm of digital recording and signal processing. The introduction of affordable digital recording equipment promises to be the most important development of this decade. DAT has whet the appetite of many musicians, and even more are eager to explore completely digital multitracking and production.

These new product developments, which will help maintain the interest of "traditional" electronic musicians, also have the beneficial effect of enticing a whole other group into the electronic music universe: acoustic and electro-acoustic musicians. Purists may disagree, seeing as the classical definition of an electronic musician is someone who uses instruments that create and modify sounds entirely in the electronic domain. But, while this once may have sufficed, in this age of pitch-shifted, reverberated, time-stretched acoustic guitar parts streaming off a hard disk, the definition clearly needs an overhaul. To my mind, any musician interested in signal processing or recording (particularly in the digital domain) may rightfully be called an electronic musician.

As a magazine dedicated to covering this still-burgeoning field, **EM** must reflect these changing interests. Toward that end, we're introducing two new columns this month: "Recording Musician" and "Working Musician." As its title suggests, "Recording Musician" will cover topics that affect musicians involved in recording, whether their medium is analog or digital tape, or hard disk. Each month working pros will offer insights into common problems that plague both budding and experienced recordists. "Working Musician" will address music-business and live-performance issues that working musicians often face. The focus, again, will be practical experience.

The electronic music universe is adapting to the needs of its members. And as it evolves, **EM** will continue to monitor its pulse and adjust accordingly. The next few years should be interesting; keep us along for the ride.

Bob O'Donnell

Electronic Musician

Publisher Peter Hirschfeld

Editor Bob O'Donnell
Managing Editor Steve Oppenheimer
Associate Editor Michael Molenda
Assistant Editor Anne-Marie Praetzel
Editorial Assistant Mary Cosola
Contributing Editors Alan Gary Campbell, Gary Hall, George Petersen, Scott Wilkinson

Art Director Andrew Faulkner
Assistant Art Director Linda Birch
Art Assistant Katherine Gibbon
Computer Illustrator Chuck Dahmer

Director of Advertising Carrie Anderson
Eastern Advertising Manager Valerie Pippin
Western Advertising Manager Dennis Gray
Marketing Manager Elise Malmberg
Classifieds Manager Robin Boyce
Classifieds Assistants Jill Stauffer, Elizabeth Hildreth
Advertising Assistant Stephanie Sedin
Sales Assistants Christine Cali, Tina Spinelli

Director of Operations and Production Anne Letsch
Production Manager Ellen Richman
Advertising Traffic Manager Donna Price
Trade Show Coordinator Jane Byer
Production Assistant Christopher Ferrell
Circulation Manager Randy Robertson
Circulation Assistant Karen Stackpole
Sales Administrator Jean Mahon
Assistant Controller Ronald LeRouzic
Accounting Lea Lewis, Therese Wellington, Christina Purdy, Bettye Gardner
Office Manager Barbara Kochiovelos

ACT III PUBLISHING
Group Publisher Hillel Resner
Director of Corporate Development David Schwartz
National Editorial, Advertising, and Business Offices
6400 Hollis Street #12
Emeryville, CA 94608
tel. (510) 653-3307
fax (510) 653-5142

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

East Coast Advertising Office
tel. (212) 315-1800
fax (212) 315-1848

Subscription Services Office
(Address changes and customer-service inquiries)
PO Box 41094
Nashville, TN 37204
tel. (800) 888-5139
or (615) 377-3322

Electronic Musician: (ISSN: 0884-4720) is published monthly by ACT III Publishing, 6400 Hollis St. #12, Emeryville, CA 94608. One year (12 issues) subscription is $24; outside the U.S. is $44. Second Class postage paid at Oakland, CA, and additional mailing offices. POSTMASTER: Send address changes to Electronic Musician, PO Box 41094, Nashville, TN 37204.

An ACT III PUBLICATION
Also publishers of *Mix* magazine.

Consumer Audit BPA

The Top 500

Play the D4 with its onboard trigger inputs.

Alesis drum machines are famous for their sounds. The HR-16's natural acoustic drums are still the standard for transparent rhythm tracks. The punchy aggressive samples of the HR16:B redefine how to make rhythm tracks burn. The SR-16 is an instant hit with its sampled reverb and ambience techniques.

Now you can have all this and more with the new **Alesis D4 Drum Sound Module.** There's an incredible 500 sounds in all. Right at your fingertips.

The D4's sounds are unparalleled for their realism. For example, when you hit a D4 sound harder, the tone *and* pitch change just like a real drum, thanks to the D4's Enhanced Dynamic Articulation.™ Plus, stereo reverb and ambience are built into many of the samples so you can keep your mind on the beat.

Using the D4 is a breeze with its large data entry knob and dedicated buttons for all major functions. There's even a touch-sensitive preview button and headphone output for instant gratification... and latenight drumset programming.

The D4's 21 user definable drumsets are accessible via MIDI or through the 12 onboard audio trigger inputs. You can even replace a wimpy drum sound on tape. Which you'll want to do if it didn't come from a D4. No rocket science here. Just pure honest incredible sound. The only reason to buy a drum sound module.

Everybody wants a hit. The D4 has 500 of them right now. At your Alesis dealer.

Play the D4 with MIDI software or hardware.

12 audio trigger-to-MIDI inputs are built in for drum triggers, pads, or tape.

ALESIS THE TOP 500 DRUM SOUNDS

THIS WEEK	LAST WEEK	WKS. ON CHART	TITLE / ARTIST	DRUM PRODUCTION
1	2	208	HONEST SNARE / HR-16	ALL WOOD-BRASS RIM
2	NEW ▶		STUDIO TOM / BRAND NEW D4	16" MAPLE TOM w/VERB
3	NEW ▶		BIG "O" / BRAND NEW D4	DOUBLE HEAD KICK w/VERB
4	5	52	RIM SHOT ROOM / SR-16	BRASS PICCOLO w/VERB
5	10	156	BIG FOOT / HR-16:B	SINGLE HEAD 26" MAPLE
6	NEW ▶		SLAM / BRAND NEW D4	POWER TOM w/VERB
7	23	156	COMBO SNARE / HR-16:B	PICCOLO PLUS WOOD
8	NEW ▶		BIG BALLAD / BRAND NEW D4	WOOD SNARE w/BIG VERB
9	NEW ▶		FAT CITY / BRAND NEW D4	SUPER FAT SNARE
			[illegible] TO OPEN	ARTICULATED HI HAT

THIS WEEK	LAST WEEK	WKS. ON CHART	TITLE / ARTIST	
302	NEW ▶		RAW HIDE / BRAND NEW D4	CUSTOM SN
303	450	52	HI ROOM TOM / SR-16	10" MAPLE
304	NEW ▶		WET HALF / BRAND NEW D4	HALF OPEN HAT
305	327	52	RIM 2 CENTER / SR-16	ARTICU
306	123	20[illegible]	[illegible] HEAD	DOUBLE HEAD KIC
307	223	15[illegible]		
308	401	5[illegible]		
309	NEW ▶			
310	175	1[illegible]		
311	NEW			
312	171	[illegible]		

ALESIS STUDIO ELECTRONICS

Alesis Corporation 3630 Holdrege Avenue
Los Angeles CA 90016

A TAXING MATTER

I am writing in response to Geoffrey Hull's letter about the proposed Home Recording Legislation (December 1991) and to Bob O'Donnell's "Front Page" editorial "The Guilt Tax" (October 1991).

I have immense respect for Middle Tennessee State University and its recording industry management program. This is why it is hard to believe Professor Hull would charge **EM** with "uninformed and misleading" comments.

Mr. Hull is incorrect in stating "the royalty assessed on digital recorders and blank tape will go to the copyright owners, not the government." I am a DAT owner and also a songwriter. I only record original music on my DAT, created by me and my friends, family, and clients. Yet, I will not receive any money collected from this DAT "tax." And the government will receive a cut of the pie in the form of increased income taxes from the receiving parties involved.

Imposing a surcharge, or tax, on all users of any product due to abuse by some would create havoc. Can you imagine what other surcharges could be justified? How about a software-theft tax on blank floppy diskettes or a shoplifting tax on overcoats. We could tax copy machines; the money could go to publications such as this one.

The real trouble is with analog cassettes, not with DAT, and the record industry knows this. If this DAT scam passes, the record industry will be stealing from me and many others who aspire to join that very same industry.

Greg Forgette
Murfreesboro, TN

If you made your living as a songwriter, you would be aware that the mechanical royalty rates (record company's rate of payment to writers from record, CD, and tape sales) are set by the U.S. government. Would you call that payment a "tax" simply because it is regulated by Congress? It is a curious arrangement at best, but at least it prevents no payment at all, which is what your commentary suggests. If you let dogs run free—in this case the powerful Japanese electronics lobby—you promote the gild-lining of an already well-fed canine. The DAT "tax" is an equitable attempt to compensate copyright owners, producers, and artists—the creators.

This issue should have been addressed when the Xerox machine first appeared. If intellectual property is made available to the public, the copyright holders have every right to expect compensation.

In your world, no one has responsibility, no one is culpable, and we all live in a beautiful, creative nirvana. I suppose that's all right, because I'll no longer pay for my subscription. I'll just borrow a copy of **EM** and go to the Xerox machine.

David Ray
Missing Keys Music
New York, NY

David—While I appreciate your concerns, you should be aware that the powerful Japanese electronics lobby and the record-industry lobby supporting this bill are one and the same.—Bob O'D

I read with interest the continuing tape tax controversy. I think the computer market for DAT tapes and 3.5-inch optical media will be as large, or larger, than the audio market. Will we have to further enrich the likes of Michael Jackson and the Gatlin Brothers every time we buy blank media for computer use?

If this is the case, the injustice is unspeakable. If not, how will the record companies know that unscrupulous CD copies are not getting blank media from computer supply stores?

Jim Chandler, Jr.
Chattanooga, TN

To update everyone: The Senate version of the "Home Recording Rights Act" was voted out of the Senate Judiciary committee in late November and recommended for approval on the Senate floor. A vote there could occur as early as late January. A slightly different House version was introduced by Congressmen Jack Brooks (D-Texas) and Bill Hughes (D-New Jersey). That bill was sent to the House Judiciary Committee, of which Congressman Brooks is chairman, and then passed onto the House Judiciary Subcommittee on Intellectual Property, which is run by Congressman Hughes. Testimony on the bill probably will occur in February, so there's still time to voice your opinion to your elected representatives.—Bob O'D

AN IMPERFECT FIGURE

I am a retired electrical engineer but new to MIDI. I am confused by the MIDI In wiring details in the November 1991 DIY ("Build a MIDI Interface for the Sound Blaster Card").

In Figure 1, MIDI In shows the cathode of diode D1 connected to pin 4 through a 220-ohm resistor. The cathode of the diode in the opto-isolator is connected to pin 5. To me, this indicates that current flows in to pin 4 and out of pin 5 at the MIDI In connector.

In the same figure, MIDI Out shows +5 volts connected through a 220-ohm resistor to pin 4. To me, this indicates that current flows out of pin 4 and in to pin 5 at the MIDI Out connector.

In the article, Figures 2 and 4 clearly show that for the MIDI In circuit, pins 4 and 5 are transposed from the official MIDI 1.0 standard. The MIDI Out circuit in the article agrees with the standard.

Am I overlooking something?

William P. Foster
Fair Play, SC

GORDON STUDER

"Performer is gorgeous...blows away the competition."

Electronic Musician

"Flat out fun to use."

Keyboard Magazine

"There is no equivalent."

MacGuide

"Probably the most powerful such setup."

Audio Media(UK)

We Couldn't Write A Better Ad.

So we spent our time developing Performer 3.6 instead. Now you can use Performer's powerful Edit and Region commands as your music is playing!

Transpose sections to new keys. Shift music backward or forward in time. Grab and move notes, set loops, draw pitch bends, and change velocities. Edit or re-arrange sets on-the-fly. All without stopping playback. And without interrupting your creative flow.

With our drum machine style quantize-on-input, events quantize as you record. And all of Performer's quantize options work in real-time, including swing-feel, strength, offset and sensitivity.

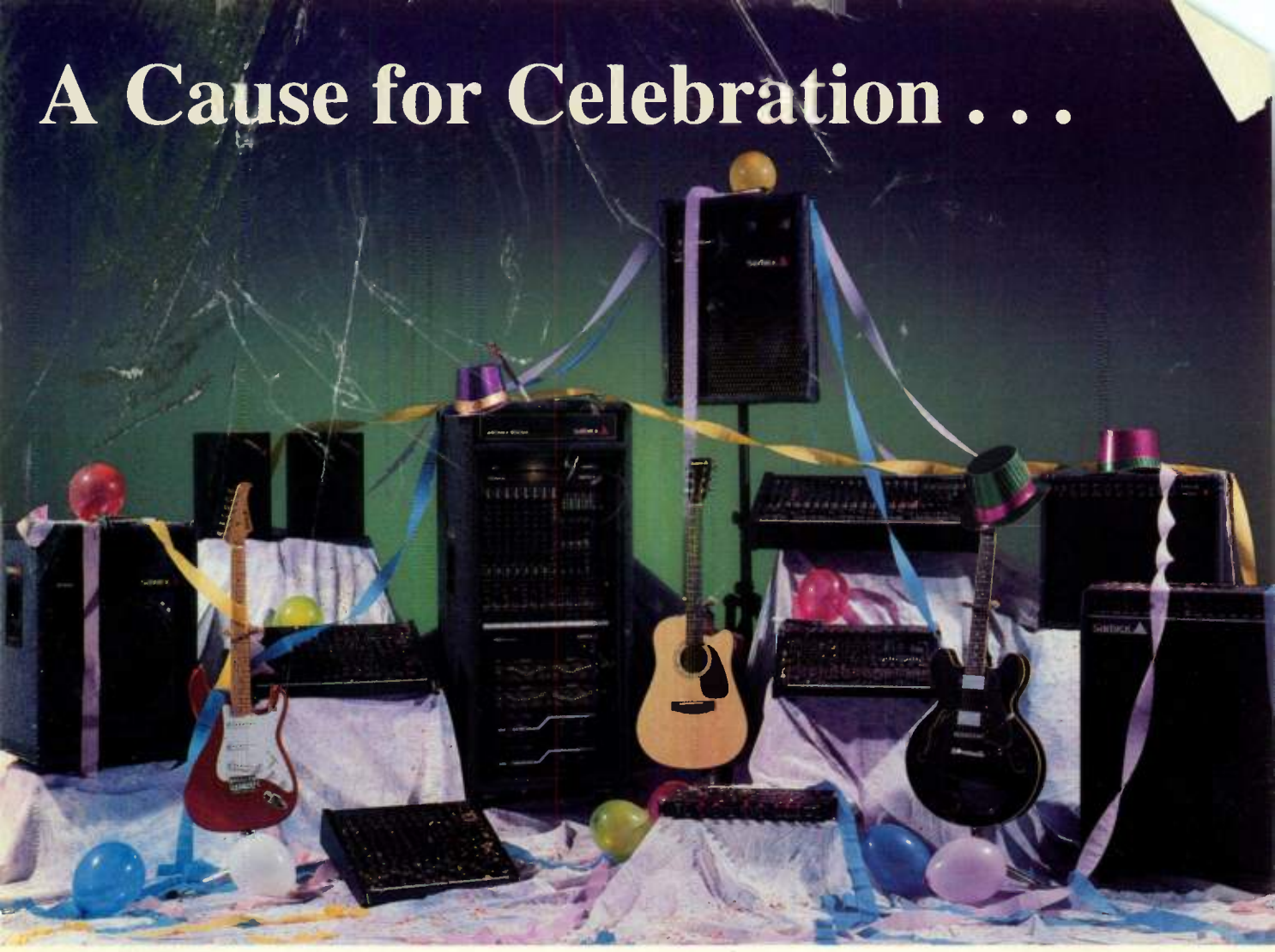
Call us for more information and the authorized dealer nearest you. Performer Version 3.6 will be sent free of charge to registered Performer Version 3.5 users.

Mark of the Unicorn, Inc.

TEC 1990 WINNER

222 Third Street, Cambridge, MA 02142 Phone: (617) 576-2760 Fax: (617) 576-3609

A Cause for Celebration . . .



Introducing

SAMICK

What's the cause for celebration? Samick has decided to have a "coming out" party for their new line of Musical Instrumen and Professional Audio Products. Since Samick's beginning in 1958, our objective has been to create quality products wi uncompromising design and value to meet your every musical need. Over the years you have come to depend on our produc and quality. After all, we didn't become the world's largest acoustic piano and guitar manufacturer by chance! Regardless your musical interests: Rock, Jazz, Country, New Age, Gospel, or Classical, Samick has a product just for you, witho draining your bank account. So we thought it was time to formally introduce ourselves and invite you to the party!

In maintaining the tradition of creating the world's finest quality musical instruments, we have created a line of profession consoles, power amplifiers, powered mixers, speakers, and electric guitars with the same innovative design and quality that w have always used.

So now that you know who we really are, come join the celebration and see why Samick is fast becoming the choice musicians and music lovers everywhere. Visit an authorized Samick dealer nearest you and, once you compare feature performance, and price, you'll be celebrating too!

Samick - We are the Source!

SAMICK • 18521 Railroad Street • City of Industry, CA 91748 • For Product Information Call: **1 (818) 964-4700**

Author Timothy Stanley responds: *You are absolutely right. The input pins in the published article are wrong. In Figures 2 and 4, input pin 4 should connect to pin 1 on the optocoupler, and input pin 5 should connect to the 270-ohm resistor. In my original manuscript the pins were labeled correctly for Figure 2 but were changed in publication. My original for Figure 4 was incorrect. Sorry for the inconvenience caused by these oversights.*

DIGITAL DILEMMAS

Because electronic musicians turn to EM for information, they deserve to read articles that are well-written and factually correct. "Data Compression and the New Audio Formats" (September 1991) is an example of incorrect facts and poor writing.

For example, there are four reasons it is doubtful "samplers and wavetable synths could use data compression to multiply their sound storage." First, all current data-compression schemes rely on the frequency content of the sound at its original pitch. Changing the pitch changes the frequency content in relation to the threshold of hearing. Second, the compression scheme removes the inaudible portions of the spectrum, which would prohibit the accurate interpolation and decimation necessary to play back samples over a wide range of pitches. Third, the audio quality of both the Mini Disc and the Digital Compact Cassette is only slightly better than a standard analog cassette. I've heard complaints about the sound quality in 16-bit linear, 44.1 kHz samplers; I can't imagine anyone settling for a data compression-based sampler. And, finally, recording the output of a data-compression system into another data-compression system results in unacceptable degradation of the sound (which is why it has such strong support from the record companies). This would mean that the output of the data compression-based sampler could never be recorded into any other data compression-based system.

Author Gary Hall says, "It appears that ATRAC coding will distort time information. The 20-millisecond blocks imply that the sound can only change 50 times a second." Mr. Hall should review his transform theory. The Fourier transform, and others such as the discrete cosine transform, perfectly map time-domain data into the frequency domain and then back again, despite block size. In fact, larger block sizes give more accurate results. Time domain problems inherent in data compression schemes, such as pre-echo, can be a factor of block size, but this has nothing to do with accurately reproducing sounds that change faster than 50 times a second.

The paragraph about analysis and resynthesis techniques belongs in another article altogether. The only common ground these two topics have with data compression is an operation in the frequency domain. You might as well have said, "The most exciting part is the implication of digital equalization."

Matt Booty
Chicago, IL

Contributing editor Gary Hall responds: *I guess I wasn't as clear as I should have been. I was referring to using analysis-resynthesis but not the deletion of partials. Also, I can't agree with you that fidelity limitations preclude using data compression in a sampler. I know at least as many people happily using their old E-IIs, etc., to make excellent music. Fidelity is a larger issue when using a sampler as a production tool, i.e., to drop in sound effects, dialog, and background vocals.*

I agree with you about the unsuitability of data-compressed media for quality-conscious recording and the politics involved in the introduction of the Mini Disc and Digital Compact Cassette (DCC). But I don't think those are good reasons not to use frequency-domain techniques in musical instruments.

Your comments about the implications of 1,028-sample blocks are on firmer ground, and I've had some good discussions about this with my colleagues at Sonic Solutions. The consensus is that there's ample reason to be wary of the impact of ATRAC on transient response, but not because the sound can't change faster than twenty milliseconds as I stated.

ELECTRONIC ORCHESTRATION

I am responding to both "Electronic Orchestration" (September 1991), as well as those letters that reacted to it. There are really two sides of the coin: those who feel we must study and emulate the techniques and characteristics of acoustic instruments and those who believe the electronic medium has its own aesthetic value and parameters.

As a composer, I employ the electronic capabilities inherent in my home MIDI system to create both new timbres and recreate traditional combinations, a distinction Mr. Salm identifies as traditional vs. electronic orchestration. While the original article was extremely well-written, I must disagree with Mr. Salm's response that "Synthesists should not feel that they need to make an in-depth study of acoustic orchestration."

As an instructor on the college level, I feel the very principles so eloquently argued in the article are what synthesists working within any genre might use as guidelines of musical common sense. An awareness of these aesthetic values would go a long way in correcting much of the weakness of contemporary electronic music: long on technological overkill, short on musicality!

Rene Salm's Ten Principles of Electronic Orchestration seem applicable to most situations, whatever the stylistic orientation, particularly the ideas of foreground, middleground, and background. Other writers have referred to this concept as primary, secondary, and tertiary focal points. At any rate, thanks for an article of unusual quality. This is one I will share with my students.

Anthony Ferrara
Philadelphia, PA

Address correspondence to "Letters," Electronic Musician, 6400 Hollis St. #12, Emeryville, CA 94608. Published letters may be edited for space and clarity.

Corrections to articles are listed at the end of "Letters." We compile these published corrections annually; to receive a copy, send an SASE to "Error Log Listing" at the above address.

By tonight, you could actually become a famous drummer.

What if you had a drum synthesizer that let you synthesize yourself?

Then hang on to your psyche and look at Yamaha's new RY30 rhythm programmer.

The RY30 is the first programmable drum synthesizer that not only gives you real drum sound but real drum feel. From real live drummers. Like Peter Erskine. Dave Weckl. Matt Sorum. Tommy Aldridge. Dave Garibaldi. And you.

It's not just more techno wizardry at work here, it's Yamaha's experience from making drums. Then listening to the artists who play them. Then taking apart their drum kits, their patterns and unique rhythms, their style, expression and nuances, their very souls. And then we put all we learned back into the RY30, plus each drummer on a neat little card.

Now the fun really starts with the RY30's programming wheel. In realtime you can toss in a pitch bend, a filter, an envelope, and change the velocity. All for each individual voice. And all with CD quality, 16-bit sampling.

The Artist Series cards can also be used on the SY55, SY77, TG55 and the TG77 keyboards.

Check one out at your Yamaha music dealer today. And tonight, someone just might ask for your autograph.

YAMAHA

FEEL THE NEW POWER OF MASTER TRACKS PRO & ENCORE

MUSIC SOFTWARE'S MOST PRODUCTIVE PAIR!

Record it Fast...

...and Score it Beautifully.

Passport's **Encore** and **Master Tracks Pro** deliver the best one-two productivity punch in music software.

Master Tracks Pro is the fastest-to-learn and easiest-to-use sequencer in existence for both Windows and the Macintosh. Its clear, direct interface lets you keep your mind on the music, not the software.

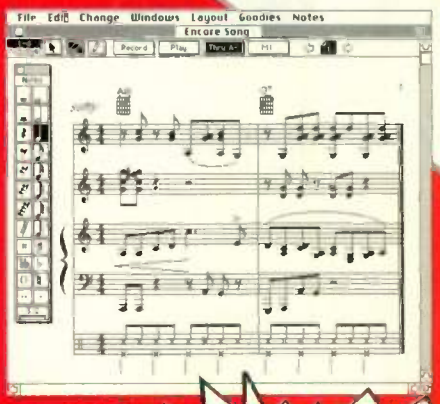
Encore is the most intuitive music scoring program available. It's the easiest way to create, edit and print professional-quality musical scores. Encore—for Windows and the Mac—records what you play on a synthesizer, imports music directly from a sequence or MIDI file, or lets you click notes in with the mouse.

MASTER TRACKS PRO AND ENCORE balance powerful new features with clean and functional operation. Separately or as a pair, they not only give you power, but ***POWER YOU CAN USE.***

Encore is virtually a one-step scoring program.

An Encore score is completely interactive. Grab and move notes, staves, symbols and other elements to edit the score any way you want. You can even play back an Encore score on your MIDI instruments. And now it's smoother, more accurate, and even easier to use than ever before. Encore's notation tools include:

- ***Transposable Guitar Chord Symbols*** - Place guitar fret and standard chord symbols anywhere.
- ***Encore 2.5 for the PC is now for Windows!*** Combine easy, accurate scoring with the powerful Windows environment.
- ***Every Object Mouse-Movable*** - No menus or dialog boxes needed—just click and drag anything.
- ***Auto Beaming*** - Step-entered and guessed notes now automatically beamed.
- ***Auto Spacing*** - Encore automatically spaces notes for easy reading.
- ***Revert to Raw*** - Return guessed notes to their "raw" state to change guess parameters.
- ***Extract Multiple Parts*** - Create parts for any number of instruments.
- ***Sonata® Font*** and Adobe® Type Manager (ATM) utility now included with Encore!



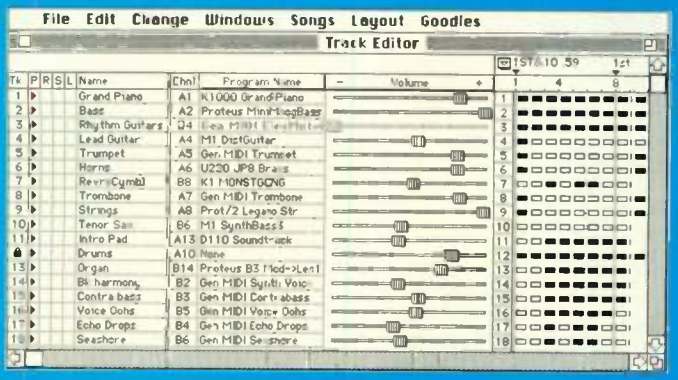
Now for Windows!

DYNAMIC

New Versions of MASTER TRACKS PRO...

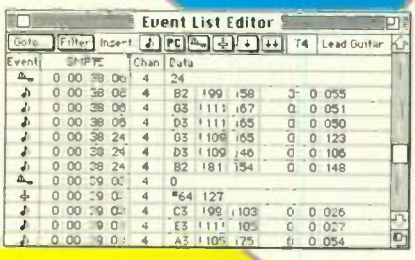
... for both the Mac and Windows put more composing power at your fingertips! A wealth of features include:

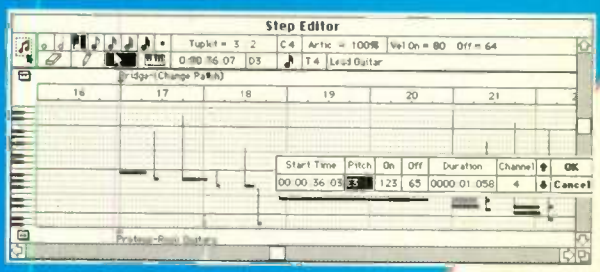
- **64 Tracks** - Record each part of your song on an inaepen-dent, synchronized and easily editable track.
- **Song Playlist** - Play back multiple sequenced songs in any order.



- **Graphically Edit MIDI Controllers** - Modify controllers by drawing a line with the mouse, a feature pioneered by Passport!
- **Fit Time** - Automatically adjust a song's tempo to fit a specified duration.
- **SMPTE Sync** - Synchronize your music to film, video or tape.
- **Change Filter** - The most common-sense way to edit specific parameters with perfect accuracy.
- **Event List Editing** - Accurately edit note, controller and time data from an alpha-numeric list.

...and much more!

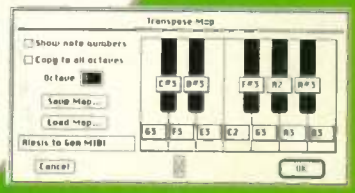




New MASTER TRACKS PRO 5 for the Macintosh...

...combines the features you've asked for, integrated seamlessly into Pro's prize-winning interface.

- **Recordable Faders** - Create an Automated mixdown.
- **Draw Velocity Curves** - Draw the shape of velocity!
- **Graphic Note Velocity** - A draggable stem on each note lets you see and edit its velocity.
- **Master Fader** - Assign any number of tracks to a single recordable group fader.
- **Transpose Map** - Fast and easy drum and note mapping.



- **SMPTE Event List** - Type in SMPTE times to create an accurate cue sheet for film scoring.
- **New MIDI Interface Support** - Supports up to two MOTU MIDI Time Pieces™ or the Opcode Studio 5™.
- **And There's Much More,** including: Ghost Notes in controller windows, punch in while playing and Multi-Channel Tracks.

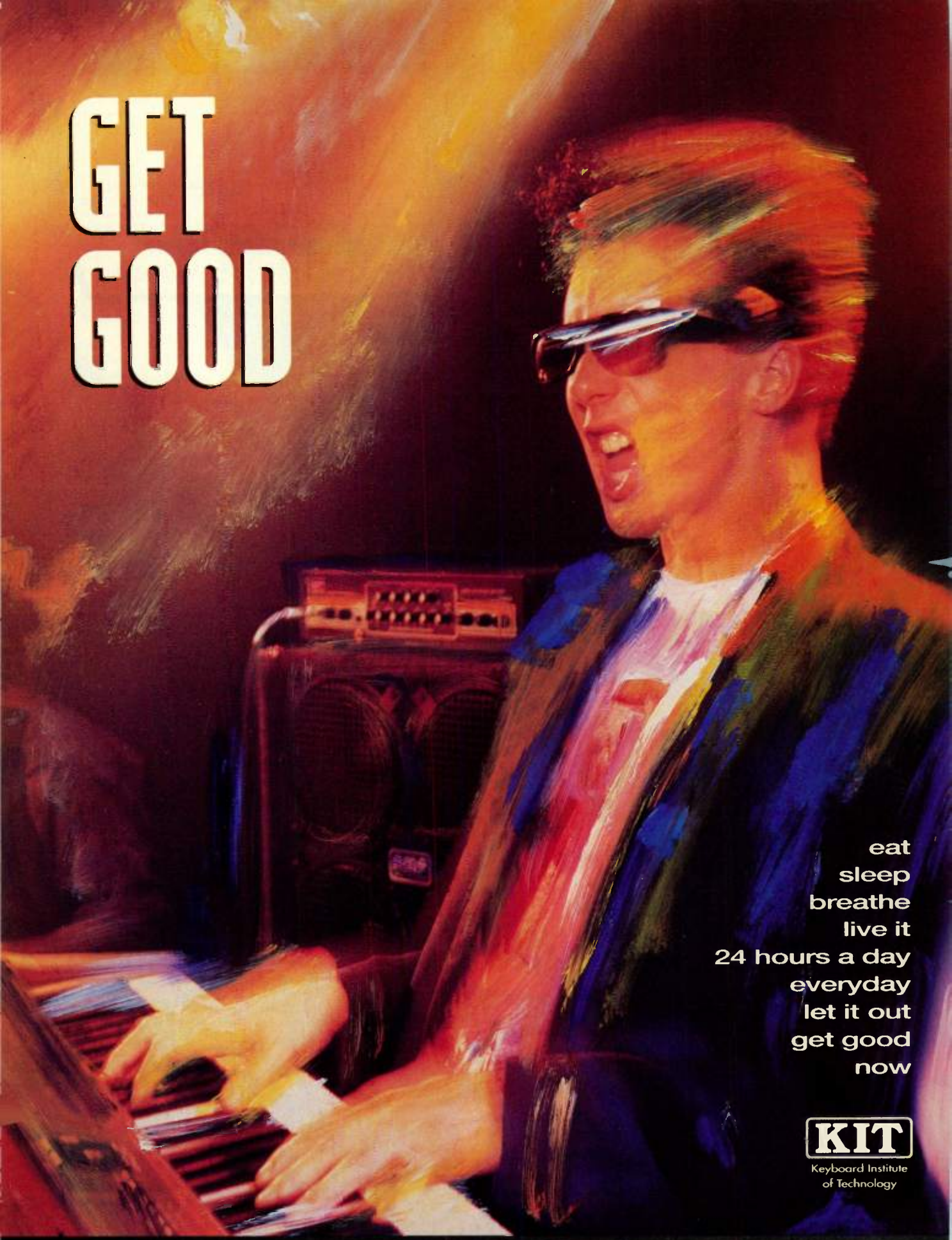
Call (415) 726-0280 for a **FREE DEMO DISK** and a dealer near you!

MASTER TRACKS PRO™ & ENCORE™

DUO!

Available at music & computer stores **WORLDWIDE!**
Contact Passport for **YOUR LOCAL DEALER OR INTERNATIONAL DISTRIBUTOR.**

PASSPORT®
100 Stone Pine Road • Half Moon Bay, CA 94019
Phone: (415) 726-0280 • Fax: (415) 726-2254



New Products

Our NAMM-bound collection includes multiple mixers and a serious blast from the past.

Big Briar Model 91A Theremin

The **Theremin** lives again, albeit in updated form. Big Briar is shipping enhanced (including optional MIDI) versions of Prof. Leon Theremin's pioneer electronic musical instrument. The new models are similar in appearance and function to those manufactured in the U.S. by RCA around 1930. Three case styles are available (starting at $1,800). The Theremin is played using two antennas: a straight, vertical pitch-control rod and a loop-shaped tube that controls volume. The player controls pitch by varying the distance between the right hand and the pitch antenna and controls volume by the left hand's proximity to the volume antenna. Unlike the originals, Big Briar's version has no tubes; the company chose to pursue modern sound, performance, and reliability standards by substituting modern analog and digital circuitry, including a crystal-controlled master oscillator. Other new features include a 10-watt (into eight ohms) onboard power amp, an optional 5-inch speaker ($150), and a line-level audio output. Those who use voltage-controlled synths will appreciate the 1V/octave pitch control output and 0 to +5V volume control jack. But the show-stopper is that the Theremin can be equipped with a MIDI interface ($275) that provides In, Out, and Thru ports and lets it transmit and receive Pitch Bend, Volume (Controller 7), and Local Control messages.

Big Briar, Inc.
Rt. 3, Box 115A1
Leicester, NC 28748
tel. (704) 683-9085

Sherpa Enterprises is shipping the **SP63 Electronic Percussion Pad System** ($1,170 U.S./8-piece system). The system includes one 11-inch, dual-trigger percussion pad ($135); three 11-inch, single-trigger percussion pads ($118 ea.); one 8-inch, single-trigger cymbal pad ($144); one 8-inch, dual-trigger cymbal pad ($169); one 8-inch, dual-output hi-hat pad ($184); and one 11-inch, free-standing bass pad. Sherpa pads use High Bounce-Soft Touch gum-rubber playing surfaces designed to give more controllable stick-bounce than real drums and avoid elbow injuries that can result from playing on hard surfaces. The dual-trigger snare pad combines rim and pad triggers, and if you feed the triggers to a trigger-to-MIDI interface (or the trigger inputs of an Alesis D4 drum module), you can adjust the velocity sensitivity to get volume crossfades between rim and pad sound as you play closer to the rim. The hi-hat pad comes with hardware and mounts on any hi-hat stand, the cymbal pads mount directly on any cymbal stand, and the percussion pad adjusts to fit any tom stand. The bass pad has a stopper to reduce sliding. Trigger outputs are via ¼-inch phone jacks. The **RS91C Rack Stand System** ($591) is made of polished chrome steel tubing with lightweight, heavy-duty aluminum castings and multiple mounting arms.

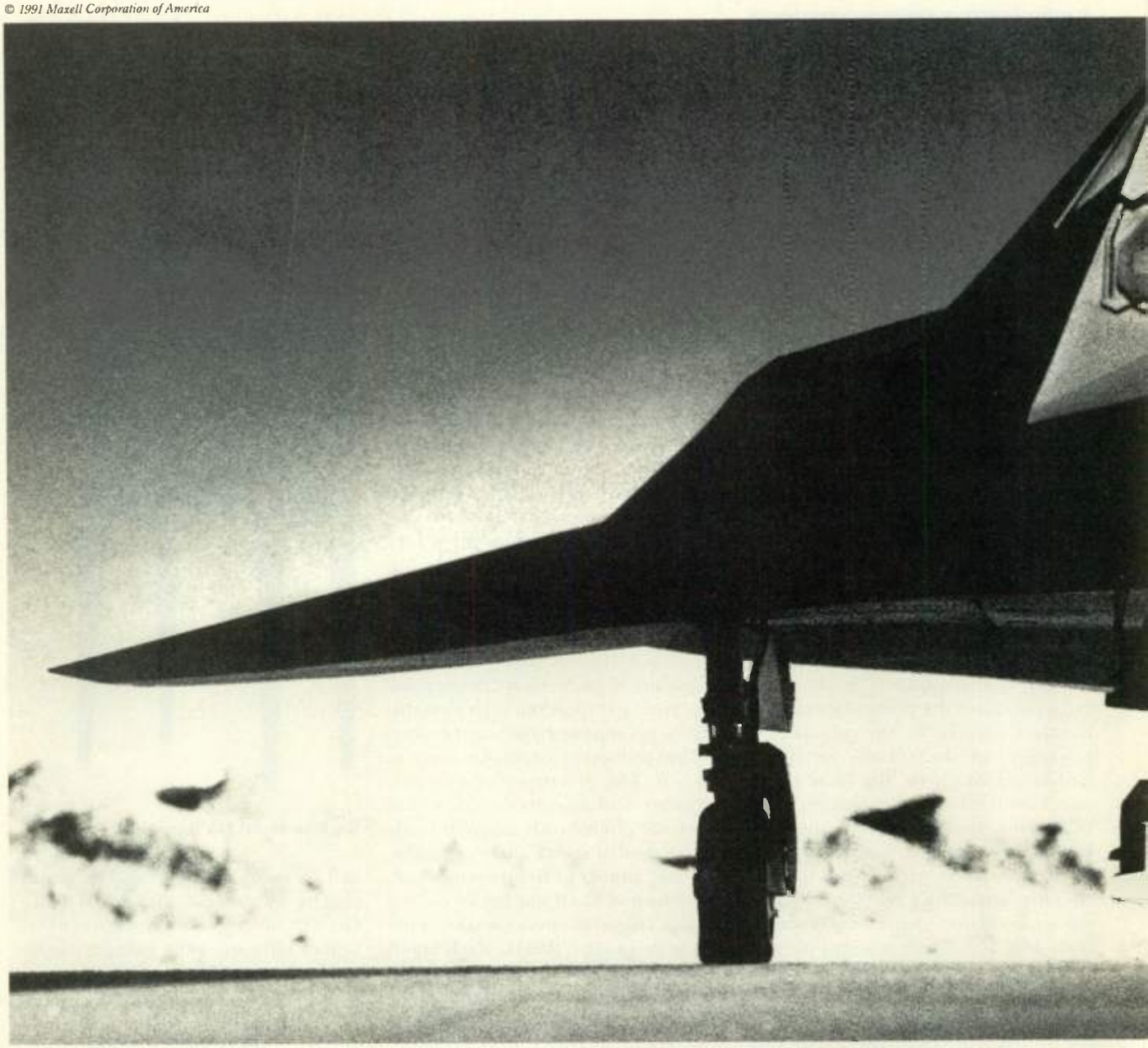
Sherpa Enterprises
80 Parklawn Rd., Suite 101A
Toronto, Ontario
Canada M8Y 3H8
tel. (416) 580-7373

MIXERS

Fostex introduced the **model 2412 recording console** ($7,995), a 24 × 12 × 2 mixer with two independent signal paths that let you simultaneously perform a 24 × 12 × 2 and a 24 × 2 mix. The two sections can be combined for a 54-input stereo mix. The 2412 provides four bands of EQ per channel (including two sweepable midrange bands); stereo, in-place soloing; three aux sends per channel (one mono pre, one mono post, and one stereo post); and six mono aux returns. The mutes can be automated with MIDI Note On/Off messages from a sequencer, or four onboard scene changes can be accessed manually. A talkback mic is built-in.

Fostex
15431 Blackburn Ave.
Norwalk, CA 90650
tel. (213) 921-1112

Mackie Designs is shipping the **Micro-Series 1202 mixer** ($399), a 12-channel mic/line mixer that uses the same components as the company's well-received CR-1604 (reviewed in the May 1991 EM). The compact unit has a footprint of less than one square foot and weighs just seven pounds and can be rack-mounted in six rackspaces. Channels 1 through 4 have four XLR mic inputs with trim pots and four balanced/unbalanced, ¼-inch mono inputs. Channels 5 through 12 are accessed via ¼-inch input pairs (i.e., left/right jacks for channels 5 and 6, a pair for channels 7 and 8, etc.). Each



THE HIGHER THE PERFORMANC

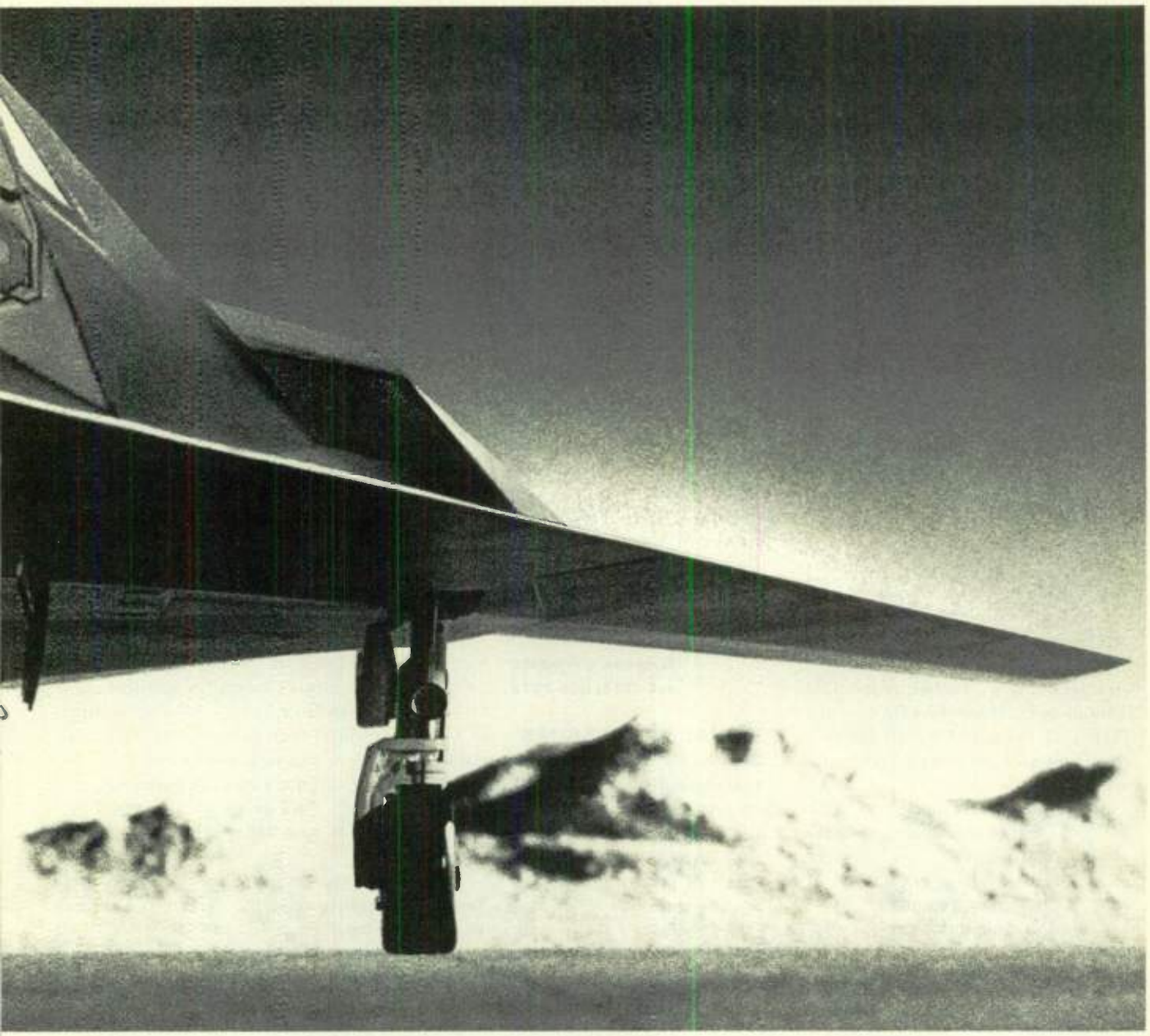
Compare Maxell's XLII-S to an ordinary cassette. An obvious difference is the size of the windows. Remember: there are no bay windows in rockets, but in houseboats there are.

That tiny little slit of a window allowed us room to build additional support into the cassette shell for greater rigidity and durability.

The shell itself is a compound of ceramic and polymer resins. With 1.4 times the specific gravity of standard cassette shell material, it's anti-resonant, absorbs vibrations that can cause modulation noise.

Inside, the tape is formulated with Black Magnetite—a higher energy magnetic material harnessed by Maxell engineers.

It contributes to the sound *CD Review* magazine described like this: "Bass response that doesn't stop staggering dynamics, real music." And in their review of Type II tapes, they



THE SMALLER THE WINDOWS.

rated XLII-S, "Head, shoulders and torso above the rest."

Of course, an XLII-S cassette is going to cost you more than one with big, low-performance windows and matching sound.

But not so much more that you have to go to Congress for it.

TAKE YOUR MUSIC TO THE MAX.

Mackie Designs MicroSeries 1202 Mixer

channel includes 2-band EQ, pan, and two aux sends. The mixer also features RCA tape inputs and outputs, two stereo aux returns, phantom power, and a pair of 12-LED peak meters that can be switched between stereo outs, mic inputs, and line inputs. All controls are sealed rotary pots with center detents; there are no faders. Except for the tape outputs, all outputs are ¼-inch phone jacks. Frequency response is rated at 20 Hz to 40 kHz (± 1 dB), THD less than .025% (20 Hz to 20 kHz), and S/N ratio 90 dB (referenced to +4 dBu).

Mackie Designs
16130 Woodinville-Redmond Rd. NE, #2
Woodinville, WA 98072
tel. (800) 258-6883
or (206) 487-4333

Yorkville Sound introduced the **Audiopro 1212 ($2,449) and 1216** (price unavailable at press time) 12- and 16-channel, powered mixers. Amplification is provided by the same circuitry as in the Audiopro 1200 power amps, supplying 600W continuous power per side into 2 ohms. An onboard Alesis signal processor provides effects. Other features include two post-fader aux sends, two monitor (prefader) sends, two stereo aux returns, 48V phantom power, and two 9-band equalizers (one stereo dedicated to the main outputs, and one mono for the monitor outputs). The 1212 has a dozen XLR and a dozen ¼-inch, line-level inputs, while the 1216 has sixteen of each type. The main outputs are compatible with both balanced and unbalanced ¼-inch jacks, due to an internal self-correcting hum reducer.

Yorkville Sound
4600 Witmer Industrial Estate, Unit 1
Niagara Falls, NY 14305
tel. (716) 297-2920

Ramsa's **WR-S4400 series mixers** are available in 12-, 16-, and 24-channel configurations ($1,995, $2,395, and $3,195, respectively). Primarily designed for sound-reinforcement applications, the boards feature 100 mm faders; two selectable inputs per channel; individually switchable, 48V phantom power; and 3-band EQ with sweepable midrange. WR-S4400 mixers have four subgroups in addition to the left and right stereo buses and four aux sends. All channel inputs are balanced XLR and ¼-inch jacks, as are the main outputs.

Ramsa/Panasonic
6550 Katella Ave.
Cypress, CA 90630
tel. (714) 895-7273

SIGNAL PROCESSORS

Drawmer's **DS301 MIDI-controlled, dual expander/gate ($1,499)** offers linear expansion; fast (fully open in five microseconds), frequency-sensitive gating with sidechain access; and 3-stage envelope control. The sidechain can be monitored via a Key Listen switch. The expander's Auto Attack feature matches the DS301's attack time to the input signal's attack time, which helps achieve smoother vocal processing. Peak Attack adds short-duration gain for percussive punch. Normal or inverted gating is available, and the ducker mode lets the DS301 be used for limiting. The two independent channels can be linked to control stereo signals. The DS301 recognizes and transmits MIDI Note, Channel, Velocity, Aftertouch, and System Exclusive messages. In Expansion mode, the unit generates Note On data when the threshold is exceeded and derives MIDI Velocity and Aftertouch data from the level of the incoming signal. The device operates at +4 dBu, and all audio connectors are balanced-line XLRs. According to Drawmer, the dynamic range is 116 dB; bandwidth is <20 Hz to 22 kHz, ±1 dB; distortion at 1 kHz is 0.04% (unity gain, +4 dBu input).

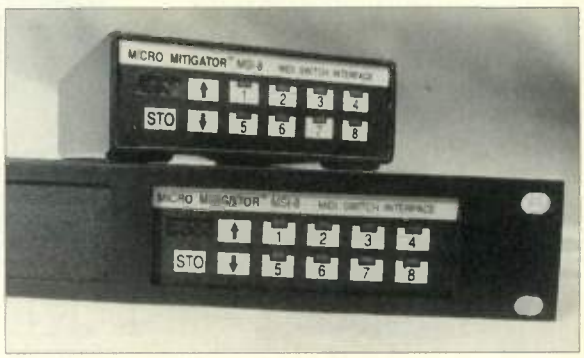
Drawmer/QMI
15 Strathmore Rd.
Natick, MA 01760
tel. (508) 650-9444

MIDI HARDWARE

The **Micro Mitigator MSI-8 MIDI switch interface** ($269) lets you control almost any analog switch function via MIDI. Essentially a set of eight microprocessor-controlled relays with a MIDI interface, the MSI-8 not only permits MIDI control over non-MIDI footswitch functions such as effects bypassing and guitar amp channel-switching but can switch audio signals directly, which lets you switch effects loops, mute mixer channels from their insert points, etc. Each relay can emulate click on/off switches or momentary switches. The unit stores 128 presets (of eight off/on settings each) that can be accessed via MIDI Program Changes, and it accepts Continuous Controller manipulation of individual relays. All connections are via ¼-inch phone jacks.

Lake Butler Sound
5331 W. Lake Butler Rd.
Windermere, FL 34786
tel. (407) 656-5515

Emerald Music's **Thru Box Three Version B** (model 4210B; $269) combines a standard, 1-In/10-Out MIDI Thru box and a separate Thru section with four selectable MIDI Inputs and two Thru ports. The sections can be used independently or combined into a 5 × 12 Thru box, and each section has an MIDI activity-indicator LED. The MIDI connectors are on the rear panel of the single-rackspace unit, while the front panel holds the selec-



Lake Butler Sound Micro Mitigator MSI-8

Jam with the best.

No matter what kind of music you make, you make better music playing with better musicians. That's why you owe it to yourself to sample the ENSONIQ EPS-16 PLUS Digital Sampling Workstation.

The EPS-16 PLUS is your ticket to an incredible library of over 1000 sounds. Sounds that have been developed exclusively for ENSONIQ by some of the best in the business.

The extensive library for the EPS-16 PLUS numbers over 1000 sounds — and new collections are being released every month.

and David Hentschel, and musicians like bassist Marcus Miller, jazz organist Joey DeFrancesco, drummer John Robinson, and vocalist Maurice White.

To help bring their expertise to your music, the EPS-16 PLUS is available as a keyboard or a rack-mount unit. Both feature 16-bit fidelity, 24-bit dynamic effects, and a 16-track sequencer with recording and editing features geared towards musicians. And both are available in Turbo configurations with expanded RAM, our FLASHBANK™ memory, and SCSI interface to give you all the power and versatility you need.

The EPS-16 PLUS Digital Sampling Workstation.

Jam with an EPS-16 PLUS, and you can make music with pianos sampled from Chick Corea's Mad Hatter Studio, guitars by Paul Jackson, Jr. and synth programs by Jason Miles. You can benefit from the talents of respected producers like Nile Rodgers

The EPS-16 PLUS Rack-mount.

So take your music to the next level and jam with the best. The ENSONIQ EPS-16 PLUS. For the dealer nearest you, call 1-800-553-5151.

The SD-1 Music Production Synthesizer — Advanced synthesis, 16-bit output circuitry, 24-bit dynamic effects, and a 24-track sequencer. Truly, the next generation in integrated music production synths.

The SQ-R PLUS Synthesizer Module — The great sound of the SQ-1 PLUS in a single-space rack-mount.

The SQ-1 PLUS Personal Music Studio — Advanced synthesis, 24-bit dynamic effects, and a 16-track sequencer make this the low-cost MIDI studio with the high-quality sound.

The SQ-2 Personal Music Studio — A 76-key synth with great sounds, 24-bit dynamic effects, and a 16-track sequencer. The perfect choice when 61 keys just aren't enough.

Please send me the FREE ENSONIQ Guide to Choosing a Synth vs. a Sampler.

Please send me information on : ☐ EPS-16 PLUS ☐ SD-1 ☐ SQ-2 ☐ SQ-1 PLUS/SQ-R PLUS

Name

Address

City

State Zip Phone

Mail to ENSONIQ, Department E-27
155 Great Valley Parkway, Malvern, PA 19355

ensoniq®

THE TECHNOLOGY THAT PERFORMS

JUST A FRACTION OF THE MUSICAL POWE

You are looking at the world's most powerful

THE PROTEUS™ MASTER PERFORMANCE SYSTEM OFFERS YOU SUPERIOR QUALITY SOUNDS AS WELL AS THE ABILITY TO CONTROL YOUR ENTIRE MIDI SYSTEM. MORE MUSICAL POWER IS AT FINGERTIP COMMAND IN THE MASTER PERFORMANCE SYSTEM PLUS ORCHESTRAL EXPANSION

PUT IT TOGETHE

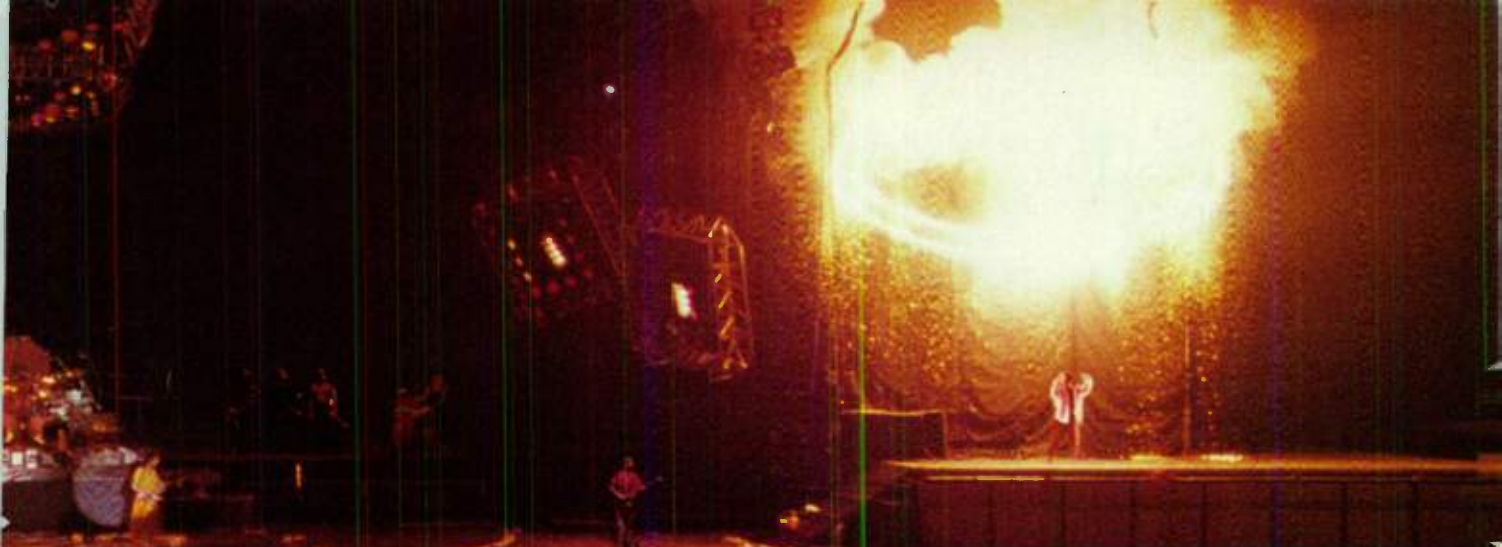
family of electronic musical instruments *(not to mention a few adoring fans)*. Individually, each brings superb sounds, immense versatility and supreme ease of use to the realization of your musical concepts. Combine them and you've created a system of unprecedented range and scope.

PROCUSSION FEATURES MORE THAN 1600 DRUM AND PERCUSSION SOUNDS WITH A LEVEL OF EXPRESSIVENESS UNMATCHED BY ANY OTHER ELECTRONIC PERCUSSION INSTRUMENT

MAKE

Start with the Proteus™ Master Performance System. This 5-octave pressure and velocity sensitive keyboard offers fabulous 16-bit sampled sounds and a host of powerful MIDI controller features like Quick Keys and Performance Maps. Plus, integrated professional quality digital effects (sure everyone has 'em, but not with this quality).

Then, let your ears delight to the Proteus line of 16-bit multi-timbral sound modules. Each provides a vast collection of exceptional sounds, 32-voice polyphony and extensive sound editing capabilities. Choose Proteus/1



ON THIS PAGE COULD MAKE YOU FAMOUS.

AND YOU COULD

STORY.

(Pop/Rock), Proteus/2 (Orchestral) and

PROTEUS/1 OFFERS YOU A WIDE SELECTION OF POP AND ROCK SOUNDS. PROTEUS/2 GIVES YOU A WORLD CLASS SYMPHONY ORCHESTRA IN ONE RACK MOUNTED UNIT BOTH FEATURE EXCEPTIONAL 16-BIT SOUNDS FROM THE EMULATOR III LIBRARY

Procussion™ (with more than 1000 drum and percussion sounds). In 1992, we'll offer Proteus/3 (World), a gathering of truly unique and unusual sounds from around the globe (from the Bull Roarer and Spirit Catcher to the ever-popular Midjwidz).

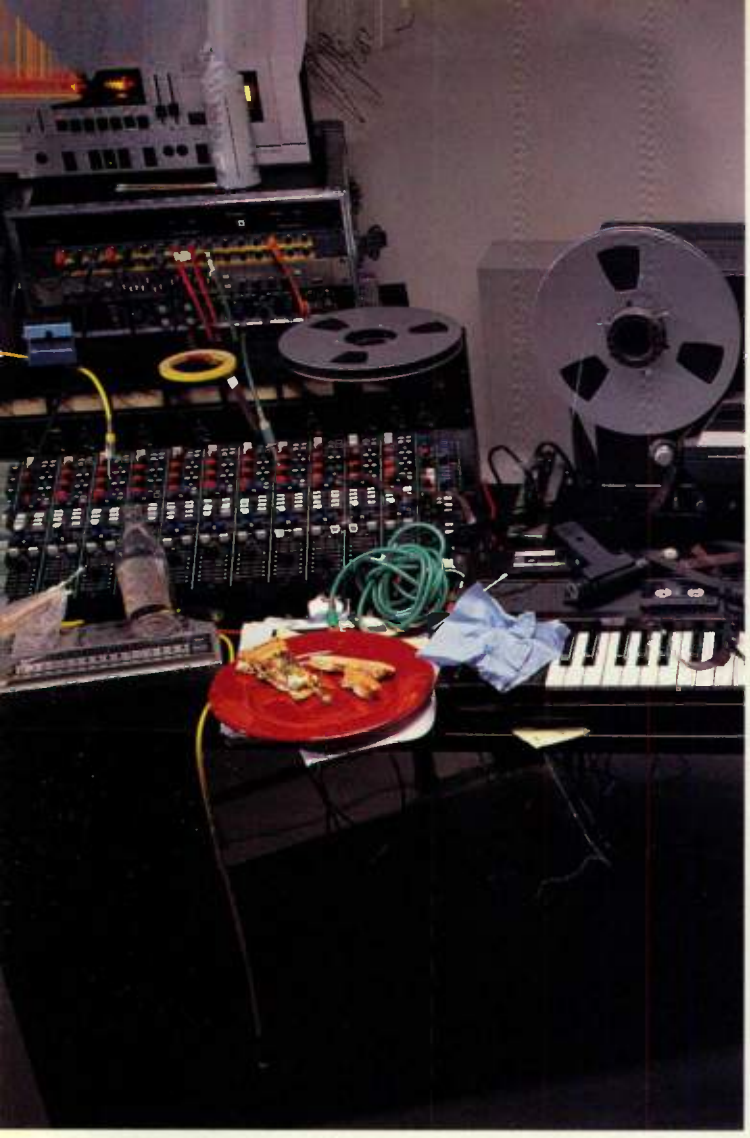
A WHOLE WORLD OF SOUNDS WILL BE IN YOUR HANDS WITH OUR UNIQUE NEW PROTEUS/3 MODULE (COMING IN 1992)

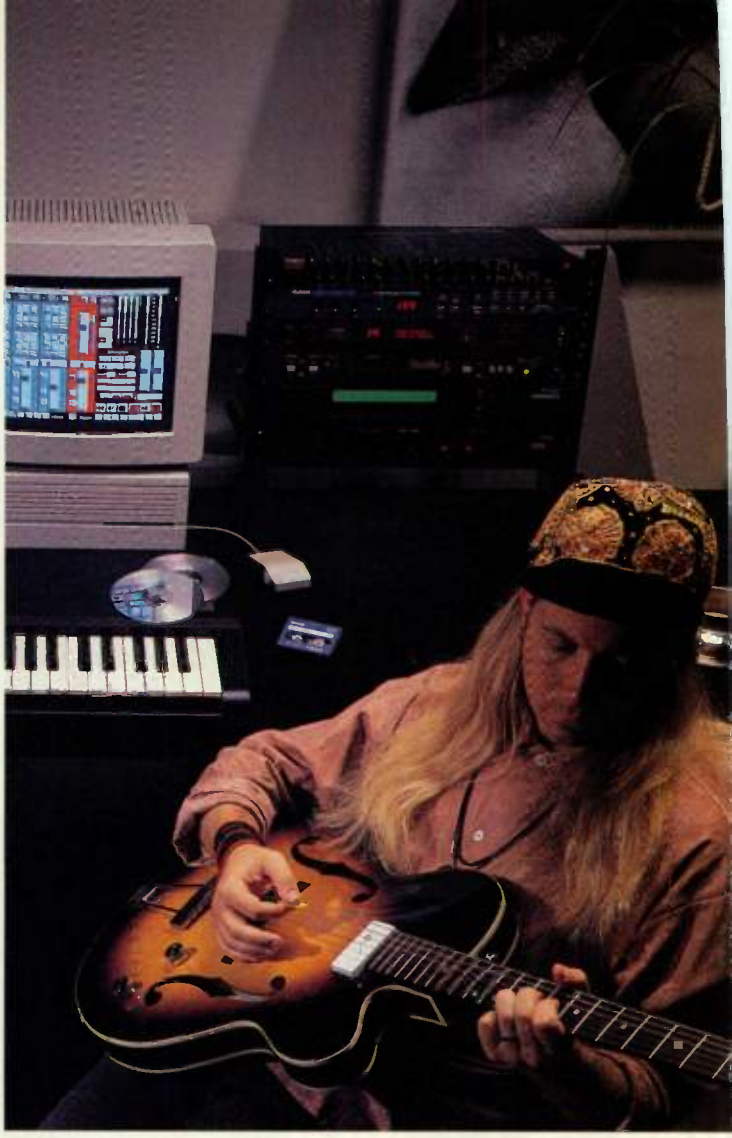
Each of these instruments offer exceptional musical power. But, when you put them together you will command literally thousands of sounds with 160 voice polyphony, 24 megabytes of memory and 80 multi-timbral MIDI channels. All of which can be swiftly manipulated to create a range of sounds never heard before *(except, perhaps in your head)*.

E-MU™

Just call us at 1-408-438-1921 for the location of the the E-mu dealer nearest you. It could prove a historic step for you and your musical career.

E-mu Systems, Inc., P.O. Box 660015, Scotts Valley, CA 95067-0015

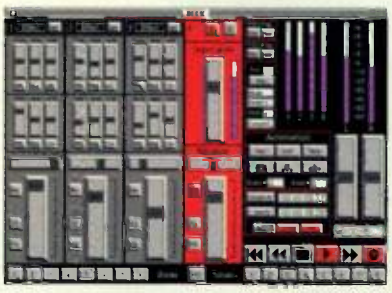




Pain. Or Pleasure.

Stop messing around with tape. For less than you might pay for an eight track analog deck and mixer you can have your own personal digital recording studio. And a lot less hassle.

Forget about tape hiss and noise reduction. Start thinking about *unlimited digital track bouncing and overdubbing* with no generation loss. And editing like you've never even dreamed of with tape. All within an integrated system that combines digital multitrack recording, automated mixing, MIDI sequencing, and sampling on the friendliest of computers—the Macintosh II.®



As simple as a Portastudio,™ DECK™ software puts digital multitrack recording, mix automation and MIDI sequence playback all on one Macintosh screen.

Most importantly, think about how great it will be to produce music that sounds as good as *commercial CDs*. Goodbye cassette-tape demos. Hello digital perfection.

Sound too good to be true? Hardly. To find out how easy it is, call **800-333-2137**. We'll tell you where you can get a demo, and send you a free copy of our book, *The Ultimate Home Studio.*

Put the pleasure back into recording with Digidesign's digital recording systems and get started producing the best music you've ever made.

Call 415-688-0600 for the name of your local dealer or international distributor.

digidesign
1360 Willow Rd. #101
Menlo Park, CA 94025
415.688.0600

Audio-Technica AT822 OnePoint X/Y Microphone

tor and power switches and display.

Emerald Music Company
392 Oak Knoll Rd.
Ukiah, CA 95482
tel. (800) 828-3837
or (707) 462-0990

TRANSDUCERS

Audio-Technica's **AT822 OnePoint X/Y stereo condenser mic** ($299) is designed for DAT and high-quality cassette recording, broadcasting, and field recording applications. The mic has a pair of matched cardioid condenser elements with low-mass diaphragms for fast transient response. Frequency response is said to be flat from 30 Hz to 20 kHz, dynamic range is rated at 101 dB, and maximum input is 125 dB SPL. A switchable lowcut filter, windscreen, and camera shoe-mount adapter are included. The unit operates on a standard 1.5V AA battery with a battery life expectancy of over 1,000 hours under normal conditions. The mic's standard cord terminates with two mini plugs threaded inside a pair of ¼-inch phone plug adapters. A mic cable with a single stereo mini plug also is included for use with video camcorders.

Audio-Technica U.S.
1221 Commerce Dr.
Stow, OH 44224
tel. (216) 686-2600

POWER AMPS

Crest introduced the **FA and LA series power amps**, both of which use modular construction, i.e., the output section, preamp, display circuitry, and power supply are independent modules. The FA series includes detented front-panel volume controls and has XLR inputs and 5-way binding-post and barrier-strip outs. The LA series has rear-panel attenuation—the front panel just has a power switch—and uses ¼-inch TRS inputs and 5-way binding-post and barrier-strip outs. All FA amps except the FA601 can power 2-, 4-, or 8-ohm systems, while the LA series can drive 4- and 8-ohm loads. Both series are 2U rack-mount. Frequency response for FA and LA amps is listed as 20 Hz to 20 kHz (+0, -0.5 dB), THD less than 0.025% (into 4 ohms at 1 kHz), and input sensitivity .775V (0 dBu) for full power at 8 ohms.

Crest Audio, Inc.
150 Florence Ave.
Hawthorne, NJ 07506
tel. (201) 423-1300

SOUNDS

Sound Source Unlimited has produced five **voice collections for the Korg 01/W synth** ($49 on disk, available in 01/W, Mac, PC, Atari, and other formats; $99 on ROM card). Each bank contains 100 programs, 100 Combinations, and a demo sequence. The Symphonic Collection is, as its name implies, designed for classical orchestrations. Non-Linear Explorations features an assortment of unusual leads, basses, pads, atmospheric sounds, and other weird stuff. Urban Dance Pop has Top 40-oriented voices for R&B, funk, hip-hop, and industrial music. Radical Film Textures offers ethereal effects washes, pads, atmospheric voices, orchestral sounds, and various soundtrack-oriented effects. New Age Textures covers surreal string ensembles and other new age-oriented timbres.

Sound Source Unlimited, Inc.
2985 E. Hillcrest Dr.,
Suite A
Westlake Village, CA 91362
tel. (805) 494-9996

SOFTWARE

Giebler Enterprises released several specialized utilities for the IBM PC. The *Ensoniq Disk Manager* ($22) lets you read, copy, format, and display EPS, EPS 16 Plus, SD-1, SQ-80, Mirage, and VFX^{SD} diskettes on the PC. *VFXSMF, EPSSMF,* and *SQ80SMF* ($32 each or $44 each, bundled with *EDM*) are supplemental utilities for *EDM* that transfer sequence files between Standard MIDI File format and VFX^{SD}/SD-1 and EPS/EPS 16 Plus formats, and from SQ-80 to SMF format. The *VFX MIDI Manager* ($32, or $44 with *EDM*) lets you transfer original VFX sounds and presets to and from a PC. *Yamaha Disk Manager* ($22) lets you read, write, copy, format, and display QX3 and SY77 diskettes on the PC. *QX3SMF* ($44, bundled with *YDM*) transfers QX3 sequences to and from Standard MIDI File format.

Giebler Enterprises
8038 Morgan Rd.
Liverpool, NY 13090
tel. (315) 652-5741

REV UP

Peavey (tel. [601] 483-5372) announced the **PRM 308SV studio monitor** (expected list $349.99 ea.), a magnetically shielded version of its PRM 308S that is designed for use near video monitors. The system uses an 8-inch woofer, a 5 ¼-inch midrange speaker with its own subenclosure, and a 1-inch, soft-dome tweeter...Ensoniq (tel. [800] 553-5151 or [215] 647-3930) has upgraded its **SD-1 synth** from 21- to 32-note polyphony. The new version ($2,745; $100 upgrade for SD-1 owners who purchased after November 1, 1991; $250 upgrade for other SD-1 owners; $699 complete upgrade for VFX^{SD}) also includes the previously optional SQX-70 memory expander, which increases sequencer memory to 75,000 notes and adds a "swing" quantize function. ●

Crest Power Amps

Model	Power/Channel (8Ω stereo)	Power (8Ω bridged)	Price
LA601	120W	400W	$630
LA901	225W	600W	$782
LA1201	280W	960W	$1,134
FA601	120W	400W	$738
FA901	225W	600W	$936
FA1201	280W	960W	$1,386

The Future Looks Fuzzy

Fuzzy logic, neural networks, and artificial intelligence could be key technologies in tomorrow's computers.

By Gary Hall

"Fuzzy" logic has been a hot topic in computer science circles for some time, and the race is on for large-scale commercialization. Major industrial and governmental concerns in Europe and Japan are in hot pursuit of new hardware that will make fuzzy logic applicable in a wide range of mainstream products.

Fuzzy systems use degrees of truth value—fuzziness—rather than the crisp "true" and "false" values of standard binary computer logic. To manipulate such values, fuzzy logic uses inequality-style arithmetic operations, which typically identify one item as being less than, or more than, another item. Inputs are "fuzzified" with what are called *membership functions*, to which crisp true/false values apply only to a certain degree. These degrees are manipulated with minimum/maximum operations, and the results are reconverted into the closest crisp number (0 or 1) for output in a process that's called *defuzzification*.

Fuzzy logic is exciting because it parallels much of the way the real world works. A switch is either open or closed, but how much of life involves going around examining switches?

Fuzzy logic is exciting because it parallels much of the way the real world works. A switch is either open or closed, but how much of life involves going around examining switches? Interpreting your boss's scribbled handwriting (Does that look more like a "7" or a "2"?) is a lot closer to the kind of daily problems that concern us, and this is the type of problem fuzzy logic solves more efficiently and satisfactorily than binary logic.

For example, automotive manufacturers are keen on the prospect of using fuzzy logic in complex control problems. Stopping a car smoothly under various road and tire conditions turns out to be a touchy matter that only can be solved by combining many inherently "fuzzy" variables. It's not enough to know the road is slick and the tires are bald. You have to know such things as how slick, how bald, how much the car weighs, how fast it's going, and how these factors combine. Then you still have to dynamically monitor the stopping process to get the desired results. Fuzzy logic already has been used with great success in braking systems for Japanese commuter trains.

Up to now, most fuzzy-logic systems have been built as software inference engines running on standard computers or microprocessors. But now the focus has switched to designing "fuzzy microprocessors," integrated circuits that incorporate the philosophy of fuzziness at the level of chip architecture. These chips are intended to be used as general-purpose, mass-production parts. This dedicated hardware will meet the goals of high speed and low cost that are critical to practical application in consumer products.

Europe and Japan have well-funded, high-profile projects under way. Japan's Ministry of International Trade and Industry (MITI) has pulled the country's top 49 companies together to form the Laboratory for International Fuzzy Engineering (LIFE), with a budget of $70 million to spend over five years. This past fall, LIFE exhibited the first

fruits of its efforts, the Fuzzy Set Processor (FSP) chip, the first piece of a complete fuzzy computer system to be called FUTURE, for FUzzy TURbo Engine. (We can only hope their hardware is as good as their acronyms.)

The FSP is a single-instruction, multiple-datapath device with an architecture that allows multiple FSPs to run in parallel. According to engineers at LIFE, four FSPs can execute fuzzy logic operations at a rate 50 times faster than a high-performance RISC (Reduced Instruction Set Computer) microprocessor.

France's SGS-Thomson has announced that it is well on the way to finishing two separate chips that will demonstrate fuzzy-logic capabilities. One device is entirely digital, and the other is a mostly digital hybrid that incorporates an analog memory. Analog memories, which are similar to bucket-brigade delay lines, are capable of storing continuous voltage levels, which makes them highly suitable for fuzzy operations. German labs also are in the forefront of fuzzy-logic developments.

Many researchers believe that the full potential of fuzzy logic will be reached by combining it with the learning capabilities of neural networks (discussed in the January 1991 "Computer Musician") and artificial intelligence (AI). As one researcher puts it, "The fields of fuzzy logic, neural networks, and AI have a common reference point in a very simple and seminal idea, that of interpolation." The idea is to use AI to manage fuzzy-logic rules derived via neural networks.

An appropriate musical application of fuzzy logic might be the creation of controllers that can match the subtlety and interactiveness of fine acoustic instruments. In contrast to a MIDI keyboard's simple Note On/Note Off (with limited modulation), the tone of an acoustic violin is the product of a number of continuously varying factors, all subject to the sensitive response of the performer. Fuzzy logic may offer a way to incorporate more of this dynamic complexity in electronic instruments.

Contributing editor **Gary Hall** *spent a rewarding year and a half as* **EM***'s technical editor. He now serves as support manager for high-end audio workstations at Sonic Solutions in San Francisco.*

WAR of the WORLDS

PHOTO BY ANNE HAMERSKY

For years, keyboardists have savored the spoils of the MIDI revolution. Isn't it time guitarists reclaimed their glory days?

If you play guitar, the occasional twinge in your fretting hand is not a cramp, but the sting of a long winter of discontent. The guitarist inherits a legacy of nostalgia for an age d'or long banished to classic rock radio stations. Meanwhile, keyboard players feast from a bottomless cornucopia of synthesizers, samplers, drum machines, and digital workstations that allows them to strut into music stores with the lust of the beloved. Some key ticklers add insult to injury by boasting they can emulate any riff a guitarist can perform.

But, beware the winds of change. Many keyboardists seem content to propagate patches that simultaneously adorn hit records, car commercials, television sitcom themes, and video games. Whoopee. It seems the new rebels of technology are not MIDI disciples, but guitarists shredding the limits of signal processing to discover weirder ways to make noise. Does this mark the resurrection of the guitar's eminence, or will keyboardists merely sample our thunder?

THE GUITAR UNBOUND

Creative signal processing returns the timbral crown to the fretted faithful.

By Michael Molenda

It was a baptism of such power that it set the course of my life. I was ten years old and fighting a losing battle with the flu, when the bedside television announced it was taking me to "Swinging London." A morning news reporter with a fake British accent started talking about groovy fashions and mod music and introduced a group called The Who that supposedly captured the hip strut of a new cultural movement.

When the camera panned to guitarist Pete Townshend, I laughed. He was nothing like the beaming pop stars that played the Ed Sullivan Show or decorated covers of *16* magazine. He was a sullen misfit with a big nose, and I despised him immediately because he had no business pretending to be a rock star when he was just an older version of a geek like me. Then it happened. Townshend's arm slashed across the front of his guitar and produced a roar of violence so sensual that it shot from the tiny TV speaker and buried itself in my heart.

On that day in 1967, the guitar became the coolest thing in the world. Cooler than Spiderman and Joe Namath and chocolate fudge ice cream. So cool that I've been its willing slave ever since.

PRIDE BEFORE THE FALL

Most guitarists have similar stories about the moment that inspired them to dedicate their souls to the instrument. It seemed a noble bond. Back in the late 1960s, and for some time after, the guitar was pop music's undisputed altar. It was sexy, mysterious, and wonderful, a dark secret shared by everyone struggling to copy the licks of heroes like Eric Clapton, Jimi Hendrix, Jeff Beck, Jimmy Page, Keith Richards, and countless others. Some believed guitars could change the world. It was, perhaps, a silly notion. But the era produced many songs that remain unmatched in their scope and passion.

Ironically, it was passion that dealt guitars a near-mortal blow. The "me" generation of the early 1980s repackaged the singles bar in a gloss of tactless romanticism, and disco music became the soundtrack for an era of open shirts and one-night stands. Guitars were not invited to the party. However, as the disco craze progressed, extended club mixes often employed hotshot guitar solos to heat up the dance floor. The prognosis was that the guitar might survive disco fever.

Then MIDI came slouching towards paradise. Keyboardists became the new heroes, and the industry bowed to win their blessings. Programming was the new passion; the sweaty strut of guitar, bass, and drums was sanitized into the *dit-a-dit-dit* rhythm of science (see "The MIDI Trap," p. 62). Although occasional anomalies flared up (Eddie Van Halen, the resurgence of heavy metal, rap music's embracing of rude rock guitars, etc.), the 1980s marked the end of the guitar's preeminence. The synthesizer usurped the throne.

THE COMEBACK MINDSET

Thankfully, all is not lost. Signal processing has evolved to offer guitarists an unlimited sonic palette. And we're not talking about MIDI guitars that bow to the technology of the infidel, but real-time effects devices that allow guitarists to enhance the glorious fury of plucked strings.

"I think guitars have always sounded better than keyboards," says famed eclectic guitarist Henry Kaiser. "But you've got to try new things and develop your own sounds. To me, the point of playing guitar is not replicating memorized licks, but searching for new ones. This also applies to signal processing, which I consider as much a part of the guitar as strings and pickups. Always seek out unique ways to process your sound."

Experimentation is the key to constructing interesting timbres. Part of the fun of being a guitarist is wearing the mantle of musical iconoclast. After all, if a guitar player can't fearlessly stampede into uncharted sonic territory, then who can? Don't just dial up a preset flange from your signal processor and consider yourself a pioneer. You must dive into a conceptual arena of reckless abandon and (gasp) mess around with effects parameters. That

MUSICPRINTER® PLUS

Excellence — PLUS more!

MUSICPRINTER PLUS is the most powerful of all notation based sequencer programs, yet the easiest to learn and operate. As the leader in the industry, MUSICPRINTER PLUS continues to be refined with the release of Version 4.1. Highly acclaimed by leading reviewers, MUSICPRINTER PLUS is consistently on best seller lists.

Here are some of the standard features you can enjoy with MUSICPRINTER PLUS: Direct entry with your MIDI instrument, computer keyboard or mouse; Quick and logical editing of any size score, lead sheet, or choral style; Publishing quality printing on a wide variety of dot-matrix and laser printers; Accurate performance of your artistic notation—rubato markings, articulations, trills, breath marks, etc.; Professional level syncing capabilities—Song Pointer, SMPTE, FSK, CLS; Multi-track importing of standard MIDI files directly to notation.

For over a decade, we have been providing our customers with free, unlimited 800-number technical support. Knowledgeable staff members are ready to assist you.

Call or write to us today for a brochure or a $10 Demo Disk.

Superiority, service, and dependability - MUSICPRINTER PLUS is the standard of quality you can depend on.

tap®

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

THE Music Composition Software for IBM and Compatible Computers

The Most Popular Keyboard. The Most Incredible Sounds. The Most Amazing Deal!

The M1 Music Workstation continues to be the most popular keyboard in music. If you've been waiting to get into its trend-setting sounds and powerful flexibility, your time has come. We've made the M1 more affordable than ever.

And that's not all. Now you get incredible savings worth up to hundreds of dollars on M1 sounds and hardware upgrades from Korg and leading 3rd party developers!

There's never been a better time to go to your Korg dealer. Get the M1* you've always wanted *and* a Super Sounds Saver coupon book. Each coupon can save you money on powerful new M1 sounds and upgrades.

M1 Super Sounds Saver. The most popular keyboard in music at a great price. Plus special discounts on the best M1 sounds and upgrades. Together in a deal so amazing, you'll kick yourself forever if you miss out on it now!

Some Participating Third Party Developers

Greenhouse Sound	Cannon Research
Korg Library	Angel City Audio
Key Clique	Patch Works
Sound Source Unltd.	Valhala
Livewire Audio	Electron Artistries

KORG® M1

*Offer good for M1, M1R, M1REX and M3R.
Offer good only in U.S. and Canada through June 30, 1992 or while supplies last.

For more information, write to: Korg U.S.A., 89 Frost St., Westbury, NY 11590
In Canada: Korg Canada, 378 Rue Isabey, St. Laurent, Quebec, Canada H4T1W1

is, if you can.

"Some manufacturers are creating an effects-illiterate public by designing equipment with limited controls," laments Kaiser. "It's as if someone sold you 50 colors of paint, but forbade you to mix them. There are many things between a chorus and a flange that don't have names. An 'intelligent' device such as the Eventide H3000 greatly increases processing options because it leaves a lot of parameter control to the user."

Unfortunately, it's tough to deliver sound-processing applications via the printed page. Even if we could, it may be a disservice to describe the construction of a particular sound.

"How do you tell a painter how to use light, or color, or shading?" says Kaiser. "You've got to teach yourself. There's no language to discuss timbre. You can't notate an effect."

Although words betray the specific description of timbres, we can offer basic tips for the creation of sonic environments. Use these as foundations for your excursions into the tonal unknown.

BEDTIME

Lush textures are not the exclusive domain of synthesizers and samplers. Sensual musical "beds" can be produced on guitar easily, once the percussive attack of pick to string is mutated. This can be accomplished with a volume pedal. Strum a chord with the pedal up (volume off), then depress the pedal as the primary attack fades to produce a volume swell. It may take practice to match the swells to a particular rhythm, because timing is not established by downstrokes, but upon the movement of the foot on the pedal.

The effect can be intensified by utilizing a compressor to increase sustain and popping a reverb or delay into the mix. Don't be afraid to throw in the kitchen sink.

"My favorite method of producing musical beds is through a thick haze of burgundy wine," jokes Private Music artist and ex-Police guitarist extraordinaire Andy Summers. "Seriously, however, I use a number of effects in combination. The key two devices would be the Lexicon PCM70 and the Eventide H3000. I often single out a warm sustain, coupled with a long reverb and an interesting program of

my own devising on the Eventide."

Ethereal shimmers can be evoked by turning the wet/dry mix on your signal processor to 100 percent wet. Try mixing a long sensual reverb with a wide chorus or phaser. Accentuate the languid timbre by strumming with the fleshy nub of your thumb.

SOARING

The creation of soaring legato lines is limited only by imagination. In the late 1970s, one of the bands that played San Francisco's legendary new wave club, Le Disque, had a guitarist who played outrageously sustained single note lines with only a Les Paul guitar and a Marshall amplifier (i.e., no effects).

What he did was turn the amplifier to full "jet turbine" volume and bind the strings under the nut with gaffer's tape to prevent them from feeding back. Gently touching a string released enough Marshall mayhem to ring notes out forever. Crude, but effective.

For the volume shy, less dangerous soaring tones are attainable with an EBow (Heet Sound Products; tel. [213] 687-9946). This tiny, horseshoe-shaped device transmits an oscillating energy field that vibrates the guitar string to produce infinite sustain. The EBow is held in the picking hand and single note lines are performed with the fretting hand.

Playing the EBow through a "clean" system (no effects or distortion) often produces sounds reminiscent of angry bumblebees. A more elegant effect is gained by running the guitar through a moderate delay (250 milliseconds) set to multiple repeats. This diffuses the nasal quality of the naked EBow without compromising its aggressive bite. I often add a "kick" to song fadeouts by coupling the delay to a touch of distortion and letting complimentary high notes soar over the chord changes.

INSPIRED LUNACY

Sometimes an effect, or combination of effects, evokes a certain atmosphere that demands its own composition, rather than being married to a structured pop song. Once I was agonizing over a chordal motif for a dance score commissioned by renowned choreographer Joanna Haigood. Haigood was against using identifible themes for this particular work ("Town," performed by her Zaccho Dance Theatre in 1990), and I was blowing the gig by continuing

to write melodic pieces.

In frustration, I turned on my Lexicon PCM42, which previously had been set (by someone else) at 1,000 milliseconds. The long delay time and five or so repeats drastically changed my insipid pop melody into something ominously beautiful. I added a long chamber reverb to accent the "spookiness" of the melody and further mutated things by cutting the tempo in half and performing the lines with volume swells. The accidental delay was the real composer of the work that finally won Haigood's approval. Also, the experience proved writer's block can be cured by twisting a few knobs on your effects rig.

"I've often found using effects drives me into a compositional mode that I may not have found without it," muses Summers. "One of my favorite methods is to build layers and layers of reverb and echo with an extremely long tape delay through the Lexicon PCM70. This creates a drone-like wash. You're generally limited to one key, but the effect is mindbending."

RIFFING OFF

Henry Kaiser is right. You can't teach creative signal processing. Nurturing an individual style requires experimentation, and this seems to be a frightening prospect to many musicians.

The vast majority of guitarists I know don't dare expand beyond preset effects parameters. That's sad. No wonder the guitar slumped. Guitarists became comfortable instead of curious. Listen to the radio. It's a relatively recent development that guitars are sounding vibrant and sexy again. And much of this resurgence is due to young British cats messing with the status quo. (History repeats?)

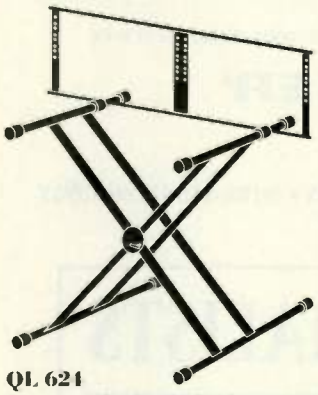
The guitar heroes of the past were never satisfied. Whether through drug-induced inspiration or simple ambition, they strove to push the limits of their instrument. Today's guitarist is (hopefully) more clear-headed and commands unprecedented signal-processing options. But guitars won't rule the world again if cowards caress the strings. So start twisting those knobs. We have work to do.

EM *associate editor* **Michael Molenda** *escapes the clutches of depression and anxiety by swinging a Les Paul over his shoulder and dancing on a wah-wah pedal.*

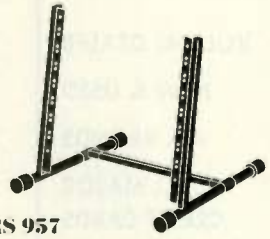
SEE OUR 9 NEW QUIK LOK MODELS AT NAMM BOOTH #3033

Rack Your Equipment, Not Your Brain

RS 959
Utility platform with 10 space rack



QL 624
8 space rack with double brace keyboard stand



RS 957
10 space table top rack stand

RS 956

RS 955

NEW Multi-purpose Utility Stand by

QUIK LOK®

for more information contact your nearest music dealer or:

Music Industries, Corp.
99 Tulip Avenue
Floral Park, NY 11001
(516) 352-4110
fax: (516) 352-0754

Quik Lok's innovative line of Multi Rack Module Systems lets you rack to the max. The advanced, patented design is stackable, so it expands right along with your rackable gear.

The sleek black metal units not only look great, they offer complete structural integrity. Because of Quik Lok's unique modular and flexible design, rear cross supports allow easy access to rear inputs, and can be raised or lowered to accommodate components that are 12", 15", or 18" deep. Lightweight and strong, the 10-space modules are stackable to 30 spaces high, come with side panels that camouflage wiring, and are protected by Quik Lok's standard two-year warranty. Other special features include front handles and easy roll casters that give you maximum mobility.

So quit wracking your brain and start racking your gear. Check out Quik Lok's full line of rackable systems at the Quik Lok dealer nearest you.

NO STRINGS ATTACHED

Keyboard players prove once again that you can't believe everything you hear.

By Steve Oppenheimer

Since Jan Hammer's amazing Minimoog work with the Mahavishnu Orchestra, rock synthesists have shamelessly attempted to emulate the sound achieved by electric lead guitarists. Their success has been notable, if limited: While many aspects of guitar-playing can be replicated on a synth or sampler, not even Hammer pulls off all the guitar tricks in the same manner as a top-flight guitar hero.

The toughest part is real-time integration of rapid chordal and double-stop patterns, picking effects, and riffs into a seamless whole. It's easier in the studio, of course, but to go beyond straight-ahead leads with an assortment of harmonics-tapping, string-bending, and vibrato effects, you have to invest a lot of time. Nonetheless, a well-rehearsed keyboard player can perform enough guitar-like parts to cover a host of musical situations.

Of course, you don't have to limit yourself to playing like a guitarist. Many times the point is to fill a similar role, so you can go beyond the guitar's limitations and add the special strengths inherent in good 10-finger keyboard playing, such as higher-speed licks; larger, more complex chords; and extended note range.

LEARNING FROM THE MASTERS

The best way for a keyboard player to sound like a guitarist is to play guitar—even badly. It's the ideal way to learn how a guitarist approaches a musical situation. Otherwise, you have a lot of watching and listening ahead. Watch guitarists' hands carefully, and get a feel for how they arpeggiate chord tones within lead lines, when they tend to bend strings, etc. If you want to play a strict guitar emulation, play within the maximum practical range of an electric guitar; depending on the guitar, the range is about four octaves (E2 to E6, or MIDI notes 40 to 88) in standard open tuning.

As with emulating other instruments, you must learn the unique playing conventions guitarists use for various types of music. For instance, jazz guitarists of the old school rarely bend strings, preferring to slide up the fretboard or jump to a different string.

It seems obvious, but it's worth emphasizing that you should listen to, and practice playing, your favorite guitar parts on keyboard. You don't need to imitate anybody when playing your music, but every musician can learn from the masters.

PITCH BEND AND VIBRATO

A guitarist must always finger-bend strings up, not down, due to the design of the instrument. Sometimes players such as the late Roy Buchanan and Jeff Beck get a down-bend effect by bending the string up while muted, then picking it and pulling the string back to normal position. (For a good example, listen to Beck's "Cause We've Ended As Lovers" on *Blow by Blow*. Not coincidentally, the song is dedicated to Buchanan.) You can do it the same way with the pitch wheel: bend first, then attack the key and ease the wheel back to center position. Guitarists generally accomplish downward bends in either of two ways. The most common method is with the whammy bar, but some guitarists occasionally use the machine heads to detune and retune the string

while sustaining a note. (Bluegrass banjo players use this detuning technique, too.)

Although keyboard players have had great success using the pitch wheel for string-bend emulation, it isn't an ideal controller. If possible, try using a ribbon controller. A touch-sensitive XY pad such as the Spectra Symbol Softstick (tel. [801] 972-6995) is even better, but you'll have to create your own interface circuitry. (We're planning a DIY project that accomplishes this using the EM MIDI Fader project published in the February 1991 issue. Stay tuned.)

These controllers let your fingers do the work, as with a real guitar, and you aren't at the mercy of spring tension. They also provide a way to get more realistic vibrato. Jan Hammer is famous for his pitch-wheel vibrato, but apparently he has exceptional hand strength and coordination, so you may find this approach difficult. In addition, some wheels have springs too stiff for smooth vibrato effects.

Many keyboard players use LFO-based vibrato (frequency modulation), which often sounds too mechanical to convince a knowledgeable listener. If you randomly modulate the LFO frequency by a very small amount, the results are a bit less mechanical. You also should set the LFO speed to match the tempo and feel of the music. One possibility is to trigger the LFO with a spring-loaded CV pedal and program the patch so the pedal modulates LFO frequency; thus, you can match the LFO frequency to various tempos by ear, "on the fly." When the pedal is released, the spring returns it to the "up" position, and the LFO frequency is zero (no vibrato). LFO-triggered effects aren't ideal, but if done well, most listeners accept them.

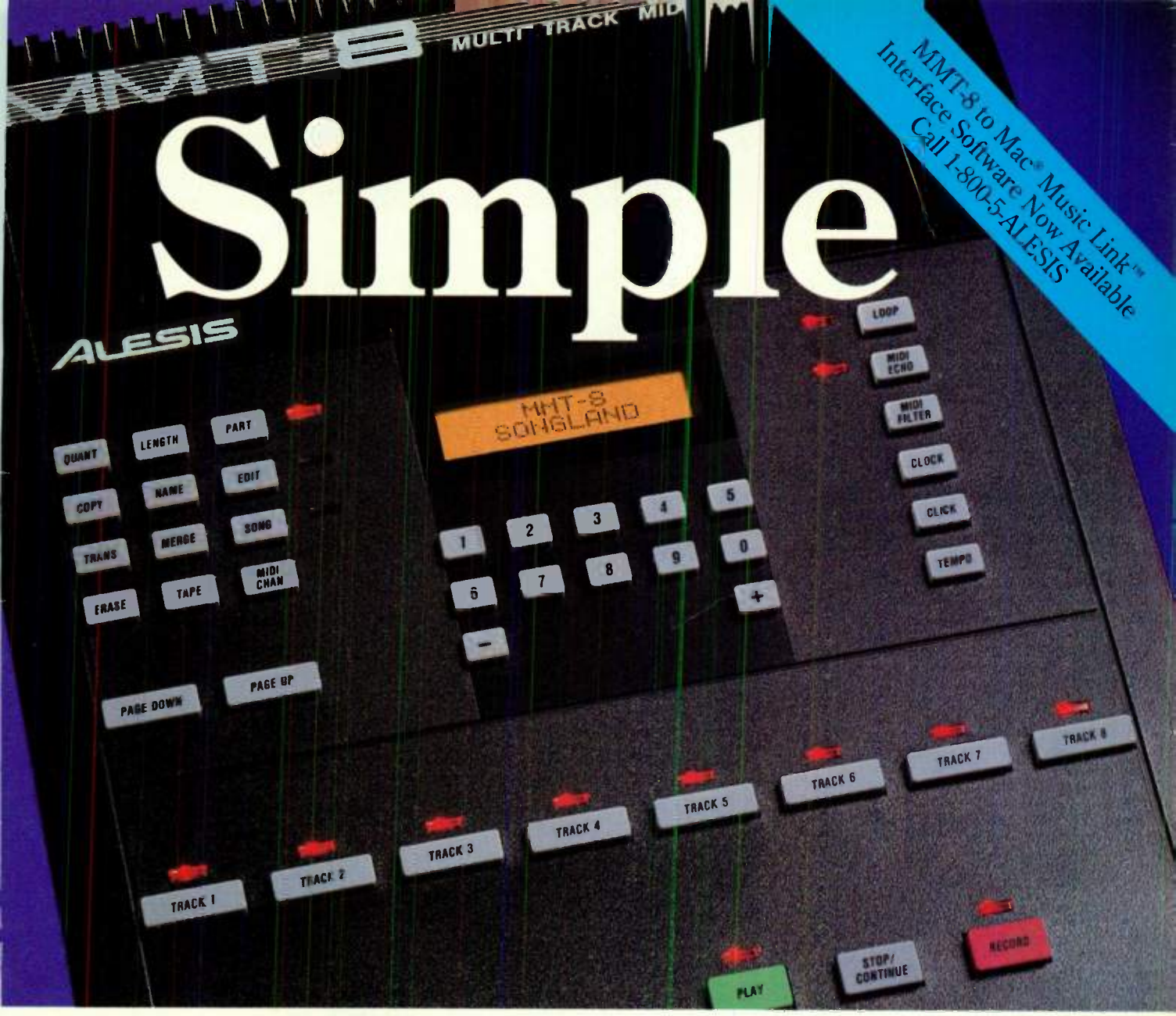
▼

A ribbon controller or XY pad lets your fingers do the walking for more realistic pitch bending.

CHORDING

A 6-string guitar commonly is tuned (from sixth to first string) to E, A, D, G, B, and E, with the sixth string two octaves below the first string. Alternate tunings are common. (One rockabilly tuning trick, which I first heard used by James Burton, is to tune the sixth string down to D. The deep sound that this produces is worth experimenting with.) You'll have to use open chord voicings spread accordingly, which will take a lot of thought until you get used to it. Naturally, you shouldn't exceed six notes in a chord if you want an accurate emulation.

For strumming effects, roll the notes as if picking them one by one, instead of attacking them all at once. You'll probably have to use both hands to get



Simple

MMT-8 to Mac® Music Link™ Interface Software Now Available Call 1-800-5-ALESIS

As in easy to use. As in no restrictions to your creative flow. As in the Alesis MMT-8® MIDI Recorder, the world's most popular hardware sequencer three years running.

If you're like most songwriters we talk to, a powerful software sequencer can sometimes be intimidating to work with, and can actually get in the way of your music. Songwriting is hard enough. Your sequencer should make it easier.

We designed the MMT-8 so just a hit on the record and play buttons puts you in songland. Intuitive, quick and easy.

The MMT-8 is the hardware sequencer for everybody. Whether you're a beginner or an advanced power user with a 400 meg hard drive.

Use the MMT-8 as a powerful notebook sequencer. It's got all the features and editing you need for your music. And now with our new MMT-8 Music Link Software™*, power users can Sysex their work over to their software sequencer for full screen editing. Stand alone or in conjunction with a computer system, the options are inspiring.

Still the best. Still only $299.** Buy an MMT-8 at your Alesis dealer today. It's that simple.

Now in basic black.

*Call 1-800-5-ALESIS for details
**Slightly higher in Canada *Macintosh is a registered trademark of Apple Computer, Inc.

Alesis Corporation 3630 Holdrege Avenue Los Angeles CA 90016

ALESIS STUDIO ELECTRONICS

the sound of a full chord strummed across six strings. If you're using a sequencer, you may find it effective to slow the tempo while rolling the chords, then return to normal speed. Jazz guitarists often strum the last three or four strings and slide straight into a melodic lead, ending with finger vibrato. You can emulate this by rapidly rolling your fingers upward across three notes and continuing into single-note lines, without string bends.

Oberheim's Strummer (reviewed in the December 1991 EM) is designed to remap keyboard voicings to sound like a wide variety of guitar voicings. It does a fine job and can save you a lot of work. Strummer emulates upstrokes, downstrokes, and many common guitar-strumming techniques.

PROGRAMMING

The basic timbre of the unprocessed electric guitar, like most plucked stringed instruments, has a respectable amount of the fundamental, with virtually every harmonic represented. There are so many different guitar sounds, though, that it's tough to generalize. For an in-depth examination of the topic and a selection of sample synth patches for guitar emulation, read *A Synthesist's Guide to Acoustic Instruments*, by Massey, Noyes, and Shklair (available from Mix Bookshelf; tel. [800] 233-9604 or [510] 653-3307).

A few tips:

• Use a very fast attack time to get a solid picking sound. Map the synth's attack time to decrease as key velocity increases so that you get more pick sound (faster attack) when you hit the key with greater velocity. You can accomplish a similar effect if you're using a sampler and can modulate the sample start time from velocity. When you want to get an extra-hard picking effect, you can layer a small amount of "pluck" patch—a separate program with very fast attack, almost no sustain, and very fast release—and trigger it with velocity, using a high velocity threshold (low sensitivity).

• Program the synth or loop the sample so that the sound has a longer sustain time than a real guitar string but doesn't sustain as long as you hold down the key. (Guitarists rely on signal processing for extra sustain; keyboard players can "have their cake" with sample looping and synth-envelope programming and still use signal processing.) Use a fast release time so you don't smear the notes in fast passages or when emulating hammer-ons and pull-offs, but make sure the release isn't so immediate that you get an audible "pop" at the end of the sound.

• Try layering two patches or samples, one of which is the basic guitar sound and the other a feedback sound that has a delayed, long, slow attack. The feedback only enters if you hold the key long enough, then continues to swell as you hold the key. If you use your ear and program the feedback sound to attack as the main guitar sound decays, you can achieve an effect reminiscent of Jimi Hendrix's feedback at the beginning of his song "Foxy Lady."

• One of the difficulties of guitar emulation is that the strings interact, causing sympathetic resonating harmonics. It's possible to program a poor person's version of this by such tricks as bringing in a delayed sine wave at the third (or other) harmonic. You can produce much more elaborate and accurate extensions of this idea if you want to dedicate a lot of programming time and multitimbral voices to the task.

• By programming a separate patch with a very fast attack, short sustain, moderately fast release, and simple waveform, you can emulate picked harmonics. Use your ear to tweak the envelopes. You can use velocity cross-switching, pedal-triggered switching, etc., to shift between the regular guitar patch and the harmonics patch. If you can play fast, accurate leaps, you can map the harmonics patch to a separate zone higher up on the keyboard. On an Ensoniq EPS sampler, you can layer the different samples and bring them in with the Patch Select buttons, the left pedal in the double footswitch, or MIDI controller 70. The same holds true for bringing in a "chicken pickin'" patch (a variation on the "pluck" patch) or sample.

• A 12-string guitar uses six pairs of strings, with the lowest four pairs tuned in octaves. You can emulate the tuned pairs by using two instruments or two oscillators tuned in octaves, with an extremely short delay between them to account for the time it takes to pick

continued on p. 132

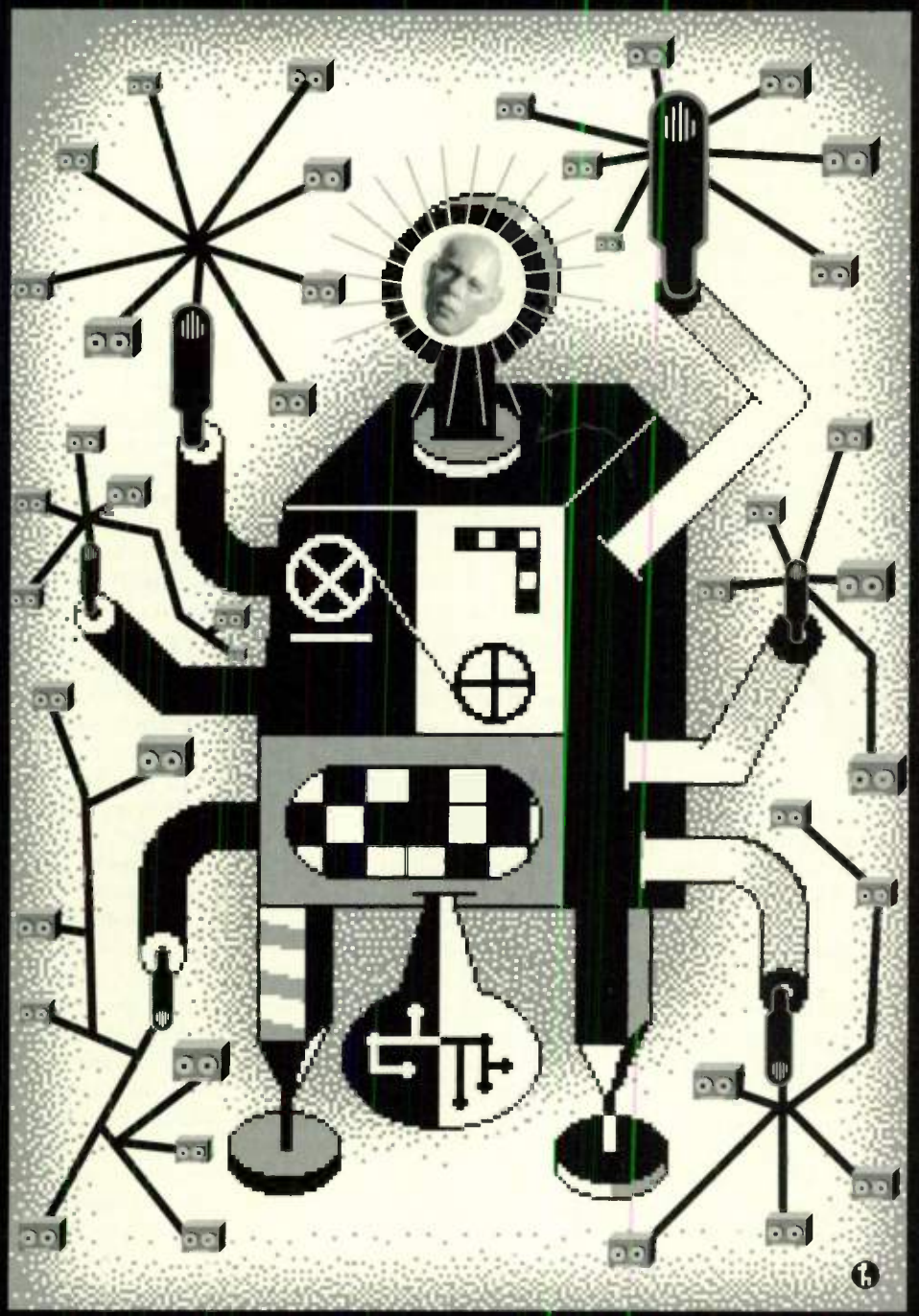
BY CHRIS MEYER

in CONTROL

The latest MIDI spec proposal will allow sequencers, tape decks, VCRs, and hard-disk recorders to be treated equally.

This was The Dream: A user sits in front of a computer-based sequencer with a number of parallel tracks running horizontally across the screen and bar markers running vertically through all tracks. The program has all the expected autolocate, loop, record select/mute, and cut/copy/paste commands. However, the first group of tracks deals with MIDI data, the next two control a hard-disk recorder, and the last eight tracks exist on a slaved reel-to-reel tape deck, with essentially no difference in the way they are handled. The user merely selects the track on which to record based on what needs to

ILLUSTRATION BY JOHN HERSEY



be recorded and how it should be edited later.

And now, The Dream, Version Two: A user is seated in front of a recording console and a set of monitor speakers. He or she is in the process of mixing down a song, along with performing a little overdubbing. To the right—in the "master" section of the console—is a set of transport controls, track-select switches, and an autolocator from which the user can control a linked MIDI sequencer, hard-disk recorder, and analog tape deck. All of the required functionality for the three devices is right there. The user needn't bother to go over to the computer, try to find room for two or three completely different autolocators, or stop and think about which one of them should be reached for next.

These were the dreams I laid out for Gerry Lester (former chief engineer of professional tape synchronizer company Adams-Smith) and David Oren (then of TEAC/Tascam; now of Fostex) at an AES show several years ago. It was then that the concept of MIDI Machine Control was born.

MIDI RECORDING

MIDI has changed the way many people record music. Previously, the tape recorder was the center of the studio, with the mixer acting as the intermediary through which came the original instruments and, eventually, a final mix. Instruments were played only to be captured on tape. A lot of music is still recorded that way today.

MIDI has shifted the focus to the instruments and a new device called a sequencer. The instruments are played every time the song is played (initially by the musician, subsequently by the sequencer), and the sequencer permits extremely flexible and detailed editing. However, when a few non-MIDI instruments are to be added to the song, the nimble sequencer must be slaved to a ponderous mechanical beast known as a tape recorder, which allows little to no editing.

Obviously, things would be much easier from the MIDI musician's perspective if the recorder(s) in a studio could be treated just like a multitimbral synth or group of synth modules that connect to one "master," be it a dedicated controller, patchbay, computer, or one of the modules. So, we have to teach the mechanical beasts how to think and speak MIDI.

SPP, MTC, MSC, & MMC

The MIDI Specification already offers several ways of controlling sequenced devices: MIDI Real Time messages such as Start, Stop, Continue, Clock, and Song Position Pointer, as well as MIDI Time Code (including Time and Cueing parts of the specification) and MIDI Show Control. Why is another protocol needed?

The original system of MIDI clocking is based on the way hardware sequencers and drum machines work. In these devices, all events—notes, drum hits, whatever—are quantized to occur on specific subdivisions of the beat. The only thing these machines care about is getting to the next fraction of a beat and releasing all of the information they have stored there. Therefore, the only thing that MIDI Clocks do is signal that the master timekeeper has moved forward to the next subdivision (1/24th of a quarter note), and anyone else trying to keep in step should do the same. A few additional messages tell a slaved device to Start (go to the start of the song and start listening for Clocks), Stop (pause and stop listening to Clocks), and Continue (start listening to Clocks again without going back to the start of the song).

The most complex message is the Song Position Pointer (SPP). It says, "Go to a point this many 16th notes from the start of the Song, because we're about to continue from there." Extensions have recently been added to tell what the time signature is and where the downbeats fall. However, the focus is more on time than on control. There is no way to convey all of the other actions that the user is performing at the sequencer or drum machine's front panel (such as muting tracks, or putting them into record).

The other problem with MIDI Clocks is that they're only a relative timekeeping system. Although they can tell you about fractions of a beat, they can't tell you how much time has elapsed between those fractions (Milliseconds? Days? The third scene of a movie?). Also, some applications don't have a beat at all. They rely more on an absolute time scale, where you might say, "Go to this point in time from the start of the reel of film or tape."

The most common format for this type of time keeping in the video and non-MIDI audio worlds is SMPTE time code. SMPTE divides time into hours, minutes, seconds, and frames (the latter being fractions of a second that correspond to individual video or film frames—see "Decoding SMPTE" in the April 1991 for more info). It soon became obvious that more MIDI musicians needed the ability to keep time in these systems (it also was getting rather expensive to build SMPTE time code to MIDI Clock converters into every device that needed absolute time). As a result, MIDI Time Code—a way to translate SMPTE into MIDI messages—came into being.

MIDI Time Code (MTC) was invented when samplers were first being used to create sound effects for movies, and signal processors were being incorporated into automated mixdown systems. This required cue lists of MIDI notes and program changes to be sent at specific times. For this purpose, MIDI Cueing messages were developed. MIDI Cueing provides a system for creating, downloading, and even editing cue and edit decision lists directly in MIDI instruments. In essence, these messages turn MIDI devices into mini-sequencers based on absolute rather than relative time. This message system even offers provisions for punching into and out of record mode on specific tracks, thinking ahead towards eventual control over tape recorders and sequencers with the same set of commands.

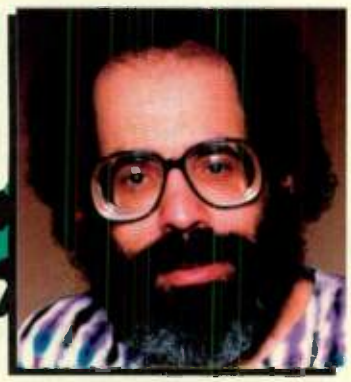
However, MTC Cueing also has some problems. The biggest one (which has just recently been cured) is that all actions in MTC Cueing had to be premeditated: An edit decision list had to be created ahead of time and downloaded to the slaved devices (not too hot for punches on the fly). Also, these lists convey too little detail compared to the constant interaction and babysitting that most tape recorders need. MTC Cueing is still useful for triggering sound effects and changing audio treatments at specific times, but some devices have more sophisticated requirements. Building this ability into all samplers and signal processors would be a great step forward for MIDI in post-production.

MIDI Show Control (MSC) was created for the needs of lighting controllers and theatrical productions in general. Instead of measure numbers or SMPTE times, these applications tend to be represented in terms of "scenes" and "cues" that could happen at variable times depending on the pace of

Dr.T's® MUSIC SOFTWARE DIRECT

Quality Software At A Great Price

124 Crescent Rd.
Needham, MA
02194
617-455-1454 voice
617-455-1460 fax



"For over 8 years we have led the way with innovative software at fair prices. 80,000 computer musicians know Dr.T's stands for quality, service, and support. We've got the hot products, like a complete Mac or PC MIDI starter pack including notation, interface and cables for only $229! Let us prove it to you."

Emile Tobenfeld, President

CALL 1-800-989-MIDI

800 number is for ORDERS ONLY • OTHER INQUIRIES PLEASE USE 617-455-1454

NEW QuickScore Deluxe™

A new entry-level MIDI notation program for IBM. Realtime MIDI and mouse input; scrolling playback; and printing on dot matrix, HP and Postscript printers. **Only $99!**

SEQUENCERS	
KCS OMEGA ☆	$229
KCS 3.5 W/LEVEL II ✦	$229
BEYOND 2.0 ▲	$149
LEVEL II ▲	$99
TIGER CUB ☆	$79
TIGER CUB ✦	$89
INTRO+ *VERY HOT* ✸ ▲	$229
INTRO (KCS, INTERFACE, CABLES) ✻	$119
INTRO (KCS, INTERFACE, CABLES) ●	$149
UPBEAT ▲	$129
REALTIME ☆ *(CLOSEOUT)*	$79
KCS ✻ ✣	$79
KCS ●	$99
PRISM ✸	$69
PATCH EDITORS/ LIBRARIANS	
X-OR (UNIVERSAL EDITOR) ✸ ☆ ✦	$229
X-OR (UNIVERSAL EDITOR) ▲	$279
SINGLE INSTRUMENT EDITORS	(CALL)

NOTATION AND SCORING	
QUICK SCORE DELUXE *NEW* ✸	$99
COPYIST PRO-DTP 2.0 ✸	$299
APPRENTICE 2.0 ✸	$99
COPYIST PRO-DTP 1.6 ✦	$229
APPRENTICE 1.6 ✦	$99
COPYIST PRO-DTP 1.7 ☆	$239
APPRENTICE 1.7 ☆	$89
EDUCATION/ COMPOSITION	
SUBOTNICK'S *INTERACTOR* ▲	$289
MUSIC MOUSE ▲ ☆ ✦	$49
"M" ▲ ☆ ✦	$119
JAM FACTORY ▲	$119
HITMAN ☆ *(CLOSEOUT)*	$79
FINGERS ☆ *(CLOSEOUT)*	$49
OVALTUNE ▲	$79
T-BASIC ☆ *(CLOSEOUT)*	$75
ALGORITHMIC COMPOSER ● ✻	$49
HARDWARE	
PHANTOM (SMPTE SYNC) ☆	$125
PHANTOM (SMPTE SYNC) ✦	$250
AMIGA MIDI INTERFACE ✦	$79
IBM MIDI INTERFACE ✸	$99
MAC MIDI INTERFACE ▲	$49
C-64/128 MIDI INTERFACE ● ✻	$69
5 ' - MIDI CABLES	$8

COMPUTER KEY: ATARI ☆ AMIGA ✦ IBM ✸ MAC ▲ C-128 ● C-64 ✻ APPLE IIe ✣

Products are also available through selected authorized retailers and foreign distributors. Call for listings.

✓ Our Policies

- To order, call our 800 number Monday through Friday 9:00 AM to 5 PM EST.
- For all other information including literature requests call 617-455-1454.
- VISA and MASTERCARD accepted. No fee on orders over $50.
- Your credit card is not charged until your order is shipped.
- 120 day limited warranty on all products.
- Defective items repaired or replaced at our discretion.
- COD is available for a $5 fee. Cash or certified check only.
- If we ship a partial order, no freight is charged on the balance of the order.
- No sales tax, except to Massachusetts residents (please add 5%).
- All US orders ship via UPS ground where applicable. Faster service is available
- We are not responsible for typographical errors. Prices and promotions subject to change without notice.
- Call customer service for a return authorization number. Unauthorized or incomplete returns and refused shipments are subject to a 20% restocking fee.
- Demo disks for most products available.

the performance. Although there are Go, Stop, and Resume commands inside MSC (which seem similar to Start, Stop, and Continue on the surface), MSC is much more like a random-access step-time sequencer that plays back both one-shot events and orchestrated segments of the performance. With commands such as Load and Fire, it also covers some area of control beyond just keeping one's place.

This brings us to the latest member of MIDI's alphabet soup: MIDI Machine Control (MMC). MMC does not create yet another way of representing time, it actually can use either SMPTE or MTC. Based on the professional remote-control standard ESbus and using a newly-created set of MIDI Universal System Exclusive messages, it is designed to remotely control everything you would expect to find on the front (and back) of a well-equipped professional tape deck with a built-in time-code generator.

MMC includes such details as individual track record and mute status, setting audio monitoring connections for each possible mode, varispeed and shuttle control, and even commands to memorize macro-like procedures and events (see the sidebar, "MMC Message Summary"). This range of functions is supported by a complete set of low-level communications commands, including sophisticated error reporting and a signature field to tell a controller just what functions a particular device is capable of performing.

Just as MTC is not a replacement for SMPTE time code in all situations, MMC is not a full replacement for a synchronizer. Devices that currently require an external synchronizer (such as many audio and video tape decks) will still require one; devices capable of synchronizing themselves (such as MIDI sequencers) do not require anything extra. You don't even need an extra serial port to speak the non-MIDI language of most current synchronizers. MMC is a unified language for speaking to synchronizers, tape decks with built-in synchronizers, hard-disk recorders, and MIDI sequencers that follow a tape-deck analogy. Combined with the universality of MIDI, the possibilities run from simple to mind boggling.

FAST FORWARD & PLAY

MMC certainly isn't the first protocol to allow external computer control of tape decks (see the sidebar "Remotely Controlled Recorders"). However, many of these protocols still rely on a controller (usually an external synchronizer) having detailed knowledge of the decks it is controlling. This includes everything from the commands they will accept to how fast they can speed up and slow down.

With MMC, a controller only has to implement commands that it thinks are necessary, depending on the application. The slaved devices then decide the best way to respond to these commands. As controllers get more complex, MMC allows them to control more details (in fact, a separate pair of MIDI cables per slaved device starts to become necessary), while the actual performance of commands still rests with the slaves.

This follows the original MIDI concept that any sequencer, master keyboard, drum trigger, or other device built yesterday must be able to talk to any sound module built tomorrow. Likewise, an MMC controller shouldn't require an update to control new

MORE POWER TO YOU!

VERSION 3

In November of 1989, the first DPM® 3 rolled off the production line and into the synthesizer market — a market historically filled with over-priced, gadget-oriented keyboards having a service life of about fifteen months. Peavey's goal was to develop a superior instrument that offered more features than comparably priced units, plus allowed for an infinite number of upgrades, making it virtually impossible for the DPM 3 to enter the "cycle of obsolescence." The DPM 3 successfully established itself as the model for synthesizer architecture of the future.

With the expanded editing functions of the DPM® 3SE and its 16-bit sampling capabilities, the SE proved that the DPM design for limitless software upgrades was truly the wave of the future.

Now, as promised, we continue the evolution of the DPM 3SE with the new **Version 3** software upgrade. **Version 3** doubles the memory capacity of the on-board sequencer. It also offers extended programming features making the SE even more flexible and easy to use. Expand your musical horizons with the DPM 3 with **Version 3** software upgrade from Peavey.

FEATURES

- Doubled sequencer capacity to 40,000 notes, 100 sequences, 20 songs
- Loopable Envelopes: 0—>3, 1—>3, 2—>3, 0<->3, 1<->3, 2<->3; sustain only, sustain plus release looping
- Programmable filter settings for each drum in a Drum Kit
- Programmable Pan per linked program in COMBI programs
- Enhanced editing from the keybed of parameters that are note or velocity-based
- Drum piece selection from the keybed

Remember, you can update your DPM® 3SE with the affordable Version 3 upgrade. Contact your local authorized Peavey dealer or call the DPM Hotline: (601) 483-5370

PEAVEY

PEAVEY ELECTRONICS CORPORATION / 711 A STREET / MERIDIAN, MS 39302-2898 / (601) 483-5365 / FAX: 484-4278

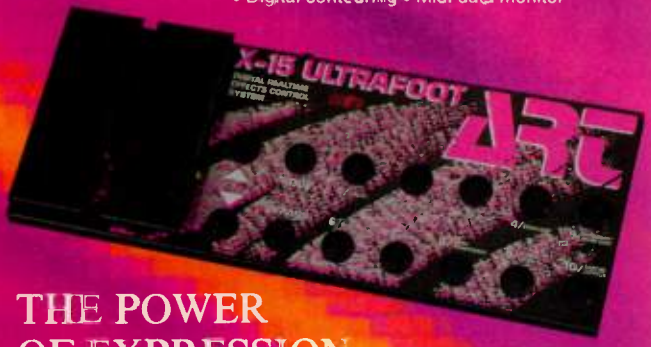
THE MOST POWERFUL GUITAR SOUND SYSTEM IN THE UNIVERSE!

Once in a great while there comes a product so revolutionary that it changes the way we create music. The SGX 2000 is a new world class digital effects system with an integrated tri-channel tube pre-amplifier. At the touch of a button it can sound like any guitar rig you've ever heard of—and hundreds more that you haven't!

- 20 effect functions at the same time!!!
- Programmable tube preamplification
- Unlimited routing, stacking and combining
- New ASIC 24 bit digital integrated effects system
- Over 70 effects to choose from!
- 20 kHz bandwidth
- Better than 90 DB S/N ratio
- Ultra-comprehensive realtime midi control
- All three preamp channels may be stacked
- Over 2 full octaves of pitch transposing
- Studio sampling - auto, manual, midi triggering
- Programmable mix and levels
- Stereo effects loops let you patch in where you want to
- Stereo balanced XLR outputs
- 200 memory locations
- Stereo inputs and outputs
- New reverb and effect algorithms
- Use preamp and effects sections together or totally independently
- Midi data monitor - check the performance of any midi device

EFFECTS LIST

• Harmonic exciter • Noise gate • Programmable equalizer • Genuine 12AX7 tube distortion and overdrive • Solid state distortion and overdrive • Expander • Peak limiter • Compressor • Envelope filter • Turbo drive • Pitch transposer (over two octaves) • Digital reverb (24 algorithms) • Gated reverbs • Reverse reverbs • Arpeggiated flange • Multi-tap delay • Rotating leslies • Stereo delay (21 different types) • Stereo echoes • Studio sampling • Live sample/playback on the fly • Line equalizer/spkr simulator • Stereo panner/imager • Acoustic and environment simulator • Digital contouring • Midi data monitor



THE WORLD'S MOST POWERFUL BASS PROCESSOR

Offering all the features of the SGX-2000, the Nightbass is the first total sound system for the bass guitar. Genuine tube preamplification for warm, fat funk or thick super-drive. A crossover allows bi-amping and the ability to send only the high frequencies thru the effects section for room-filling sound while retaining tight, punchy low end. Optimized tube and EQ circuits allow a range of bass sounds beyond imagination! Coupled to one of the world's finest digital processors, the SGX Nightbass is the studio or live processor that will define bass sound for generations to come.

THE POWER OF EXPRESSION

The Ultrafoot will function with any midi processor, but used with an SGX it is unbelievable! Select any patch instantly. Select each effect in each patch. Control up to 8 effects in realtime per patch! Realtime effects control is the cutting edge in creative music. Do incredible dive bomb pitch shifts! Pan your solos back and forth to each side of the stage or tape track. Bend notes with your feet! Make your instrument sound like its moving around in space! The possibilities are endless. And you'll love the price!

ART

THE SOUND OF PERFECTION

APPLIED RESEARCH AND TECHNOLOGY, INC., 215 Tremont Street, Rochester, New York 14608, (716) 436-2720, Telex: 4949793 APTROC, FAX (716) 436-3942

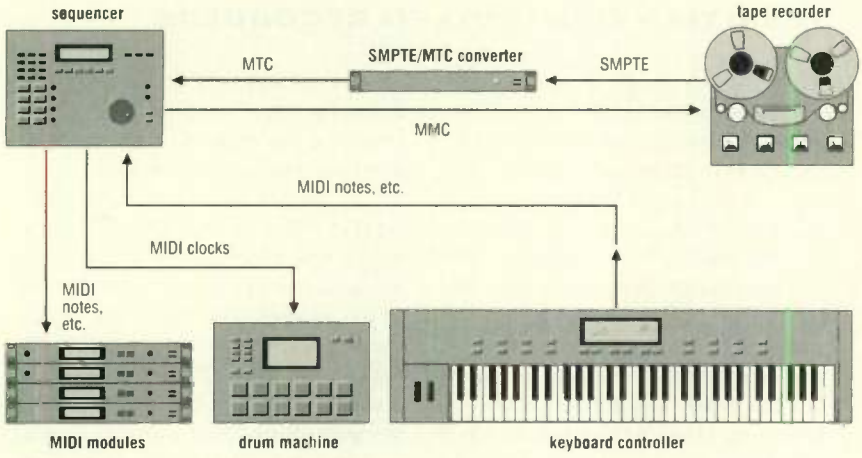


FIG 1: A typical MIDI studio with MMC

devices as they come along (unlike many current synchronizers). For tape decks, this allows the synchronizer to be split into a component that controls the ballistics of the reels themselves (such a component usually can be built into the deck) and the actual controls. For sequencers (which already can synchronize to other devices), this is the same as having a second set of virtual buttons to control their movements or sending these button pushes out over MIDI to another device.

The most obvious application of MMC will be to add the ability to slave the transport of external tape decks to MIDI sequencers. On the simplest level, it will only be a replacement for the Play/Record/Pause/Stop/Fast Forward/Rewind controls on the front of the deck but displayed on the computer's screen, so that the user would not have to switch user interfaces when they move from editing a song to playing it back. This low-level communication wouldn't even require a closed-loop MIDI connection between the sequencer and tape deck; the transport commands can be issued one-way. Synchronization probably will

MMC MESSAGE SUMMARY

The entire MIDI Machine Control specification document is thicker than the *MIDI 1.0 Detailed Specification*, which makes it a little hard to provide full details here. Also, at press time, MMC was going through one final round of updates and revisions before approval (although it should be fully approved by the MMA and JMSC by the time you read this). Nevertheless, here is a sampling of some of the commands and responses that probably will be included in the first version of MMC.

COMMANDS

STOP, PLAY, DEFERRED PLAY, FAST FORWARD, REWIND, RECORD STROBE, RECORD EXIT, RECORD PAUSE, PAUSE, EJECT, CHASE, LOCATE, VARIABLE PLAY, SEARCH, SHUTTLE, STEP, ASSIGN SYSTEM MASTER, PROCEDURE, EVENT, GROUP, DEFERRED VARIABLE PLAY

RESPONSES & INFORMATION

SELECTED TIME CODE, LOCK DEVIATION, LOCATE POINTS, SIGNATURE, RESPONSE ERROR, COMMAND ERROR, TIME STANDARD, SELECTED TIME CODE, SOURCE, STOP MODE, FAST MODE, RECORD MODE, RECORD STATUS, TRACK, RECORD STATUS, GLOBAL MONITOR, RECORD MONITOR, TRACK SYNC MONITOR, TRACK INPUT MONITOR, STEP LENGTH, PLAY SPEED REFERENCE, LIFTER DEFEAT, RESOLVED PLAY MODE, CHASE MODE, TRACK MUTE, FAILURE

REMOTELY CONTROLLED RECORDERS

MIDI became possible because synthesizers started to use microprocessors—in essence, small computers—to control themselves. This was equivalent to a lifeform evolving from simple stimulus/response behavior (in a synthesizer's case, playing notes in response to control voltages and gates) to gaining conscious awareness, and with it, the ability to think and control itself. Once an organism knows how to control itself, it becomes much easier to control it and tell it what to do (not unlike a newborn eventually growing into a person with whom you actually can have a conversation).

Tape recorders have followed a similar evolutionary path. They are mechanical in nature, centering around a motor dragging a piece of tape across the record and playback heads in the desired direction at the desired speed. Aside from some fancy servo circuits that maintain a steady speed during recording and playback, controlling this motion mainly consists of turning a motor on and off or feeding a different voltage to it. Remote control means adding relays that can turn the commands on and off into these lines. In addition, remote control requires audio circuitry, which is responsible for converting audio to and from some weak magnetic fluctuations that appear on the tape.

The speed is externally controlled by sending a crystal-controlled set of tachometer ("tach") pulses—exact timing pulses at a frequency of 9,600 or 8,000 Hz that control the capstan's speed. Tape-deck synchronizers and remote controllers are devices that know which lines to switch on and off (via the parallel interfaces on many decks), and how to send tach pulses at a rate that would match the speed and position of multiple decks.

This system isn't compatible with the concept of MIDI control. MIDI is based on sending a fairly abstract command to a device and expecting the device to figure out how to execute it. For example, in a synthesizer, the simple command "turn a note on with a pitch of middle C and a 'velocity' of 64" gets translated into a complex set of software commands and control voltages that manipulate the internal chips making up a "voice" in precisely the correct manner.

As for synchronization, the closest thing to a tach pulse is the MIDI clock, which comes along at the variable and fairly leisurely pace of 24 per quarter note (16 to 100 Hz, for tempos ranging from 40 to 250 beats per minute). Therefore, the only way these two systems can talk is to print some form of clock pulses or time code on the tape itself. Then you must have an intermediate device translate that into MIDI clocks or MIDI Time Code (MTC) for a sequencer or drum machine to follow.

Eventually, tape decks also started employing microprocessors to help them control their own functions better. Early on, this was limited to speed control and perhaps monitoring the status of a few switches. But as microprocessors became both cheaper and more powerful, they were eventually used to run the whole show: speed, direction, record status, audio routing, bias levels, memorized counter locations, etc. As tape decks learned to control themselves better, they became easier to control by other computer-minded devices, and MIDI control became possible.

MIDI is not the first taste of computer control given to tape recorders. Several protocols already exist and are widely supported by various professional recorders (especially in the video field). In particular, Tascam has created a consistent serial control protocol for several of their cassette and open-reel decks. They have also attempted to get several MIDI sequencer companies to support this protocol. However, because their protocol did not follow MIDI hardware or software specifications, they unfortunately did not have great success. In contrast, Fostex added a proprietary MIDI control system to just one of their decks—the R8—and got some interest. This Tale of Two Protocols is perhaps the best example of why MIDI seems to be the best bet as the protocol to hook a variety of devices together.—*CM*

still come from a time-code track on the tape deck, converted to MTC to drive the sequencer (see Fig. 1).

The next logical step would be to add track-select controls to the sequencer. Just as the user can mute or chose to record on various MIDI tracks, it makes sense to put track-record and mute controls for the audio recorder on the same screen. Because many MIDI sequencers follow a linear tape analogy already, these tracks could appear in parallel, alongside the MIDI tracks. A smart sequencer would even keep track of when the user punched in and out on these external tracks and perhaps represent them as solid bars to show data (i.e., music) present (see Fig. 2).

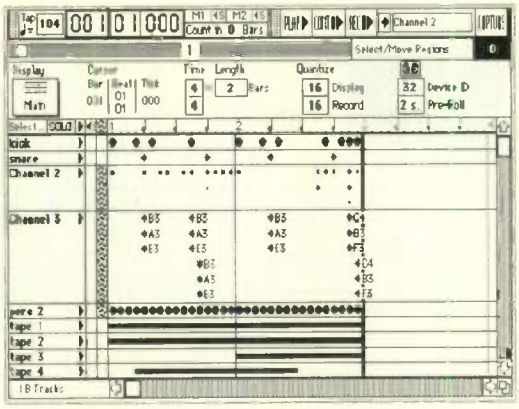


FIG 2: A hypothetical MIDI sequencer expanded to control a 4-track cassette deck.

Another possibility is to use the markers sported by many current sequencers as locate points that are sent to a tape recorder as well. In this application, the deck winds the tape to the correct point when the user selects the marker. Sequencers can even "step" external decks by sending a corresponding step time over MMC.

Not only are these obvious applications of MMC, they also will probably be the first to appear. At the fall 1991 AES Convention, Tascam showed their MMC-100, which converts MMC into the serial protocol used by their 238, 644, and 688 cassette decks and TSR-8, MSR-16, and MSR-24 open-reel recorders. The company even has started evangelizing MMC to sequencer companies. Roland plans to add MMC to their DM-80 hard-disk recorder, hoping that this will allow it to be controlled by a number of different companies in different applications. C-Lab also promises to add MMC to all their sequencers.

However, in front of a MIDI sequencer is not the only place that a musician or recording engineer sits when working on a song. Especially for people recording audio-for-video, it makes sense to build transport controls and track selects into a mixing console, because this is where they tend to sit while watching the video monitor. Likewise, a songwriter might want these controls built into their workstation keyboard, controlling either an internal sequencer, a tape recorder, or a computer-based sequencer or audio recorder (see Fig. 3).

To be truly mobile, perhaps we will see MMC versions of devices such as the JLCooper CS-1 and CS-10 or Niche ACS control stations. Maybe inventive programmers will write interpreters in Ear Level's *HyperMIDI* or Opcode's *Max* to allow these devices to control future equipment. Fig. 4 shows how this studio might look, with the aid of a multiport MIDI interface (such as MOTU's MIDI Time Piece, Opcode's Studio 5, or Lone Wolf's MidiTap) and a strong routing protocol (such as Apple's *MIDI Manager*, Opcode's *OMS*, or Lone Wolf's MediaLink) to hook it all up.

Expect the tables to be turned as well,

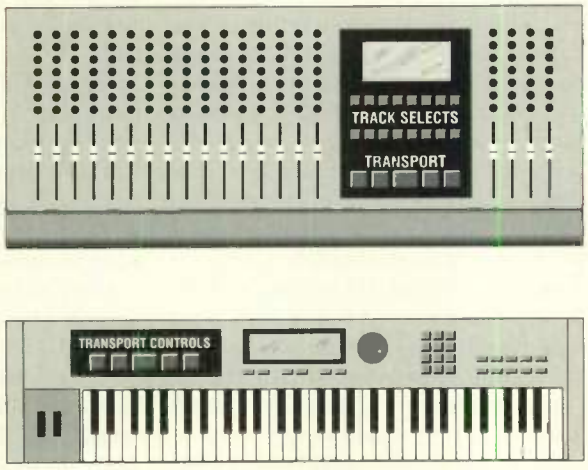


FIG 3: Future MMC-savvy mixers or master keyboards could add transport controls.

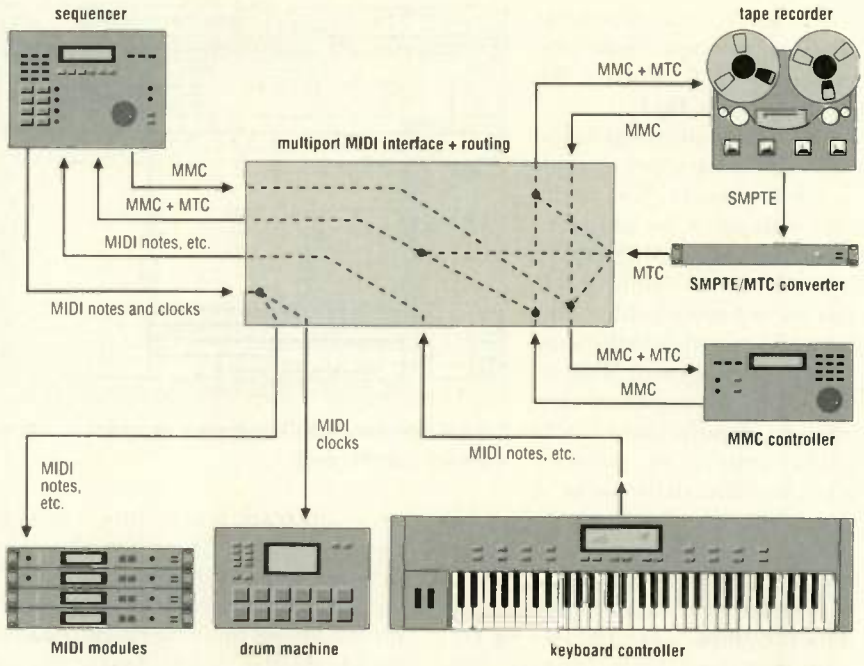


FIG 4: A more complex MIDI studio with a remote controller.

with more tape machine synchronizers being able to control MIDI sequencers or simply a wider variety of other recorders. A Tascam MIDIiZER combined with their MMC-100 should allow simultaneous control of a more traditional tape deck in parallel with an MMC-ready sequencer or recorder. And Roland plans to add MMC support to their SBX-1000 sync box, which currently supports MIDI cue lists and GPI triggers.

Perhaps most significant is the decision by Alesis to base communication between their ADAT digital recorder and BRC (Big Remote Controller) on MMC. The BRC is designed to control up to 128 tracks, and there's no rule that all these must be ADAT tracks. Several video deck manufacturers are members of the JMSC's MMC working group, and even some high-end audio recorder manufacturers have admitted that they too will have to support MMC in the future (some in response to calls they've already received from their users). MIDI often has been dismissed by the professional audio and video industries. Maybe the reality of low-budget home studios taking over more work will encourage these professionals to work with semi-professional equipment.

At the bottom line, MMC will hopefully mean that we no longer have to make a conscious decision about what we are going to record before starting a project, be it a song or a multimedia presentation. We'll just hook all of the recorders up to one master and select tracks as needed without having to call the United Nations for a translation or another engineer to operate the other decks. Ultimately, that is what technology should be about: giving us, the users, more creative freedom to choose how and with what we want to work.

The complete MMC specification should be available from the IMA (5316 West 57th Street, Los Angeles, CA 90056; tel. [310] 649-6434) by the time you read this. Its price wasn't set at press time. Manufacturers and individuals interested in implementing and further evolving MMC are encouraged to join the MMA, which also can be reached at the above address.

(Special thanks to MMC proposal author, Gerry Lester, former chief engineer of Adams-Smith, and the JMSC's working group chairman, Shoji Fujiwara of TEAC/Tascam. It will take the work of many individuals and companies to make MMC a success, but it couldn't even have become a reality without these two.)

Chris Meyer *is technical chairman of the MIDI Manufacturers Association and an MMC working group member. He is the author of the MIDI Time Code and Sample Dump Standard extensions to the MIDI specification.*

It will take you over 300 years to play every sound.

- 32-bit internal precision, into 18-bit output DACs.
- 4 SIMM sockets for user sample RAM up to 64 Mb.
- Up to 3 configurable filters or effects per voice, movable in real time.
- 5 polyphonic audio outputs, configured as 4 separate outputs plus a stereo master pair.
- Separate outs double as insert points, allowing external effects to be used and returned to the master stereo output pair.
- Over 1,000 sound programs in ROM, including piano, drums, waveforms, transient attacks and synthetic timbres.
- Room for over 100 user-created sounds.
- 16-bit linear sample format.
- Sends or 3 MIDI channels.
- 24-voice polyphony.
- Up to 4 oscillators per voice for "fat" timbres without using up voices.
- 16-channel multitimbral.
- 3.5", 1.4 M DOS-compatible disk drive.
- SCSI port for connection to hard disks and optical med a CD ROM).
- Optional audio input board for stereo sampling of analog or direct digital sources (R-DAT, etc.).

Specifications subject to change without notice.

At one new sound per second, 24 hours a day, it would take over 300 years to outgrow the new Kurzweil K2000. That's how powerful it is. The K2000 features a totally new approach to creating sound called VAST™ (Variable Architecture Synthesis Technology). It's like having the entire history of synthesis under one control panel — from analog subtractive programming to several types of digital synthesis.

But no programming is necessary to enjoy the K2000's vast stockpile of onboard sounds: 8 megabytes worth of striking new 16-bit soundfiles. Beyond this, the K2000 can accept MIDI sample dump files from other machines. And there's even an option that lets you sample your own sounds. Its sonic potential is infinitely expandable.

There's also an onboard multi-effects processor that can produce up to four simultaneous effects. External signal processors can be patched right into the K2000, too.

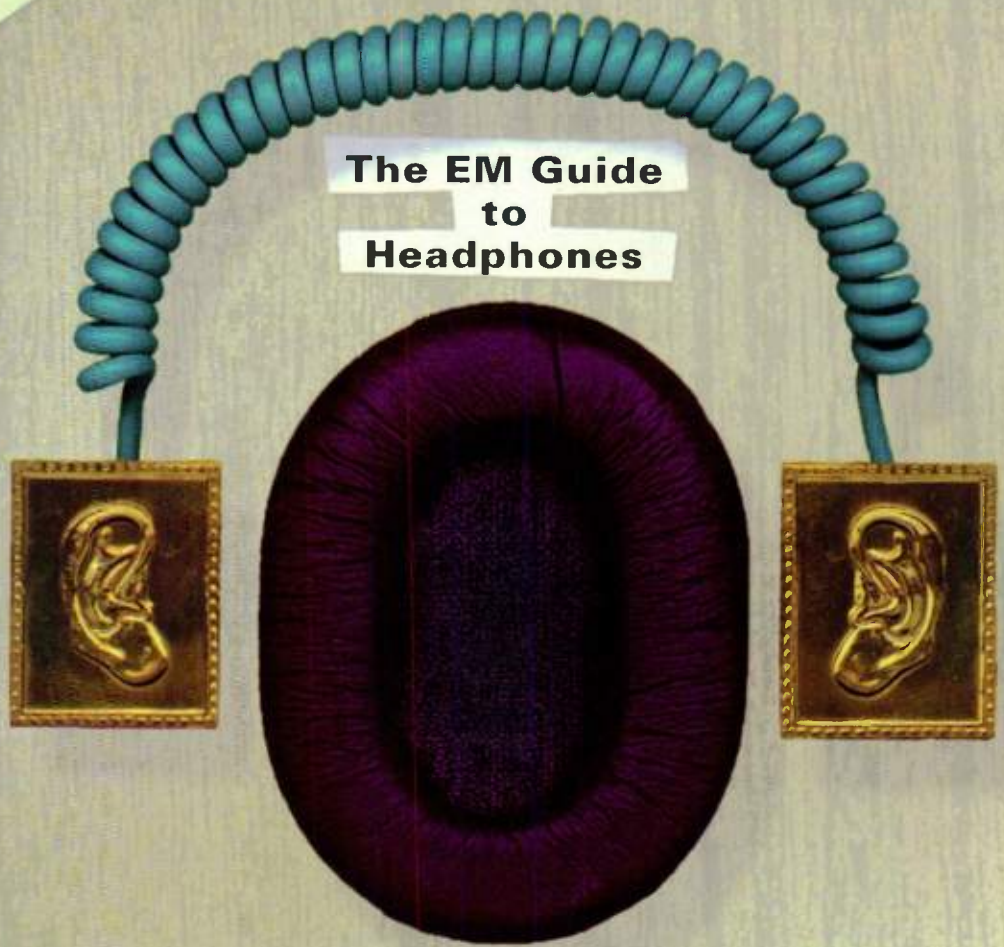
Add a 61-note velocity/aftertouch sensitive keyboard with master controller features, a big 240x64 backlit graphic display for programming ease, immediate support from the top names in music software, and you've got all the synthesis power you'll need for a long time to come...the next 300 years, at least. So there's no time to lose. Visit your Kurzweil dealer for a glimpse at the future of synthesis — the K2000.

KURZWEIL
Music Systems

Kurzweil is a product line of Young Chang America, Inc.

INTIMATE REFERENCES

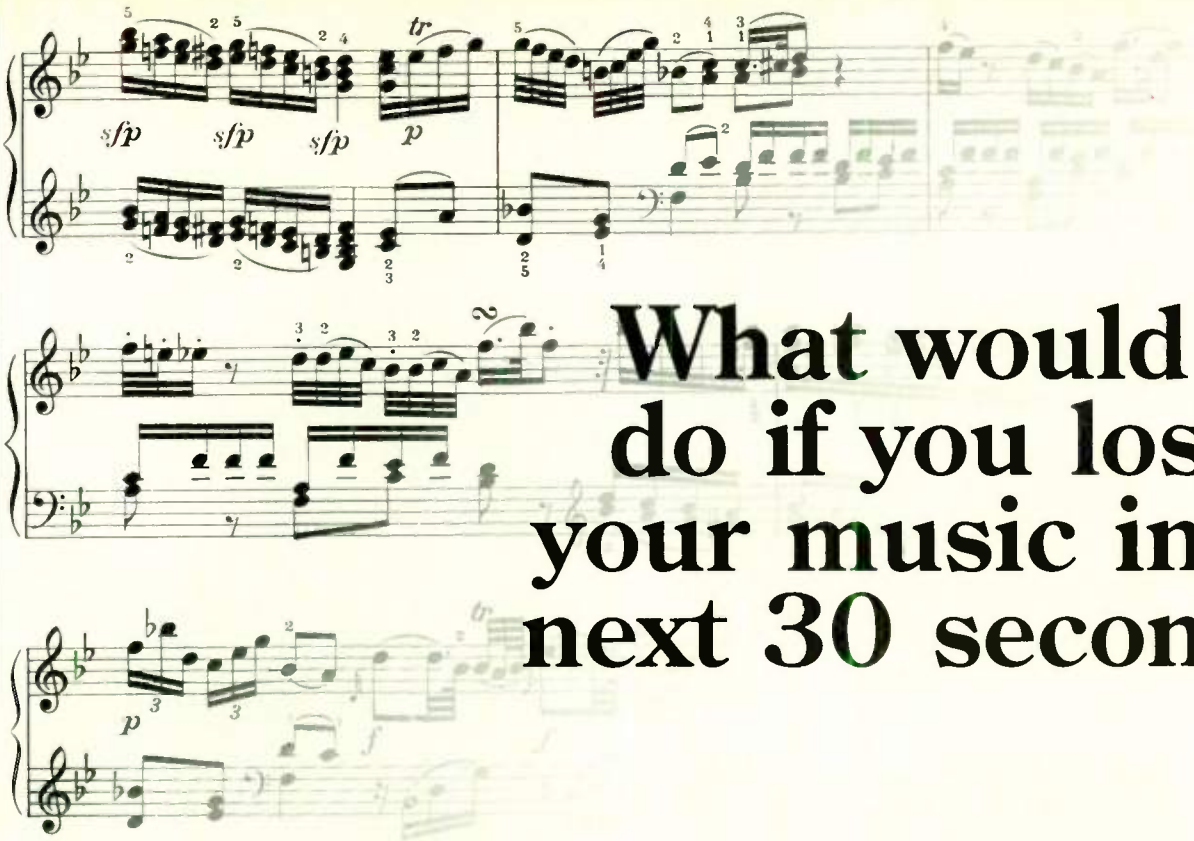
The EM Guide to Headphones



BY MICHAEL MOLENDA | Some musicians are forever linked to umbilical cords. The doctor's swift cut was just a tease, as the organic bond with Mom was replaced by MIDI cables and guitar cords. And in the delivery room of musical ideas—the home recording studio—we often reap audio sustenance from a headphone cable.

The proliferation of home demo studios has increased the importance of headphones. Early recording artists didn't need headphones, they just played and sang together live. However, during rock music's "age of overdubs" in the 1960s, live studio recordings gave way to meticulously stacked guitar and vocal tracks. Although monitoring previously

ILLUSTRATION BY ERIK ADKINS - MEAD



What would you do if you lost all your music in the next 30 seconds?

Cry. A lot, probably. But that wouldn't help you remember the subtleties of a great melody. Or bring back the project you're working on under deadline. What a nightmare.

We have a simple solution to this very real possibility. **DataDisk.** The direct MIDI to disk storage unit that backs up your hard work in an instant push button operation. Connected to the end of your MIDI chain, it stores 800K of Sys Ex data directly to standard 3.5" floppy disks.

And DataDisk is multi-lingual, capable of receiving data from all popular brands of musical equipment. So why pay $50 a piece for ROM cards when you can store 1000s of synth patches on a single one-dollar floppy disk? You can even name files, so you're safe, cost-effective *and* organized. Plus, our new *SQ* software lets you use DataDisk as a real time MIDI sequencer so you don't have to lug your computer to gigs.

A power failure or loss of data could turn your musical dreams into bad memories, in just seconds. Protect your time and creativity. Pick up a DataDisk at your Alesis dealer today.

19" Rack mountable. 800K of direct MIDI to disc Sys Ex data storage on 3.5" floppy disks. Real time sequencer. $449 suggested retail. Slightly higher in Canada.

ALESIS
STUDIO ELECTRONICS

Alesis Corporation 3630 Holdrege Avenue Los Angeles CA 90016

Lyrics and Song Notation

NOW AVAILABLE!

The most widely used midi sequences in the world. First in customer satisfaction for over six years. Over 1,300 song titles available for any musical application. All programmed in LA for consistent top quality by Stephen Kern.

From Pop to Rock. From Country to Standards to custom programming, we've got it all!

Trycho sequences are available for most popular computer and hardware based sequencer systems. We even have stereo audio cassette and DAT versions for non-sequencer users. We're the only sequencing company authorized as a dealer for equipment we support. For you, this means great sequences, fast setup, access to the best midi hardware, comprehensive technical support, and fantastic overall service six days a week - year in and year out.

So whether you're involved with audio production, multimedia presentations, are a hobbyist or a professional musician in a solo, duo or trio act, you can count on ***TRYCHO TUNES*** for the absolute best in midi sequences.

TRYCHO TUNES Performance Sequences ... there's ***NO*** competition!

FOR WORLDWIDE SALES
Please Contact:

Australia	Canada	Japan
Pro Audio Supplies 14-16 Woolley St. Dickson Act 2602 Australia Ph. 06 249 7766	In Home School of Music 1120 11 Ave. SW Calgary Alberta T3C OM4 Ph. 403 245 3250	Music Network 234-1-501 Eda-Cho Midori-Ku Yokohama Japan 225 Ph. 045 912 2472
New Zealand	**Norway**	**United Kingdom**
Music Houses of New Zealand P.O. Box 39029 Auckland, NZ Ph. 9 640099	ACS musikk Oscarsgate 1C N0352 Oslo 3 Ph. 47 2 56 41 80	Zone Distribution 5 Abbeville Rd. London SW 4 England Ph. 081 766 6564

TRYCHO TUNES are available at many fine music & computer stores. Or order direct at:

TRYCHO TUNES

PERFORMANCE SEQUENCES™

1-800-543-8988

TRYCHO MUSIC INTERNATIONAL
2166 W. Broadway St. • Suite 330
Anaheim, CA 92804
Phone (714) 826-2271
Fax (714) 995-8079

Please see us at NAMM Booth #2716.

AMERICAN EXPRESS CARD · VISA · DISCOVER · MasterCard

MIDI MUSIC WITH THE HUMAN TOUCH

recorded tracks could be accomplished with conventional playback speakers. sound leakage became a problem. (However, producer Phil Spector used this leakage to great effect for his "Wall of Sound" productions.) Headphones became the monitor of choice for the first wave of rock's multitrackers.

Today, the home recordist utilizes headphones as an instrument of isolation. Few apartment dwellers can blast drum machines or sampled industrial noise into the wee hours. Headphones allow the home recordist the luxury of laying tracks at any time without risking eviction. Many musicians track and mix entirely through headphones. The need for increased quality has prompted manufacturers to design models with extended frequency response and enhanced listening comfort.

To help put all the choices into perspective, we've compiled a chart (p. 58) that lists headphones deemed suitable for home or pro studio use. Models considered purely for consumer use were not included. The differences between various models are fairly straightforward, but the following paragraphs elaborate upon the features incorporated into the chart.

Remember, headphones are the most intimate of reference monitors, so they should not be purchased without a "heads on" trial. Bring familiar tapes or CDs to test frequency response and decrease the chance of being fooled by bass or treble boosts. Also, wear the headphones for awhile to see if they are too tight, too loose, or exhibit an awkward symmetry.

Koss PRO/4XL

TYPE

Dynamic designs are easy to make, dependable, and are the standard of the industry. Similar to dynamic microphone designs, the transducer employs a voice coil suspended in a static magnetic field.

Electrostatic models are more complicated and require outside power to polarize a thin transducing diaphragm suspended between two fixed electrodes. (AKG's hybrid dynamic/electrostatic model K340 does not require

LIST OF MANUFACTURERS

AKG Acoustics, Inc.
1525 Alvarado St.
San Leandro, CA 94577
tel. (510) 351-3500

Audio-Technica U.S., Inc.
1221 Commerce Dr.
Stow, OH 44224
tel. (216) 686-2600

Beyerdynamic
56 Central Ave.
Farmingdale, NY 11735
tel. (516) 293-3200

Fostex Corp. of America
15431 Blackburn Ave.
Norwalk, CA 90650
tel. (310) 921-1112

Koss
4129 North Port Washington Ave.
Milwaukee, WI 53212
tel. (414) 964-5000

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

Sony Corp. of America
3 Paragon Dr.
Montvale, NJ 07645-1735
tel. (201) 930-1000

Stax Kogyo, Inc.
16920 Halldale Ave.
Gardena, CA 90746
tel. (213) 538-5878

Telex Communications, Inc.
9600 Aldrich Ave. South
Minneapolis, MN 55420
tel. (612) 884-4051

Yamaha Corp. of America
6600 Orangethorpe Ave.
Buena Park, CA 90620
tel. (714) 522-9011

EM Guide to Headphones

Manufacturer/Model	Type	Frequency Range	Sensitivity (dB per mW)	Impedance (Ohms)	Power Handling Capacity	Ear Cup Design	Ear Cup Covering	Cord Length (Feet)	Price
AKG K33	dynamic	20 Hz-20 kHz	100	50	100 mW	semi-open	fabric	6.6	$49
AKG K44	dynamic	20 Hz-24 kHz	100	50	100 mW	semi-open	fabric	6.6	$59
AKG K141/2	dynamic	20 Hz-20 kHz	97.5	600	200 mW	semi-open	leatherette	10	$119
AKG K240DF	dynamic	20 Hz-20 kHz	88	600	200 mW	semi-open	leatherette	10	$169
AKG K240M	dynamic	20 Hz-20 kHz	88	600	200 mW	semi-open	leatherette	10	$139
AKG K270S	dynamic	20 Hz-20 kHz	92	75	200 mW	sealed	leatherette	10	$209
AKG K280	dynamic	20 Hz-20 kHz	94	75	200 mW	semi-open	leatherette	10	$199
AKG K340	dynamic woofer/ electrostatic tweeter	15 Hz-25 kHz	88	400	200 mW	semi-open	leatherette	8	$249
AKG K400	dynamic	20 Hz-26 kHz	96	120	200 mW	open	fiber	11	$189
AKG K500	dynamic	15 Hz-27 kHz	94	120	200 mW	open	fiber	11	$229
AKG K1000 system	dynamic	20 Hz-20 kHz	74	120	1000 mW	open	metal	14	$2,199
Audio-Technica ATH908	dynamic	20 Hz-22 kHz	100	40	n/a	open	fabric	9.8	$75
Audio-Technica ATH910	dynamic	20 Hz-20 kHz	100	30	n/a	sealed	leatherette	9.8	$99
Audio-Technica ATH911	dynamic	20 Hz-20 kHz	100	30	n/a	open	cloth	9.8	$139
Beyer Dynamic DT100	dynamic	30 Hz-20 kHz	94	400	1000 mW	sealed	vinyl	10	$189
Beyer Dynamic DT102	dynamic	30 Hz-20 kHz	94	400	1000 mW	sealed	vinyl	10	$139
Beyer Dynamic DT211	dynamic	30 Hz-18 kHz	98	40	100 mW	open	cloth	10	$49
Beyer Dynamic DT220	dynamic	20 Hz-20 kHz	102	400	102 mW	sealed	vinyl	10	$139
Beyer Dynamic DT770 Pro	dynamic	5 Hz-35 kHz	96	600	100 mW	sealed	cloth	10	$249
Beyer Dynamic DT990 Pro	dynamic	5 Hz-35 kHz	96	600	100 mW	semi-open	cloth	10	$274
Fostex T-10	printed ribbon	65 Hz-25 kHz	91	50	200 mW	open	vinyl	8	$70
Fostex T-20	printed ribbon	50 Hz-30 kHz	96	50	200 mW	semi-open	vinyl	10	$99
Fostex T-40	printed ribbon	30 Hz-40 kHz	98	50	200 mW	sealed	vinyl	10	$130
Koss CD 3	dynamic	15 Hz-20 kHz	98	60	100 mW	sealed	vinyl	8	$35
Koss CD 4	dynamic	20 Hz-20 kHz	97	60	100 mW	semi-open	foam	8	$45
Koss ESP/950	electrostatic	8 Hz-35 kHz	104	100,000	n/a	open	leatherette	4	$2,000
Koss HV/1A Plus	dynamic	15 Hz-30 kHz	95	140	100 mW	open	foam	10	$50
Koss HV/PRO	dynamic	15 Hz-35 kHz	93	100	100 mW	open	foam	8	$75
Koss MAC/5	dynamic	20 Hz-20 kHz	95	60	100 mW	semi-open	foam	8	$30
Koss MAC/7	dynamic	20 Hz-20 kHz	95	60	100 mW	sealed	vinyl	8	$50
Koss Porta/Pro	dynamic	15 Hz-25 kHz	97	60	100 mW	open	foam	4.5	$50
Koss Porta/Pro Jr.	dynamic	15 Hz-25 kHz	97	60	100 mW	open	foam	4.5	$40
Koss PRO/4AA	dynamic	10 Hz-22 kHz	94	230	100 mW	sealed	pneumalite	10	$100
Koss PRO/4X Plus	dynamic	10 Hz-40 kHz	102	100	100 mW	sealed	pneumalite	10	$90
Koss PRO/4AAA Plus	dynamic	10 Hz-22 kHz	102	100	100 mW	sealed	pneumalite	10	$70
Koss PRO/4XL	dynamic	10 Hz-22 kHz	99	180	100 mW	sealed	vinyl	4/8	$130
Koss PRO/75	dynamic	10 Hz-20 kHz	94	180	100 mW	sealed	pneumalite	10	$75
Koss PRO/99	dynamic	10 Hz-20 kHz	96	100	100 mW	sealed	pneumalite	10	$100
Koss PRO/450	dynamic	10 Hz-30 kHz	102	100	100 mW	sealed	pneumalite	10/25	$175
Koss TNT/55	dynamic	15 Hz-20 kHz	90	60	100 mW	sealed	foam	8	$40
Koss TNT/66	dynamic	20 Hz-20 kHz	93.5	60	100 mW	sealed	vinyl	10	$50
Koss TNT/77	dynamic	15 Hz-20 kHz	91.5	60	100 mW	sealed	foam	10	$60
Koss TNT/88	dynamic	15 Hz-30 kHz	94	60	100 mW	sealed	vinyl	10	$70
Sennheiser HD25	dynamic	30 Hz-16 kHz	105	70	n/a	closed	vinyl	10	$229
Sennheiser HD250	dynamic	10 Hz-25 kHz	94	300	n/a	closed	vinyl	10	$239
Sennheiser HD450	dynamic	20 Hz-20 kHz	94	70	n/a	open	foam	10	$99
Sennheiser HD450 Studio	dynamic	20 Hz-20 kHz	94	600	n/a	open	foam	10	$109
Sennheiser HD490	dynamic	18 Hz-22 kHz	94	70	n/a	open	foam	10	$129
Sennheiser HD520	dynamic	18 Hz-22 kHz	94	300	n/a	open	vinyl	10	$169
Sennheiser HD540 Reference	dynamic	16 Hz-25 kHz	94	300	n/a	open	vinyl	10	$199
Sennheiser HD560 Ovation	dynamic	16 Hz-30 kHz	94	300	n/a	open	velvet	10	$279
Sony MDR-7502	dynamic	60 Hz-16 kHz	102	45	0.5W	sealed	leatherette	7	$55
Sony MDR-7504	dynamic	15 Hz-18 kHz	104	45	0.5W	sealed	leatherette	10	$95
Sony MDR-7506	dynamic	10 Hz-20 kHz	106	63	1.0W	sealed	leatherette	10	$120
Stax Kogyo 5NB SRD-6sb	electrostatic	15 Hz-25 kHz	97	8	30W	open	vinyl	7	$349
Stax Kogyo Gamma Pro SRD-7 Pro	electrostatic	10 Hz-35 kHz	100	8	30W	open	vinyl	7	$699
Stax Kogyo Gamma SRD-6sb	electrostatic	10 Hz-35 kHz	97	8	30W	open	vinyl	7	$399
Stax Kogyo Lambda Pro Classic/SRM-Xh	electrostatic	8 Hz-35 kHz	108	50 kΩ	n/a	open	vinyl	7	$849
Stax Kogyo Lambda Pro SRD-7 Pro	electrostatic	8 Hz-35 kHz	108	8	30W	open	vinyl	7	$799
Stax Kogyo Lambda Pro SRD-P	electrostatic	8 Hz-35 kHz	108	50 kΩ	n/a	open	vinyl	7	$799
Stax Kogyo Lambda Pro SRM-1 Mkz Pro	electrostatic	8 Hz-35 kHz	108	50 kΩ	n/a	open	vinyl	7	$1,199
Stax Kogyo Lambda Signature SRM-T1	electrostatic	7 Hz-41 kHz	108	50 kΩ	n/a	open	vinyl	7	$1,999
Stax Kogyo Lambda SRD-7sb	electrostatic	8 Hz-35 kHz	102	8	30W	open	vinyl	7	$599
Stax Kogyo Sigma Pro SRM-1	electrostatic	30 Hz-35 kHz	110	50 kΩ	n/a	open	vinyl	7	$2,299
Stax Kogyo SR-30 Pro SRD-4	electrostatic	20 Hz-24 kHz	95	8	30W	open	vinyl	7	$199
Telex V-100	dynamic	10 Hz-20 kHz	102	600	200 mW	open	moleskin	5 (modular)	$127 (cord $43)
Telex V-200	dynamic	10 Hz-20 kHz	94	600	200 mW	sealed	moleskin	5 (modular)	$127 (cord $43)
Yamaha RH-5M	dynamic	20 Hz-20 kHz	98	32	n/a	sealed	leatherette	8	$40

outboard power because it employs a transformer within the headphone.) Electrostatic headphones generally reproduce more precise highs than dynamic models.

The printed ribbon design utilizes a transducer that moves like a piston to ensure its sound reproduction is totally in phase.

FREQUENCY RANGE

Many manufacturers offer models with frequency response beyond the accepted range of human hearing (20 Hz to 20 kHz). So why bother with headphones claiming a response of 5 Hz to 35 kHz? Well, depending on who you talk to, the science of psychoacoustics assumes humans can perceive frequencies as low as 10 Hz and as high as 50 kHz. If you're recording film scores, museum exhibit audioscapes, or theatrical sound-design productions, it may be necessary to "hear" these extended frequencies. Headphones with super-wide frequency response are a boon to the home recordist who usually cannot audition subwoofer rumbles at movie-theater volumes.

SENSITIVITY AND IMPEDANCE

These specifications determine how much level the headphone can produce. Sensitivity ratings show the decibel level attained by each milliwatt input. High impedance values, such as 600 ohms, often are used in large studio systems where multiple headphone configurations are the norm (an entire band tracking live, large vocal choirs, etc.). This ensures that each headphone delivers optimum level without overtaxing the main power amp.

Low impedance values (50 ohms) allow reasonable volume levels from the wimpy headphone amplifiers included in cassette ministudios and some consumer power amps.

POWER-HANDLING CAPACITY

Cassette ministudios, consumer audio products, and headphone outputs on most mixing consoles route only a few milliwatts of power to the headphone jack. So don't get nervous if the headphones you're considering have a power-handling capacity of 100 milliwatts (mW), and your power amp is rated at 200 watts RMS. Pro-studio applications involve different power requirements, but the headphones on the chart should survive normal professional use.

● HEADPHONES

EAR-CUP DESIGN

Sealed designs offer maximum isolation and limit "bleed through" of track sounds into nearby microphones. Isolation is especially important for musicians who monitor at high volumes. (Loud monitoring is not recommended. Guitarist Pete Townshend attributes much of his tragic hearing loss to headphone monitoring at blitzkrieg levels.) However, even moderate monitoring levels can cause "ghost" drums to appear on acoustic guitar or vocal tracks. Also, feedback can be a problem when recording intimate vocals extremely close to the microphone.

While sealed designs are helpful during tracking, enclosed systems can cause resonance problems that are undesirable during mixdown. Some manufacturers are accomplished at engineering optimum tonal accuracy despite the proximity problem, but it pays to carefully audition closed designs for frequency anomalies.

It is not a bad idea to employ a separate, more accurate headphone system for critical referencing and mixdown. Semi-open designs often employ acoustic chambers behind the transducer to vent (and smooth out) low frequencies. Completely open systems are touted as offering the truest frequency response.

Despite the increased chance of sound leakage, don't dismiss the value of open headphones for tracking. Open and semi-open designs provide singers a more "natural" monitoring environment, because the sound of the voice in the room is not sealed out. Many singers are more comfortable hearing their voice this way.

EAR-CUP COVERING

People often get squeamish about what touches the sides of their face. If this sounds silly, you haven't witnessed studio cats rummaging through twenty pairs of headphones to find a set that doesn't feel "icky." (It really happens.) Obviously, manufacturers are sensitive to the ear-cup issue, and have varied ideas regarding suitable coverings. Some even offer different coverings within the product line. A few models have ear cups that can be removed for cleaning or replacement.

CORD LENGTH

Few things are more frustrating than a short headphone cord. Sure, exten-

sions are readily available, but sometimes too much of a good thing gets tangled around microphone stands and chairs. If you use headphones as the primary monitors in your home studio, make sure the basic cord length allows easy access to your instruments and mixing board. It's no fun being at the "end of your rope" and having the headphones ripped off your ears every time you turn away from your keyboards to tweak the EQ on your mixer.

HEAD 'EM OUT

When you deal with a lot of manufacturers, you find many differences in how they promote their products. For instance, the subject of headphone weight caused a lively dialog. We deleted this category from our original chart outline because we deemed it of little interest to EM readers. However, during the initial gathering of specifications, several manufacturers commented on the missing category. They stated that broadcasters and professional recording engineers are concerned about headphone weight, due to the comfort considerations of extended use. Other manufacturers balked at the category, fearing consumers might think a lightweight headphone was cheaply constructed.

A completely unscientific survey of local broadcasters, engineers, and recording artists revealed that 90 percent think you're nuts if you ask them, "Are you bothered by the weight of your headphones?" We deleted the category. (Most professionals were more concerned with maximum adjustments—large head sizes unable to thwart pinching and small head sizes unable to remedy slippage.)

The main factor to keep in mind is personal preference. You'll probably do a lot of singing and overdubbing of instruments with these things on your head. Many musicians just want headphones that sound good, but it also helps if the ear-cup pressure (and even the covering) is comfortable. It's especially distracting to attempt soulful vocals when the headphones pinch.

Beware of models that accentuate mid and/or treble frequencies. A constant barrage of sheering mids can induce swift auditory fatigue, a guaranteed productivity buster if your apartment-based studio forces you to monitor everything on headphones.

In the end, determining which headphones suit your needs will probably be based on subjective considerations, regardless of what the chart specs say. The intimacy of headphone monitoring can have a direct influence on how you perform and/or mix your music, so make sure your audio umbilical cord offers the appropriate sustenance.

(Special thanks to editorial assistant Mary Cosola for compiling the chart.)

Sennheiser HD25

The MIDI TRAP

MIDI has simplified the music-making process, but at what price?

An article published recently in a respected independent film journal claimed that no decent film score would ever come from a MIDI studio. The author, an experienced film composer, argued that MIDI-produced music was "mechanized, quantified, [and] predigested" and could never replace "real musicians." Furthermore, it stated MIDI wasn't any cheaper.

Seeing as I make a decent portion of my living doing film scores in my MIDI studio, I was rather taken aback by this thesis. It suggested that everything I and my fellow MIDI-heads have worked on for the last decade or so—making synthesizers sound better, designing software that improves creativity, bringing professional tools to affordable price brackets, and designing elegant and cheap ways to link sound and pictures—has been for naught. But after a few days reflection and some concentrated radio and TV listening, I began to agree with him. I also find most MIDI music—and not just music for films—predictable, mechanical, and boring. (He was dead wrong about it not being cheaper, but that's a different article.)

The writer blamed MIDI itself, and on this crucial point I disagree. MIDI doesn't kill music, musicians

RICHARD DOWNS

BY PAUL D. LEHRMAN

THE SD-1 NOW HAS 32 VOICE POLYPHONY

No matter where you go, there we are.

Whether you're recording, composing, playing live or just getting started, do yourself a favor. Do it with an ENSONIQ synthesizer.

Our combination of advanced synthesis, dynamic effects and creative sequencing is second to none. That's because we pioneered the synth workstation concept, and have honed it to perfection in a line of synths that are right for any player in any situation.

Our top-of-the-line SD-1 32 Voice Music Production Synthesizer is the perfect combination of sound, sequencing and exclusive performance features, with a friendly user-interface and new 32 voice polyphony. (Factory-direct upgrades on existing SD-1's and VFX^{SD}'s are available.)

Our SQ-1 PLUS and 76-key SQ-2 Personal Music Studios offer a complete range of musical possibilities to the budget-conscious musician. And our SQ-R PLUS gives you the great sound of the SQ instruments in a rack-mount — the perfect addition to any MIDI setup. And all the SQ series feature 21 voice polyphony.

Of course, ENSONIQ has long been an acknowleged leader in affordable samplers, such as the EPS-16 PLUS Digital Sampling Workstation and EPS-16 PLUS rack-mount unit.

So no matter what kind of music you make, we've got you covered. And there you are.

For the dealer nearest you, call 1-800-553-5151.

☐ *Please send me the FREE ENSONIQ Guide to Choosing a Synth vs. a Sampler.*

Please send me information on : ☐ SD-1 32 Voice ☐ SQ-2 ☐ SQ-1 PLUS/SQ-R PLUS ☐ EPS-16 PLUS

Name

Address

City

State Zip Phone

Mail to ENSONIQ, Department E-25
155 Great Valley Parkway, Malvern, PA 19355

ensoniq®

THE TECHNOLOGY THAT PERFORMS

How Two Men Separated Jim Morrison From Thousands Of Screaming Fans.

Willie Stateman and Scott Martin Gershin of Soundelux, Inc., creators of digital sound effect tracks for "The Doors," shown with the ADAP PORTABLE and Atari laptop STACY.

Without ever leaving the safety of the digital domain provided by ADAP, sound designers Stateman and Gershin layered hundreds of crowd samples, replaced dialog, prepared tracks, designed special audio effects and synchronized foley. Armed with powerful 16-bit ADAP systems, they created an entire world of audio illusion for Oliver Stone's blockbuster movie, "The Doors."

They did it all with unsurpassed digital sound quality, while being able to take their sound creations from their stationary ADAP workstation directly to the sound stage using the fully compatible ADAP PORTABLE.

And they're not alone. These days, more and more film and post production houses, recording studios, and radio and TV stations are using ADAP to bring audiences to their feet. And all this at the best price/performance ratio in the industry.

Hybrid Arts, Inc.

Good Things From A Small Box.

Hybrid Arts, Inc. 8522 National Boulevard, Culver City, CA 90232 (213) 841-0340 US Fax (213) 841-0348 Int'l. Fax (213) 841-0346

kill music. MIDI has made it possible, even easy, to create "perfect" music, precisely programmed and absolutely identical every time it's performed. But MIDI-based music that sounds live, as if it were performed by human beings instead of machines, is a rare commodity. And only music can communicate human values that listeners find worth listening to. This becomes more true as music ages. In 2015, "Classic Hits" radio will not be playing New Kids on the Block and Vanilla Ice.

MIDI has been a wonderfully democratizing influence, encouraging many musicians who otherwise could not possibly afford to produce good-sounding stuff to try their hand at making records, performing, scoring images, or simply enjoying themselves. It's fueled a tremendous technological revolution, inspired countless software and hardware designers and independent record labels, and created a new genre of magazines such as **EM**.

But MIDI also has caused both manufacturers and consumers to become lazy. When it's so easy to make everything sound so good, why even work at making music? That's the trap MIDI musicians have fallen into.

IS MIDI TO BLAME?

It's fashionable to complain that MIDI isn't good enough for doing "real" music. But in reality, despite the inevitable compromises that went into its adoption, MIDI is an extremely well-designed descriptive language for musical performance.

Before electronics, all music was created by physical gestures, such as singing, whistling, and beating. MIDI, with its carefully defined but wide-ranging command set, provides an excellent modeling system for physical gestures. A musical sound starts, it grows and changes, it stops. All of these actions are reflected in the MIDI command set.

Then what's the problem? Because MIDI tools do so much immediately and bring so much power to even the poorest (in both senses of the word) musician, it's incredibly tempting to let the tools do all the work. There's an old joke about a guy who hears a certain machine will do half his work for him, so he buys two. When the tools do all the work, however, the musician gives up the responsibility of creating, and what comes out only will speak to other tools, not other humans.

Rather than take advantage of the new horizons MIDI technology opens, many musicians simply use it as a faster, cheaper means to the same old goals. In the process, their horizons get even smaller, and the genres they work in become even more restricted.

USER-LAZINESS

The most commonly cited fault in MIDI composition is over-reliance on quantizing. Quantizing robs music of any rhythmic subtleties. And while it often helps compensate for a lack of technique, it also eliminates much of what we hear as phrasing. Phrasing is more than note durations and volumes, it's also small changes in timing: A note that's delayed slightly will sound emphasized, while notes that are played ahead of a beat tend to be de-emphasized. Quantizing completely destroys this.

Step-time entry is even worse, because durations are quantized as well as attacks. If you ever feel like taking a glorious phrase by Mozart and squeezing all the life out of it, enter it into a sequencer in step-time.

Another familiar bugbear is dependence on factory sounds. Synthesizers admittedly are hard to program, and the folks at the factory know a lot more about it than you do. But becoming a slave to their taste is a sure-fire way to lose any semblance of individuality in your music.

Factory sounds are designed to show off an instrument in a music store, to grab your attention and wrench your gut. While these qualities are useful, successfully composing, arranging, and producing a project also requires subtlety, expressiveness, and the ability to blend.

In addition, factory sounds get old fast, as a quick listen to the cheapo music behind most late-night TV ads will attest. A fundamental principle related to this phenomenon occurred to me a few years ago, after a particularly boring computer-music concert: Any sound, no matter how beautiful and complex, becomes boring if you repeat it often enough.

HALF A SPEC

Just as neurologists theorize that we normally use only a small part of our brains, most MIDI users take advantage of only a small part of the MIDI

spec. How many of us have ventured beyond Note Ons and Offs, the occasional Sustain Pedal, and maybe a little Mod Wheel or Pitch Bend? Knowing when a violin note starts and stops is only a small part of what that note is all about. So it should be with a MIDI note. But few MIDI composers bother to use footpedals for anything other than volume, or aftertouch for real-time timbral changes, or breath controllers or joysticks for anything. Ask yourself: Do you even know how to program your synths to respond to that kind of control?

Finding or designing "the perfect sound" too often becomes the goal: We just hit a key and walk away while the music unfolds by itself. But music is not what happens when you push a button; music is what you do with the sound *after* the button is pushed. Every note that comes from a saxophone is different; the pitch, vibrato, tone, and volume contour all differ. How dare we play a few notes on a keyboard and call it a sax line!

Reliance on Note Ons often creates repetitive pattern-based music that leaves little room for nuance or expression. Everything that isn't dance music sounds like Philip Glass: It becomes non-physical, non-human music. (Yes, Glass is a successful composer, but if your only goal is to write like him, you don't need to read this article.)

It takes a traditional musician years to master a single instrument, to develop the ears, the micro-muscular responses, and the aesthetic sensitivity to make it produce music that others want to hear. Remember the first time you picked up a flute or a trumpet: Could you make any sound at all? The first time you pick up a new synth, it may sound great, but you are a long way from using it to its full capabilities.

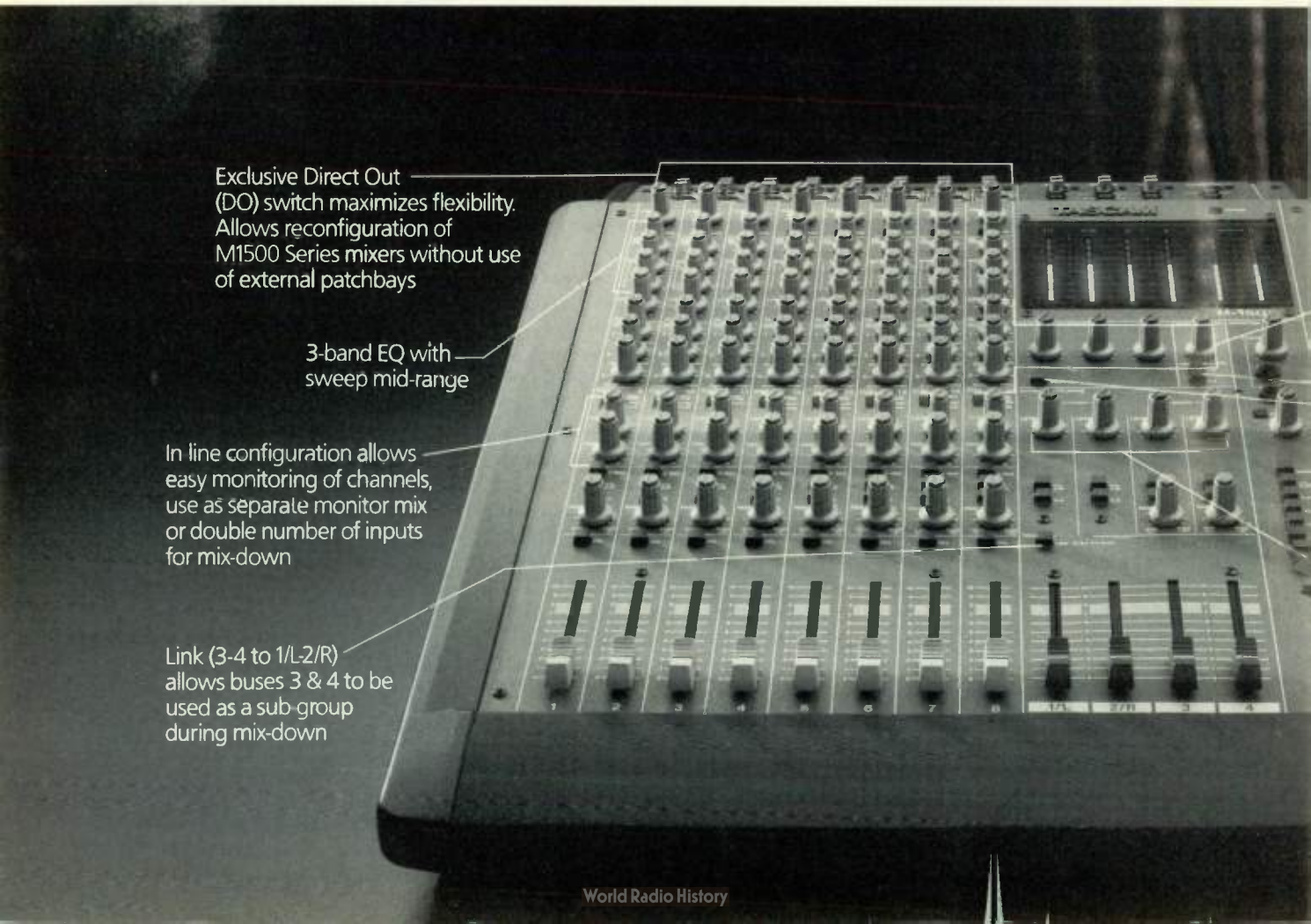
The MIDI studio is, after all, a musical instrument. And like any other instrument, it needs to be mastered. Most of us don't give ourselves enough time to learn its parts. Every synth, every *patch* on every synth, has a playing technique. A good patch should provide room for exploration and expression, but most of us just choose something quick and simple.

Samplers are particularly seductive. A sampler records the sound of a specific instrument playing a specific note in a specific way. Many users think that's all it takes to capture that instrument. But to convincingly re-create a real instrument requires many samples, many ways to choose among them that make musical sense, and a playing (or sequencing) technique that reflects an understanding of how the instrument is played.

Proper use of velocity, aftertouch, and mod wheel *can* effectively simulate a real violin performance. But if you don't know exactly what a violin sounds like, you won't fool anybody.

MIXING

Because the technology gives MIDI-users a rich vocabulary and great control over so many aspects of the music, many start to believe they can handle the composing, arranging, mixing, recording, and editing all by themselves, with equal facility. MIDI is empowering, but it's not magic. Some of us, let's face it, can't deal with all that. I've been mixing music for nearly twenty years, but when I have an



important project, I still hire a mixing engineer.

A lousy mix can be a dead giveaway of what would otherwise be an acceptable MIDI-produced track. In an acoustic session, an engineer would never spread out a piano so it takes up the entire stereo image and then put a five-piece horn section in mono, dead center. But an inexperienced MIDI musician, equipped with a brass patch on a one-output synth and a stereo piano sample, might do just that.

Onboard processing, while it can make a synth sound much better in the store, can get you into trouble in a mix. A half-dozen synths mixed together, each with its own peculiar reverb, often results in a mishmash of unrelated acoustic spaces that sound unreal and out of control.

The other side of the coin is that MIDI makes it *too* easy to sound good. In the past, a killer piano sound required a quality piano, mics, room, and engineer. Today all you need is a $500 box. Good-sounding instruments make even bad music sound decent to the non-discerning ear.

HARDWARE LIMITATIONS

Before you start believing it's all your fault, realize that manufacturers share the blame. Few manufacturers produce anything that challenges the status quo of MIDI. Wonderful new products come out all the time, but few offer any radical new ways to exploit MIDI. And if they do, they are difficult to find, because nobody knows how to support or sell them. Occasionally a major manufacturer dares to create something truly revolutionary. But unless it's an overnight smash, the manufacturer usually gives up on the product before it has a chance to take hold.

Here's an example: An important characteristic of string and wind instruments is that the speed and depth of vibrato are independent of each other. In the vast majority of digital synths, however, a patch's LFO speed is fixed. Even if your synth lets you control speed and depth separately (like the Kurzweil 1000 series and Oberheim's Matrixes), you've probably never tried to set up a patch that takes advantage of this capability. This isn't because you're dumb; it's because the manufacturer has buried it in the software, not bothered to explain it in the manual, and failed to provide any presets that illustrate it.

Another example: Real singers and wind players can only produce one note at a time, but they get from one note to the next in a variety of ways, like sliding, breathing, or tonguing. Most synths have a switch for "mono" mode, but few actually behave any differently or offer any useful choice of articulations when they are in this mode. A "legato" controller is in the final stages of being written into the MIDI specification, but it fails to dictate how instruments will behave in "legato" mode; each manufacturer must take its own initiative on that front.

In fact, of the many useful additions to the MIDI spec in the last few years, few—except for MIDI Time Code and MIDI Sample Dump—have become common practice. Instruments that use general purpose controllers, or registered and non-registered parameters, are still quite rare. Controller matrices finally are appearing in synthesizers, samplers, and processors, but few of

these devices include factory patches with complex controller maps.

You could argue that constant technological innovation actually *harms* the cause of MIDI music. Many users feel pressured to have the latest, hippest noisemakers, so they never get a chance to fully explore each new toy before they move on to the next one.

SOFTWARE INTIMIDATION

Sequencer manufacturers often throw in new features without carefully considering how they will be used. A modern computer sequencer must delicately balance comprehensiveness and accessibility, or it will stifle the user's creative flow. For example, if you have to wade through all of a program's features to use its basic functions, you'll probably become frustrated and give up altogether.

At the same time, many programs still lack functions that could help the realism of sequenced music enormously. For example, you should be able to tell a track to rush or drag *progressively* over a period of time, as a real instrumentalist often is asked to do.

Truly useful System Exclusive capabilities are also long overdue. Many sequencers offer SysEx recording and playback, so a synthesizer (or even a whole studio) can be reprogrammed at the beginning of every sequence, but this could go further. Some synths only reach their full expressive capabilities when controlled by SysEx. To exploit this, sequencers need to give the user a chance to edit SysEx data like text and then send it within a sequence like any other MIDI event.

WHAT CAN YOU DO?

Despite our film-composer friend's experience, there are people out there creating great music with MIDI. Here are some things you can do to make sure you're in that group.

• Master your instrument. Take time to learn what your studio can do, and get good at doing it. Try to avoid spending all your time looking for the latest and coolest hardware, but work with what you've got. As one successful, but frustrated composer told me, "I've got all the tools I ever wanted. Now I wish they'd just leave me alone and let me make music!" Maybe you can get the complex sound you want by layering two instruments, or using processing, instead of searching for that one synth you think will do it all for you.

For a good exercise, try working with classical pieces, and see if you can make them sound convincing on your equipment. It doesn't matter if you don't have a string sampler. You don't need a specific acoustic sound to make an orchestral point. You can instead use something that fulfills the same function as that sound, and make it come alive under its *own* terms. For example, where an orchestral composer would use a viola section to fill in a chord, you might get the same effect with a vocal pad. While it won't sound exactly the same, it might fit well with the rest of the sounds you use.

• Learn how to make music breathe. Sometimes it helps to think of each instrument as a human voice and shape each line as if you were singing it. Whether you're imitating an instrument or creating something entirely new, imagine how that instrument *feels* to play, and figure out how to translate that into finger and controller movements.

• Learn about orchestration (see "Electronic Orchestration" in the September 1991 **EM** for a start in the right direction). The principles of orchestrating for electronic instruments are largely the same as for acoustic instruments: Different timbres should complement each other and stay out of each other's way. Make sure each line has its own distinct spectral space. Keep things from getting muddy. Learn about mixing; it goes hand in hand with orchestration. Learn how to create spaces with processing and how to keep elements distinct even as they blend.

• Try alternative controllers. Get a couple of drum pads, or try a MIDI guitar. Even the lousiest MIDI guitar does note and chord combinations that are clumsy to do on a keyboard. If you sing, spend some time with a pitch-to-MIDI converter. If you play woodwinds—even a pennywhistle or a recorder—try a MIDI wind controller. Even at the simplest level, one of these can add new layers of expressiveness to your music. And if you really get into it, you can create a unique compositional voice for yourself.

If you can devote time to them, look at the truly alternative controllers from Don Buchla, or alternative composition programs like *M* or *Music Mouse*. Try to expand your vocabulary beyond

Play It. Stretch It. Squash It. Clone It. Loop It. Punch It. Patch It. Drag It. Zoom It. It's A Piece Of Cake.

Take hold of your music with Cakewalk.™ The Cakewalk MIDI sequencer lets you shape musical ideas into new forms. With the click of your mouse or a few simple keystrokes, you can change velocities, adjust tempos, quantize rhythms, extend tracks, transpose pitches and much more. Cakewalk's intuitive interface and on-line help get you up and playing in no time. And with 256 tracks, Cakewalk gives you plenty of room to experiment.

Cake For Pros.

If you're making a living making music, take a look at Cakewalk Professional.™ Don't let the low $249 price fool you. Cakewalk Professional is loaded with features that you would expect only from higher priced sequencers, like support for all SMPTE formats, over 32 MIDI channels, and multiple interface boards. Professional also comes with the powerful Cakewalk Application Language (CAL) that lets you create your own program commands and editing routines.

It's a LIVE!

Build a playlist of up to 128 songs for your live performances. Play along to your own tracks without delays between songs. Cakewalk LIVE! loads and plays standard MIDI files, so you can use it with any MIDI software package. Lists for $49.

Oh Romeo.

The Romeo Music Cakewalk Series is a three-disk set loaded with over 60 multi-track song files of classical, jazz, pop, and drum patterns. Just load the songs into Cakewalk and start playing along, or "sample" any of these sequences for use in your own MIDI compositions. Commissioned by Romeo Music Inc. exclusively for Twelve Tone Systems. Only $29.95.

Get a Piece.

For more information on the full line of Cakewalk MIDI software products, give us a call at **800-234-1171**. Ask about our free catalog. Order the Cakewalk demo diskette for only $10.00.

Cakewalk is also served at finer music and computer software stores everywhere.

The #1-selling MIDI sequencer for IBM PC-compatibles. **Only $150!**

Cakewalk Highlights

- 256 tracks
- MIDI/SPP with Chase Mode
- *NEW!* MIDI metronome
- Multiple sequence views, including piano roll, event list, measure and track view
- *NEW!* Enhanced real-time controls
- Step record
- *NEW!* Fractional tempos
- Event filters
- Standard MIDI File formats
- On-line help
- Mouse support
- Extensive edit commands
- No copy protection!

Cakewalk Professional Highlights

All the features of Cakewalk, plus:

- Direct SMPTE/MTC
- *NEW!* Built-in fit-to-time command
- Percentage quantization
- *NEW!* 48-480 pulses per quarter note
- Cakewalk Application Language (CAL)
- Powerful keyboard macros
- *NEW!* Supports multiple MIDI output ports
- *NEW!* Supports over 16 different interface boards
- ...and more

Cakewalk™

PC MAGAZINE EDITOR'S CHOICE

Cakewalk 2.0 Nov. '88.

Prices are subject to change without notice. Cakewalk and Cakewalk Professional are trademarks of Twelve Tone Systems, Inc. Other products mentioned are trademarks or registered trademarks of their respective manufacturers.

Outside of U.S., call 617-273-4437.

Twelve Tone SYSTEMS

P.O. Box 760
Watertown, MA 02272

the Note On/Note Off totalitarianism of keyboards.

• Get out of the studio once in a while. Go out and listen to some real music: not Milli Vanilli, but chamber music, jazz, or ethnic music. Hear how these performers use subtle changes in time, pitch, timbre, and vibrato to make their expressive points. Think about how you can adopt some of those techniques to your music.

• Collaborate. MIDI is making one-man bands out of many people, but not all of us are up to the gig. Even if you have the best instrumental, orchestration, and engineering chops in the world, you can gain perspective by working—playing, programming, or mixing—with someone with a different perspective.

CAN WE DO THIS?

I believe in MIDI. I have spent the past eight years immersed in it, and it has changed my life in more ways than I can count. I intend to keep working with it for a long time. Needless to say, it drives me nuts to hear "It isn't good enough," or "It isn't pro," or "I want *real* music."

We, as users and developers, have not done all we can to realize MIDI's potential. But it's not from lack of desire. We all (well, most of us) live in the real world and are constrained by real-world economics. Manufacturers have to sell to fickle customers, compete in a highly fashion-conscious market, and constantly introduce new products to stay competitive. Users must justify the costs of their equipment, meet client schedules, and feed, house, and clothe themselves and their families. Few of us on either side of the equation have unlimited time to experiment, to play, to continuously seek out new forms of creative expression.

But unless that precise form of play is encouraged, and unless MIDI demonstrates its creative—not just commercial—potential, it will always be associated with "machine music." And that will be a great loss to humans.

Paul D. Lehrman *is a composer, consultant, and author, who has been working with electronic music since 1968. He is on the faculty of the Sound Recording Technology program at the University of Massachusetts at Lowell and serves on the Executive Board of the MIDI Manufacturers Association.*

WHATEVER YOUR TASTE

Whatever your platform (be it Atari,™ Apple Macintosh™ or the PC*), you can enjoy the wonders of Cubase...The Freshest MIDI software tool available.

Cubase is renowned for its user friendliness, intuitiveness and flexibility. M•ROS (MIDI real-time operating system) lets you record, edit and arrange your music in 'real-time' in a logical graphic environment, where all functions are available (even saving your work to disk) without stopping.

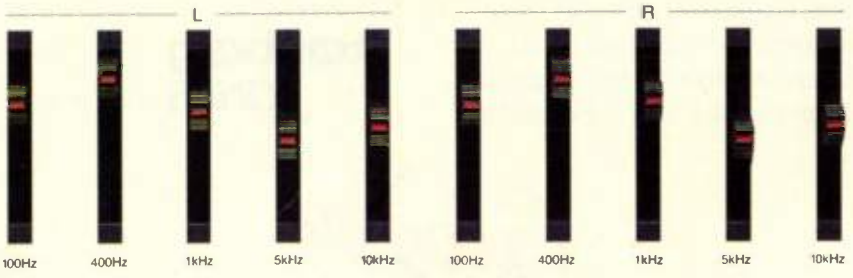
Cubase adapts to the way you work, offering more ways to manipulate, edit and arrange your music than you ever imagined. Everything you need is at your fingertips: Linear or Pattern-based sequencing; 4 Graphic Edit windows (each with a dedicated tool box); a Logical Editor for event-specific manipulation; 8 creative Quantizing options (including user definable Grooves); add-on modules which range from MIDI Processing to composition assistance; and File-Format compatibility between computer platforms.

Whatever your musical style, or the way you work, or the computer you use, we invite you to savor the many flavors of Cubase...Whatever your taste.

*Windows 3.0™ 386 SX and up.

Steinberg JONES

17700 Raymer Street, Suite 1001
Northridge, California 91325
818-993-4091 FAX: 818-701-7452



The MT120 with 5-band EQ. Creative freedom. And a bit more.

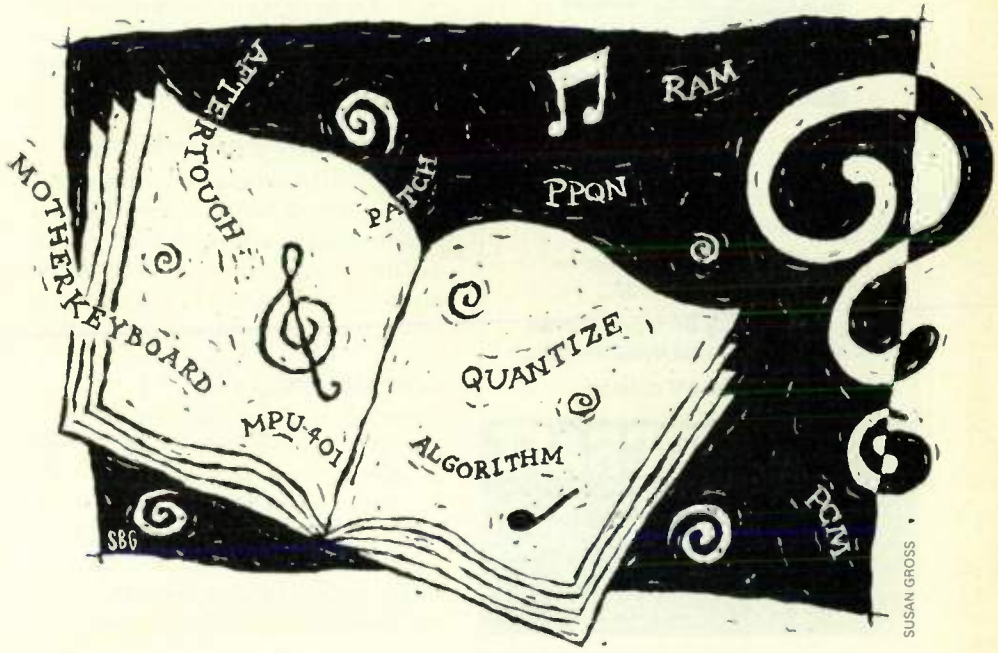
Quite a bit more. Like getting a rock solid bottom end from the kick drum. Like bringing more brilliance to a cymbal. Like making a dull guitar track scream. All from a four track cassette recorder with an integrated mixer and a 5-band graphic equalizer. When you go in to your local dealer, don't ask for the MT120. Demand it.

YAMAHA®

The EM Glossary

By Lachlan Westfall

The terminology of electronic music from A to Z ... well, actually from A to W, but who's counting?



SUSAN GROSS

In the unlikely event you've run across an unfamiliar term in the pages of EM (ahem), here's a list of definitions designed to keep you in the know.

ADSR

Acronym for Attack, Decay, Sustain, Release. Describes the four stages of a standard envelope generator. (See Envelope Generator.)

AES/EBU

Digital audio standard developed jointly by the Audio Engineering Society (AES) and the European Broadcast Union (EBU). The standard describes a format for transmitting stereo digital audio along a serial cable. Although balanced XLR is the only "official" cabling format, fiber optic and coaxial cables commonly are used. (See Balanced/Unbalanced, S/PDIF.)

AFTERTOUCH

MIDI message that indicates the amount of pressure applied to a key, or keys, after they have been depressed.

ALGORITHM

A pattern of information or set of instructions. In electronic music, an algorithm can define the specific set of parameter values to create a sound on a synthesizer (as in a DX7 patch), or specific permutations of MIDI data performed by computer software (as in "algorithmic composition").

AMPLIFIER

A device or software algorithm that increases the amplitude of the voltage, power, or current of a signal. Commonly refers to a device that increases the volume of an audio signal. (See ADSR, Envelope Generator.)

ANALOG

An audio signal is an electrical representation of, i.e., is analogous to, a sound waveform. The signal's voltage fluctuates in the same pattern as the speaker cone that reproduces it. Analog synth technology uses electronic components, including oscillators, filters, and amplifiers, to create electrical signals analogous to the audio waveforms they represent. (See Oscillator, Filter, Amplifier.)

AUTOMATION

The act of controlling aspects of a music studio automatically. For example, mixer automation allows you to record the movement of the volume faders or mute switches so that they will consistently repeat their movements.

BALANCED/UNBALANCED

Terms used to describe two types of audio cable conventions. Unbalanced cables, such as standard guitar cords, use two wires. One wire carries the actual audio signal and the other is used for ground. Balanced cables, such as three-pin XLR microphone cables, use two wires for the signal and one for the ground. One of the signal wires carries the sound, while the other carries an inverted copy. When the signal reaches the destination, the inverted copy is flipped and added to the original. Any noise added by the wire also is inverted. When combined with the "non-inverted" noise, the two noise signals cancel each other out.

BYTE

A piece of digital information. Much like each word is a piece of an English sentence, a series of bytes typically makes up digital messages. In MIDI, bytes are made up of eight bits, and most messages are two or three bytes in

length. What's a half a byte? A nibble, of course.

CLICK TRACK
Audio "clicks" recorded on one track of a multitrack tape recorder. The clicks indicate the tempo of the music on the tape. These clicks help musicians play with the recorded music, or they can be translated into MIDI sync. (See Synchronization.)

CONTINUOUS CONTROLLERS
A set of MIDI messages, such as Modulation Wheel and Volume, that represent dynamic or continuously changing aspects of a performance. These are the primary means of communicating musical expression with MIDI.

CONTROL VOLTAGE
Electrical signal used to control the values of parameters in analog circuits. By sending a specific (or continuously varying) electrical voltage to an element of the synthesizer, such as a filter, you could describe what you wanted it to do (such as raise or lower the cutoff frequency).

CUE
A section of music or sound effects used in a film or video. A cue can range from a short piece of background music to a complex score. The specific points at which the cues are triggered in order to correspond to visual events are called cue points or "hit" points.

CUTOFF FREQUENCY
The point at which a filter no longer allows frequencies and overtones of a sound to pass. In a lowpass filter, a high cutoff frequency allows most of a sound through and generally produces a bright sound, while a low cutoff frequency blocks most of the sound and produces a muted or plain sound.

DAT
Acronym for Digital Audio Tape, a medium for storage of digital audio on small cassette-like tapes.

DB
Abbreviation for Decibel, a logarithmic expression of a ratio comparing two quantities, such as how much louder one sound is than another, or how much more power is available at the output of an amplifier than at the input. Also used to indicate the amplitude of a signal. (See "The Decibel Demystified" in the April 1990 EM.)

DIGITAL
In essence, having to do with numbers. In electronic music, digital information may describe the waveform of a sound or the nuances of a performance as a series of numbers. The numbers then are translated back into sound or played as a performance on electronic instruments.

ENVELOPE GENERATOR
An electronic circuit or software algorithm that changes parameters over time. A sound's volume envelope will determine the different volume levels of a sound from the point it is first played until it is no longer heard. A filter envelope similarly will determine the changing brightness of a sound over time. (See ADSR, Amplifier, Filter.)

EPROM/EEPROM
An acronym for Erasable Programmable Read Only Memory. This is a type of computer chip that can be loaded with digital information (perhaps a sample of a sound) and later erased and loaded with new information. Standard EPROMs are erased under exposure to ultra-violet light. A newer version, EEPROM (Electrically Erasable Programmable Read Only Memory), can be erased by an electrical voltage, making the chips much easier to update.

FILTER
A device that removes, or "filters," certain elements or data from an audio waveform or datastream. In a synthesizer, a lowpass filter allows low frequencies to get through while inhibiting higher frequencies; a highpass filter does just the opposite. A bandpass filter allows the frequencies within a specified range to pass, while a notch filter blocks the frequencies in a specified range (see Cutoff Frequency). A MIDI data filter removes certain messages from the MIDI datastream.

FSK
Acronym for Frequency Shift Keying. FSK is an audio tone typically generated by a sequencer, drum machine, or computer MIDI interface that is recorded on one track of an audio tape for

With NRI hands-on training, you can experience the rewards of a career in computer programming

NEW! 386sx mini-tower computer!

Now you can get the practical training and experience you need to succeed in computer programming, today's top-growth computer career field.

NRI at-home training gives you real-world programming skills in four of today's hottest computer languages: BASIC, Pascal, C, and COBOL. You get hands-on training that now includes a powerful 386sx/20 MHz mini-tower computer, modem, and programming software ... all yours to train with and keep! Best of all, NRI gives you the programming know-how you need to succeed on the job, in a new career, or in a business of your own.

Job opportunities for the skilled computer programmer will increase by 71.7 percent over the next 10 years according to Bureau of Labor Statistics forecasts. And now, with NRI training, you can be one of the increasing number of computer programmers using their skills to build a top-paying career — even a business of their own — in this professionally and financially rewarding high-tech field.

▼ The only programming course that includes a powerful 386sx-based computer system and programming software you keep

Right from the start, NRI training gets you actively involved in the challenge of real-world programming. You learn how to create the kinds of full-featured, powerful programs today's employers and clients demand. And, unlike any other school, NRI lets you experience first-hand the power of an IBM PC/AT-compatible, 386sx-based computer system, complete with modem, a full megabyte of RAM, disk drive, and monitor — all yours to train with and keep!

Plus you explore the extraordinary capabilities of not one or two but four in-demand computer languages. You learn to design, code, run, debug, and document programs in BASIC, Pascal, C, and COBOL. In the process you become uniquely prepared for the wide variety of programming opportunities available today.

▼ No previous experience necessary

Immediately, you start getting the money-making job skills you need to secure a future in computer programming — no matter what your background. NRI's unique Discovery Learning Method guides you swiftly from computer novice to computer professional with step-by-step lessons covering program design techniques used every day by successful PC programmers.

You'll find no heavy textbooks to plow through. No night classes to attend. Instead, NRI's at-home, step-by-step training covers all the bases, guiding you from the important fundamentals to real-world methods and techniques. Backed up throughout your course by your experienced NRI instructor, you quickly gain the skills you need to handle a wide variety of programming tasks with confidence. You even use your modem to "talk" to your instructor, meet other NRI students, and download programs through NRI's exclusive programmers network, PRONET.

▼ Send today for your FREE catalog

Now you can experience the professional and financial rewards of a career in computer programming. See how NRI at-home training gives you the know-how, the computer, and the software you need to get started in this top-paying field. Send today for your FREE catalog!

If the coupon is missing, write to us as the NRI School of Computer Programming, McGraw-Hill Continuing Education Center, 4401 Connecticut Avenue, NW, Washington, DC 20008.

SEND FOR YOUR FREE NRI CATALOG TODAY!

NRI Schools
McGraw-Hill Continuing Education Center
4401 Connecticut Avenue, NW, Washington, DC 20008

☑ Check one free catalog only

- ☐ **Computer Programming**
- ☐ Microcomputer Servicing
- ☐ PC Applications Specialist
- ☐ Programming in C++ with Windows
- ☐ Desktop Publishing & Design
- ☐ Bookkeeping and Accounting

Name _____ Age _____
(please print)

Address _____

City _____ State _____ Zip _____

Accredited Member, National Home Study Council

5466-022

synchronization purposes. The tone alternates between two frequencies, and the rate of alternation indicates the tempo of the music being used as a reference. FSK can be used to synchronize MIDI sequencers and drum machines to tape machines. (See Synchronization, Synchronizer.)

HERTZ (HZ)
The measure of the frequency of a vibrating object, such as a guitar string or speaker cone. Equivalent to cycles per second. The human range of frequency perception is about 20 Hz to 20,000 Hz (or 20 kilohertz, abbreviated kHz).

LFO
Acronym for Low Frequency Oscillator. A circuit that produces an alternating signal at a frequency typically below the human threshold (1 to 15 Hz). Used to create effects such as vibrato, tremolo, and wah-wah. (See Modulation, Oscillator.)

MASTER
Term used to indicate the controlling instrument in a system. If the MIDI Out of synth A is connected to the MIDI In of synth B, synth A is the "master" and synth B the "slave." (See Slave.)

MIDI
Acronym for Musical Instrument Digital Interface. A digital communications protocol developed in the early 1980s that allows electronic musical instruments and computers to communicate with each other. The protocol consists of a set of messages that represent various aspects of a musical performance.

MIDI CHANNEL
A logical division separating MIDI messages, which allows multiple instruments to be addressed independently over a single MIDI cable. Most messages are sent on one of sixteen channels. Instruments can be set to respond to specific channels, allowing them to play certain parts and ignore others.

MIDI CLOCKS
Also known as "MIDI Sync." A set of messages that communicate tempo and timing information between instruments in a MIDI system. (See Synchronization.)

MIDI INTERFACE
A hardware device that connects to a personal computer and translates MIDI into a format it can understand.

MIDI MODE
An operational state that determines how an instrument will respond to incoming MIDI messages. In Omni mode, an instrument responds to notes on all channels. In Poly mode, the instrument plays multiple notes simultaneously. In Mono mode, the instrument plays only one note at a time.

MIDI TIME CODE (MTC)
A set of MIDI synchronization messages that correspond to SMPTE time code. MTC allows MIDI software to synchronize more easily with time code recorded on film or video tape. (See SMPTE, Synchronization.)

MILLISECOND
One thousandth of a second.

MODULATION
A term used to describe the process by which one element affects another. For example, a low-frequency oscillator modulating a filter's cutoff frequency makes the sound duller or brighter. An envelope generator modulating an amplifier will cause the sound's volume to change over time. (See Envelope Generator, LFO.)

MULTITIMBRAL
A term used to describe a MIDI synthesizer that can respond to multiple MIDI channels simultaneously and thus play many musical parts at one time. One multitimbral instrument, for example, could simultaneously play piano, strings, brass, and drum parts.

NOTE OFF
A MIDI message used to instruct a MIDI instrument to stop playing a particular note. For example, a Note Off message is sent when you release a key on a MIDI keyboard.

NOTE ON
A MIDI message used to instruct a MIDI instrument to play a particular note. For example, a Note On message is sent when you strike a key on a MIDI keyboard.

OFFSET
The difference in time between two

SOUND CHOICES

A system of digital effects processors that adds spectacular sonic enhancement to your performance or production.

Lexicon's LXP Series digital multi-effects processors combine Dynamic MIDI® effects automation, spectacular effects, 128 user memories, and of course, the legendary Lexicon Sound. Add Lexicon's MRC MIDI Remote Controller, and you have a multi-effects system with an unprecedented range of control. The newest member, the LXP-15, enhances the series even further.

The LXP-15: Simply Brilliant
You don't need a photographic memory or a degree in computer science to get the most from the LXP-15. It was designed to bring its incredible range of effects to everyone. The LXP-15's effects programs include pitch-shifting, stereo delays, gate, plate, and Lexicon's renowned reverb. Best of all, the LXP-15 makes it fast and easy to let them work for you.

For performance freedom without MIDI, the LXP-15 has external inputs for use with most foot switches or pedals. These inputs can be patched to any of the LXP-15's effects parameters. You can even use them together with Dynamic MIDI for superb effects control.

The LXP-1: Small But Mighty
The half-rack LXP-1 gives you access to Lexicon's repertoire of renowned digital reverberation programs, and delay, gate, and chorus programs as well. All via simple controls that let you adjust two parameters for each effects program. The LXP-1 is the essential, fundamental component of the LXP Series.

The LXP-5: Sensational Sound
The LXP-5 complements the LXP-1 with an additional 64 preset effects, including pitch-shift over three octaves, dramatic stereo delay, flanging, chorusing, and a wide array of reverb too. You can access every effect's parameters from the LXP-5's front panel, for a breathtaking spectrum of control. And combine this versatile processor with the LXP-1, and you fill a single rack space with incredible power and performance.

MRC: MIDI Mission Control
The LXP-1 and LXP-5 are formidable in their own right. But add Lexicon's MRC MIDI Remote Controller, and you have a commanding ensemble of networked effects. The MRC also simplifies programming and control of all your MIDI gear, up to 16 MIDI devices simultaneously.

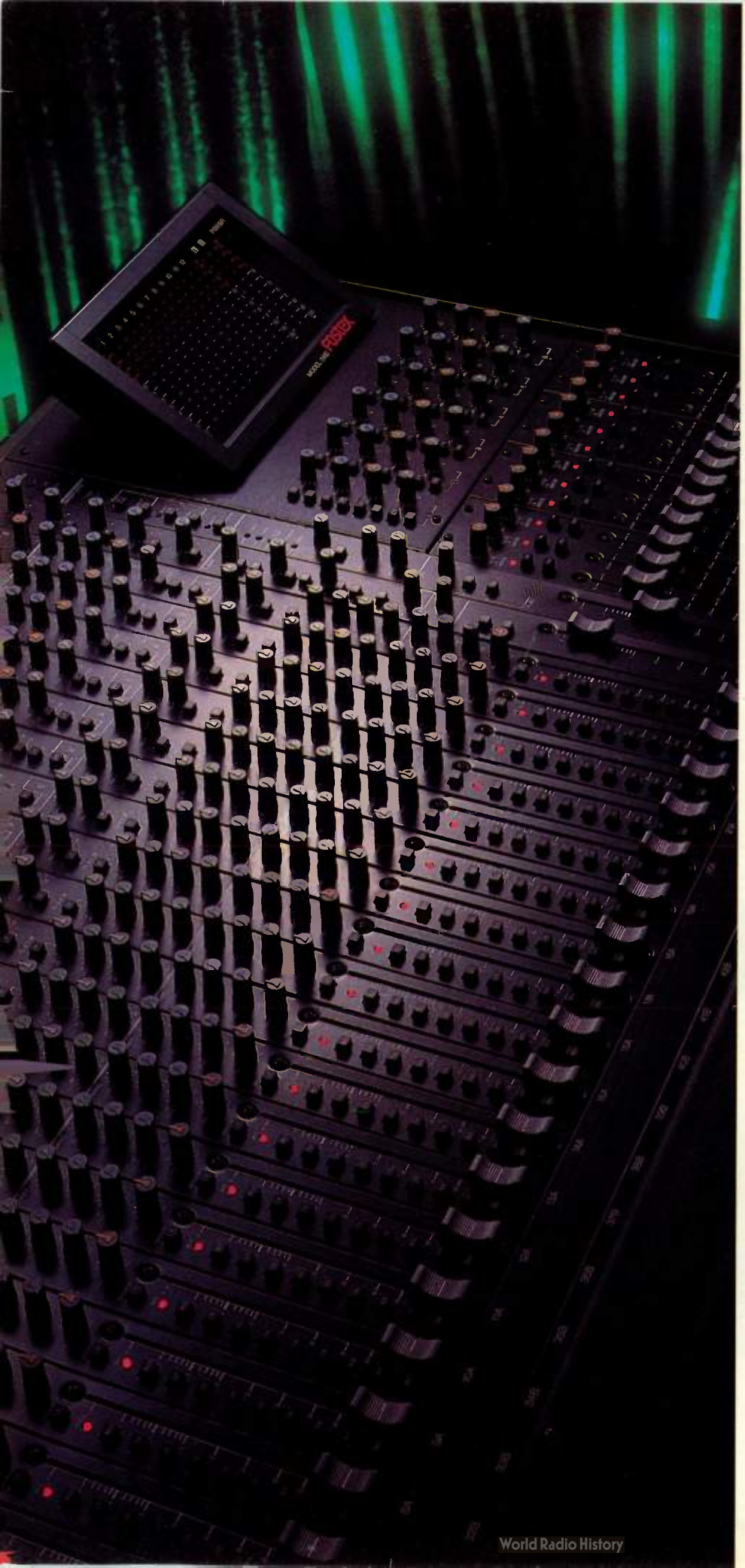
The LXP-1, LXP-5, LXP-15, and MRC are powerful tools for the producer, engineer, or musician. You can't help but make the right choice.

For more information about the LXP Series, call us at (617)736-0300, FAX (617) 891-0340, or write Lexicon Inc., 100 Beaver St., Waltham, MA 02154.

Dynamic MIDI is a registered trademark of Lexicon Inc.

Lexicon
The Art and Science of Sound

Please see us at NAMM Booth #1353.



The compact new 2412 mixer from Fostex combines flexible functionality with efficient use of space. Designed for project studios and personal facilities, the 2412 represents a new dimension in creative freedom.

How Fostex Sizes Up.

NUMEROUS MIXING OPTIONS.

The 2412 is a 24x12x2 recording console that features multiple inputs and dual mixing paths in a chassis only 22" deep. Both mixes have EQ and effects processing. A total of 58 inputs can feed the stereo mix—a unique capability in such a compact console.

STATE-OF-THE-ART CONTROL.

We offer MIDI-automated muting, six effects returns, 12-buss configuration and proprietary Fostex faders for smooth operation. It all adds up to flexibility that gives you greater control.

SEE FOR YOURSELF.

Visit your authorized Fostex dealer and get a complete 2412 demonstration. You'll be surprised at how well we size up to the competition.

FOSTEX

events or series of events. For example, if you record a piece of music that starts at one SMPTE time, and you intend to use it in a film where it should start at a different time, the offset is the difference between those two times.

OSCILLATOR

A circuit in a synthesizer that typically generates an alternating, or "oscillating," voltage (analog synths) or series of numbers (digital synths) at a specific frequency. This produces a waveform that can be processed by filters and amplifiers. (See Amplifier, Filter, Waveform.)

PARAMETER

A "variable element," according to Webster. If you've ever programmed a synthesizer, you know there are many different aspects of the sound to specify, such as waveform, envelope attack, or velocity response. Each of these aspects is one of many parameters that, when combined, make a finished sound or patch. (See Patch, Program.)

PATCH

A specific set of parameter values on a synthesizer that create a specific sound. Derived from early synthesizers that used "patch cords" to connect different elements. (See Parameter, Program.)

PCM

Acronym for Pulse Code Modulation, one of the most common techniques by which an acoustic sound or analog signal is converted into digital information. (See Sample.)

PPQN

Acronym for Pulses (or Parts) Per Quarter Note. The ppqn of a MIDI sequencer or tape synchronization device indicates the accuracy or "resolution" with which it can represent a performance or communicate a tempo. MIDI clocks are generated at a rate of 24 ppqn (which corresponds to an accuracy of 32nd-note triplets), but many computer-based sequencers feature rates as high as 480 ppqn. (See Resolution.)

PROGRAM

One of many terms used to indicate a particular set of parameters on a synthesizer or signal processor. Also known as a "patch." (See Parameter, Patch.)

PROGRAM CHANGE

MIDI message used to tell an instrument to change to a new program. The Program Change message can specify 128 different programs.

QUANTIZE

An operation that aligns notes recorded in a sequencer onto a rhythmically exact timing grid. Quantization allows you to "clean up" the timing of your performance by making sure that all of the notes line up with specific rhythmic divisions, such as quarter notes, eighth notes, sixteenth notes, etc.

RAM

Acronym for Random Access Memory, a type of storage medium for microprocessor-based devices such as synths and computers. The most common

forms are dynamic and static RAM. Dynamic RAM is temporary memory that only holds data when the device is turned on. Static, or battery-backed, RAM is semi-permanent memory that holds data as long as it has power, generally from a battery.

REAL TIME

The act of recording or manipulating something as it occurs. Playing a part "on the fly" is an example of real-time recording; editing or recording a performance note by note is not. The latter is typically called "step-time" recording. (See Sequencer, Step Time.)

RESOLUTION

1) The rhythmic accuracy with which a sequenced performance can be recorded. Resolution is typically measured in pulses per quarter note. A higher resolution will result in a more accurate representation of the performance. (See PPQN.) 2) The number of bits used to represent a sample. A higher sample resolution will result in a more accurate representation of the dynamic range of the sampled sound. (See Sample, Sampler, Sampling Rate.)

ROM

Acronym for Read Only Memory. ROM typically is used to store data on a computer chip that can be used but not changed. ROM cards allow you to load new sounds into a synthesizer, but sounds in ROM cannot be overwritten.

SAMPLE

A digitally recorded sound. When sampling a sound, the waveform is analyzed and converted into a series of numbers. This digitally represented waveform then can be manipulated in various ways using a synthesizer or computer. (See Resolution, Sampler, Sampling Rate.)

SAMPLE DUMP STANDARD

A set of MIDI System Exclusive messages that allow digital samplers from different manufacturers and computers to exchange sampled sound information. (See System Exclusive.)

SAMPLER

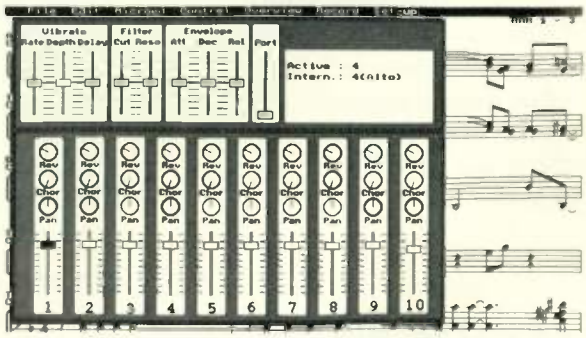
A device that can digitally record a sound and play that sound back from a keyboard or in response to MIDI messages. (See Resolution, Sample, Sampling Rate.)

SAMPLING RATE

The rate at which an incoming sound wave is "examined" to produce a number representing the instantaneous level of the waveform at that moment. Typical sample rates range from 11 kHz to 48 kHz. Higher sampling rates result in more accurate and often better-sounding samples. (See Resolution, Sample, Sampler.)

SCSI

Acronym for Small Computer Systems Interface. A computer interface specification for connecting up to eight devices together in a system. Typical SCSI devices include hard disks, removable cartridge storage devices, or optical storage media for digital data. Many samplers have SCSI ports and thus provide the ability to add



The Mixer lets you change Volume, Pan, Chorus, Reverb and GS-parameters as the music is playing. The Drum Mixer (not shown) lets you change Volume, Pan, Pitch and Reverb for each individual drum (GS-instruments only).

hard drives for additional storage.

SEQUENCER

A MIDI recorder that stores every element of a musical performance as a series of individually editable events. Sequencers can be hardware- or software-based. Hardware sequencers are stand-alone devices that can record, edit and play back MIDI information. Software sequencers are programs running on personal computers that provide the same functionality and often include additional features. (See Real Time, Resolution, Step Time, Synchronization.)

SLAVE

A device that only responds to information received from a controlling device. (See Master.)

SMPTE

Acronym for Society of Motion Picture and Television Engineers. It is commonly used to specify SMPTE time code, a method of representing hours, minutes, seconds, and frames on film, video, and audio tape. This timing reference then can be used to synchronize music to the film/video. (See MIDI Time Code, Synchronization.)

SONG POSITION POINTER

A MIDI message used to indicate a specific point in a song, typically to indicate the point from which to start playing. An intelligent tape synchronization device uses Song Position Pointer (SPP) messages to tell a connected MIDI sequencer where to begin playing in a sequence by reading the sync code recorded on the tape and converting it into the appropriate SPP message. (See Synchronization.)

S/PDIF

Acronym for Sony/Philips Digital Interface. A "consumer" digital audio interface standard. (See AES/EBU.)

STEP TIME

The act of recording or manipulating something one step at a time. An example of Step Time includes editing or recording a sequence note by note. (See Real Time, Resolution, Sequencer.)

STRIPE

Recording a synchronization signal onto a tape track. (See FSK, SMPTE.)

SYNCHRONIZATION

The process of ensuring that multiple devices in a music system, such as tape decks, sequencers, and drum machines, have the same timing and control reference. Typically, this means starting and stopping at the same time and playing at the same tempo. Various synchronization schemes include click tracks, FSK, MIDI sync, and SMPTE time code. (See Click Track, FSK, MIDI Clock, SMPTE.)

SYNCHRONIZER

A device that allows you to coordinate the operation of multiple devices, including tape recorders and sequencers, as a system with a common clock reference. Machine synchronizers allow you to simultaneously run the transport controls of multiple tape recorders, and MIDI synchronizers translate SMPTE or FSK into MIDI Song Position Pointers or MIDI Clocks. (See FSK, MIDI Clock, SMPTE).

SYNTHESIZER

An electronic musical instrument that can generate or "synthesize" complex waveforms (as opposed to a sampler, which records external waveforms). Synthesizers often include keyboards, but keyboardless synthesizers or expanders also are common. Most post-1983 synthesizers include a MIDI interface. (See Amplifier, Envelope Generator, Expander, Filter, LFO, Modulation.)

SYSTEM EXCLUSIVE

Set of MIDI messages with which a device or computer program can send information particular to one specific instrument or family of instruments. System Exclusive, or SysEx, also is used for various complex messages in MIDI such as the Sample Dump Standard and MIDI Show Control. (See Sample Dump Standard.)

TRACK

In essence, a place to store information. On a multitrack tape recorder, you typically have four, eight, or 24 tracks on which to record individual parts. With MIDI, it gets a bit more complex. A track in a MIDI sequencer can hold MIDI data that usually is sent on one specific MIDI channel. However, MIDI tracks and channels are not synonymous. One track can hold information on many MIDI channels, and a number of tracks can be set to a single MIDI channel. (See MIDI Channel, Sequencer.)

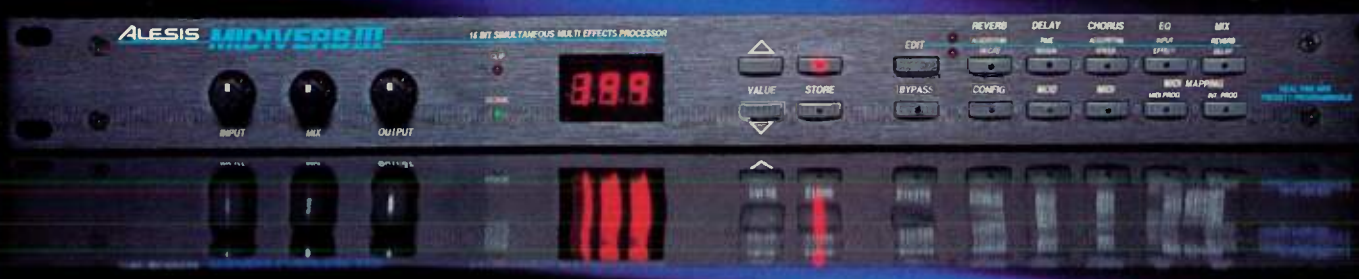
VELOCITY

An aspect of MIDI note messages that indicates how fast a note is attacked. In the case of a keyboard, it measures how fast a key travels down (Velocity) or up (Release Velocity). It is not to be confused with aftertouch, which measures how hard a key is pressed after the note has been played. (See Aftertouch.)

WAVEFORM

Sound is made up of repeating pressure waves moving through the air. A waveform is a description of a single cycle of the sound wave. Waveforms can be created by synthesizers or recorded by samplers.

Lachlan Westfall *is the president of the International MIDI Association.*



Take Control

When factory presets alone are just not enough. When you know it's time to exercise more control over the sound of your music. Move up to **MIDIVERB®III.** The powerful simultaneous multi-effects processor that's the latest incarnation of the award winning* MIDIVERB from Alesis.

We know better than anyone else how to make great sounding digital effects. That's why MIDIVERB III has 200 programs in 16 bit stereo with 15kHz bandwidth. And features the kind of programmability you need to create powerful mixes. All this and 4 effects at the same time make MIDIVERB III the first choice in digital processing.

For the ultimate in creativity, MIDIVERB III's extensive MIDI control lets you alter effects in real time while you're mixing or performing. Control reverb decay time with aftertouch. Alter the modulation speed of the chorus with a foot controller. Record the changes into your sequencer for an automated mix. This is the kind of control you need to make a personal statement with your music.

It's time to stop compromising. Get on the inside of your effects processing. Take control of a MIDIVERB III at your Alesis dealer now.

** Midiverb II won the prestigious 1988 TEC Award for technical achievement.*

Alesis Corporation 3630 Holdrege Avenue Los Angeles CA 90016

ALESIS
STUDIO ELECTRONICS

Standard MIDI Files

By David (Rudy) Trubitt

With the help of meta-events, SMFs make it easy to share your musical creations.

SUSAN GROSS

Virtually all sequencer manufacturers and developers now support Standard MIDI Files, and with good reason. They provide the easiest way to transfer sequences between different programs (including notation packages) and different computers. Standard MIDI Files (SMFs) also have encouraged the development of algorithmic composition, drum-pattern programing, and other types of esoteric software. SMFs make it a snap for these programs to export the music they create into general-purpose applications. (For a detailed review of the SMF spec see "Introducing Standard MIDI Files" in the April 1989 **EM**.)

This month, I'll look at the SMF format and how it's being implemented by commercially available sequencer and notation programs. As you'll see, this implementation varies widely.

SMF CITY

SMFs include two types of data: MIDI and non-MIDI. Not surprisingly, MIDI performance data and any related SysEx make up the majority of most files. (Not all SMF-compatible sequencers can read SysEx, however.) SMFs also can include special non-MIDI information called meta-events (see sidebar, "Meet the Meta-Events"). Meta-events include things such as track names and tempo and time signature changes. As with SysEx, support for these meta-events is not universal, but this doesn't mean you won't be able to hear your music after a transfer. It simply will confuse matters.

Here's a common problem: You transfer an SMF from one sequencer to another, and you lose your track names and tempo changes. Which sequencer is to blame? Your first test should be to create an SMF in the source sequencer and import it back into the same sequencer. Any information lost during this out-and-right-back-in transfer probably was not put into the SMF by your sequencer in the first place, so there's no point in blaming the second sequencer for "ignoring" nothing. This test also will show you if different tracks assigned to the same channel are merged and what happens to looped tracks in the SMF.

If this test leaves the track names and tempo changes intact, shift your focus to the second sequencer. Two options are possible: Either the second sequencer doesn't support these messages, or the information is being encoded into a different type of meta-event than the sequencer expects. For instance, track names have their own track-name meta-event, but some programs use the text meta-event instead. If the source sequencer stores them as text and the destination looks for them as track-name events, they'll be lost in the translation. Some programs offer the thoughtful option of selecting text or track-name events for onscreen track names so you can work around the limitations of other programs.

Very few programs support all, or even most, of the currently defined meta-events. (One exception is Opcode, who was instrumental in the adoption of the SMF format. *Vision's* meta-event support is complete.) Although support for all events is not a requirement for a "proper" implementation of SMFs, the more the better.

That said, there are some parts of the SMF 1.0 spec that have never caught on. For example, most programs support both format 0 and format 1 files, which represent single-track and multitrack sequences, respectively. However, almost no one supports format 2 SMFs, which are akin to a collection of format 0 sequences in a single file. Within SMFs, the time between events

Automatic Accompaniment has arrived – ...and just got better with Version 5

BAND-IN-A-BOX™

INTELLIGENT SOFTWARE FOR IBM, MAC & ATARI COMPUTERS

Type in the chords to any song, choose the style you'd like and Band-in-a-Box does the rest...

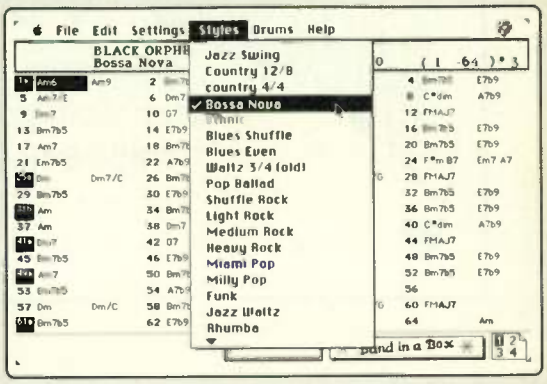
Automatically generating professional quality five instrument accompaniment of bass, drums, piano, guitar & strings in a wide variety of styles

24 Styles built in...

Jazz Swing • Bossa • Country • Ethnic • Blues Shuffle • Blues Straight Waltz • Pop Ballad • Reggae • Shuffle Rock • Light Rock • Medium Rock Heavy Rock • Miami Sound • Milly Pop • Funk • Jazz Waltz • Rhumba Cha Cha • Bouncy 12/8 Irish • Pop Ballad 12/8 • Country (triplet)

Version 5: 2 more instruments + built-in sequencer...

The built-in sequencer lets you record melodies (or buy our MIDI-FAKE-BOOK disks which include chords & melodies). Also make your own 5 instrument styles using the StyleMaker™ section of the program – or edit our styles to your tastes. Now there are 5 accompaniment instruments (including guitar/strings). General MIDI standard implementation (even for old synths). Plus 70 other new features!



1990
– FINALIST –
PC Magazine Award
for Technical Excellence

AFTER HOURS/ENTERTAINMENT
Band-in-a-Box
PG Music

WE DIDN'T SAY IT... PC MAGAZINE DID!

"This amazing little program from PG MUSIC creates "music-minus-one" accompaniments for virtually any song any style. You simply type in the chords, pick a tempo and one of 24 styles, and the program creates nicely embellished chords, a bass part, and drums to be played on a MIDI synthesizer. ***Band-in-a-Box understands*** *repeats, choruses and verses, and even varies the accompaniment, just as human musicians would. Peter Gannon, the author of the program makes no claim to artificial intelligence, but Band-in-a-Box is software that repeated surprises and delights you, especially in its jazz styles."*

PC Magazine Jan. 15, 1991
Technical Excellence Awards

DownBeat – the #1 Jazz Magazine says...

"Band-in-a-Box is the most significant contribution to Jazz Education since Jamey Abersold Records."
DownBeat October 1991

"I can't imagine a better way to spend $59."
Electronic Musician October 1990

"One of the neatest programs I've seen in a long time."
STart magazine 1990

"Every studio teacher and songwriter needs to own Band-in-a-Box."
Music Paper Magazine August 1990

Standard Edition *(24 styles)*	$59
Professional Edition *(75 styles)*	$88

ADD-ONS FOR REGISTERED USERS

NEW! *Upgrade to Ver. 5 for registered users*	$29
NEW! *Midi-FakeBook with Melodies (100 songs on disk)*	$29
NEW! *Styles Disk #2 – 25 new styles for Ver. 5*	$29
Any 2 of above	$49
Any 3 of above	$59

IBM with MIDI *– 640K, MIDI (any MPU 401 / Midiator / YamahaC1 / SoundBlaster MIDI)*
IBM with no MIDI *– 640K + AdLib / SoundBlaster (reduced version)*
MACINTOSH *version REQUIRES 2 mb RAM (reduced version for 1 mb included)*
ATARI *1040ST / 1040STE / Mega / TT – reduced version for Atari 520 included*

– 30 day Unconditional MBG –

MasterCard
VISA

TO ORDER TOLL FREE:
1-800-268-6272 or 416-528-2368
to hear recorded demo ***416-528-2180*** *(24 hours)*
or send cheque/m.o.
for $59 + $3.50 shipping to: ***PG Music Inc.*** *111-266 Elmwood Avenue, BUFFALO NY 14222*

can be expressed as fractions of a quarter note, or in a time code-based representation. But support for time code-based SMFs is almost non-existent. There are orphans among the meta-events as well. Support for cue points, SMPTE offsets, and lyrics are rare.

SHUTTLE DIPLOMACY

Lost meta-event information can be replaced manually once you've loaded the sequence, but if you're sending the same SMF back and forth repeatedly, you'll have to make the fix each time. Unfortunately, not much can be done to avoid this, but knowing which events will and won't survive the transfer can help you choose the way you annotate your sequences.

Here are a few problems you may come across. Consider a sequencer that reads cue or marker events but transforms them into text events. If you write that sequence as an SMF, the resulting file won't have any marker events in it—they'll be mixed in with other text events in the sequence. Data also can vanish when the program preserves only the first or last instance of a particular meta-event. For example, *Texture* recognizes tempo change events, but only the first one in a file. Similarly, *Cadenza* only preserves the last text event it receives on a given track, discarding all earlier ones. *Cakewalk* only recognizes the first key signature event.

In order to read tempo-change and time-signature information correctly, some programs require these "conductor" events to appear in the first track (in fact, the SMF spec recommends this). A related situation occurs with Dr. T's *KCS* and *Tiger Cub* sequencers. These programs assume that the conductor track is as long as the longest track in the sequence. If the incoming SMF has only one tempo event at the beginning of the sequence, the programs will appear to get stuck on the first note because they will think that represents the end of the sequence. You can work around this problem by lengthening the conductor track after loading the SMF.

Different internal resolutions can also result in a round-off error between sequencers. For instance, 192 ppqn does not divide evenly into 480 ppqn, and moving sequences between these resolutions can cause notes to be shifted slightly.

COMPUTER TRANSLATIONS

As you've seen, moving SMFs between programs on a single computer isn't necessarily trivial. But what about moving an SMF to a different type of computer? You could always just connect the MIDI Out of one computer into the MIDI In of another and not use SMFs, but even if you've got the two computers in the same room, that's not the most accurate method. Two better approaches are serial transfer—through a direct cable, via a network, or via modem—and floppy-disk exchange.

If you have the appropriate transfer software, serial transfers should be straightforward. However, you must be careful to use a file transfer protocol that preserves the integrity of binary data files. Never use the protocols intended for "text" files; you'll get garbage.

Floppy-disk exchange can be very easy or more complicated, depending on the computers involved. First, the easy stuff. PCs with 3.5-inch drives and Atari STs share the basic disk format, so SMFs on disk can be easily swapped between these machines. (STs can only read 720K disks, however.) Amiga disk formats also are somewhat similar, but the Amiga requires a special controller board called a Bridgeboard (Commodore's XT model lists for $462 and their AT model is $754) to read and write PC or ST disks.

The Macintosh is a different case, because its disk and file formats are incompatible with PCs. Thankfully, you can overcome this incompatibility on either the Mac side or the PC side. First, all of the newer Macs (from the SE/30 onward) are equipped with SuperDrives, which can read and write 3.5-inch DOS format 1.4 MB or 720K disks when used with *Apple File Exchange*, Dayna Communications' *DOS Mounter*, or similar software. Owners of older Macs are stuck spending a fair amount of dough purchasing either an Apple or third-party external Mac drive that can read and write DOS disks. For PCs, Central Point Software (tel. [503] 690-8090 or [800] 445-2110) offers the Deluxe Option Board, which enables your 3.5-inch floppy drive-equipped PC to read and write Mac disks.

Once files have been transferred successfully to a Mac floppy or hard drive, you also have to deal with the Mac's file formats, regardless of whether you used modems, serial cables, or floppy disks to make the transfer. Macintosh files include information on the file type and the file creator in a special header at the beginning of the file (this, by the way, is the information used to determine which document icons are shown on the desktop). Unfortunately, an SMF from a non-Mac computer won't include this "creator" information and will show up as a plain document file on the Mac desktop. Even worse, your Mac sequencer won't even try to open such a file, because it will think (incorrectly) that it doesn't contain the right "type" of data.

Fixing the problem is simple once you know how. Two four-letter codes identify the file's type and creator. Just change the file's type to "Midi" (case-sensitive). This can be done using a number of programs, including Apple's

ResEdit or Central Point's *Mac Tools*. Once you have corrected the problem, your sequencer will let you load the file and begin working. Changing the creator info is not required.

This information also plays a role when you transfer SMFs from a Mac to another non-Mac computer. The 128-

MEET THE META-EVENTS

Here is a list of the meta-events defined in version 1.0 of the SMF spec, along with a brief description of their purpose. In addition, we've listed the percentage of support for the various events, based on an informal survey of 26 software developers. For a more detailed chart showing numerous programs' specific support, write to EM, SMF Chart, 6400 Hollis St., Suite 12, Emeryville, CA 94608.

End of Track (100%) This mandatory meta-event specifies the end of each track.

Sequence/Track Name (80%) This event preserves your descriptive track names.

Set Tempo (76%) Multiple ST events in an SMF affect tempo changes, although not everyone can accept more than one. Some programs also require them to be in track 1.

Time Signature (73%) Multiple TS events are also allowed, although I found occasional problems handling time signatures other than 4/4.

Key Signature (58%) This is useful to notation programs, which, incidentally, support fewer meta-events than sequencers.

Text Event (50%) The most general way to put comments into an SMF is with text events. As mentioned, some sequencers use text events for track names, but a better use of this event is probably for general comments.

Copyright Notice (27%) You could put copyright notices in text events or a track name (although empty tracks with names may be lost in translation). This event is probably of most interest to those who distribute SMFs for sale.

Instrument Name (23%) This meta-event was created to leave a message describing the sort of sound that should be used with a given track. To be safe, you should put that information in the track-name event instead.

MIDI Channel Prefix (19%) A group of subsequent meta-events can be associated with a specific channel or track in a format 0 file with this meta-event.

Lyric (15%) Several notation developers commented on the lyric event's lack of provisions for second and third verses. At a low support rate such as 15%, you'd better send the lyrics in a separate file just in case.

Marker (15%) Designed to mark beginnings of verses, etc., this meta-event has surprisingly low support. Note that some programs, such as Voyetra's *Sequencer Plus*, have markers that are not exported as marker events.

Cue Point (11%) These are like markers, but for "hit points" (car crash, breaking glass, etc.) when synching to video.

SMPTE Offset (8%) With the number of sequencers capable of synching to SMPTE, it's surprising how few packages support this event. Hopefully, this will change. In the meantime, put this vital piece of info in a (non-empty) track name.

Sequencer Specific (8%) Intended for special use with packages that use SMFs as their only file format, this is like a SysEx for meta-events. It is also used by Hybrid Arts' *SMPTE Track* for interface port selection. (A new meta-event for this purpose is under discussion.)

Sequence Number (0%) Last, and apparently least, is the lonely Sequence Number event, which no respondents supported.

byte header containing this data must be deleted before most PC, ST, or Amiga programs can import the file. The deletion can occur either on the Mac before sending the file, or on the other computers with one of many utilities capable of doing the job.

WHAT NEXT?

Standard MIDI Files aren't standing still. One new use has been found by Opcode, whose programs now can cut and paste SMFs to the Mac's clipboard just like any text or graphic. Using the clipboard avoids the extra steps of exporting an SMF to disk and then importing it into the next program. Because the clipboard is a common place for data exchange, other vendors hopefully will follow suit.

Another area being discussed within the software-development community is the transfer of scores between notation programs. The SMF spec is well-suited to the task of exchanging sequences, but falls far short when trying to move traditional notation. For example, there are no MIDI messages to describe stem direction or slur placement, and MIDI's note representation (Note On, Note Off) is fundamentally different than a score's view of a singular note event that embodies duration.

At this point, things could go two ways. Additional meta-events describing more specific notation information could be added to the SMF spec, or an entirely new file format could be developed for exchanging scores. While new meta-events certainly can be added, most notation programs currently support far fewer meta-events than sequencers. However, creating a new format won't be an easy task, as each notation-software developer has developed unique structures for storing scores.

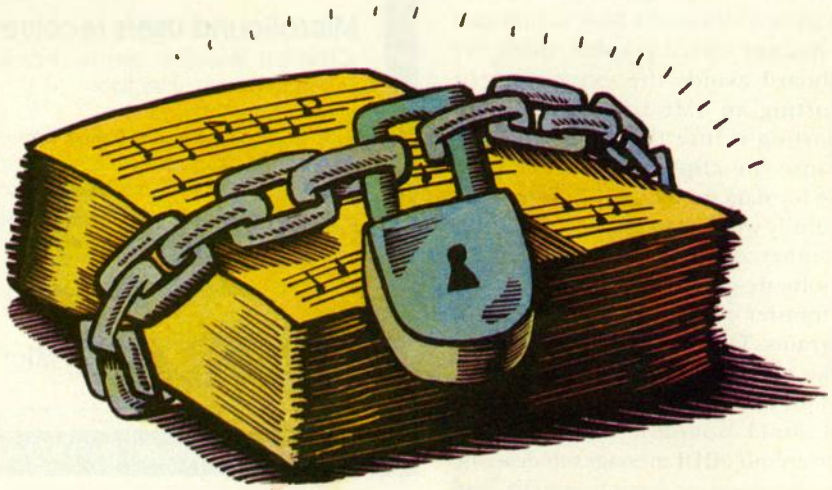
Hopefully, vendors will continue to expand their SMF meta-event support. General MIDI will certainly increase the number of SMF sequences, and better meta-event support will make things easier for users. Despite the incomplete implementations and the potential problems that situation causes, SMFs are a success. When software companies create a framework for cooperation, everyone benefits.

David (Rudy) Trubitt *is the author of* Managing MIDI, *available from Alfred Publishing.*

Comprehending Copyright

By Michael A. Aczon, Esq.

Ignorance of this law can arrest your career.



RANDY LYHUS

Somewhere between the first clumsy entry of an idea into your sequencer and your tenth platinum album, you'll have to deal with copyright of musical works. Electronic musicians are surrounded by copyright issues, from the ownership of software to the ownership of lyrics. While this article is not intended as a definitive reference, it should reveal this law's importance to your career.

The United States Copyright Law is found in Title 17 of the United States Code, a dry piece of work with a supporting body of extraordinary case law. The cast of copyright-infringement actions range from major record labels to *Mad* magazine to famous artists in every field of expression.

WHAT IS COPYRIGHTABLE?

A copyrightable work is the expression of ideas, not the idea itself. For instance, developing an idea for a rock song about a girl named Susie entitled "Eighteen-Wheelers From Kentucky" does not entitle you to file copyright-infringement actions against every composer who lamented a girl named Susie, invoked the state of Kentucky, or worshipped big trucks in their songs. However, once the idea is fixed in a tangible medium (a demo tape, lyric sheet, or sequencer file), the work is copyrightable. Titles of songs are generally not copyrightable, as they rarely express a complete idea.

There also is confusion over the distinction between the copyright of musical works and the right to copyright master recordings, included in the copyright law as a protection against counterfeiting. Musicians need to understand that the right to own a composition (song) is distinct from the right to own a recording (i.e., a master tape or phonorecord. Phonorecord is defined as "the physical object which embodies the work of authorship," such as compact discs, tapes, or records.)

Let's say you decide to produce a CD of your own compositions along with a cover version of "Revolution" by The Beatles. Upon completion of the project, you would own the rights to your master tape and the rights to your compositions. However, simply recording "Revolution" does not give you the rights to the Lennon-McCartney song, just the rights to your *master recording* of their composition. The sale of your CD is subject to payment of royalties to the copyright holder.

CREATIVE DIVISION

When it comes to songwriting and copyright, collaboration can be a scary subject. I've witnessed a number of disputes over song ownership when groups compose by jamming together, or when writers shuffle parts. ("I've got a great rhythm track; can you write a melody and lyrics over it?") Collaborators often forget the importance of converting creative contributions to a finished work into percentages of ownership. It's difficult to decide—especially *after* a song sells 1 million records—whether to attribute the work's popularity to its cool bass line, lyrics, vocal melody, or sensual synthesizer licks.

Creative isolation prevents song-ownership conflicts, but it is hardly fun (or practical) for most composers to write in exile. It's better to forge a written agreement with collaborators, particularly if there is to be an uneven distribution of royalty income. This agreement should include a detailed description of each writer's contribution, the percentage of ownership earned by that

contribution, whether one writer has the authority to speak for the other, and what happens if the original work is altered (or if it *can* be altered).

Of note here is the concept of a "work for hire" arrangement. If a composer is commissioned by a third party to create a work, the registered owner and "author" of the copyright is the third party who commissioned the work. Be sure to immediately establish whether your commission is a work for hire. If it is, you won't own any of the compositions you are contracted to write.

FORMALITIES

Registering your composition with the Library of Congress gives it a recognized proof of ownership and avails the copyright holder a number of legal remedies should his or her rights be compromised. Registration of a work requires filling out form PA, available from the Register of Copyrights (Publications Section, LM-455, Copyright Office, Library of Congress, Washington, D.C. 20559; forms hotline tel. [202] 287-9100), along with the score or recording. Your nearest federal government printing office or a local entertainment lawyer also may dispense these forms. The current registration fee is $20.

People often ask if they can save registration fees by mailing a tape to themselves in a sealed envelope, or registering all their songs under one song title. However, while these methods are legally acceptable as alternatives to registration, they should be undertaken with caution.

If you do not register your work with the Library of Congress, certain remedies, including statutory money damages, may be unavailable should someone infringe on your copyright. Also, registering a number of songs under one title may cause the transfer of rights to all songs registered on the same form, when a third party may intend to buy only a single work. The general rule is that the investment in correctly registering your songs is minute compared to the costs of protecting unregistered work should a dispute arise.

THE COPY "RIGHTS"

The copyright holder of a musical work is entitled to a number of exclusive rights, which include: reproducing the work in copies or phonorecords, preparing derivative works, distributing copies or phonorecords by sale or other transfer of ownership, performing the work publicly, and displaying the work publicly.

An infringement of any of these rights entitles the copyright holder to take action for copyright-infringement. Two factual elements are necessary to prevail in a copyright-infringement action: a substantial similarity in the infringing work with the original work, and proof the infringing party had access to the original work.

SOURCES OF INCOME

From the exclusive rights granted by the copyright law arise four major sources of income for the copyright holder.

Mechanical income. A license issued for the use of the composition on a mechanical device, such as a CD, cassette, or DAT tape. The mechanical license fee is a statutory rate (presently 5.7 cents per record sold) that can be negotiated with the user. This is the

most identifiable and substantial source of income for copyright holders. A platinum album (1 million units sold) containing ten songs licensed at the full statutory rate generates $570,000 in mechanical royalties.

Performance income. These royalties are derived from the performance of compositions, usually on radio and television. However, royalty payment obligations have expanded recently to include exercise classes, restaurants, and telephone "on-hold" music. Performance royalties are collected for composers and publishing companies by performing rights societies. The most notable of these are SESAC, BMI, and ASCAP.

Print income. When sheet music and compilations of printed versions of compositions are manufactured and sold, a royalty is earned by the copyright holder.

Synchronization income. Utilization of a composition in movie, video, or television programming requires a "sync license." This is a negotiated license based on a number of variables, including how much of a hit the song is, the duration of use, how the work is used, and who is using the composition. It is not unusual for a hit song utilized on a multi-year ad campaign for a major product to garner a six-figure fee for the sync rights alone. Note that this income is separate from the performance income, which is earned on top of the sync fee.

SIGNING OFF

Until the copyrights are transferred to a third party, they remain the exclusive rights of the original composer/copyright holder. The transactions of all of these rights and the income derived from them translate into the multi-million dollar industry of music publishing. This is the *real* big game in the music industry. It's also a deep and complicated business that can confuse even experienced industry veterans. Hopefully, this brief overview of copyright law entices you to do some additional research. If you want to pursue a career in the music industry, knowledge is power.

San Francisco-based attorney **Michael A. Aczon** *has chaired numerous music business panels. Among others, he has worked with Tony! Toni! Toné! and Tommy Boy rap artist Paris.*

In Good Voice

By Scott Mathews

Sometimes the greatest vocal takes are mistakes.

RANDY LYHUS

True story: Many years ago, Paul McCartney produced an album for his younger brother, who avoided apple-to-apple comparisons by calling himself Mike McGear. During a vocal session, Paul ordered a large cardboard box brought to the studio. Imagine the nervous glances when Paul grabbed a microphone, climbed inside the box with wife (and background vocalist) Linda, and started to sing. I can just hear Mac #1 assuring his brother, "Don't worry mate, this is how we cut all those Beatles records." (Well, maybe Ringo's tunes.)

The moral of this story is, whatever works, works. Paul's cardboard isolation booth probably horrified the session engineer, but the result may have produced a strange and wonderful vocal sound. (Unfortunately, history is hazy on this one.)

Admittedly, the law of averages is on the side of conventional recording practices. Industry standards have been honed by decades of trial and error, and the unassailable facts are that professional methods yield professional results. But the path of convention is not the only road to great sound, and never is the mix of imagination and technique more critical than when recording vocals.

ALIVE AND KICKING

Sometimes the best method of recording a great vocal performance is to stay out of the way. Even Mitch Miller was hip to this. Miller was a squatty cat with a Van Dyke beard who produced some incredibly foul *Sing Along with Mitch* records in the 1960s. When Miller heard a sound he liked, he instructed the recording engineer to freeze. Once, an engineer objected to the command, complaining the VU meters were pinned at their maximum levels. Miller simply told the uptight knob-twister to shut up. He then ordered the meters covered with masking tape so no one could see them.

Miller trusted his ears and so should you. Technological etiquette is fine, but if the sound you hear is glorious, who cares if the tape deck is on fire? The first step in this organic listening process is to decide whether the vocalist should be recorded live. Although it is contrary to conventional recording wisdom, many vocalists are at their best when singing with the band. The magic of a "guide" vocal cut live to cue the rhythm section often is superior to the carefully recorded lead vocal overdub. It is more common (and usually more practical) to record lead vocals after the rhythm tracks are completed to ensure technical quality. However, more "keeper" vocals are cut during the basic tracking sessions than many of us realize.

Some great mop-top vocals were live, including "Twist and Shout," "Yesterday," "I Want You (She's So Heavy)," "Let It Be," and "The Long and Winding Road." The King (Elvis Presley) cut almost everything live. The other Elvis (Costello) often releases tracks containing his impassioned and spontaneous guide vocals, rather than the "proper" overdubbed performances. Even the Chairman of the Board, Frank Sinatra (who does everything his way), insists on cutting his vocals with the band.

A few years ago, I had the pleasure of producing Roy Orbison. He told me "Pretty Woman" was recorded live in the studio with two drummers pounding and the background vocalist literally singing backup, because the guy sang over Roy's shoulder into the same

microphone. Obviously, the majesty of this track was not compromised by its rough-and-ready recording process.

However, getting good live vocals to tape requires forethought. The optimum situation is to limit unwanted sounds leaking into the vocal microphone by placing the singer in an isolation booth. If this isn't possible, position the drums and amplifiers as far from the singer as possible. Then place baffles around the drums, amps, and vocal microphone. Commercial baffles work the best, but guitar amps can be isolated by draping a heavy blanket over the cabinet. Atco recording artists The Rembrandts used mattresses to isolate unwanted sounds while tracking vocals.

Besides its standard role of deflecting vocal "pops," a windscreen should be placed in front of the microphone to prevent the singer from swallowing or grabbing it during moments of spontaneous abandon. It also helps to roll off a little low end (100 Hz or so) to diminish the rumble of a band in full swing.

THE PROPER TAKE

The conventional option of overdubbing vocal performances on completed rhythm tracks still requires creative listening. Singers are an intensely individual breed, and a microphone that sounds marvelous on one voice may sound hideous on another. If several microphones are available, be sure to test a selection to see what sounds best. Once the right microphone is chosen, experiment with miking positions. If you don't have a lot of microphone options, mic placement is critical to achieving good sound. A soul or gospel shouter can send shivers down your spine with the microphone relatively far away, but other stylists may require more proximity.

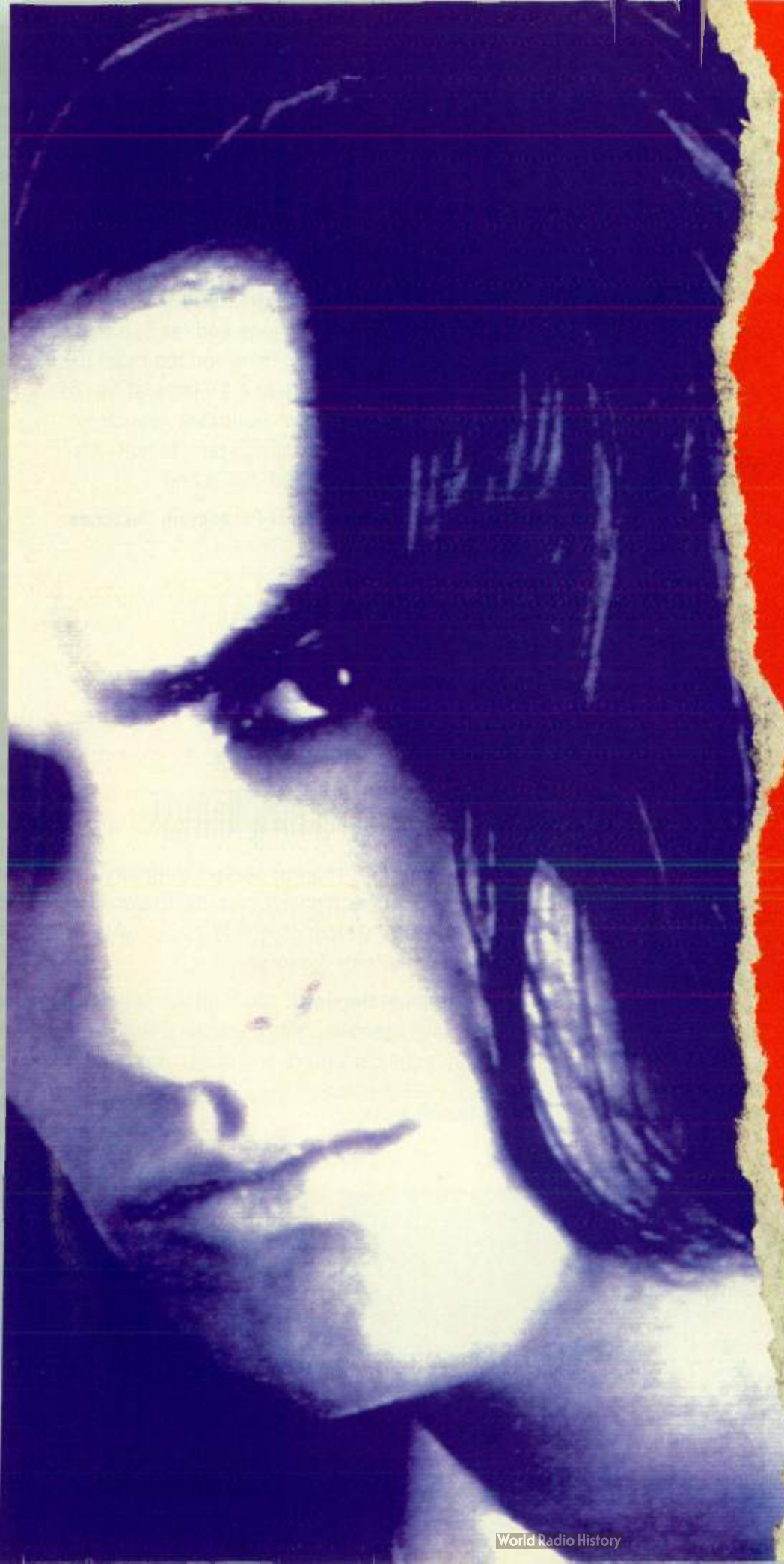
I often like singers very close to the microphone for an intimate sound. Here's my recipe: Set a condenser microphone on a cardioid or hypercardioid pattern with a -10 dB pad and prop it two inches behind a windscreen. Instruct the singer to put his or her lips right on the windscreen (remember to clean the screen after every session). If the extreme proximity causes pops, lift the microphone up and down a bit until the sound hits the diaphragm from a slight angle. Once the sound is pure, let the singer rip. When a track is completed, audition the performance and punch in lines that need improvement of pitch, phrasing, or intensity.

The improvement process can be overdone. The performances of singers such as Whitney Houston, Madonna, Michael Bolton, and Bono (and I don't mean Sonny) often are polished until they bore me to tears. The voice you hear on their records is a compilation of endless takes, utilizing the best lines, words, or even syllables to construct a final, perfect vocal take.

GROUP VOX

Recording group background vocals is a relatively easy task. If you desire a room blend of voices, use as many mics as needed and position the singers straight at the mics from a distance of approximately two feet. You also may hang one omnidirectional microphone in the center and have the singers form a "circle of love" around it. But once again, it often pays to seek out the bizarre in order to capture interesting background vocals.

One of the great innovators of



TRI POWER

1-17-92

AKG

YOUR REFERENCE MASTER

You need contacts to make it in the audio and music production industry, and the **1991-92 Mix Master Directory** has the contacts you're looking for. Names, addresses, phone and fax numbers, services...thousands of facilities and individuals included absolutely free to bring you the most comprehensive directory of the professional audio industry. Whether you're looking for a 16-track studio to record your big-break demo or the names of companies that manufacture digital multitrack recorders, the *Mix Master Directory* is the place to start. In fact, it's the only reference source you'll need. You'll find:

- **Recording & Video Production/Post-Production Facilities**
- **Remote Recording Facilities**
- **Sound Reinforcement Companies**
- **Independent Engineers & Producers**
- **Mastering & Tape Duplication Facilities**
- **CD Replication Plants**
- **Facility Designers & Suppliers**
- **Recording Schools, Seminars & Programs**

Exclusive Master Directory Bonus!

Directory of Manufacturers: The *Mix Master Directory* includes 14 solid pages of equipment manufacturers—the audio production industry's most complete guide—with a handy product cross-reference for easier use.

Directory of Professional Services: You'll also find listings of essential, hard-to-find pro audio services, including advertising agencies, public relations firms, business consultants, photographic services, marketing agencies, technical writers and much more.

The *Mix Master Directory* is published by *Mix* magazine, for 14 years the professional audio industry's most authoritative directories publisher. If you need to make contact, you need the *Mix Master Directory*.

Call toll-free and place your order today. (800) 233-9604.

1991-92 MIX MASTER DIRECTORY OF THE PROFESSIONAL AUDIO INDUSTRY

Please send me __ copies of the *1991-92 Mix Master Directory* at $24.95 each. (Add $3.50 shipping and handling. CA, NY & IL residents add appropriate state sales tax.)

☐ Please send me information on being listed in the *Mix* monthly directories.

Name .....

Company Name .....

Address .....

City/State/ZIP .....

Daytime phone ( ) ..... *ext.* .....

☐ Check or ☐ Money order enclosed

Check # .....

Charge to ☐ Visa ☐ MasterCard ☐ Discover Card

☐ American Express Expiration Date .....

Credit Card # .....

Cardholder Signature .....

Shipping times may vary; please allow two to three weeks for delivery. For immediate customer service and rush orders, call (800) 233-9604 or (415) 653-3307. 24-hour fax line (credit card orders only): (415) 653-5142.

Mail completed order form and prepayment to Mix Bookshelf, 6400 Hollis St. #12, Emeryville, CA 94608

strange recording approaches is Brian Wilson. Once, after a leak necessitated draining his swimming pool, Brian placed microphones at the bottom of the deep end and directed the guys to do group vocals on their stomachs facing down at the pool mics. The result can be heard on the album *Smiley Smile.*

Brian's active mind struck again when I recorded with The Beach Boys at Al Jardine's Arabian horse ranch in Big Sur. Since the surroundings were amazing, Brian suggested recording background vocals in the great outdoors. The Beach Boys' recording engineer, Steve Desper, hooked microphones to a horse exerciser, a large, round contraption designed to walk six horses in circles. The apparatus worked great. Each vocalist had his own mic, eye contact was facilitated by the circular design, and "pet sounds" were provided by horses and birds.

Recording large groups, such as gospel choirs, requires thoughtful administration. The sheer size of these choirs makes it difficult to identify weak performances (or even fit all the singers in the studio). To avoid a nervous breakdown, try recording the vocalists in easily manageable sections: basses, tenors, sopranos, and altos. The different sections can be recorded on separate tracks and then submixed to achieve the desired tonal balance.

CONCLUSION

Recording great vocals is a process limited only by the singer and the imagination of the engineer. The old cliché stands true: "The only rule is there are no rules." Michelle Shocked recorded her fine premiere release entirely on a Walkman, and it may be the only record that actually costs more to buy than it did to make. At the same time, million-dollar releases from industry vets with every hot piece of gear ever invented at their disposal often are virtually unlistenable. Great records are products of the heart. Don't panic if this leads you into cardboard boxes, entices you to drain the swimming pool, or makes you embrace a few conventional recording techniques.

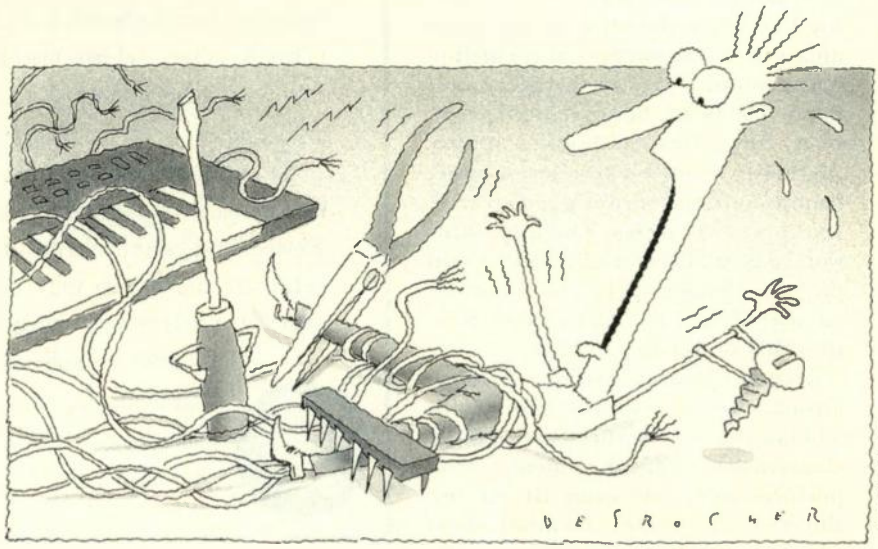
See ya on the charts, babe!

Scott Mathews *is a nattily handsome independent producer, songwriter, and multi-instrumentalist who has worked with everyone from Barbra Streisand to Sammy Hagar.*

Questions and Answers

By Alan Gary Campbell

Our savant of service ponders power problems and concedes that DIY service has its pitfalls.



JACK DEROCHER

Q. Your answer in the September 1991 "Service Clinic" regarding the "do-it-yourself" servicer, while complete with regard to tools and test equipment, left out one important ingredient: getting some professional training. As a qualified technician and shop owner with twenty years of experience, I provide service for fourteen stores in my area. The majority of headaches in repair come from inexperienced "do-it-yourselfers" who destroy more than they fix. Even the technically minded guys (such as the one who brought all the socketed ICs from his mixer in to be "tested" but didn't make a layout) are a pain. Please, do the real technicians a favor and advise people to get training first.

A. The logic of "education before experience" is irrefutable, and the above comments are well-taken. A reminder regarding proper training and experience, placed with the original text, would have been helpful.

It should be considered, however, that "Service Clinic" addresses the needs of several categories of readers. For the technical beginner and the interested nontechnical reader, the column explains general matters of equipment operation and preventive maintenance. For the student and the technical hobbyist, it presents straightforward, explanatory repair, service, and modification information. For the technician, technologist, and engineer, it offers specific and often highly technical information to aid in professional diagnosis and service.

Necessarily, there is some overlap among categories. It has been and continues to be my practice to print warnings (e.g., "Do not attempt this repair if you do not have the proper knowledge, skills, and equipment; refer the job to a service center.") for procedures likely to be attempted by the do-it-yourselfer that may cause difficulty or present risk to equipment or people.

Nonetheless, do-it-yourself service is an educational activity for many EM readers. They have to start somewhere, and most technicians started by disassembling something they had no idea how to fix. Of course, not every do-it-yourselfer who botches an attempted repair will transmute misadventure into a career, but some most assuredly will. My attitude toward do-it-yourselfers is a bit different: I provide them with a list of information sources, courses, and schools; explain (and on rare occasions demonstrate) proper service procedures, with applicable cautions; encourage their interests; and hand them a bill.

Of more concern to me is the frequency with which I am called upon to repair the attempted repairs of other service centers. Perhaps this is inevitable given the complexities of modern technology and the time pressures of electronic musical instrument repair. It clearly reinforces the need for the individual to maintain a good working relationship with a competent regional service center and to carry spares, if at all possible, when touring.

Q. I recently sent my new unit [brand name withheld to protect the guilty] to the factory for repair, and it took five and a half weeks and two phone calls to get it back. At that point, the factory had it longer than I, and they didn't offer to extend the warranty. My local service center says this is normal. Is it?

A. Many music technology companies are, in reality, small businesses with small service departments that have to deal not only with customer repairs, but with production defects, upgrades, beta testing, trade-show service, etc. It

is, unfortunately, not uncommon for some factory repairs to take from two to four weeks, and sometimes longer, although I occasionally receive factory "farm outs" back within a week, shipping time included. It depends upon the factory service workload at the time. (Note that it often takes from four to eight working days for UPS surface shipments to cross the continent.)

To speed up factory repairs, provide detailed, written information regarding the nature of the defect, including its frequency, time of onset from power-up, susceptibility to temperature and impact, audible artifacts, display glitches, etc. For in-warranty repairs, make sure you include proof-of-purchase documentation. To avoid further problems from shipping damage, pack the unit carefully, preferably in a factory carton (order one, if a suitable substitute cannot be found), and insure the shipment for the replacement cost of the instrument.

It is reasonable to inquire by phone if a repair is taking longer than expected, although harassing or threatening calls generally are counterproductive. Some manufacturers will extend the warranty period in cases such as yours. I suggest you write a letter to the service manager of the company, carefully explaining the circumstances. Be sure to include copies of all the relevant purchase and service documents.

Q. The memory in my Fender Polaris synth got scrambled. I opened the keyboard and discovered what appeared to be two flashlight batteries inside. Do these back up the memory, and is it okay to replace them with regular batteries?

A. The two D cells in the battery holder adjacent to the power supply do, in fact, back up the memory. These are, believe it or not, normal flashlight batteries manufactured by National Hi Top, a division of Panasonic. Even more amazing is that, among the many Polaris synthesizers I've serviced, I've never found one with depleted or leaking batteries. (That doesn't mean there aren't any, just that I haven't found them.) Their long life is at least partially attributable to the low current consumption in this application.

Nevertheless, the batteries should be replaced if the combined terminal voltage (measured by high-impedance DVM only; do not use an analog VOM) drops below 2.7 volts. I recommend Duracells in this application (no, they don't send me free ones) for their long life and comparative freedom from leakage.

The Polaris is somewhat sensitive to line transients, which can scramble memory. The batteries may still be good. Either way, you'll have to reset and recalibrate the instrument. The procedure was described in detail in the June 1990 "Service Clinic."

Q. Why are the memory circuits of programmable synths so sensitive to power-line glitches?

A. AC line transients can get through the power-supply circuitry of synths, causing noise on the power-supply lines that feed the memory circuits and ancillary circuits. This noise can result in incorrect operation of digital components, writing bad data to memory. The problem is aggravated by the fact that most synth memory is battery-backed, requiring the power supply to "hand off" the memory ICs to the battery on power-down, and vice-versa on power-up. This "hand-off" process presupposes an orderly power-up/power-down sequence, which can be severely compromised by line transients.

A simple, cube-tap-type surge suppressor, while a valuable form of affordable "equipment insurance" that can arrest potentially damaging transients, will not stop low-level noise or solve significant line problems. A *line filter* contains, in addition to the varistors of a surge suppressor, filter elements such as inductors and capacitors. Line filters offer considerable protection from noise, and many digital synths and effects now have filters built in. A *line conditioner* is the next step; these usually contain a constant-voltage, ferroresonant transformer (varistors and filters are redundant) that delivers a constant 117 to 120 VAC despite brownouts and more serious line-voltage fluctuations. (For more on surge suppressors, line filters, line conditioners, and other types of related devices, see "Basic Studio Series, Part 6: Getting Wired—A Power Primer" in the April 1990 **EM**.)

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

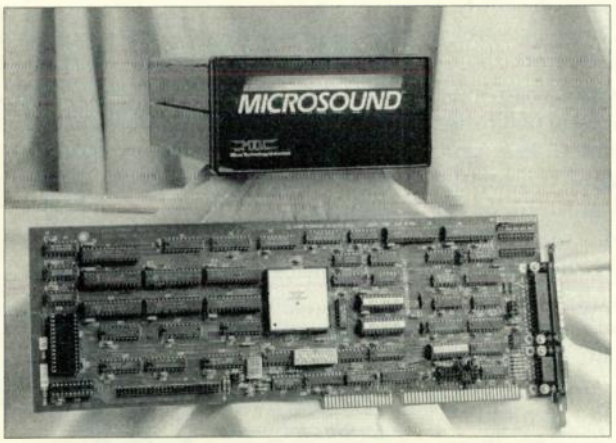
Reviews

Micro Technology Unlimited Microsound

By David Miles Huber

MTU's digital mastering system offers a graphic interface and clean sound.

If you've been reading **EM** during the last year or two, it will come as no surprise to learn that the world is becoming flooded with digital audio recording systems. Among the most promising are systems that record audio data directly to hard disk, and the PC-compatible platform seems to have inherited its full share of these. Micro Technology Unlimited's MicroSound digital audio hard-disk editor offers a few unique twists that distinguish it from the pack.



PETER DIGGS

The MicroSound hard-disk recorder/editor for the PC consists of an external I/O box, a DSP board, and *Windows*-based recording and editing software.

MicroSound primarily is designed to function as a 2-track mastering system, but it also works well as a video post-production tool. Learning MTU's system requires becoming accustomed to some different terminology, but the user is rewarded with extremely flexible editing and song-assembly features.

The system is designed to operate on 80286-, 80386-, and 80486-based, AT-bus computers running under Microsoft's *Windows 3.0* graphic operating environment. It consists of three basic components: an external I/O module, a digital signal-processor board, and *Windows*-based digital-audio editing software.

EXTERNAL I/O MODULE

The external I/O module is a metal interface box that is tied to the main processing board via a 5-foot, shielded cable. Its main purpose is to connect the system to the outside signal world. Measuring approximately 3 × 6 × 9 inches, it houses up to two 2-channel I/O module boards. ("Channels" in a random-access digital audio recording system such as MicroSound are not exactly analogous to "tracks" in linear-based recording, as discussed in "From the Top: Hard-Disk Recording" in the December 1991 **EM**.)

The I/O boards are available in three possible configurations: unbalanced analog audio, balanced analog audio, and digital audio (AES/EBU and S/PDIF). This allows the system's hardware and software to be configured to include two analog channels, two analog channels plus two digital channels, or four discrete analog channels (two analog boards in tandem). The system is not intended to replace a multitrack recorder, so even though it offers multiple channels, you only work with groups of stereo soundfiles.

The system's analog interface is capable of 64-times oversampling, analog-to-digital conversion at any of fifteen user-selectable sample rates, ranging from 8 kHz to 48 kHz. D/A conversion is accomplished with 8-times oversampling, 18-bit converters. Analog input and output levels can be adjusted independently to match various level standards through the use of 20-turn gain-trim pots. The optional digital interface offers AES/EBU and S/PDIF input/output ports with selectable sampling rates of 32, 44.1, or 48 kHz. All input/output ports offered by MTU use Walkman-style, ⅛-inch mini jacks, with 2-conductor, stereo mini jacks for balanced analog and AES/EBU digital port connections, an unfortunate design decision.

MTU's AT-DSP56 processor board is a full-size, 16-bit card, whose primary function is to interface the external I/O module to the host IBM-AT (ISA-

Good Sound Advice.

Here's an easy way to figure out which software will help you get the most out of your MIDI setup: call the MIDI software experts at Soundware and get the kind of reliable service and support that our customers have come to rely upon. Simply dial (800) 333-4554. Orders gladly taken at the same number.

MACINTOSH

Sequencers
Dr. T's
Beyond
Mark of the Unicorn
Performer
Passport Designs
TRAX
Passport Pro 4
Opcode Systems
EZ Vision
Vision
CUE-The Film Music System
Integrated Sequencing and Printing
Coda
Finale
Passport Designs
Encore
Coda
Music Prose
Scoring and Printing
Mark of the Unicorn
Professional Composer
Passport Designs
NoteWriter II
Interactive Composition
Dr. T's
Jam Factory
M
UpBeat
Editor/Libs-Samplers
Digidesign
Sound Designer II SK
Turbosynth

Editor/Libs to Synths
We carry all the most popular packages for all systems: Sound Quest, Opcode Systems, Dr. T's and Big Noise. Please call.

Passport Designs
Alchemy
Education
Ars Nova
Practica Musica
MIDI Interfaces
Opcode Systems
Midi Translator
Professional Plus
Studio Plus Two
Timecode Machine
Studio 3 (SMPTE)
Mark of the Unicorn
MIDI Time Piece

IBM PC

Sequencer
Big Noise
Cadenza
Passport Designs
Master Tracks Pro
TRAX
Voyetra
Sequencer Plus Jr., Classic, Gold
Twelve Tone Systems
Cakewalk
Cakewalk Professional
Magnetic Music
Texture
Prism
Integrated Sequencing and Printing
Passport Designs
Encore
Dynaware
DynaDuet
Temporal Acuity
MusicPrinter Plus
Musicator
Musicator
Coda
Finale

Scoring and Printing
Dr. T's
The Copyist (all levels)
Passport Designs
SCORE 3
Thought Processors
Noteprocessor
Interactive Composition
Cool Shoes
Sound Globs
Drummer
Voyetra
M/pc
Editor/Libs-Samplers
Turtle Beach Software
SampleVision
MIDI Interfaces
Roland
MPU-IPC, MPU-IMC, LAPC-1
Voyetra
V-4000, V-22, V-22m, V-24s, V-24sm
Music Quest
PC MIDI Card
MQX-16, MQX-16S, MQX-32M

ATARI ST

Sequencers
Dr. T's
KCS
KCS Level II with PVG
Passport Designs
Master Tracks Pro
TRAX
C-Lab
Creator
Steinberg/Jones
Cubase
Cuebeat
Integrated Sequencing and Printing
C-Lab
Notator

Scoring and Printing
Dr. T's
The Copyist (all levels)
Steinberg/Jones
Masterscore

COMPLETE MIDI SYSTEMS

Complete 286 and 386 PC MIDI computer systems are now available from Soundware. We take all of the guess work out of configuring the system you need for your MIDI studio. All of our MIDI computer systems are backed by a full one-year on-site service warranty on parts and labor and a technical support number you can use to be in touch with our technical support staff. These systems come complete with various software and MIDI interfaces. Our computers are the highest quality 286 and 386 compatibles available. Each system goes through a rigorous test and burn-in before it's delivered to you. Many models and custom configurations to choose from. Please call for details.

OUR POLICY
FREE "MIDI by Mail" catalog available. Just call or write and we'll be happy to send you a copy.

No question too dumb. MIDI systems are great. But the software can be a little confusing when you're first starting out. We understand. That's why we try our best to answer any questions you have before you order. Just call us at (800) 333-4554. **Institutionalize us.** Attention buyers in professional studio facilities, schools and universities: Soundware is the perfect place to buy your MIDI software. We not only have the products, but also the knowledge to help make sure you get the right ones. And we'll happily accept your PO.

We accept VISA, Mastercard, and American Express with no added service charge. Your credit card will not be charged until we ship your order. Personal and company checks accepted. Please allow one week to clear. California residents please add local sales tax to your order.

SHIPPING
For foreign orders and Next-Day-Air, please call. For all others, add $4 per item to cover UPS 2nd-Day-Air.

Best Sellers

Cakewalk - IBM	Performer - MAC
Vision - MAC	Voyetra Seq. Plus Gold - IBM
Copyist - IBM	Opcode Editors - MAC
Encore - MAC/IBM/ Atari	PC MIDI Card - IBM
Music Printer Plus - IBM	MQX-16 - IBM
Midi Quest - ALL	Studio 3 - MAC

Soundware

Your MIDISource

Call to order:
(800) 333-4554
Good anywhere in the U.S. and Canada
Monday thru Friday 9-5, Saturday 10-4 PST

All items subject to availability. Defective software and hardware replaced immediately.

 200 Menlo Oaks Drive Menlo Park, CA 94025 (415) 328-5773 FAX (415) 328-0611

bus) or EISA-bus computer. At the heart of this card is a 20 MHz, Motorola 56001 digital signal-processor chip for calculating the necessary mixes, gain changes, and fades and drawing the onscreen waveform displays.

An optional SMPTE/MIDI card makes it possible for the MicroSound's start/stop, punch, and timing functions to be remote-controlled from an external source, using either SMPTE time code or MIDI Time Code.

SOFTWARE OVERVIEW

The *MicroEditor* software's main screen (see **Fig. 1**) includes a series of pull-down menus for performing various functions, including recording a Soundfile, creating a Segment, and creating a Mixfile. Below the menus are a Soundfile status line that shows the sample rate, length, start time, and the system's File Window Box. The latter provides a graphic representation of your location in the overall Soundfile. When you point the mouse at a particular location in the File Window Box, it whisks you to the corresponding location in the Soundfile.

The larger Waveform window located near the lower part of the screen is a graphic area used for expanded waveform-viewing, high-res zooming on parts of a Soundfile, and showing mix-related graphic information. A movable, rectangular Zoom box within the File Window Box indicates how much of the Soundfile is presently being displayed within the Waveform window.

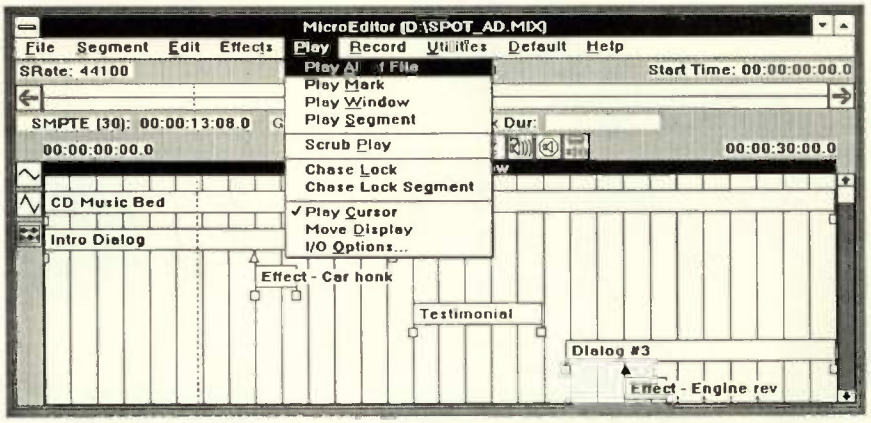


FIG. 1: MicroSound's main screen offers a graphic playlist that allows you to easily see and manipulate chunks of stereo digital audio.

THE RECORD SCREEN

The Record screen (**Fig. 2**) is used to record audio directly to hard disk as a Soundfile or play back any number of previously recorded Soundfiles. In this case, a Soundfile is a length of unedited, 16-bit PCM digital audio, which is stored to disk in standard MS-DOS format.

The Record screen is accessible from the program's main window and in-

cludes separate record and playback sections. (This was done to prepare for an update that will include simultaneous recording and playback.) Either section can be triggered manually from the screen's transport buttons or, with the optional SMPTE/MIDI card, can be triggered automatically using SMPTE time code, MTC (MIDI Time Code), or MIDI Note On commands. This function definitely earned my appreciation.

User-selectable sample rate, I/O, and other system settings can be set up once and saved as a standard start-up default. In addition, peak amplitude meters are designed into the Record screen to help keep the recorded level below the clip range. Several real-time numeric and graphic displays are supplied, including a tape counter, record bar meter, and free disk space indicator.

CREATING SEGMENTS

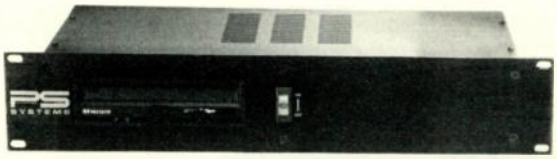
Once a Soundfile (or series of Soundfiles) is recorded to hard disk, the user can continue on to the next phase: creating Segments. A Segment is a marked region within the raw Soundfile. Once named, such an audio Segment is easily inserted into an edited Mix. Any number of segments can be created from up to twenty different Soundfiles, which can be stored on multiple disk drives, including network volumes.

Upon clicking Create Segment within the main menu, a dialog box appears that allows a choice of the recorded Soundfiles residing on the disks. Upon selecting a Soundfile, a new Waveform window pops up, displaying the File window which represents the file's overall length, and its corresponding rectangular Zoom box. The latter indicates how much of the Soundfile is displayed in the larger Waveform window.

Any part of the Soundfile can be viewed by simply mouse-dragging either the leading or trailing edge of the Zoom box to include the Soundfile area you wish to see. Then you simply let go of the mouse button, and the desired area will be displayed in the larger Waveform window.

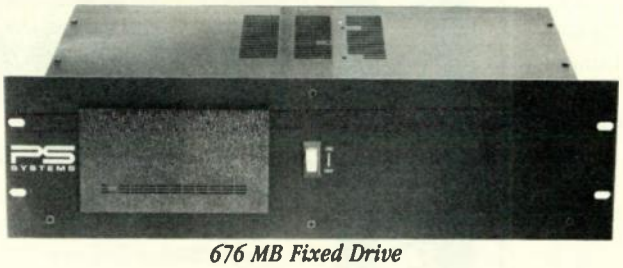
Simply put, an audio Segment is defined by the creation of a beginning and an ending "marker." These are digital location points that tell the computer to play back only a defined

SCSI SOLUTIONS



44 MB Removable

44 MB Removable / CD-ROM combo



676 MB Fixed Drive

The Musician's Drive

Nothing can compare to the convenience of a SCSI hard drive. At PS Systems, we make SCSI simple. That's why PS Systems continues to be the Professional's Choice...worldwide. We custom-build your drive in a durable, lightweight aluminum case, with up to two drives of removable, optical or fixed media, in any combination.

Then we support it with professional, accessible and courteous customer service. Finally, we back it all with a one year, no hassle warranty. This commitment to the professional musician has made us the fastest growing rackmount SCSI drive manufacturer in the world.

FEATURES

- PS Systems' quality and reliability
- Custom made twisted pair cables
- Lightweight aluminum case
- Illuminated power switches
- External SCSI ID switches
- Two SCSI connectors per drive
- Shock mounting
- Exclusive air convection cooling system

P.S. We also make memory expansion for a variety of keyboards and samplers.
Give us a call at (800) 446-8404 for a PS Systems dealer near you.
PS Systems...The Professional's Choice.

PS SYSTEMS
music technology products

region of a larger, unedited Soundfile at a prescribed trigger time. (Digidesign uses the term Region to denote the same thing.)

You define a Segment by selecting the Mark icon, placing the mouse at a point, and click-and-dragging it to mark the desired area. This can be done in the File, Segment, or Waveform window. Moving an existing marker point is done by placing the mouse cursor over either marker boundary (at which point the curser turns into a L/R arrow cursor), clicking the mouse and moving the Mark to its new location.

To help you set the appropriate points, the Scrub command lets you listen to any part of a Soundfile at standard, ½ , ¼ , ⅛ , or 1/16 play speed. When selected, this function can scrub the playback cursor over a displayed waveform in either the forward or backward direction.

THE MIX SCREEN

Once a series of Segments are created, they can be assembled into a final mix using the Mix screen. The function of this screen is to provide a graphic interface for viewing, placing, and controlling Segments and for saving these combined Segments as a separate Mix file.

The Mix screen allows Segments to be selected from the available Soundfile list and places them into the Segment window. A graphic representation of these Segments is placed into the window as a series of named, horizontal rectangles. The Mix screen graphically organizes these blocks in a decision list that lets you see when they will play or if they overlap in time.

Segments can be placed into the Segment window with a number of different methods: linear assembly; overlap assembly, which MTU refers to as Disk Layering; or via a Positioning window (a multi-segment clipboard). Linear assembly places one segment directly after another (in a butt-edit fashion) to create a single, continuous program. Overlap assembly is used when two or more Segments are positioned such that they overlap and play at the same time within a Mix file. Whenever such Segments overlap, the program automatically and rapidly mixes the files together in the digital domain and stores them to disk as a separate series of Sound Blocks. Upon playback, the program accesses these mixed Blocks at the appropriate times, producing a seamless mix of the 2-channel program.

MicroEditor is capable of layering up to 38 overlapped Segments, each of which has fade-in, fade-out, and left- and right-channel gain parameters. Be aware that these files take up additional hard-disk space, however, so if you plan on doing many long fades, you'll quickly eat up room on your hard disk.

A Segment also can be moved and/or placed at any location within an existing edited mix through the use of *MicroEditor*'s Positioning window. This window acts as an audio clipboard, allowing Segments to be positioned and inserted into a mix at any place or removed from the mix and reinserted at a different point in time.

Two additional command tools of particular interest in fine-tuning an edited mix are the Snap to Grid and Gain/Fade commands. Within *MicroEditor*, you can find your location in the Mix file using vertical gridlines whose spacing and resolution change with

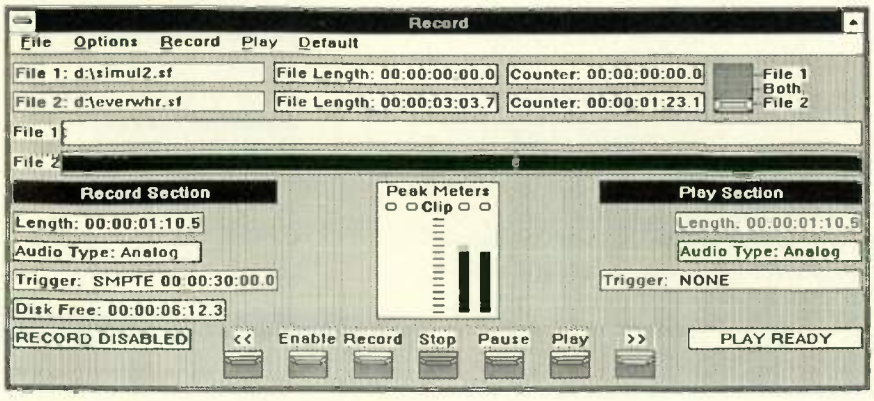


FIG. 2: The Record screen offers several counters and active meters for monitoring your recording and familiar transport controls.

zooming. Grids are used to indicate overall time increments in a program and allow the user to graphically place a Segment with relative accuracy. They can be displayed as SMPTE time (the program supports 24, 25, and 30 fps and 30 drop frame), absolute time, and number of samples.

The Snap to Grid editing function allows a Segment to be placed into the Segment window with sample-level accuracy. When Snap to Grid is active, the leading or lagging edge of a Segment, or a flag selected with the moving Segment, can be "snapped" to the closest Grid line, assuming the Segment is located within the left or right third of a Grid section. When it moves beyond this one-third spacing, the Segment freely moves in relation to the mouse.

Segments also can be digitally faded or changed in gain so as to match or alter levels within a mix. Any number of fade in/out times can be entered into a dialog box, or a user-defined default time can be used. In addition, Segments may be individually attenuated down to 0%, or amplified to 2,500% (25 times) of its original level, clipping notwithstanding. The fades can be up to the length of the Segment. Unfortunately, you cannot do real-time automated mixing of the Segments; all mixes must be determined ahead of time.

MicroSound does not offer digital EQ or other DSP functions, but MTU sells a separate DOS-based software package called *MicroTools* ($200) that can perform non-destructive time compression/expansion, noise suppression, pitch shifting, filtering, and other sophisticated DSP functions. *MicroTools*, which requires a math coprocessor, does not perform its manipulations in real time.

The Mix screen is comprehensive enough to let you place a Segment anywhere within a mix, remove it, place it in another spot, or to slip a bunch of them in time. The mixing abilities of the Disk Layering (overlap assembly) process lets you experiment with layering sounds while maintaining independent control over levels and fades. It's great for building layered effects. By mixing together clips from an effects CD and adding a dash of slow, backward scrubbing, I created wild sci-fi effects tracks. This is useful for video and film post-production. While in the Mix screen, you can do SMPTE or MIDI chase-lock, which speeds editing operations and reduces preroll to under two seconds.

From within the Record screen, you can save any number of Soundfiles to disk. The Mix screen, however, is capable of saving Segment markers and other mix-related data as a separate Mix file. Any number of Mix files can be saved, so you can store alternate mixes. In addition, a Save as Soundfile command can be used to store a completed mix to disk as a single, separate Soundfile, just as though it were re-recorded.

MY TWO CENTS

The way MicroSound layers sound is different than many other systems in that when Segments are layered and overlapped in time, it automatically performs a disk-based mix. Most other random-access audio recording systems (such as Digidesign's Sound Tools systems) assemble soundfiles in linear, sequential, playlist-based fashion.

Because the MicroSound system works differently from most other disk-based, random-access systems, the man-

Product Summary

PRODUCT:
MicroSound Digital Audio Editor
REQUIREMENTS:
80286-, 80386SX-, 80386-, or 80486-based IBM AT-compatible computer with at least 1 MB of RAM (4 MB recommended); MS-DOS 4.01 or 5.0; *Windows 3.0;* hard drive with 28 ms access time or faster
PRICE:
Basic 2-channel, unbalanced analog system $3,690
Digital I/O board $495
MANUFACTURER:
Micro Technology Unlimited
PO Box 21061
Raleigh, NC 27619-1061
tel. (919) 870-0344

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ●
EASE OF USE	● ● ● ●
SOUND QUALITY	● ● ● ● ◖
VALUE	● ● ● ◖

ufacturer elected to utilize new and unfamiliar terminology. Partly because of terminology problems, the documentation is unclear at times. I would have appreciated a well-written Quick Start section that explained the system's operations more simply and directly. Fortunately, *MicroEditor* includes over 200 detailed, context-sensitive help screens.

Although the literature says that the *MicroEditor* works on 80286-based computers, I could not get it to work on my main workhorse. (*An MTU representative assured us that the author's experience was unique, and the company is not aware of similar problems with other 80286-based users.—SO*) Upon reinstalling it on an 80386-based PC, the system passed its startup test with no hitches.

Once working, I was faced with the task of making adapter cables from phono to the external I/O module's ⅛-inch mini plugs. MTU's decision to use mini jacks lets the company integrate both unbalanced and balanced I/O connections into a single, interchangeable plug-in housing. Nonetheless, it forced me to put in a lot of time soldering cables, which was a nuisance. (Adapter cables also are available from MTU.)

My biggest beef about the software design, other than the lack of DSP, is the inability to monitor a signal through the record system in any other state than Record. I feel that the system should be able to monitor its input in all states but Playback so you can always reference the source signal. Fortunately, MTU promises to implement this in version 2.06, which should be out by the time your read this.

Overall, MicroSound performs admirably. Its ability to automatically mix layered files is an especially good feature. The system also is easy to use: Creating Segments is as simple as zooming to the spot you want, highlighting the region, and placing it into the Mix screen. It's a relatively fast and easy process.

MicroSound currently is not optimized to function as a multitrack recording/editing system, as the Spectral Synthesis system is, so if you want independent track adjustments, panning, etc., look elsewhere. However, MicroSound is well suited to sophisticated 2-track mastering applications.

After getting fairly well acquainted with a number of hard-disk recorders and workstations, it becomes obvious that each system has its own operating philosophy and its own way of connecting you to the digital world. Although sometimes it is difficult to figure out what MTU's literature is trying to say, once you grasp the concepts, the system can be operated with a reasonable amount of speed and generally performs as advertised. Caveats aside, the MicroSound system warrants a personal test drive for interested IBM users.

David Miles Huber *recently realized that on his next trip to Mexico he can only take two carry-on items: his cat and his DAT.*

Alesis D4 Drum Module

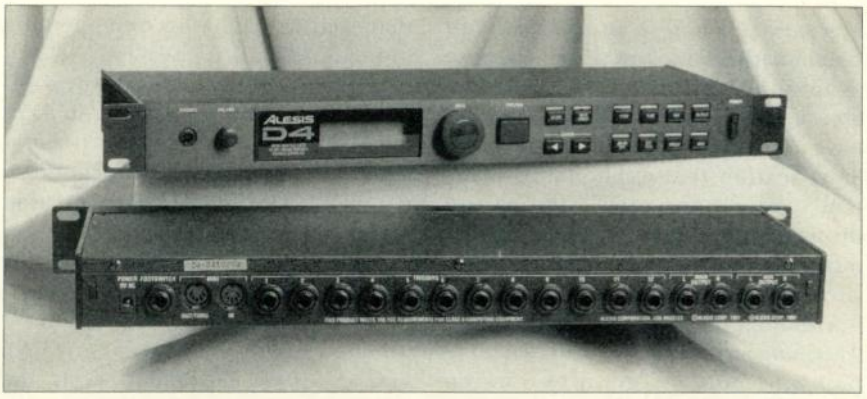
By Zack Price

More than a sound repository, this box triggers major changes.

Alesis has a knack for making drum machines that perform as well as the competition's for about half the price. They did it a few years ago with the HR-16 and HR-16:B, and more recently with the SR-16. They've done it again with the new D4 drum module. And, in true Alesis style, they've thrown in an innovative feature that's bound to delight MIDI percussionists and producers and irritate their rivals' design teams.

DESCRIPTION

The D4 is a 1U rack-mount drum sound module, similar in function to the Kawai XD-5 and E-mu Procussion. Unlike the latter modules, you can't synthesize your own sounds with the D4, nor can you add sounds or kits as you can with the XD-5. However, the D4 has over 500 quality percussion sounds that can be arranged into 21 different drum kits. That's more than enough for serious rhythm work. Considering that the D4's price is less than half of the other two modules, you have to decide whether programmability and expansion card slots (which use expensive ROM or RAM cards) are worth the extra money.



PETER DIGGS

In addition to providing a wealth of sampled percussion sounds, the Alexis D4 has twelve inputs that let you trigger its sounds from electronic drum pads, drum triggers, or audio signals.

The D4 possesses many tried-and-true Alesis features, such as two sets of stereo outputs, dynamic articulation, and 16-voice polyphony. It also has a headphone jack (a first for Alesis) and a trigger pad on the front panel so you can audition sounds without having to use a keyboard or other trigger device. However, this pad is so velocity *insensitive* that I had to give the thing a darn good whack to get a moderate sound level.

The D4 also responds to Local On/Off, MIDI Volume, and a variety of Continuous Controller messages. Pitch bend affects all assigned voices by "tuning" them in whichever direction the bend takes place. The extremes of the bend effect are more radical than when the sounds are normally tuned to their upper and lower limits. It will definitely bring out the cyberpunk in you.

TRIGGER INPUTS

Don't get the idea that the D4 is just doing the same thing as other machines, but at a cheaper price. It has a special feature that makes it not just MIDI-friendly, but drummer- and producer-friendly. In the back are twelve trigger inputs that can be connected to electronic drum pads, drum triggers, and even audio jacks. In addition, a rear-panel jack accepts an optional momentary footswitch that lets you step through drum kits, or serves as a hi-hat pedal, depending on its user assignment.

For the MIDI drummer, the D4 is an excellent means of triggering percussion sounds without having to use a "drum brain" or trigger-to-MIDI converter, because it combines the functions of both. Furthermore, the D4 can respond to trigger data and MIDI note data at the same time (within the limits of its 16-voice polyphony), so you can combine electronic trigger pads, MIDI trigger pads, keyboards, and sequencers.

The D4's trigger inputs also generate MIDI note data, so drummers can easily use other MIDI modules in their setups. For example, one of the sounds in the D4 is Silence, which can be assigned to any or all notes. Simply assign Silence to a note that triggers a sound made by another module. When triggered, the D4 will generate the MIDI note data to trigger the other device without making a peep. If you don't want to use any of the D4's sounds, send it a Local Off command, and the D4 will act as a trigger-to-MIDI box.

Drummers aren't the only people that will appreciate the trigger input feature; producers can use them to replace drum tracks in multitrack situations. Simply plug in the appropriate audio outputs from the tape machine to the trigger inputs, select the trigger type, and play the tape. Instantly, you get new drum sounds from old. I tried this using a Tascam Porta-05 4-track ministudio, so I could trigger only four sounds at a time. The D4 performed the task without any problems once I determined the right trigger setting. That wasn't difficult, as the manual did an excellent job of explaining how to use this function.

It should be clearly understood that this feature only works properly if each drum sound is recorded on a separate track first. If drum sounds are combined on a track, the D4 will trigger the assigned sound for that input, regardless of the nature of the audio signal that triggers it. (This makes it difficult to replace a previously recorded hi-hat, since the D4 can't distinguish between an open and closed hi-hat sound on the same track.)

Although the most obvious use for the input triggers is to trigger drum sounds, keep in mind that they also generate MIDI note data that can be recorded into a sequencer. This makes it easy to bring "live" (or multitrack recorded) drums into a sequencing environment for a variety of editing and processing needs. (For instance, the hi-hat problem mentioned earlier can be solved by altering the note data via sequence editing to distinguish between open and closed sounds.)

SOUNDS

The trigger input feature wouldn't be so impressive if there weren't great onboard sounds to trigger. Fortunately, the D4 has over 500 high-quality sounds, including many from the HR-16, HR-16:B, and the SR-16. They're arranged into six groups: Kick drums (99 sounds), Snares (99), Toms (92), Cymbals (55), Percussion (76), and Effects (80). Each group has a healthy mixture of unprocessed and processed sounds, and the processed sounds are not just cheesy gated-reverb effects. The D4 has hall, room, gated, and ambient sounds to suit anybody's needs. As with the other Alesis machines, the emphasis is on rock and dance sounds, but there are plenty for other purposes. Jazz musicians will appreciate the crisp, unprocessed snare drums, including excellent piccolo and chrome snares.

In addition, some sounds, such as the Snare-Rimshot, employ velocity-switching or crossfading. Other sounds use stereo effects. One of the more outstanding examples of the latter is a crash cymbal voice that actually sounds like a drummer hitting two cymbals at once. If the processed sounds aren't to your liking, there are plenty of excellent dry sounds to which you can add your own signal processing.

While the D4 sounds are excellent, there were some missing sounds that could have made this machine better. For instance, there were no orchestral percussion sounds, such as gong or tympani. (I can only imagine how interesting it would have been to combine a tympani with pitch bend.) The Latin sounds were wonderful, but they account for the vast majority of the ethnic percussion available. And even though I liked the effects sounds, I could have done without so many of them in exchange for more Oriental,

Indian, and African percussion sounds.

CREATING DRUM KITS

Up to 61 drum sounds can be assigned to a single drum kit, and a total of 21 kits can be stored as patches. Drum kits can be stored and retrieved through SysEx, and the factory kits can be recalled either individually, or as a group.

To create a drum kit, you select a root note (the bottom of the MIDI note range) and assign drum sounds over the next five octaves. (You can't map sounds to MIDI notes outside the 5-octave range.) The default root note is C1 (36), although you can set the root note from C -2 (0) all the way up to G3 (67).

Setting and changing drum kit parameters is accomplished by using the various front panel buttons and the data wheel, which looks and feels like a toy truck wheel. Alternatively, with the Note Chase feature, you can map sounds to notes played on an external MIDI controller.

ASSIGNMENT MODES

Once a sound is mapped to a MIDI note, its volume level, pan position, tuning, and output assignment can be adjusted in much the same way as on the HR-16 and SR-16. However, the D4 also offers a choice of four different voice-assignment modes for each note. The assignment mode determines how the sound behaves when played from MIDI or external triggers.

The first two modes are quite straightforward. In Single Assign mode, if a sound is retriggered before the end of its envelope, the retriggered sound will cut off the first one. In Multi Assign mode, a triggered sound plays through its envelope even if it is retriggered before the end of the first sound. In essence, this makes the Multi Assigned drum sound polyphonic, so there's no need to assign the same sound to two different MIDI notes or trigger pads.

The third and fourth Assign modes, A and B, group sounds together so that any sounds that are part of a group are cut off by the most recently occurring note in that group. The most common use for this mode is to assign open and closed hi-hat sounds to a group and use it to control when these sounds are played. Keep in mind, though, that any sounds can be assigned to either of these groups.

CAVEATS

As much as I love this little unit, I do have some complaints. First, the D4 has a "wall wart" AC adapter plug, a despicable object that takes up more than its rightful space on a power strip. I know Alesis isn't about to stop using adapters, but I wish they used the "lump-in-the-line" type (where the power converter is in mid-cable).

My other complaint is about the manual itself. While it is well-written, it excludes some vital information concerning the parameters that can be manipulated in real time through Continuous Controllers. Nothing is more frustrating than trying to create some great real-time special effects with a device when the manufacturer didn't supply the information necessary to make it possible. I hope Alesis corrects this serious oversight as soon as possible. (*An Alesis representative informed us that the MIDI implementation wasn't ready in time for the initial shipments but are included now. Current D4 owners can call Alesis to obtain a copy.—SO*)

THE BIG FINISH

These complaints aside, the D4 is a great machine that delivers a lot of quality sounds and useful, original features. That it does it for such a low price makes the D4 almost irresistible to any MIDI musician. For instance, if you just use your drum machine as a sound module, it makes more sense to use the D4. If you're a MIDI drummer, this is the box that should be at the heart of your system. Producers and studios will find that this device offers flexibility and power in all phases of the production process.

Product Summary

PRODUCT
D4 drum module
PRICE:
$399
MANUFACTURER:
Alesis
3630 Holdrege Ave.
Los Angeles, CA 90016
tel. (800) 525-3747
or (213) 467-8000

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ●
EASE OF USE	● ● ● ● ◖
DOCUMENTATION	● ● ◖
VALUE	● ● ● ● ●

In short, the D4 has something for every MIDI musician, and I predict it will find its way into a lot of people's racks. It already found a spot in mine.

Zack Price *programs rhythm tracks for other musicians and teaches MIDI rhythm seminars to non-drumming musicians in the Chicago area. He also is a left-handed MIDI guitarist, which qualifies him for endangered species status.*

Vestax MR44 Personal Multitrack Recorder

By Dave Bertovic

This easy-to-use ministudio is a sound investment.

I like to keep things as simple as possible, especially when I'm recording. The fewer gadgets and wires I have to deal with, the more I can concentrate on music. Straight-ahead products have their own fascination, and nothing attracts me like a no-nonsense approach to product design. Not that I avoid things that are loaded with features, but I've always admired technology that doesn't get in the way.

The Vestax MR44 Personal Multitrack Recorder fits right in with this left-brain philosophy. This little sibling of Vestax's MR66 6-track cassette deck (reviewed in the August 1990 **EM** and formerly distributed by Midco) brings multitrack cassette recording to market at a reasonable price without the techno-two-step.

OVERVIEW

The Vestax MR44 is a 2-head (record/reproduce and erase), 4-track cassette recorder with a 4-channel audio mixer. The unit is rack-mountable and occupies four rackspaces. The MR44 records in one direction on four tape tracks and permits recording on all tracks simultaneously.

The four record-signal input jacks and the Punch In/Out jack are ¼-inch, unbalanced. All of the other inputs and outputs—line out L/R, monitor out, aux sends 1 and 2, aux return L/R, individual tape outs for tracks 1 to 4, and tape sync in/out—are RCA connectors and operate with line-level signals.

The interesting thing about the MR44 is that all of the input and output connectors are on the *front* panel, which gives the unit a patch bay-type functionality. Some may feel this detracts from the MR44's cosmetic appeal, but functionality definitely wins over beauty in this instance. I bolted the recorder into my rack just above my two patch bays and was ready to work in a matter of seconds. Even the power-supply input on the rear panel (the rear panel's only jack, by the way) is duplicated on the front panel for easy access. The MR44 uses an AC-to-DC converter power pack.

Four 15-segment LED bar-graph meters facilitate visual monitoring of audio levels. Meters 1 to 4 correspond to inputs 1 to 4 during recording and

tape tracks 1 to 4 during playback/mixdown. Meters 1 and 2 also indicate the overall level of the stereo mix. A mode switch for the meter selects between 4-track/4-channel operation and stereo L/R metering. You can activate the meters for level setting before actually rolling tape by enabling a track or tracks for recording and pressing the Record button alone.

A 3-digit LED display functions as a standard tape counter with reset to zero. The unit also has a return-to-zero function that stops the tape at 000 in both rewind and fast forward.

MIXER SECTION

The MR44's 4-channel mixer permits recording four mic- or line-level sound sources, or mixing the four tape tracks to stereo. Crosstalk between channels is negligible, and when you turn the faders all the way down, there's no bleeding—"off" really is off.

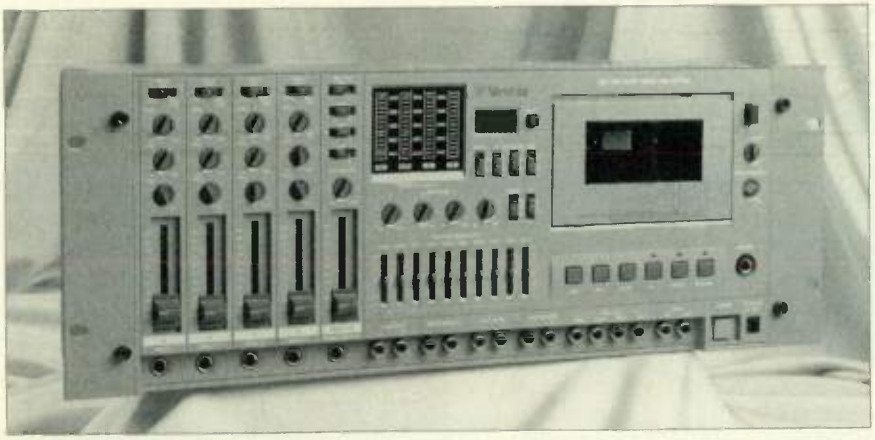
Each channel includes a 3-position (Tape, Off, and Mic/Line) input-select switch. The Off position acts as a mute function that prevents the sound source or tape track from being routed to the main outputs. When Off is selected on a channel, its corresponding tape track can be monitored through headphones, and its level is set by one of four Monitor knobs located just to the right of the channel controls. Turning off a channel also prevents the corresponding tape track from being recorded on a new track during overdubbing or ping-pong recording.

Each channel includes an input Trim

Product Summary

PRODUCT:
MR44 Personal Multitrack Recorder
PRICE:
$679
MANUFACTURER:
Vestax Musical Electronics Corp.
2860 Cordelia Rd.,
Suite 120
Fairfield, CA 94585
tel. (707) 427-1920

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ●
EASE OF USE	● ● ● ● ●
DOCUMENTATION	● ●
VALUE	● ● ● ●



PETER DIGGS

The Vestax MR44 4-track recorder has outstanding sound quality and signal-routing flexibility for the price but offers little in the way of timbral control.

knob that compensates for the wide differences between low-level microphones and high-output electronic instruments, a stereo aux send, a stereo pan control, and a level fader. Noticeably absent from the channel controls is any type of frequency modification. There aren't even simple bass and treble knobs.

The MR44's only tone control is a stereo, 5-band graphic equalizer with bands centered at 100 Hz, 400 Hz, 1 kHz, 5 kHz, and 10 kHz. Control sliders provide ±10 dB of boost or cut, and the equalizer can be switched on or off. An interesting feature of the unit's EQ is that input signals can be filtered during recording. As expected, stereo tracks are routed through the EQ section during mixdown.

Signal routing on the MR44 is a simple matter and follows the same conventions as other products of this type. A 3-position (L, Off, and R) Record Enable switch on each track arms the track for recording and assigns channels to the left and right buses. By panning all channels hard left and switching Record Enable to the left bus (with the others switched off), the input signal on each mixer channel is recorded on the same-numbered track (direct track assignment): Channel 1 to Track 1, Channel 2 to Track 2, and so on. Alternatively, each mixer channel can be routed to any tape track or tracks via the left and right buses. The design is flexible and simple.

The two L/R monitor output jacks route signals from one of three sources, selected with the Monitor Source switch. When set to Program, the Monitor jacks send the stereo signal mixed from the four tape tracks. This is the same stereo signal sent from the Line Out jacks. When switched to Mix, the Monitor outputs provide a stereo mix of any instruments or microphones connected to the mixer channels, plus a mono mix of the four tape tracks. (These levels are set by the four tape monitor knobs.) When set to Monitor, each of the jacks outputs a mono signal set by the four tape Monitor knobs. A stereo headphone output on the front panel enables the user to monitor the MR44 in the same manner as the Monitor outs. The Phones/Monitor volume control allows you to set a comfortable monitor level independent of the line outputs.

The channel aux send provides a post-fader, pre-EQ, line-level, mono signal, routed to a pair of parallel output jacks. The aux return is via discreet left and right jacks, with a master aux return level control.

The MR44 provides four independent tape outs that take signals right off the tape tracks, pre-mixer. This makes it possible, for example, to connect the MR44 to another mixer and create an additional stereo monitor mix.

Among the conveniences of the MR44 are dedicated sync in and sync out jacks for synchronizing devices such as a sequencer or drum machine to tape. A line-level sync signal, connected to Sync In, is filtered and limited to ensure that the optimum signal is recorded. Tape sync signals record and play back from Track 4 only.

RECORDER SECTION

The MR44 uses high bias (Type II) audio cassettes. As with other ministudios, the MR44's manual recommends using the shortest tape possible and advises against C-120s. The dbx noise-reduction circuitry can be switched on

● VESTAX MR44

and off. Tape speed is switchable between 1 7/8 ips (the standard for audio cassettes) and 3 3/4 ips. A pitch-control knob varies the selected tape speed by ±10%.

The MR44 shines when it comes to sound quality, as the higher 3 3/4 ips tape speed, coupled with dbx noise reduction and dual-coil tape heads, makes a recorder that sounds almost as good as high-priced units. The bass response is deep and tight for a cassette machine, and high-end clarity is impressive.

In listening for upper midrange to high-end quality, I paid particular attention to cymbals, transients such as string plucks and snare hits, and dense reverb decays. All retained much of the original signal's sound quality when taped. In an A-B comparison with a CD, the recorder held up quite well.

The MR44's transport uses solenoid "soft-touch" controls and operates much the same as a standard cassette recorder. The transport controls feel good, but there is a noticeable hesitation when engaging Record or Play from Stop. Fast Forward and Rewind commands engage immediately, but when Stop is pressed, the unit simply slows the tape to a stop, rather than braking it to a definite halt. At first I thought the MR44's transport was sluggish, but a Vestax representative explained that the design was intentional. A slightly slower engage and brake mechanism prevents the tape from stretching, which is good foresight on the company's part. I also noticed that when Zero Return is engaged, the unit always overshoots the zero mark in both fast-wind modes, ending up at 997. This is intended to give the tape a few inches of pre-roll, which gets the tape up to speed by the time 000 is reached.

Punch-ins and punch-outs fare adequately for a unit of this caliber. Punching out leaves a slight gap before the previously recorded material becomes audible again, but I expected this and do not find it objectionable. I was disappointed to discover, however, that punching can only be done with the optional FP-1 footswitch (list price $29) or other momentary footswitch. They cannot be accomplished manually from the front panel transport controls.

IN CONCLUSION

The Vestax MR44 has all the ingredients that most people would look for in a ministudio. For its price range, I found it surprisingly easy to use, since the usual design approach uses several multi-function controls in order to keep costs down. The MR44 does not suffer at all from lack of hardware, and the user is not likely to get lost trying to remember what each control is intended to do.

The MR44 sports remarkable signal routing for its price, providing excellent flexibility for many recording and monitoring situations. The front panel is clean and fairly easy to get around on with a well-arranged design. The knobs, switches, and EQ sliders are small, however, and some may find it difficult to operate them. It was all too easy to overshoot the middle spot on the 3-position switches, for example.

As for the documentation, the more I read Japanese manuals translated into English the more I feel that something is missing from the box when I open it. The MR44's manual covers all of the functions, but not in a way the first-time user will find helpful. The majority of the functions covered in this review became evident from prior experience with ministudios, or were discovered through experimentation.

Still, the MR44 is a solid value. It's logical in its operation, offers a nice feature set, and sounds quite good. Future ministudio customers will do well to put this product on their shopping lists as a definite contender.

Dave Bertovic *is a freelance writer, sound mixer, and musician working in Los Angeles. He actually finds time to record a new song now and then.*

Roland RSP-550 Stereo Signal Processor

By Geary Yelton

Double your pleasure and fun by replacing two effects processors with one.

My first audio signal processor, almost twenty years ago, was a Maestro Echoplex, which only produced discrete echo. To change the delay time, I had to physically reposition the record head. It was noisy, but I loved it and used it every day.

Today's effects processors are superior in every way, and the new Roland RSP-550 is a good example. It produces up to five simultaneous effects from a long list that includes delay, reverb, vocoder, pitch shifting, chorusing, and quite a few others. Like other high-end processors in the latest generation, the RSP-550 offers extensive programmability, real-time MIDI control, true stereo operation, 16-bit linear resolution, and a 48 kHz sampling rate. It stores 39 presets in ROM and 160 user-programmable effects for a total of 199 programs.

HOW IT LOOKS

All this signal-processing power is stuffed into a single-rackspace unit with as many displays and controls as anyone could comfortably fit. The module has a tendency to run warm, so I suggest extra space above and below it in an equipment rack.

An LED numeric display shows the program number in big, green digits. Program names and parameter values are displayed by a backlit, alphanumeric LCD, and stereo LED meters can be switched to indicate input or output levels. The input levels are controlled by a pair of concentric knobs, but there are no front panel controls for the output levels. Instead, output level is memorized for each program. One pair of up/down buttons are labeled Program/Page, while another pair increments and decrements parameter values. There are eight more buttons for selecting Edit mode, bypassing the effects, writing programs, changing system parameters, and so forth.

The back panel holds a pair of ¼-inch jacks for audio input and another pair for audio output. Each pair has a switch for selecting between -20 dBm and +4 dBm levels to match your mixer's expectations. (The -20 dBm level setting was a bit surprising, as -10 dBV is more common.) MIDI In, Out, and Thru ports allow you to change programs and control parameters from a MIDI instrument or sequencer. Three of the remaining four jacks let you connect standard footswitches to duplicate the functions of the bypass switch and

the program up/down switches. The fourth jack accepts a user-assignable continuous footpedal.

On power-up, the RSP-550 is in Play mode. Although there's no way to enter program numbers directly, the device accepts patch-change messages over MIDI. When you scroll through programs, some signal processors hold on to the previous program until you press an Enter button, but the RSP-550 cuts off its effect until you stop scrolling and the new program takes its place.

A Program Change Map makes it possible to rearrange programs into a more convenient order. When you remap program changes, you assign program numbers to as many as 128 of the 199 programs without actually changing their memory locations. Because the RSP-550 isn't organized into banks (which would let you send it MIDI Bank Select messages), remapping is necessary to select program numbers higher than 128 from a MIDI controller. Remapping also is helpful if you want to make effects programs match up with particular patches on your synthesizers.

HOW IT WORKS

Every program begins with one of the 39 presets, which are called "algorithms." Each algorithm specifies which effects are available, their order, and their parameters. Effects can be turned on and off, and you can adjust their parameter values, but you can't replace one effect with another. To use reverb and delay in the same program, for example, you have to find an algorithm that includes both.

Just because an algorithm includes an effect called "reverb" doesn't mean that it has the same parameters as another algorithm's reverb. Some reverbs offer variable diffusion; some offer early reflection (the manual says "refrection"), pre-delay, and level; and other reverbs offer highpass and lowpass filters.

If more than one effect is used in a program, the LCD shows its "block," or combination of effects. Once you select an effect, you can turn it off and on, or go to its first page of parameters. As you step through subsequent pages, all the parameters are revealed, allowing you to increase or decrease their value. Most effects let you set the balance between the processed and

PETER DIGGS

The Roland RSP-550 is distinguished by its impressive number of programmable parameters, up to 480 seconds of delay time, and exceptional phasing, flanging, and chorusing effects.

direct (dry) signal.

If you exit from Parameter Edit mode without saving first, you lose all your changes, and the parameters revert to their original values. Because there's no Compare function, there's no way to A/B your modifications with the original program.

As many as four MIDI controllers and on/off footswitches can be used to control certain parameters in real time. Acceptable MIDI sources include Pitch Bend, Aftertouch, Note number, Velocity, and 89 Continuous Controllers. Which control-signal destinations are available depend on the algorithm; for instance, a delay algorithm might permit you to control effect on/off, feedback, and mix level. With continuous parameters such as reverb time and flanging rate, you can define the range of values that can be elicited by, say, minimum and maximum keyboard pressure or velocity.

HOW IT SOUNDS

For the most part, the basic algorithms create good, usable effects. Some of the programs are fine for showing off the RSP-550's acrobatics, but like a lot of factory programs, they have too much flash and not enough substance. They sound impressive, but they probably won't find their way onto many records. Most people don't really need 199 different effects anyway, so if you discover a dozen or more that you find useful, you'll probably be happy. Some programs are a little noisy, however, particularly the ones that produce multiple simultaneous effects.

Only one algorithm gives you five effects at the same time. Five algorithms are called "Multis" because they combine some of the most practical effects into one program, uniting either chorus, flanging, vibrato, or pitch shifting with delay, reverb, and EQ. In Multi 5, one of the modes is called "Tremoro."

Modulation Delay/Reverb and Rev1/Rev2/Delay are the only algorithms that allow you to assign left and right inputs to separate effects; you can select left, right, or both channels as the input to each effect. On the remainder of the stereo algorithms, such as the Enhancer, Stereo Flanger, and Stereo Pitch Shifter, the two sides are processed separately, with the left and right inputs directed to their respective outputs. Several other algorithms dynamically pan the outputs in stereo.

Algorithms that incorporate equalization utilize the 3-band variety. Each band has a range of cut or boost from -12 to +12 dB. Only the middle band has a variable frequency. The upper and lower frequencies are fixed at 8 kHz and 200 Hz, respectively.

All sorts of inventive echo effects can be fabricated with the RSP-550's delay algorithms, which have a maximum delay time of 2.7 seconds. It's nice that the delay time is variable in increments of 1 millisecond. The feedback can be cranked up to 120%, which makes each successive echo grow louder until your speakers explode into flame. (Don't try this at home.)

There are two multitap delays: a 4-tap and an 8-tap. Each delay tap can be set independently, with back-and-forth panning on two of the 4-tap delays. Some multitap delay programs, such as Wave, set up rhythmic patterns that may be useful for improvising new tunes, but others sound like they could never be musically suitable, even for special effects.

The most practical delay algorithm is the Tempo Delay, which pans the signal back and forth with each echo at a rate specified in beats per minute, rather than milliseconds. Set the tempo between 46 and 280 bpm, then indicate whether you want the echo to occur at sixteenth-note, eighth-note triplet, eighth-note, dotted eighth-note, quarter-note triplet, or quarter-note

intervals. A front-panel control button or a footswitch can be assigned to perform a Tap Tempo function, and delay time can be synchronized with MIDI clocks from a sequencer. I wish every delay unit had these features.

Although quite flexible and pleasant sounding, the reverbs may seem a little lackluster if you're accustomed to dedicated studio reverbs. Perhaps I'm looking for perfection, but more bands of EQ probably would help. These reverbs offer the longest hang time I've ever seen: up to 480 seconds. I tried it, and sure enough, I could just barely hear a sound reverberating eight minutes later if I turned my amplifier up loud enough.

There is a good variety of different reverb types: halls, rooms, plates, and more. My favorite is the Modulation Reverb, which turns a piano into something from a Brian Eno record. That effect inspired a song that friends tell me is the most beautiful thing I've composed. Some reverb programs offer a gate with adjustable threshold level, attack time, hold (sustain) time, release time, and leftover level (reverb "tail"). The Reverse Gate algorithm sounds like a backward reverb that ends in a dry echo.

The phaser is outstanding. I never knew a phase shifter could feature so many variable parameters, employing up to a dozen stages of phase shifting. Depending on which phaser algorithm is selected, you can change the phaser type, rate and depth of phasing, modulation phase, resonance depth, base frequency, tremolo depth, step rate, and more. As many as eight parameters can be modulated with external controls. One algorithm, the Dynamic Phaser, alters the phasing rate in response to the loudness of the input signal.

The stereo flanger is equally versatile. Its Bi-Flanger mode links two normal flangers in series for deep, throaty flanging effects. Resonance can be applied to direct and flanged sounds, or flanged sounds only. In addition to depth, rate, center frequency, and levels, you can control the phase angle of flanging, which the manual refers to as "moduration phase."

There are six chorus algorithms in addition to others that incorporate chorusing. The effect can be delayed and the cutoff frequency boosted or cut. The most complex algorithm is the Penta Chorus, which divides the audio spectrum into five bands and choruses each separately. The Space Chorus simulates the Roland Dimension D, with four modes of depth and speed. The Ensemble algorithm is an especially fat chorus with two independent LFOs.

The Rotary Speaker effect, coupled with Overdrive distortion, is perfect for Hammond organ sounds. You can adjust the slow and fast speeds separately for the simulated high-frequency horn and low-frequency rotor, as well as the balance between the two. The Rotary algorithms use a footswitch to toggle between fast and slow rotation, which effectively imitates changing speeds on a real Leslie speaker. You also can control the rise time from fast to slow and vice-versa.

Up to four pitch shifters can appear in the same program. The amount of shift is specified in semitones and cents to a maximum of two octaves up or down. The shifted sound can be panned to any location and delayed as much as 600 milliseconds. There are two modes: High Quality, which sounds good but takes more calculation time, and High Speed, which sounds okay and has less delay.

If you enjoy making synthesizers talk (and who doesn't), you'll like the Vocoder algorithm. (Remember Wendy Carlos' "Beethoven Chorale" in *A Clockwork Orange?* That was done with a vocoder.) Basically, a line-level signal at one input is modulated by the mic-level signal at the other input. On the RSP-550, the left input's audio signal is divided into eight frequency bands, which are controlled by continuous

Product Summary

PRODUCT
RSP-550 Stereo Signal Processor

PRICE:
$1,295

MANUFACTURER:
Roland Corporation
7200 Dominion Circle
Los Angeles, CA 90040
tel. (213) 685-5141

EM METERS	RATING PRODUCTS FROM 1 TO 5
SOUND QUALITY	● ● ● ●
FEATURES	● ● ●
EASE OF USE	● ●
VALUE	● ● ●

spectral analysis of the right input signal. You can mix in the original mic input signal with the line-level signal, if you want. The Vocoder works best if the gate threshold is set low and the hiss mix (sibliance) level is set to High.

The remaining effects are for improving presence in a mix. The Edge Expander slightly boosts the clarity of attacks. The stereo Enhancer mixes the original audio signal with a phase-shifted version, enhancing definition. Ambience is intended to simulate a microphone placed some distance from the source. All three are subtle effects.

DOCUMENTATION

There are two manuals: an owner's manual and an algorithm guide. The owner's manual is an obvious Japanese translation, very dry and matter-of-fact, but it gets the information across. It's written much more as a reference than as a tutorial. The manual thoroughly documents the MIDI implementation and features an index.

The algorithm guide is better. It explains each algorithm, showing a block diagram and a list of parameters. Almost a quarter of its 90 pages are dedicated to explaining how all the parameters function. There's no index, but a chart in the back lists the algorithms and their associated effects, and another chart lists all 199 factory programs.

IN CONCLUSION

This was a difficult review to finish because I kept getting so wrapped up in playing with the RSP-550. My overall impression is that it serves best as a signal processor for keyboards. Many of the effects are oriented toward organ, piano, and strings. Although a handful of programs are specifically designed for guitar and bass, it lacks the versatile distortion you find in guitar processors. On the other hand, if you already have a satisfactory guitar preamp with distortion, this product will perform your other guitar effects quite well.

The RSP-550 is no more difficult to program than most other sophisticated musical electronic gear. Its many parameters are controlled by too few buttons, though, a problem compounded by the limited space on the front panel of a single-rackspace unit. As a result, it takes too long to step

through program and parameter changes from the front panel. I wish there were an optional keypad or some other way to enter values directly.

The lack of a Compare function also seems like an oversight. Although the RSP-550 is pretty flexible, it's not the end-all and be-all of audio effects processors. There's no parametric EQ and no compression or limiting.

What it does, it does well, especially phasing, flanging, chorusing, and Leslie simulation. At $1,295, it's not cheap, but imagine what you would pay for all the separate effects this thing could replace. There are less-expensive devices (such as the Lexicon LXP-15 and Boss SE-50) that do much of what the RSP-550 does, but they have fewer parameters and less delay time. For the moment, at least, the Korg A2 and Rocktron Intellifex probably are the RSP-550's primary competition in the same ball park.

All in all, the RSP-550 is a well-rounded processor that offers a few effects you may not have already. If you have a small studio, or if you play keyboards, give it a try before you consider buying another signal processor in its price range.

Geary Yelton *has written three or four books, scored dozens of commercials, lectured to music teachers, sequenced three Christmas records and a lambada CD, orchestrated the album* Bach for a New Age, *and taught college students how to make funny noises with computers.*

Dr.T's KCS 3.5 (Amiga)

By Bob Lindstrom

A veteran sequencer gets real-time graphic editing with brains, if not beauty.

Dedicated fans of Dr. T's software for the Amiga were starting to worry. Lately, the doctor looked more like a country practitioner than a dude about town. While other Amiga-based sequencers boasted graphic controller-editing, object-oriented toolboxes, and notational displays, the text screens and event lists of Dr. T's *Keyboard Controlled Sequencer (KCS)* worked well, but they showed their age.

With *KCS 3.5* for the Amiga (the latest version is 3.57), the situation has changed: Dr. T's has gone graphic. In addition to all the power of MIDI event-list editing, *KCS* now incorporates the *Tiger* graphic editing environment, enhanced from the doc's *Tiger Cub.* For more visuals, version 3.5 also includes *QuickScore,* a manuscript notation and printing module. And from the version 3.0 upgrade, *KCS 3.5* has a real-time MIDI mixer, the *Level II* algorithmic composing tools, and SMPTE sync support (with the appropriate hardware).

Also, *KCS* Amiga now is freed from the shackles of key-disk copy protection. For Workbench 2.0 users, the program even includes custom icons suitable for Commodore's new interface design. Finally, for Amiga multimedia mavens who lack synths, *KCS* supports recording and playback using IFF 8SVX-format samples for the computer's internal soundchip, making it a useful tool for self-contained Amiga presentations.

Instead of the *ARexx* interprocess communication port included in some other Amiga sequencers, Dr. T's includes its proprietary *Multi Program Environment (MPE)* to enable automatic data-sharing with other Dr. T's programs. *MPE* isn't exactly an *ARexx* substitute (see sidebar), but it is a powerful tool.

ANOTHER PRETTY FACE

Diving into individual MIDI data values is a great way to detail a MIDI sequence. But face it, the event-list editing that made Dr. T's famous isn't glamorous. So the doctor tanked up with *Tiger,* a graphic environment that allows real-time editing of notes, controllers and tempos. *Tiger* is not a standalone extra or *KCS* afterthought, but a fully integrated editing/recording module launched from within *KCS,* using *MPE.*

On the surface, *Tiger* closely resembles other graphic editors, though like most Dr. T's software, its spartan visual design is functional and not flattering (see **Fig. 1**). A piano display on the left side of the Track window helps identify the pitches of horizontal note bars. The length of the bar shows the duration.

One of *Tiger's* idiosyncrasies is also one of its assets: Note velocities are represented by vertical stems rising from the beginning of each note bar. The stems point out the start of each note (an advantage in dense passages), and stem length defines velocity. This system allows excellent note-by-note velocity editing, although velocity also can be mouse-drawn in a controller window.

Other controller messages can be drawn in a controller window as single events or multiple event curves. Windows for most common controller values can be selected from a command menu bar, but user-defined controller windows can be created in a pull-down menu.

Activating a conductor track (which now is the stated purpose of Track 1 in *KCS*) also provides the option of drawing tempo changes, either offline, or during real-time playback. A control bar over the Track windows has "hot spots" for moving between tracks, soloing or muting the current track, changing the MIDI channel, setting program or volume changes, and adjusting time offsets.

Below the Track window, icons are available that change the most common MIDI values—velocity, duration, start time, and pitch—as well as providing cut-and-paste functions. Also found here are gadgets for changing tempo, locating the mouse pointer by Measure:Beat:Clock, zoom in/out, and basic quantization. More sophisticated and less often used transformations and editing options—transpose, quantize with swing, time reverse, and others—are tucked away in a bar of pull-down menus.

Tiger has its own track-oriented recording capabilities, but I still find *KCS* a more efficient recording environment. In addition to recording data from a MIDI controller, *Tiger* recognizes real-time mouse entry of controller and note events, though I recommend this only for the mouse-obsessive musician.

Graphic editing is slick, but what makes *Tiger* an essential addition is real-time editing. A good example was my effort to make an improvised keyboard solo sound a bit more like a live flute player in a groove than the butterfingered dribblings of a paper composer. *Tiger* can loop up to nine measures of a score, with the option of

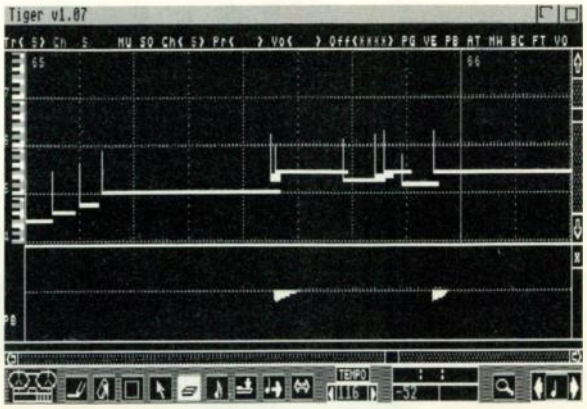


FIG. 1: *Tiger* provides real-time graphic editing windows for note and controller data.

soloing or muting the current track. It was easy to loop two to four measures of a soloed track while tweaking a little spontaneity into start times, velocities, and duration. A little more real-time diddling while listening to all the tracks, and I was done. The cursor keys were especially helpful in fudging individual notes and groups of notes (including non-contiguous groups of notes) forward and backward for the right "feel."

However, the size of notes in the graphic display is linked to the current resolution. At 24 ppqn (which no right-minded MIDI master should be using, anyway), the notes get so close together that they often are impossible to edit at the highest zoom-in level. At 240 ppqn (*KCS 3.5* Amiga maxes out at 384 ppqn), notes are large and manageable. If you need to plunge down to those bargain-basement resolutions, simply step up to 240 ppqn for *Tiger* editing, then convert back before saving the file.

THE SCORE

Like *Tiger, QuickScore* is an MPE module that must be activated from within *KCS* (see **Fig. 2**). This stripped-down subset of Dr. T's *The Copyist* (PC version reviewed in the January 1992 **EM**) provides a convenient means of displaying and printing, but not editing, MIDI scores in conventional notation.

Several setup options choose the measures per page, clefs, part transpositions, and other notation preferences. Other than that, if you don't like the notation, that's tough. You can't alter it.

I wish *QuickScore* filled the screen with staves in Single Track mode. At present, all you get is one lonely staff rattling around in a mainly empty screen. Even so, it does a good job with most notation and prints out attractive parts and scores for a quick and not-so-dirty hard copy of your MIDI music.

One caveat about both *QuickScore* and, to a lesser extent, *Tiger:* These modules work best with accelerated Amigas. Notating full scores using a stock Amiga 500, for instance, is an exercise in patience. If you can't afford a 68020- or 68030-based supercharger for your computer, have a favorite beverage ready. *QuickScore* gives you plenty of sipping time.

STILL MORE MODULES

The remaining two extras in *KCS 3.5* are carry-overs from version 3.0: *AutoMix* and *The Phantom.*

AutoMix 1.3 is a self-contained virtual MIDI mixer (see **Fig. 3**). Designed to resemble a mixing board, *AutoMix* contains graphic onscreen ("virtual") faders that transmit user-selectable Continuous Controller messages (it defaults to Volume and Pan) in real-time. Up to sixteen setups can be stored in RAM or saved to disk. The program provides a handy mixer when recording to tape, or the controller messages can be *MPE*-transmitted directly to *KCS.*

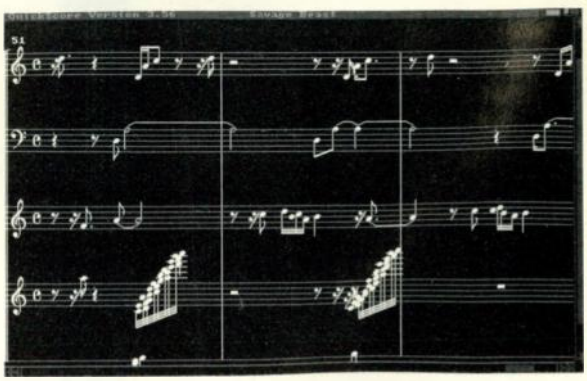


FIG. 2: *QuickScore* notates and prints MIDI files in full score, as pictured, or in single-track parts.

Dr. T's also provides an enhanced beta version, *AutoMix 2.0*. It supports the Niche ACM audio control module (which I didn't test) and can slave up to four groups of pan and volume sliders for simultaneous adjustment.

The Phantom is a SMPTE sync utility that reads and writes all formats of SMPTE time code when used with Dr. T's Phantom MIDI interface/SMPTE time-code reader/generator for the Amiga.

OUR STORY SO FAR

If you're unfamiliar with previous Amiga releases of *KCS*, you should know that its recording and editing areas have changed little since first released several years ago. Through the years, it has retained a reputation for rock-solid performance and creative versatility. Whether you prefer pattern- or track-oriented recording, *KCS* takes it in stride.

KCS has three basic recording and editing modes: Track, Open, and Song.

The Track mode Play screen is composed of a tape transport control panel and a text display showing the status of all 48 available tracks (see Fig. 4). Under *KCS*'s flexible environment, looped recording can be activated for pattern-oriented composing of short tracks, or track-oriented composers can lay down tracks of unlimited length.

Product Summary

PRODUCT:
Keyboard Controlled Sequencer (KCS) 3.5 for Amiga

PRICE:
$400

REQUIREMENTS:
Amiga 500 or better, with 2 MB RAM and Desktop 1.3 or 2.0; hard disk recommended.

MANUFACTURER:
Dr. T's Music Software
220 Boylston St.
Suite 206
Chestnut Hill, MA 02167
tel. (617) 244-6954

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ● ◖
EASE OF USE	● ● ● ●
DOCUMENTATION	● ● ● ◖
VALUE	● ● ● ● ◖

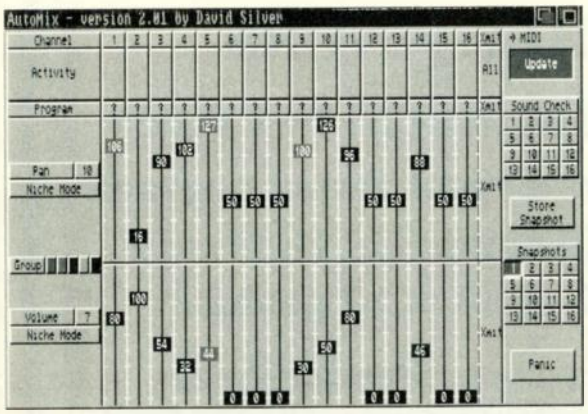


FIG. 3: Both pan and volume sliders may be grouped in the beta version of *AutoMix 2.0*.

On the Track mode Edit screen is a MIDI event list and a menu of mouse-selectable editing options. Here, true *KCS* nerds get into the "spreadsheet" groove and revel in the detailed control of event-list editing. It's hard to learn and initially hard to use. Still, no other editing technique gets down to those micro MIDI levels.

Whatever your style, you'll probably layer several tracks into Open mode sequences. The Open mode Edit screen offers event-list editing for up to 126 sequences. The Open mode Play screen shows the current status of all sequences. It is possible to record in Open mode, but the Open mode Play screen lacks onscreen tape transport controls.

In Open mode, one or more control sequences can be set up to build a full score. In a control sequence, you may sequence, overlap, interrupt, stop, transpose, and otherwise manhandle other Open mode sequences in your search for structural perfection. Though complex to master, Open mode control tracks offer unparalleled creative freedom.

For those who prefer to get The Big Picture, Song mode is a simpler way to string together full sequences without the learning curve of Open mode.

At its best, *KCS* enables composition at several levels of detail, using many different techniques. Once you grow accustomed to the mathematical precision of event-list editing, the program offers extraordinary control over the work and the work environment.

CH-CH-CHANGES

The *KCS* design has not entirely resisted change, however. Event-list editing in *KCS 3.5* includes a few work-enhancing additions.

The Split command in Track and Open modes now lets you move ranges of notes and controller messages to another track, or split out data according to MIDI channel. Tracks and sequences now can be remapped from the original MIDI channels to other MIDI channels. A menu item activates *The Phantom* SMPTE support, and current Phantom settings are saved with *KCS* files.

A Raise Priority option effectively locks out all other programs running in the Amiga's multitasking environment. It makes *KCS* a bad multitasking neighbor but also prevents other programs from trashing timing accuracy during time-critical recording or playback.

VARIED VARIATIONS

Two versions of *KCS 3.5* are included in the current package, with and without the *Level II* algorithmic composing and editing tools: the Master Editor and the Programmable Variations Generator (PVG).

The Master Editor steps in when some conventional editing operations just don't cut it. Among its global operations are the ability to deflam chords, rewrite chords as arpeggios, selectively merge data values from two tracks (share velocities without sharing pitches, for example), strip ranges of controller messages to separate tracks, and assign individual chord notes to separate MIDI channels.

By and large, ME's impact on MIDI

MULTIPLE MULTITASKING

On the Atari ST, *Multi Program Environment (MPE)* is one of Dr. T's chief selling points. *MPE* allows users to load and run more than one program and share MIDI data between them.

But who needs *MPE* on the Amiga? The computer multitasks from the get-go, so why pile multitasking upon multitasking? The answer is interprocess communication.

While two Amiga MIDI programs can share the MIDI port (allowing a patch editor to change timbres while a sequencer plays a track), only the synth knows what each program is doing. Generally speaking, neither program recognizes the existence of the other.

Under *MPE*, programs not only run simultaneously, they also share data simultaneously. Therefore, patch setups saved by Dr. T's *X-oR* universal editor/librarian can be piped directly into *KCS*, and track editing in *Tiger* can be instantly transferred to *The Copyist* (but not exported back to *Tiger*; I guess you can't have everything).

In *KCS 3.5*, both *QuickScore* and *Tiger* require *MPE* and function only when launched from within KCS (or *Tiger Cub*, the only other *MPE* host program). The result is that *QuickScore* and *Tiger* are totally integrated into *KCS*, effectively working as new modes of *KCS* rather than stand-alone programs or patched-in add-ons.

Offering *MPE* instead of *ARexx* has a significant drawback, however: *MPE* doesn't handle *ARexx*'s primary task of sending control commands between applications. If, for instance, you want to multitask *KCS* with a NewTek Video Toaster, you can't control the Toaster from within *KCS* as you can with Blue Ribbon SoftWorks' sequencer, *Bars&Pipes Professional*. On the other hand, if your primary concern is data-sharing between *KCS* and other Dr. T's programs, *MPE* will do the job.

Finally, as veteran Amiga owners know, multitasking works only when applications play fair. Not all MIDI programs from all publishers work together or share the serial port. *MPE* not only guarantees data-sharing between Dr. T's programs, it offers some assurance they will work cooperatively.

FIG. 4: The *KCS* Track mode Play screen includes standard tape transport-type controls and a track status display.

data is predictable and controllable. This isn't so true for the PVG. As a paper composer who believes music starts with inspiration and ends with anxiety, it's hard to stir my muse by mathematically mauling my carefully chosen notes. On the other hand, I suppose inspiration comes from wherever you can shovel it. So I hesitate to look a gift algorithm in the mouth.

The truth is, the algorithmic options of PVG are formidable but inscrutable. Instead of a graphic interface like the one in *M* (available from Dr. T's for the Amiga, Macintosh, and Atari ST and from Voyetra for PC-compatibles), we get a classic number-numbing Dr. T's interface in which the uninitiated can puzzle over arcane values. (For more on *M*, an algorithmic composition program originally distributed by Intelligent Music, see "Interactivity in Action: 'M' Meets the Amiga" in the April 1989 **EM**.)

After beating against PVG for awhile, with results best-suited for the John Cage Hallucinogenic Music Festival, I turned a stone ear to pitches and applied PVG to rhythm tracks. Here I hit home and generated variations that suggested new textures and cross-rhythms.

The moral is: PVG and ME are potent tools with unusually steep learning curves. As part of the total *KCS* package, they are a considerable asset. And they're a good way to spend time playing "in" when you're not playing "out."

I NEED HELP

As features grow in *KCS*, so does the documentation. The latest includes the *KCS* version 3.0, *Level II*, and version 3.5 Amiga addendum docs in a loose-leaf ring binder. *Tiger* and *QuickScore* get a separate, stapled booklet. In general, the documents are clearly written, but it might be time for the manufacturer to reevaluate and reassemble the presentation.

THE FINAL BAR

Even with *Tiger*, *KCS 3.5* isn't beautiful, but it works harder and better than many of those prettier sequencers. It certainly isn't a breeze to master, either, though it's possible to get comfortable quickly if you start by just MIDI recording in Track mode.

To really get into the *KCS* groove, you'll need to invest time. Your payback as an experienced *KCS* user will be the ability to lay down tracks quickly, elaborate your scores efficiently, and fine-tune those inspirations in an environment rich with creative options.

Sequencing with *KCS* for the Amiga isn't a decorator sport. This is a sequencer for the serious, and it carries a sometimes-steep learning curve. Once on the top of that curve, though, *KCS* is an excellent performer that offers more efficiency, convenience, power, and versatility than most sequencers on the Amiga or any other platform.

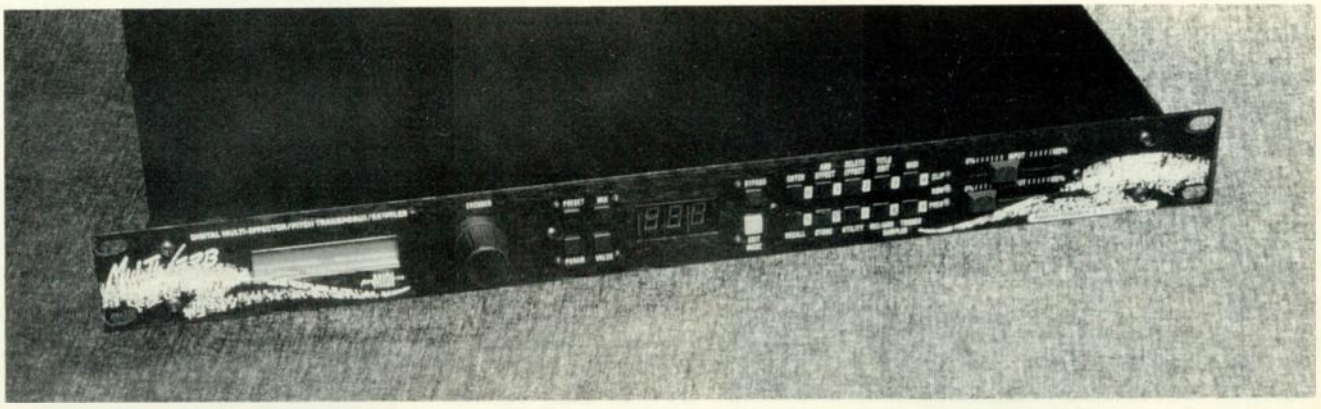
Bob Lindstrom *is a composer of computer game scores, an orchestral conductor, and vice president of programming and music for Dynamix, Inc. He formerly was editor-in-chief of* Computer Shopper *and A+ magazines.*

ART MultiVerb Alpha Digital Effects Processor

By Michael Molenda

Options abound in a moderately priced multi-effects box.

At the risk of sounding like the guy who justifies his discount bookstore chain by stating



RON MILLER

The ART MultiVerb Alpha's vast menu of signal processing parameters enhances countless studio and stage applications.

"books are too expensive," I submit that digital effects processors are getting too ambitious.

Consider the ART MultiVerb Alpha, a typical overachiever. It doesn't stop at offering the usual cool digital effects such as reverb, chorus, flange, and delay. It doesn't even call it quits after adding a pitch shifter and a programmable 7-band equalizer. An acoustic-environment simulator is included, but it's still not enough. Two hundred user-memory locations, full programmability of all parameters, and real-time MIDI control of eight parameters aren't even the icing on the cake. The Alpha just wasn't complete until it could boast sampling with pitch-shift capabilities and several triggering options. Distortion is the only important guitar effect it lacks, and there are plenty of other boxes that can supply that. And because ART probably thinks "digital effects processors are too expensive," it priced the Alpha under $500.

Mark my words: Pretty soon these digital demons will critique musical performances (in real-time) and shut down the audio if the quality level falls below preset parameters.

THE GRAND TOUR

Luckily, the current Alpha model does not include a fearsome "music critic" program, and for all its technological ambition, the user interface is pleasantly straightforward. The gaudy front panel (black metal screened with pink and white lettering and pink, white, and gray splatter logos) belies the clean layout of parameter controls and displays.

The 32-character, backlit LCD display has an adjustable view angle and is easy to discern in most situations, although bright stage lights play havoc with readability. A large Encoder knob allows fast access to program and parameters and takes the place of increment and decrement buttons. The four main editing buttons are to the right of the Encoder knob, with Preset and Mix stacked above Parameter and Value. A red, 7-segment, numeric display boldly illuminates program numbers and separates the main edit buttons from the Bypass and Edit Mode buttons.

Additional edit function buttons are grouped together. A 3-position LED input meter enhances level monitoring, and sliders determine input and output levels (0 to 100 percent).

The back panel offers six ¼-inch mono jacks for L/R lines in and out, the Remote 1/Bypass footswitch, and the Remote 2 footswitch. Of course, you also get MIDI In, Out, and Thru. A handy power jack sends (+) 9 volts DC to external devices such as MIDI footpedals. The main power supply is internal.

PROGRAMMING

Programming the Alpha is so easy the manual seems superfluous ("seems," not "is"). Preset programs can be customized by hitting the Param button to view parameters, pushing the Value button, and using the Encoder knob to change the character of the displayed parameter. Quick editing can be enacted by repeatedly depressing the Value button to scroll through editing options and twisting the Encoder knob to tweak specific parameters. This negates bouncing back and forth between the Param and Value buttons.

Creating programs from scratch is child's play, and all effects chains are user-configurable. Pushing the Add Effect button scrolls through effects options. When a desired effect is onscreen, the Enter button puts the effect "on line." Each effect appears with default parameters so it can be heard immediately upon access. This feature also provides the programmer with a starting point, rather than forcing a sound to be constructed from silence. Subsequent effects in the chain are accessed by continuing to push the Add Effect and Enter buttons.

The Alpha automatically decides which effects are still available, as your selections devour memory capacity. Although the Alpha is capable of chaining seven simultaneous effects, some effects require more memory than others. You may not be able to combine the maximum delay time of 1,500 milliseconds with a Taj Mahal reverb, pitch shifting, sampling, and chorusing. Memory constraints may allow only the delay and reverb selections, or offer an additional low-memory effect such as EQ. But for most musical applications, I found the Alpha to possess plenty of memory storage, and I never discovered a situation where all seven simultaneous effects were mandatory. (I topped out at five.)

However, if you determine a chain must have a particular effect that the processor won't let join the party, compromise is easy. A non-essential (yet memory-gobbling) effect can be deleted, which usually clears enough space to admit the desired effect. If not, continue deleting effects, or rethink your chain.

You also can program the wet/dry mix and the level of pre-effect (dry) equalization, write your own program titles, and configure certain global parameters (bypass volume level, LCD angle, remote switch bypass, etc.).

The Alpha supports two footswitches,

either of which can be used for Bypass On/Off, or to trigger the sampler. You also can use the Remote 1 switch to increment through program changes. Remote 2 decrements through program changes and arms the sampler to record.

SOUND SANCTUARIES

The Alpha boasts a 24-bit digital architecture, which is a great sales tool for the ART marketing department, but I never trust such specs. (The internal processing is 24-bit, not the A/D and D/A converters.) Ultimately, your ears must determine whether an effect is a thing of beauty. Here's the box score on what *my* ears decided.

Equalizer. The seven bands are thoughtfully set at musical frequencies (40 Hz, 100 Hz, 250 Hz, 640 Hz, 1.6 kHz, 4 kHz, and 10 kHz) with boosts/cuts preset at ±2, 4, 6, 9, 12, or 15 dB. I found the EQ to be quite smooth. You also may sweep bands via MIDI.

Acoustic Environment Simulator. What a surprise! All the environments sound natural and add a subtle psychoacoustic dimension when mixed with reverb. Unfortunately, this feature is so hip, I often was seduced into overusing it. Available "environments" include: heavy carpet, stone ceiling, wood baffles, and wall drapes.

Lowpass Filter. Thirty roll-off frequencies are provided. The only time I use this effect is to diminish audible hiss. Unfortunately, this effect defaults to the front of the chain, and what I put into the chain was relatively clean.

Pitch Transposer. The Alpha does a great pitch-shifting job for an inexpensive unit. Treble frequencies on guitar tended to expose unwanted artifacts, but bass notes were processed nicely. The overall quality was a bit harsh for an upfront vocal effect or stereoizing. Used as a "ghost" timbre to add dimension to lead or background vocals it performed superbly. For evoking tonal deconstruction, or eliciting bizarre timbres, it couldn't be beat.

Flanger and Chorus. Neither of these effects possessed a sensual quality when employed on legato lines or strummed guitar chords. The "digital thing" seemed to rear its head and enforce a static, clipped quality. Arpeggio lines worked better. A nice shimmer was evoked during sharp, staccato performances.

Panner. Fast speeds send the equilibrium into a vortex, but a little restraint can add a dimensional quality to pitch shifting, chorusing, flanging, and delay effects.

Tremolo. Maybe it was the application (a mid-tempo ballad), but it was difficult to tune in the sound I wanted. Wild, rapid modulations were easy, but a nice, sexy articulation eluded capture. In addition, the configuration of the tremolo effect's gain stages makes it susceptible to audible hiss. I eventually tuned in a great sound, but the gain levels produced too much noise. Rather than dilute the effect by lowering the mix level, I ran the unit through outboard processing to satisfy my Mr. Clean psychosis.

Reverb. ART has optimized the reverbs for specific sources, so care must be taken to match the effect to the instrument. The manual details which programs are recommended for vocals, guitars, keyboards, and percussion. I found that guitars and keyboards were enhanced beautifully. Long decays were full and sensual, gated varieties bright and tough, and short decays added body and spatial articulation. The vocal reverbs possessed a slightly brittle timbre. This "steely" presence improved the clarity of aggressive vocals, but was less effective on crooners. The effect was best employed as a subtle secondary reverb (for spatial enhancement of a lead vocal), or to sweeten background vocals. All of the reverb programs performed fine on percussion.

Delay. The delays *always* sounded great. No matter how long the time, or how high the regeneration, the tone was sharp and clean. The reverse-delay

Product Summary

PRODUCT:
ART MultiVerb Alpha digital effects processor
PRICE:
$499
MANUFACTURER:
ART, Inc.
215 Tremont St.
Rochester, NY 14608
tel. (716) 436-2720

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ●
EASE OF USE	● ● ● ●
SOUND QUALITY	● ● ●
VALUE	● ● ● ●

parameters were a knockout; I couldn't stop inventing these silly symphonies of clashing counterpoints. In a practical realm, the reverse effect (used subtly) increased the sonic interest of secondary instruments and background vocals. Even basic applications (vocal slap, dub effects, guitar solo histrionics) sounded wonderful.

Sampler. Another surprise. Who expects the sampler on an inexpensive effects processor to sound professional? My ears were opened. Obviously, the applications and sample times (up to 1.58 seconds) are limited, but the quality is good. You even can use pitch shifting to enhance the sound. The trigger is reasonably quick and can be fired via the front panel Trigger button, by MIDI message, or by audio. The Play mode includes a Repeat sample function. There often is a slight "click" audible when the sample is triggered, so recording applications are risky. However, for live use, it's completely awesome. (I triggered Orson Welles whispering "Rosebud" by switching the trigger to Audio and scratching a muted rhythm on my guitar.)

CONCLUSION

The Alpha is a very musical effects processor. Its programmability and sound quality provide for basic sonic enhancement and the complete destruction of tonal morality. In other words, it's fun.

However, all this fun comes with some responsibility. The Alpha's multiple gain stages can produce audible hiss if the user is not careful tuning the wet/dry mix. This situation is readily apparent via the unit's mix default setting of 75%, which exhibits a fair amount of noise. For pristine sound, it's essential that the mix levels of all programs are auditioned and adjusted. Although some programs are harder to tame than others, I achieved the cleanest results by setting the wet/dry percentage to 50. (You can hear the hiss diminish markedly as the wet level is reduced.)

I also was disturbed that program changes are enacted with an audible click. This has been a continuing problem with the MultiVerb family. It's not a big deal when used onstage as a guitar processor in a loud band; the roar of the band will certainly drown out a tiny glitch. However, in quieter pas-

sages, or when a MIDI sequencer is ordering effect changes during a mixdown, a garbled transition can be disastrous. Everyone I know who owns a MultiVerb complains about this, so it seems ART should address the situation.

Besides these two complaints, the Alpha is a marvelous device. It can be employed onstage, or in the recording studio and deliver professional results. That's a decent recommendation for a $499 processor. But don't compliment the Alpha where it can hear you. These things are getting smart enough to develop egos.

EM *associate editor (and resident theater/film snob)* **Michael Molenda** *is mourning the fact he was caught reading Stephen King's* Needful Things *in the lunch room.*

Stratus Sounds for the Akai S1000

By Geary Yelton

Feed your S1000 the best samples money can buy.

You have to admire independent sample developers like Stratus Sounds. They're real craftsmen who do it for the sheer joy of doing it right. Back when their company was called Miller-Blake Digital Samples, they produced critically acclaimed disks for the Prophet-2000 and the Kurzweil 250. (Kurzweil has encouraged them to develop sounds for the new K2000, which should be a good move for all concerned parties.) Now they've focused their efforts on Akai's popular sampler.

Most Stratus Sounds samples are designed to fit in two megabytes of RAM. Many instrument sets take up two floppy disks but cost the same as single-disk sounds. Most are ready to pop into your S1000 and play.

PIANOS AND HARP

Although there's no velocity crossfading between dynamic levels, these may be the most realistic piano samples around. Grand Piano One and Grand Piano Two are two beautiful 9-foot Steinway Model Ds. The second is miked at a greater distance than the first, so you get a more "live" sound. You really can hear those strings resonating in the low end. To my ears, Grand Pianos Three and Four sound slightly boxier, and the latter is a bit darker in tone. The Yamaha Electric Grand fits on a single high-density disk, making it a whole lot lighter than the real thing.

If you like the avant-garde, you may already have an appreciation for Piano Harp Effects, where piano strings are stroked with a guitar pick or other item. The loops are obvious enough to give them an eerie electronic quality. Speaking of harp, if you don't already have some great harp samples, you can't go wrong with Concert Harp One.

STRINGS

The Lush Strings are a real find: thick and luxurious, a perfect all-purpose, sampled string ensemble. A synthesized string pad (it sounds like a Roland JX) is layered onto one of the four programs on these three disks. Solo Violin One is rather sweet and well multisampled, with a lot of vibrato. The Legato Violins set has two violins with even heavier vibrato and a chorused version that sounds slightly artificial. Solo Viola One is pretty and lyrical, with delayed natural vibrato. Solo Cello One is so realistic listeners might think it's a live cello player. Just don't wander into the keyboard's extreme ranges if you want to make the most of its natural vibrato.

WOODWINDS

The Baritone Sax is the best of the three saxophone disks. The attack is quite realistic, and there's nearly a one-second delay before the vibrato begins. Another disk, Tenor/Alto Sax, includes two saxes separately, then layered together. I can scarcely hear a difference between the three programs on the Soprano Sax disk, but all have programmed vibrato.

The English horn and oboe disks are top-notch, perhaps the best I've heard. Like other double-reed samples, it's really hard to control the decay so that your sampler sounds like a real player. Probably because of its relentless vibrato, Solo Flute One sounds an awful lot like a Mellotron, especially when you

ADVERTISER INDEX

Advertiser	Reader Service #	Page
Access II	501	125
AKG Acoustics	502	95
Alesis (D4)	503	7
Alesis (MMT-8)	504	39
Alesis (DataDisk)	505	55
Alesis (MIDIVERB III)	506	83
Alla Breve Music Software	507	116
Applied Research & Technology (ART)	508	48
Architectural Arts	509	76
Sam Ash Music Stores	-	109
Audix (300xb)	510	106
Audix (D-one)	511	107
Bananas at Large	512	127
Bartleby Software	513	76
Big Noise Software	514	51
Buchla & Associates	515	99
Cannon Research	516	52
Caroline Records	517	102
Century Music Systems	518	92
C.I.R.I.A.S.	519	114
Coda Music Software	520	40
Codehead Software	521	105
Computers & Music	522	82
Cool Shoes Software (Sound Globs)	523	59
Cool Shoes Software (Drummer)	524	112
DAT - Audio Gallery	525	120
The DAT Store	526	86
dBm Technical Services	527	123
Digidesign	528	24
Digital Audio Labs	529	61
DigiTech	530	139
Disc Makers	531	118
Discount Distributors	532	105
Dr. T's Music Software	533	45
EarLevel Engineering	534	125
EFXX Products	535	68
EM OnLine	-	128
E-mu Systems	536	22-23
Encore Electronics	537	115
Ensoniq (EPS-16 PLUS, etc.)	538	21
Ensoniq (SD-1, etc.)	539	63
Europadisk	540	120
E.U. Wurlitzer	541	97
Eye & I Productions	542	59, 121
Five Pin Press	543	81
Fostex	544	78
G.H.S. Music Products	545	46
Goodman Music	546	119
Grove School of Music	547	33
Gulbransen	548	91
Harvey & Company	549	60
Hybrid Arts (Digital Master)	550	38
Hybrid Arts (ADAP)	551	64
Imaja	552	74
InVision Interactive	553	65
Key Electronics	-	12
KMX	554	121
Korg	555	32
Kurzweil Music Systems	556	53
Leigh's Computers	557	34
Lentine Music	558	129
Lexicon	559	77
LT Sound	-	68
MacBeat	560	34
Mackie Designs (1202)	561	2
Mackie Designs (CR-1604)	562	3
Mark of the Unicorn	563	9
Maxell	-	18-19
Micro Technology Unlimited (MTU)	564	89
MIDI-CYMS	565	70
MIDI Land (PCD-401)	566	94
MIDI Land (16 Track for IBM)	567	117
MIDIMAN (Syncman)	568	79
MIDIMAN (MiniMixer)	569	103
MIDIMAN (Rack-Release)	570	110
Mix Bookshelf (Principles of Digital Audio)	571	131
Mix Bookshelf (SR Handbook)	572	131
Mix Bookshelf (MIDI Manuals)	573	132
Mix Master Directory	574	96
Mount Rockmore	575	123
Musicator A/F	576	80
Musicians Institute	577	16
Music Industries/Quik Lok	578	36
Music Quest (MQXs)	579	103
Music Quest (PC MIDI Card & MQX-32M)	580	119
Music to MIDI	581	86
New Sound Music	582	118
NRI/McGraw Hill	-	75
Oktal/Korg Canada	583	111
On Record	584	110
Opcode	585	4
PAiA Electronics	-	88
Passport	586	14-15
Peavey	587	47
PG Music	588	85
Pixel Publishing	589	108
PolyQuick	590	99
PS Systems	591	104
QCA	592	116
Rane	593	11
Rhythm City	594	35
Rolls	595	114
Romeo Music International (RMI)	596	113
R T P	597	57
Samick	598	10
San Jose State University	599	128
Sennheiser	-	35
SOFTpacific	600	129
SongWright Software	601	127
Sonocraft	602	74
Soundcraft	-	140
Sound Quest	603	50
Soundtrek	604	112
Soundware	605	101
Spectral Synthesis	606	109
Steinberg/Jones	607	71
Sweetwater Sound	608	41
Systems Development Group	609	122
Tascam	610	66-67
Teach Services	611	88
Tech 21	612	97
Temporal Acuity Products (TAP) (Music Printer Plus)	613	31
Temporal Acuity Products (TAP) (PianoWorks)	614	92
Thoroughbred Music	615	81
thoughtprocessors	616	49
TimeLine	617	27
Tran Tracks	618	108
Trycho Tunes	619	56
Turtle Beach Systems	620	87
Twelve Tone Systems	621	69
USCO Audio	622	60
Voyetra (V-22, V-24s)	623	70
Voyetra (Sequencer Plus)	624	89
Yamaha (RY30)	625	13
Yamaha (MT120)	626	72

RATE THE ARTICLES IN THIS ISSUE!

FEBRUARY 1992

We want to know what you think of the articles in *Electronic Musician*! Now you can use your reader service card to give us feedback about *EM*'s editorial coverage. We have assigned a rating number to each of the main articles in this issue. Please select a rating for each article and circle the appropriate number on your reader service card:

Please select ONE rating number per article	Very Helpful	Somewhat Helpful	Not Helpful	Didn't Read
a. "War of the Worlds: The Guitar Unbound," p. 30	701	702	703	704
b. "War of the Worlds: No Strings Attached," p. 37	705	706	707	708
c. "In Control," p. 42	709	710	711	712
d. "The MIDI Trap," p. 62	713	714	715	716
e. "Working Musician: Comprehending Copyright," p. 90	717	718	719	720
f. "Recording Musician: In Good Voice," p. 93	721	722	723	724

play chords. If that's the sound you want, though, it's perfect.

GUITARS AND BASSES

Acoustic 6-String One is a steel-string guitar that's clear as a bell. The bright version sounds like it's picked closer to the bridge, rather than just filtered. Another variation has a slow attack followed by vibrato, rather like a pedal steel. Acoustic Guitar Two is bright at the top and full at the bottom, and includes a variation with nice harmonics. Acoustic 12-String One may be everything you could hope for in a sampled 12-string guitar. Classical Guitar One crossfades between a pretty, soft velocity and a bright, biting, hard velocity. Rock Guitar One is a good multisample, but every note has the same type of harmonic, probably performed with the heel of the hand. No one plays that way all the time.

I recommend the Steinberger Bass. Variations include fingered with different tone settings, popped, slapped, a slide that ends in a slap, and a gorgeous "Chorusberger." The Fender Bass has similar variations and an excellent picked-bass sound. Compared to the Steinberger, the fingered Fender is too dull, and the chorus is lackluster.

PERCUSSION

Super Latin Percussion is a 3-disk set with a single program that maps 55 samples of thirteen instruments and their variations across the keyboard, including open, muted, slap, heel, slide, flam, snap, and so on. Tumbas, quintos, timbales, shakers, woodblock, claves, gourd, bells, bongos, and Peruvian drums are here, all recorded with natural room ambience. The 2-disk Orchestral Percussion has four programs with big bass drums, snares, timpani, cymbals, tambourine, triangle, and layered percussion hits.

Four disks of Cymbal Collections contain crash, ride, splash, and sizzle cymbals that are hit, scraped, and rolled with both sticks and mallets. The 2-disk Hi-Hat Collection sounds like a single pair of hi-hats played 25 different ways: various degrees of open, closed, muted, struck on the rim and bell, etc. Because each is mapped across the whole keyboard, you need to copy individual samples into your sampled drum set.

ETHNIC SOUNDS

Stratus Sounds features some very good ethnic instruments from around the world. The best is the Sansa, more commonly known as kalimba, or African thumb piano. The Yueh Ch'in is a stringed Chinese instrument that you're bound to recognize. To play it realistically, though, you may have to constantly switch between its four programs. Pan Flute One is a welcome improvement over synthesized pan flutes. Without the Andes Flute disk, you have no business playing Peruvian music on an S1000.

SYNTHESIZERS

According to Stratus' catalog, several sampled synthesizers are available. I received four sets of Korg Wavestation samples with signature sounds other synthesizers don't offer, such as Ski Jam, Midnight Run, New Zealand Vice, and Kilamanjaro. Though they're less expensive than a real Wavestation, too many sounds are crammed into each 2-disk set. Most aren't multi-sampled, and when they are, there may be only one sample per octave. Wavestation Four probably has the most musically useful range of timbres.

DO THEY SOUND COOL?

Almost without exception, they sound cool. If you buy something, and you're not completely happy, Stratus Sounds is willing to take your suggestions and improve upon whatever they can. Updates aren't uncommon, and they also take requests. At present, there are over 125 sample disks in the Stratus Sounds library.

If you use an S1000, you're making a mistake if you don't have some Stratus Sounds in your sample collection.

Product Summary

PRODUCT:
Akai S1000 Sample Disks
PRICE:
$16.95 each
MANUFACTURER:
Stratus Sounds
7505 Steamer Way
Sacramento, CA 95823
tel. (916) 395-3365

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	●●●●◖
EASE OF USE	●●●●
DOCUMENTATION	●●
VALUE	●●●●

● WAR/KEYBOARDS (continued from p.41)

both strings in a pair. The low note sounds first on downstrokes. This also can be accomplished with a sequencer by transposing duplicate notes up an octave and very slightly time-shifting the transposed notes.

SIGNAL PROCESSING

Any effects processors guitarists use are available to keyboardists. Chorusing, flanging, delay, distortion, and reverb are fair game. But synths and samplers output line-level signals far hotter than passive guitar pickups, so if you process your signal with a guitar effects box that expects to see a direct signal from a guitar, remember to pad down the synth's output level considerably.

Electronic instruments also have a dynamic range far wider than that of an electric guitar. Before you add effects, it's a good idea to compress the dynamic range to about 6 to 12 dB, as experimentation dictates. It's best to do this within the patch, but you also can use an outboard compressor. Guitarists often use compressors ahead of their distortion devices, but this is mostly to increase sustain by keeping the signal from decaying too fast, which isn't as crucial with a properly programmed synth patch or sample.

Before routing the signal to an effects device, roll off the extreme highs, using your synth's filter or a parametric equalizer. Otherwise, the extraordinary high harmonics generated by a synth will aggravate clipping when put through a distortion device. The distortion box should give you all the highs you need.

A large part of the classic electric guitar sound is the amp and speaker combination. Sometimes there's nothing like the real McCoy. Try using an old tube amp with separate channel and master volume pots and a pair of 12-inch speakers. By sending the processed signal to this rig, overdriving the channel circuit, and miking the speakers with a Shure SM58 or similar mike, you can get that classic tube amp sound. Alternatively, you can use a classic amp with a Marshall SE100 speaker emulator (reviewed in the November 1991 issue), or a Tech 21 Sans Amp (reviewed in August 1991). The Sans Amp does a little emulation of its own to produce classic amp tones without an amplifier and is plugged directly into the mixer.

GET TOGETHER

It's a blast to watch a guitarist's jaw drop when a synthesist comes impressively close to *The Sound.* Using a synth or sampler to emulate a guitarist also somewhat reduces the need for the genuine article. And with ten fingers and strong chops, you can go beyond mere emulation and pull off licks and chords no guitarist can play. But I still prefer having a hot guitarist around. The biggest thrill comes from challenging each other and combining forces to really rock the house.

(Thanks to Charles R. Fischer, Rob Rayle, and Kirk Ferris.)

EM *managing editor* **Steve O** *likes working with guitarists. On the other hand, in his touring days, he enjoyed putting bass players out of a job.*

CLASSIFIEDS

ELECTRONIC MUSICIAN
Classified Ads are the easiest and most economical means to reach a buyer for your product or service. Call (800) 747-3703 for complete information on prices and deadlines.

EMPLOYMENT OFFERED

Let the government finance your new or existing small business. Grants/loans to $500,000. Free recorded message: (707) 448-0270 (NS9).

EQUIPMENT FOR SALE

Looking for used or new MIDI equipment? We've got tons of super clean Yamaha, Roland, Korg, Ensoniq, Kawai, and E-mu products in stock. **Come in or do it all through the mail**. Call, write, or fax for prices & details. **Caruso Music**, 20 Bank St., New London, CT 06320, USA; **(203) 442-9600**. FAX (203) 442-0463.

Mail order prices with knowledgeable, helpful people...major brands of MIDI-based music and recording equipment...E-mu Systems, Kurzweil, Akai, TOA, JBL, Lexicon, QSC, AKG, Carver, Ramsa, Panasonic, Fostex, Amek/TAC, JL Cooper, Digidesign, all Macintosh, IBM, Atari software and interfaces. **Sweetwater Sound, Inc.**, 5335 Bass Rd., Ft. Wayne, IN 46808; (219) 432-8176.

Largest selection of multitrack recorders and consoles. Trident, Amek-TAC Magnum and Scorpion II, Apple computers, Soundtracs, Akai A-DAM, Tascam M3500, Digidesign Sound Tools, Panasonic SV-3700, Opcode, Tascam DA-30, Studer-Dyaxis, Eventide H3000SE, Adams-Smith Zeta-3, Roland/Akai samplers. Studio package specialists. Experienced staff/unequaled service. **EAR Professional Audio/Video**, (602) 267-0600.

Fax your EM Classifieds.
(510) 653-5142

Sequential Studio 400 sampling drum machine/sequencer. 20MB hard disk. Factory library. $1,400. Eves: (601) 485-5860.

We want your used MIDI equipment and well-maintained recording gear. We'll give you **cash** or take it in on trade. Come in or do it all through the mail. Call, write, or fax for prices and details. **Caruso Music**, 20 Bank St., New London, CT 06320; **(203) 442-9600**. FAX (203) 442-0463.

Computers for Musicians
We sell Atari ST's & other computers for sequencing, scoring & music video production.

Call for our **FREE** Discount Catalog!
1-800-456-5689

Computer Garden
West Side Mall #50
Edwardsville, PA 18704

THE MUSICIAN'S COOP
Know what you want and want a good price? Here's your chance to beat the high cost of some music retailers by becoming a member of a unique cooperative. Put together by musicians, for musicians, we can give you the discount price you're looking for on guitars, basses, keyboards, amps, processing, recording, and PA gear. Let us help you make your next purchasing decision with friendly and professional advice.
919-286-9146
Call today for membership details and prices!

American Pro Audio

• Sony/MCI • Trident •
• Tannoy • Eventide •
• Yamaha • Tubetech •
• Fostex • Soundtracs •
• Beyer • Roland • Akai •
• Ramsa • Panasonic •

Mini Lease Program
New or used, trade-ins 24-60 months with buyout option $5K-25K **no** financials required min. 2 yrs in business.
1-800-333-2172

Road cases, unbelievable introductory prices. Keyboard $72, racks $65, DJ coffin $129, many more. Write for brochure and nearest dealer. Island Cases, 1121-I Lincoln Ave., Holbrook, NY 11741; (516) 563-0633, (800) 343-1433.

The Q-Logic MIDI-Metro is here! This unique visual metronome is a must for every MIDI studio & an ear-saver for anyone who uses click tracks. Full MIDI-sync or stand-alone rack-mount unit. Call (800) 726-6491, or write to: Euro-Stuff, 4455 Torrance Blvd., Ste.159, Torrance, CA 90509.

APO or **FPO** as a mailing address? Then call, write, or fax our special department for **absolutely** all of your new or used musical equipment needs. Worldwide delivery! **Caruso Music**, Dept. OS, 20 Bank St., New London, CT 06320, USA. Phone: **(203) 442-9600**; FAX (203) 442-0463.

Electronic Bow For Guitar
E-Bow
Call Our 24 Hr Demo Line To Hear The EBow
(213) 625-EBOW
To Order call (213) 687-9946 VISA/MC Check/MO
Heet Sound Products 611 Ducommun St LA, Calif 90012

ATARI COMPUTERS $425.00
MACINTOSH / ENSONIQ COMPATIBLE
EXT. *SCSI* HARD DRIVES !!
20 MEG $289.00
45 MEG $379.00
105 MEG $479.00
TECH WAREHOUSE
13 YOUNG RD.
FOXBORO, MA. 02035
1-508-543-7141

DON'T GET BEAT
When you need equipment call
8TH STREET MUSIC
(800) 878-8882
PHILADELPHIA'S LARGEST MUSICAL INSTRUMENT DEALER!!!
8th Street Music, 1023 Arch St. Philadelphia, PA 19107

When you're buying or selling, look no further than Electronic Musician Classifieds.
(800) 747-3703

INSTRUCTION

Be a recording engineer. Train at home for high-paying, exciting careers, or build your own studio. **Free** information. **Audio Institute of America**, 2258-A Union St., Suite F, San Francisco, CA 94123.

Dr. Maury Deutsch: Symphonic composition, modern arranging, Schillinger, multimedia, improvisation, applicable to computer electronics, films, TV, theater. Send for catalog: 150 W. 87th St., NY, NY 10024. (212) 724-4722.

Music Engineering Technology, Bachelor of Science Degree. The only program in the country where you can learn MIDI from A to Z, synthesizer and sampler hardware and software design. Fully equipped individual MIDI work stations. Careers for music, electronics, and computer industries. Accredited. **Cogswell Polytechnical College**, 10420 Bubb Road, Cupertino, CA 95014. **(408) 252-5550.**

Frustrated
with owner's manuals?
Get a free copy of our catalog, which features tips and techniques books for equipment by Roland, Alesis, Yamaha, Casio, Korg, Ensoniq, Kawai, Kurzweil and Oberheim.
All titles reviewed and guaranteed!
MIX
BOOKSHELF
6400 Hollis St. #12
Emeryville, CA 94608
(800) 233-9604 • (415) 653-3307

MIDI KEYBOARD LESSONS For IBM PC
Learn and Play Faster! Highly interactive! Vol. 1 Major Studies; Vol. 2 Minor Studies; Vol. 3 Jazz Modes; Vol. 4 Jazz Chords Prices $49.95 ea. For info write or call (516) 536-0298. To order send check or m/o.
Call 1-800-327-0209
FAST FINGERS MUSIC SOFTWARE
Box 741, Rockville Centre, NY 11571

CLASSIFIEDS

INSTRUCTION

LEARN TO PLAY ANY KEYBOARD AND READ MUSIC OVERNIGHT !!!
With this new and exciting 84 minute video production "BEGINNING KEYBOARD", includes a fourteen lesson study book. Was ~~$39.95~~ now $19.95 plus $3.50 S/H VHS only VISA/MC
ATP Phone (801) 292-6331
611 Lacey Way
No. Salt Lake, Ut 84054

PARTS & ACCESSORIES

Blank Audio Cassettes. BASF chrome, clear shells from 35 cents. Run by musicians for musicians. Money-back guarantee, MCard/Visa. Cassette House, **(800) 321-KSET** (5738).

Factory-direct flight cases for keyboards, guitars, lights, amp racks, utility trunks, etc. Best quality; low factory-direct prices. Custom orders shipped in five days or less. Sound Engineering, **(800) 837-CASE.**

Simmons SPM8:2 mixer users. Now save & load setups thru MIDI sys. ex. Eprom/Mod $50. SYNTHLAB, 2729 Newbold St., Raleigh, NC 27603. (919) 832-3559.

SONEX-SOURCE
58 Nonotuck St., Northampton, MA 01060
Your Source for Sonex Acoustical Foam
BEST PRICES-NATIONAL DELIVERY
800-484-1003 ext. 0032 ORDER
413-584-7944 FAX OR INFO
MC/VISA Accepted

SOUND LOGIC
Electronic Keyboard Accessory Specialists
MEMORY EXPANDERS
SOFTWARE
RAM CARDS
SOUNDS
HardDrives
BOOKS Call for latest prices
Flash Bank
FREE CATALOG
ORDERS 800/753-6558
INFO 619/789-6558
FAX 619/789-4170
1125 ELEVENTH STREET
RAMONA, CA 92065
February Specials
AKAI 8MB Cards $567
New! K2000 16MB Cards
SY99 RAM Cards Call
EPS16+ $117/EPS4X $197
W30/S330 EXPANDER
TX16WX 1.5MB $157
IBM MID I/F 401Comp. $74
TX81Z 5X RAM $109
FREE SHIPPING

Midi Retrofit Kits
Pipe-Organs, Keyboards, Pedalboards, Accordions, Custom Projects.
For Details Write:
Technical Magic
26090 - 62 Robertson Road, Nepean, Ontario CANADA K2H 9R0
Phone: 613 596-9114 FAX: 613 596-3304

BUY FACTORY DIRECT
12 ft Midi cord $3; 20 ft Guitar Cord $3
Strings: Guitar -3 sets /$10; Bass -2 sets /$23
Professional direct box $25, 2 for $47.95
Professional XLR /transformer mic splitter, $28
A C. Phantom Power Supply $25
100 ft 16 x 4 mic snake, all XLR $249
Shure SM-48LC vocal mic $59
Pro 20 ft XLR mic cable $9
4 space 19" rack $25, Mic Pop Stop filter $3
Steel tube guitar stand $10, Guitar cord tester $12
"The Knob" instant synth volume control $12
S & R $20 min. order, Money Back Guarantee
BOX 3456, ST LOUIS, MO 63143 *(314) 781-2125*

REMOVE LEAD VOCALS From Records & CD's
Build this kit for under $50 which removes lead vocals from standard stereo records, CD's, Tapes or FM broadcasts. Easily connects to any home component stereo. Perform live with the backgrounds. You can be the lead singer of your favorite band. Detailed Plans $4.95.
Weeder Technologies
14773 Lindsey Rd.
Mt. Orab, Ohio 45154

MT-32 OWNERS
AND D-110, D-10, D-20 OWNERS
MODIFICATIONS FROM REAL WORLD INTERFACES
MT-32: Battery Back-Up
Less Noise & Distortion
50 Reverb Settings
Front Panel Memory Access
D110 Reverb Sounds
Individual Outputs
D-110: 5.4 db More Gain
2.2 db Less Background Noise
New Reverb Outputs
D-10 & D-20: 5.4 db More Gain
4 New Outputs
Smoother Reverb
Call for Free Brochure
L.A. Custom Instruments
1979 N. Lake Ave., Altadena, CA 91001
(818) 797-8529

PUBLICATIONS & BOOKS

Synch your delay! Delay Master. Rhythmic Delay Time Handbook. Gives delay times in milli-seconds for different subdivisions of the beat. Tempos range from 40-260 BPM and rhythmic values range from whole to 32nd note, (dotted and triplet values included). Send $8 + $2 S&H to: **Delay Master**, PO Box 9031, Chapel Hill, NC 27515-9031.

Free! Drum charts catalog & sample! Over 400 note-for-note drum transcriptions of today's best rock, pop, fusion, jazz & metal songs! **Perfect for programming** drum tracks just like the record! Drum Charts Int'l, PO Box 247-EC, Nanuet, NY 10954.

Books, Tapes, Videos
Get our free catalog featuring resources on
- MIDI • Instrument-specific guides
- Synthesis & sampling
- Drum machine patterns
- Recording • Composition
- Music business • A&R Lists and more

All titles reviewed and guaranteed!
MIX BOOKSHELF
6400 Hollis St. #12,
Emeryville, CA 94608
(800) 233-9604 • (415) 653-3307

MUSIC SUPER MEMORY
Memorize ANY music, quickly, easily,and with greater retention.
A powerful,new,revolutionary,easy to learn music memorization technique.
Includes method book and 85 min. tape
Send $22 Plus $5 S&H to:
MSM, PO Box 862,ISLINGTON MA 02090
ORDER PHONE: 617-320-9542

RECORDING SERVICES

****A great deal!****Real-time cassettes**—Nakamichi decks, chrome tapes—the best! Album length $1.50/100. On cass. printing/ inserts avail. Grenadier, 10 Parkwood Ave., Rochester, NY 14620; (716) 442-6209 eves.

AUDIOPHILE QUALITY...
EUROPADISK, LTD.
US' MOST COMPLETE FACILITY!
- **Cassette Duplication**
- **Compact Disc Production**
- **DMM Vinyl Pressing**
- **Custom Graphics**
- **Mastering Studios**

COMPLETE PACKAGES with state-of-the-art Neve Digital Mastering for CD, Studer & Lyrec HX-Pro Cassette Duplication, DMM Mastering for Vinyl and a complete in-house art department - design, layout, typesetting, color separation. Get THE BEST at no extra cost!
For a Complete Brochure, call or write:
EUROPADISK, LTD.
75 Varick Street, New York, NY 10013
☎ (212) 226-4401 FAX (212) 966-0456

DISC MAKERS
User Friendly CD, Cassette, & LP Manufacturing
FREE design and typesetting
Call for our free, full color catalog:
1-800-468-9353
1328 N. 4th Street, Philadelphia, PA 19122
215-232-4140, FAX: 215-236-7763

IF THE TAPE QUALITY *SUCKS*, THEY'LL NEVER HEAR YOUR MUSIC!
HIGH QUALITY REAL-TIME PACKAGE SPECIALS!!!
250 Cassettes with J-Cards $595.00
500 Cassettes with J-Cards $975.00
EACH REAL TIME DUPLICATION PACKAGE INCLUDES:
- CHROME TAPES (TO C-32)
- CLEAR SHELL
- ON SHELL PRINTING
- NORELCO BOX
- REAL-TIME DUPLICATION
- TRANSFER TO D.A.T.
- PROOF CASSETTE
- TYPESETTING
- 2 COLOR J-CARD (4 X 4)
- ASSEMBLY / SHRINK WRAP

1-800-393-*TAPE*
Total Tape Services
Quality tape copies that sound like the master
639 Cleveland St., Suite 130 / Clearwater, FL

Attention techno/electronic dance composers and musicians! Looking for talented new artists to publish and release. Will evaluate your work to determine commercial potential in America and Europe, produce a professionally engineered master and arrange for a possible publishing agreement. Send your demo tape and we'll send a description of services and fees to those whose tapes qualify: Teaspoon Music, Attn: Peter R. Schleger, 200 Central Park South, New York, NY 10019. (212) 245-4973.

****Cassettes duplicated ****
The highest quality cassette duplication. Custom-loaded blank cassettes. Lowest prices. Visa/ MC accepted. Call or write: Cup of Water Productions, 13780 12th Road, Plymouth, IN 46563; (800) 242-2015

COMPLETE CD AND CASSETTE PRODUCTION
DIGITAL HOUSE
212-333-5950
MASTERING REPLICATION
PRINTING TOTAL PACKAGING
POSTERS GRAPHIC DESIGN STUDIO
PERSONALIZED EXPERT SERVICE
101 WEST 57TH ST. NEW YORK, N.Y. 10019
"FOR THOSE WHO HEAR THE DIFFERENCE"

CLASSIFIEDS

SOFTWARE & PATCHES

VZ, CZ, TX-81Z, V50 users: Start off the New Year with some fresh sounds for your synth. 1-hr. demo tape: $5, check/MO. Call demo line, (201) 334-3546, or write for info: Charles Lauria II, Dept. E2, 17 Forest Pl., Towaco, NJ 07082.

Canadian user groups. Sound Canvas (101 tutorials), Proteus, U220/U20, D-110. Module-specific sequences. Martunes, 2586-B Waterloo St., Vancouver, BC V6R 3H5. Martin, (604) 736-2434.

MIDI Sequence Users Club—IBM, Atari, Amiga, Kawai-Q80, Akai. (305) 434-9760, 5099 SW 95 Ave., Cooper City, FL 33328.

Creative analog for **EPS** & **Mac**: ARP 2600, et al. Avant garde/New Music sounds, unique and beautiful. $89.95 EPS, 10 disks; $79.95 Mac, 8 disks; demo disks, $10. MacBeat, (800) 622-2328.

Create your own MIDI software...with the source code for the exec. used in **DynaMix™** (see EM display classified). Call for specifics. Colorado Online Systems, Inc., 3540 Zuni Place, Sedalia, CO 80135, USA: (303) 660-8606 anytime.

Fax your EM Classifieds.
(510) 653-5142

IBM MIDI INTERFACE
BasicMIDI ONLY $99
BEST PRICES ON:
Cakewalk, SongWright, Prism, Free Demos
OPTRONICS TECHNOLOGY
Box 3239 ◆ Ashland, OR 97520
(503) 488-5040

MIDI SEQUENCES
All types of music available on most formats. Call or write for **FREE** catalog and demo tape. Specify sequencing software and hardware.
THE MIDI INN
P.O. Box 2362, Dept. EM
Westmont, IL 60559
(708) 789-2001

Cakewalk pro users; CAL tutorial. Includes over 20 useful CAL programs $12.95 check/MO to: Clockwork Music, 6A Centaur Ct., Lafayette, CO 80026. Include your address and specify 3.5" or 5.25" disks. (303) 666-0688.

Korg support T series, M-1, DSM-1, and DSS-1. Program, PCMs and samples. Call or write Greenhouse Sound, 601 E. Walnut St., Nappanee, IN 46550. (219) 773-2678.

For EM Classified rate information
call Robin Boyce
(800) 747-3703
or Fax (510) 653-5142

DynaMix™ - The Key To *Killer* Sequences
is control of seven neglected "live feel" parameters. You get this by running MidiFiles through our unique DynaMix ***sequence enhancer***, plus... ***Batch*** playback. ***Convert*** drumnotes, bends; channel- or ***polyphony-fit*** complex music to limited equipment. *More...*

DynaMix $99.95 plus $3 s/h. Literature, audio demo $9.95 (credit). For 440k IBM™ /clone with 401™ /clone/Mediator™ on-disk manual. MC/VISA, US$. *Refund if not satisfied.*

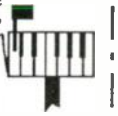
Colorado OnlineSystems, Inc.
3540 Zuni Place
Sedalia, CO 80135
USA 303-660-8606 24 hrs.

LEXICON LXP-1
Command Center
A COMPLETE Editor/Librarian
IBM, MPU-401, Mouse
$85 (Free Demos)
by **Tsunami Software**
Call and ask about our 30 day free trial
1-800-647-3535

Why program?
When you could be playing!

Livewire has high-quality patches for synths old and new, at affordable prices. For under $35, we can upgrade your sound. With thousands of happy customers since 1984, we must be doing something right! Try us and see - we are the best.

KORG **M1 & M3R** - "M1 Dreams." 200 sounds: $29.95. *Disk Libraries* - 1000 **M1/T1** sounds: $99.95, 600 for **M3R**: $69.95. **Wavestation** - 117 sounds: $29. 192 **DW-8000** sounds: $29.95. 64 **Poly-800** sounds: $27.95. 400 **DS-8 & 707** sounds: $39.95. *KAWAI* **K1**- 96-sound disk: $29.95. **K4** - 128 great sounds: $29.95. *YAMAHA*: 4000-sound **DX7** disk: $75! **TX81Z & FB01** - 96 sounds: $24.95. **SY22, SY55, TG33** - 64 sounds: $34.95. *ROLAND*: **MT-32, D-110** - 128 sounds: $29.95. **Juno, D-50, and Jupiter** - call! *CASIO* **VZ-1** - 128 sounds: $34.95. *Peavey* **DPM-3** - call! Order on datatape, or Alesis, ST, Mac, or IBM disks. *Ensoniq* **EPS-16 & Mirage**, Casio FZ, Korg T1, Yamaha SY99 samples: write us! We accept chargecards (4% extra). Send SASE for free info. *Try us!!*



Livewire
PO Box 561- Dept. EM
Oceanport, NJ 07757
(908) 222-1227

Gig-proven MIDI sequences. Top 40, 50s and 60s, country, standards. Macintosh, IBM, Atari, Akai, Roland, Kawai, Yamaha, and Alesis formats. Call or write for free song catalog and demo. **The Works Music Productions, Inc.**, PO Box 22681, Milwaukie, OR 97222. (503) 659-3964 or (206) 254-3187.

SAMPLER OWNERS
We have the sounds you need!
Akai - S900/S1000/MPC-60
E-mu - EMAX/EMAX II
Ensoniq - EPS/EPS 16+
Korg - DSS-1/T-Series/Wavestation
Roland - S-330/S-550/S-50/W-30
Dynacord - ADS Sequential - P-3000
Strings, brass, pianos, drums, percussion, FX, Fairlights, and other classic keyboards.
Call for FREE CATALOG - Demo disks Available.
SampleCell™ Owners - CD-ROM Now Available!
Over 550 Megs of Studio Quality Sounds - $299.00
Also works with Alchemy™ and Sound Designer™
greyfsounds
8700 Reseda Blvd., Suite 101 • Northridge, CA 91324
818-773-7327 • FAX: 818-773-9203

ATARI ST Software
by EMC / Germany
EDITOR / LIBRARIANS (including sounds)

ROLAND:	D50 $45; D10/20/110 $100 U20/220 $100; D70 $160; JX-1 $80
YAMAHA:	SY55 $100
KAWAI:	K1 $35; K4/XD-5 $100; Spectra $80
KORG:	M1/R/M3R $100
EMU:	Proteus $120
ENSONIQ:	VFX $120
LEXICON:	PCM 70 $120; LXP 1/5 $140
OBERHEIM:	OB-8 $140
KURZWEIL:	K 1000/1200 & Pro 1/76 $210
MAPPER, universal drum converter	$75

Sounds, Sequences and catalog available.
Dealer inquiries welcome.
Superb Monochrome Graphics!
CORRIGAN marketing
114 Lakewood Circle • Smyrna, TN 37167
(615) 355-8756 or 459-2960

Atari–MC500–Mac–Amiga–IBM–PC. Sequences—the most popular of the 30s through today's music. All styles, very special for Jazz-Swing arrangements, Bossa Nova with neat harmonizing. Free catalog and information. Write to: Central Presse, Via Cantonale 15, 6815 Melide, Switzerland

Hey HR-16 & :B owners! Chrominance Productions is going to **pieces!** Our hot, **usable** patterns are now grouped by style: Rock/Shuffle, Electro/Dance/Rap, and Latin! Still available on Atari ST, Mac or MS/DOS disk, or data-cassette: $25 for the first, $20 for each additional! Chrominance Productions, PO Box 51, Madison, WI 53704-0051. (608) 244-4181. MasterCard/Visa.

MIDI hits. Professionally engineered sequences with true sound reproduction. Classic Rock, Oldies, Jazz, Standards, R & B, Country, etc. Huge selection. Wood Consulting, 3450 Granada Ave., Suite 50-E, Santa Clara, CA 95051. Free catalog. **(800) 484-1096, ext. 3525** (enter ext. at tone).

MUSIC SOFTWARE
FINAL CLEARANCE SALE
313-973-6262
PATH MUSIC

Public Domain MIDI Software For Atari ST, Commodore 64/128, IBM Compatibles From $3.00 Per Disk. Write Today For Your Free Catalog Disk! Please Specify Computer Type.

MIDI Software
Post Office Box 533334
Orlando, FL 32853-3334
Telephone (407)856-1244

CLASSIFIEDS

MIDI SEQUENCES
TRAN TRACKS —quality service, great prices & a large selection of popular songs. All computer formats and most dedicated sequencers supported.
ORDERS: 1-800-473-0797
Fax: (201) 383-0797
Technical Support: (201) 383-6691
Major credit cards
TRAN TRACKS MIDI SEQUENCES
133 West 72nd St., Suite 601, NYC, NY 10023

Nkey for **Windows** only **$39!** You can jam the Blues, improvise Jazz, write melodies, even solo Rock & Roll. Nkey transforms your IBM PC's computer keyboard into a true polyphonic musical instrument. Never play a wrong note with Nkey's scale & key selection. Standard MIDI file song player, graphic piano keyboard display, graphic real-time mixer, 25+ SMF song files. Requires IBM compatible, Windows 3.0, MPU-401 compatible or sound card (Sound Blaster or Adlib). Send check and diskette size: Artec Company, PO Box 28, Waterford, WI, 53185. Fax/phone (414) 534-4309. WI residents add sales tax.

MONEY-BACK GUARANTEE
The Best, Most Highly Organized Sound Libraries Available!

T-1/2/3 - 2 Sets	Total 2,000+ Voices
M3R - 2 Sets	Total 2,000+ Voices
M1 - 2 Sets	Total 2,306 Voices
MT-32	1,001 Voices
D-10/110/20	1,199 Voices
D-50 - 2 Sets	Total 2,194 Voices
K1 - 2 Sets	Total 2,113 Voices
TX81Z/DX11	2,250 Voices
DX7/TX802 - 2 Sets	Total 6,225 Voices
ESQ-1	2,095 Voices

All Libraries — $100 Each Set
All Formats Available • *Free* Librarian Demos
Visa/MasterCard/COD • Call Today!
ManyMIDI Products
213-650-6602
Box 2519-EM, Beverly Hills, CA 90213

SEQUENCES *by*
MUS-ART
Past / Present
Large library
All formats
Licenced
FREE CATALOG
Box 680664
Orlando FL 32868-0664
TEL: 407-290-MIDI
FAX: 407-291-2266
BBS: 407-292-0444

Macintosh users! Large selection of MIDI public-domain/shareware software. Great MIDI programs, patches & more goodies! $5/disk. Send SASE for catalog. **MIDI Mac**, 15568 Brookhurst St., Suite 234-E, Westminster, CA 92683.

MIDI Guitar Roland GR50 Editor/Librarian for IBM/C64, $60. **MT32/D10/D5/D110** Editors for IBM/C64, $60. 256 Sounds, $25. Blue Ridge Music, Rt. 4, Box 227AA, Charlottesville, VA 22901. (804) 978-3735.

M.U.G.
International MIDI Users Group
Join MUG and receive a
***FREE* KORG M1 Sound Disk Library**
(200 Patches/Combis)(Disk formats only)
Macintosh Opcode-Galaxy / Atari ST / IBM / Roland MC500 / MIDICaster
or receive a FREE disk for one of these units:
Ensoniq EPS/ Mirage/ SQ80/ DX-7
Korg DW8000/ Roland MC500/etc...
Send $20 (check or M.O.) for 1 year membership to:
MUG
P.O. Box 615
Yonkers, NY 10703
For more info call (212) 465-3430

Korg resource materials. M1/M1R (on 1, 2, or 3 ROMs): Sound Set #1 (50P/49C), $39, (1); Sound Set #2 (100P/100C), $49, (1); M1 drum pattern set (drum kits, 150 patterns, application text, detailed procedures), $69, (2); M1 Sky album (requires Set #1, sound/sequencer demo songs, instructional text includes valuable M1 info), $79, (3); M1 Sky album audio cassette, $6. **M1EX/M1REX**: Pretty—MEX (100P/100C), $49; Nasty—MEX (100P/100C), $49. **M3R** (on ROM): Composer set (100P/100C), $49; Performer set (100P/100C), $49. **T-1/2/3** (on disk): Migh-T set (100P/100C), $31; Pret-T set (100P/100C), $31; Nas-T set (100P/100C), $31; Kit-T set (300 drum patterns, drum kits, indepth text), $45. M1/M1R/T1/T2/T3 sequencer track sheets —Log all details of your sequencer music tracks and setup data: $8.50/40, $14/100. Package discount prices available. Cont. U.S. shpg: $6/item; $11/pkg. **Electron Artistries**, PO Box 40, Franklin, Ohio 45005, (513) 746-4283. Visa/MCard/COD. (800) 235-6432.

TRYCHO TUNES
PERFORMANCE SEQUENCES™
Over 1300 current Top 40, oldies, standard, and c&w songs for most brands of sequencing equipment.
We're the oldest and still the best!
Trycho Tunes are available at many fine pro audio/computer stores.
Or order direct at:
1-800-543-8988
TRYCHO MUSIC INTERNATIONAL
2166 W. BROADWAY ST. • Suite 330
Anaheim, CA 92804
Phone (714)826-2271 FAX (714)995-8079
See us at NAMM Booth #2716

Emax, Emax II, best performance samples, copyrighted, super memory efficient, over 70 titles, **1,000-sound multi-sampled cassette**. Excellent quality, great prices. Stoklosa Productions, PO Box 13086, Pittsburgh, PA 15243. (412) 279-8197.

Quality S-1000 samples. 150+ megs/$129 on DAT-RAM. Two-disk sets, $10—demo tape, $6. Major credit cards accepted. **Boulder Sounds**, 1705 14th St., Suite 518, Boulder, CO 80302. Call anytime, (303) 442-2025.

When you're buying or selling, look no further than Electronic Musician Classifieds.
(800) 747-3703

MIDI MS-DOS device driver for IBM PC-compatible computers with MPU-401 card. Easy access with file I/O. Includes sample C & C++ code. Send $14.95 to Factory Designs, 230 Pinecroft Dr., Taylors, SC 29687. (803) 268-2333.

KID NEPRO
THE PATCH KING
incredible sounds
available worldwide
KID NEPRO IS THE PATCH KING!
We have more quality sounds, for more instruments, than anyone in the entire universe! *ORIGINAL, USEABLE PATCHES.* Sounds available on *RAMS/ROMS/DATA SHEETS/ALESIS DATADISK/MAC & ATARI FORMATS.* Thousands worldwide agree our sounds are incredible. *AUTHORIZED DEALER KORG/ROLAND/DR.T/PASSPORT & MORE! WE SELL HARDWARE TOO!* Disks/RAMS/Cartridges Expanders for most instruments.
Write or Call for *FREE CATALOG!*
Kid Nepro Productions
PO BOX 360101 (DEPT. E)
Brooklyn, NY 11236
718-642-7802/212-629-3708
FAX # 212-947-0027

Band-in-a-Box™ Users - Build Elaborate Arrangements *Fast!*
Measure4Measure plays standard MIDI file rearranged in any order, changing keys and more. Quickly add intros, transitions, endings to accompaniment. Open up for solos, repeating until *you* decide to go on. *Performers, check it out!* (MPU401/equiv)
Cut New Gear Hassle
FastPatch quickly resets program changes, drum notes and more, track-by-track. Hardware remaps may not help. Your song library now easy to update. One set-up for any module, even a borrowed one. Never dread a new purchase changeover *again!*
30-day moneyback guarantee $35ea or $55 both ($3s/h)+CA tax. IBM 5/3" format (demos-$5) info or orders, please write/call
Mike Erickson
1618 W Brookdale
Fullerton CA
92632
(714) 879-7176

PC–XT–AT MIDI SOFTWARE

GR50/D110 TONE EDITOR–LIB	$45
GR50 PATCH–TIMBRE EDITOR–LIB	$27

• Rythm setup ed/lib FREE with above 2 programs
MIDI special effects: PORTAMENTO and DELAY, both for $29. With FREE menu program. Works with most synths. Call or write
WAVESTATION PATCH LIB. & UTILITY $37
Sum Micro 818–891–5913
P.O. Box 5116
Mission Hills, CA. 91395–0116

*** The deal of the century! Music Publisher Software ***
The very best MIDI music publishing program ever designed! Runs on any Macintosh (Plus & up). Your software includes: Music Publisher 2.5.2 software, Presto keyboard & cables, Repertoire music font, Keycap stickers & reference card, and user manual & tutorial files. Order direct & save 50%! $244 ($495 retail). Call (800) 522-5939, or send your check or money order to: 3261 Ash, Palo Alto, CA 94306.

Korg T1-2-3/Ensoniq VFX/SD/EPS/EPS-16+/Alesis data disk —Sequences from L.B. Music! Over 600 songs and no editing needed. Just load our disk and push play. Call for free demo kit at (215) 626-8890, or write us at PO Box 261, Clifton Heights, PA 19018-0261.

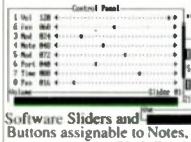
DRUM PATTENS on FLOPPY DISK !
Just pop them into your computer sequencing program and choose from 500 different patterns to accompany your own compositions. It's just THAT SIMPLE !
All patterns are recorded in Standard Midi File Format, supported by all major sequencing programs.
Choose from 5 collections of 100 different measures for $20 each, or $59 for all 500 Measures
NoteWorthy
Available for all IBM PC, Mac, ST and Amiga disk formats. Collection Titles are: 1) Rock & Roll; 2) Country/Rock; 3) Latin; 4) Rap/Dance; 5) Standards
Send check or money order to:
NoteWorthy, 334 Swaps Dr., San Jose, CA 95111-2841

CLASSIFIEDS

IBM Users Group exchanges MIDI information, help & ideas. For free newsletter: Jeff, (813) 697-2293.

Korg DW6000 editor/librarian for IBM PC/clones. CGA, EGA, VGA color monitor required. Context-sensitive help, all parameters supported. $25 ppd. Tracy Barber, 471 West Street, Albany, NY 12206. Telephone: (518) 438-3656.

Universal MIDI Command Center
For all MIDI Devices



"Maximum MIDI"

Software Sliders and Buttons assignable to Notes, Program Changes, Pitch Bend, Volume, Pan, and Continuous Controllers.
IBM, MPU-401, Mouse
$95 (Free Demos)
No Copy Protection
by **Tsunami Software**
Call and ask about our 30 day free trial
1-800-647-3535

DISCOUNT MIDI SOFTWARE
FOR ANY COMPUTER MUSICIAN
IBM Mac Atari Amiga C64 Apple II GS
All MIDI SOFTWARE for SEQUENCING • NOTATION
MQX • CMS • INTERFACES • Keyboards • Modules
SOUND MANAGEMENT 800-548-4907
P. O. BOX 3053 PEABODY, MA 01961 • Foreign 508-531-6192 • Price Quotes • Open Weekends!
Send $2 for MIDI Buying Guide Catalog

Ensoniq Owners—read/write/format Ensoniq disks on IBM PCs w/our Ensoniq Diskette Manager (EDM) software, $22. **Transfer sequences to/from standard MIDI files**. Each package VFX-SD/SD-1 or EPS/EPS-16+ includes EDM & costs $44. Giebler Enterprises, 8038 Morgan Rd., Liverpool, NY 13090, **(315) 652-5741.**

DANCE SAMPLES
FOR ANY SAMPLER
CALL FOR OUR COMPLETE CATALOG OF DISKS AND SAMPLING CDs
MIDI MARK
PO BOX 217 • WHITTIER, CA 90608
FOR CATALOG: 213-699-0095

PATCHES - SAMPLES - SY77!
SOUND MANAGEMENT BBS
708-949-MIDI ALL SYNTHS!
708-949-KEYS VIA MODEM
708-949-4BBS 24 HOURS!
ALL COMPUTERS!
ENSONIQ EPS SAMPLES ON DISK FROM $2.50 PER DISK. SEND $1 FOR DISK LIST "ATTN EPS DISK"
NO MODEM? SEND $2 FOR LARGE FILE LIST ON 2 - 3.5" IBM DISKS! RE FUNDED ON 1st ORDER
WE ARE A BETA TEST SITE FOR MUSIC QUEST, INC, TURTLE BEACH SOFTWORKS, TWELVE TONE SYSTEMS
BOX 396, MUNDELEIN, IL 60060
WORLDWIDE E-MAIL SYSTEM
MIDI PROGRAMS & DEMOS
SEQUENCES EPS DISKS

When you're buying or selling, look no further than Electronic Musician Classifieds.
(800) 747-3703

MISCELLANEOUS

Free–Manny's first-ever music catalog! Manny's brings 48th St. to your doorstep. Become a charter subscriber. Send name and address to: AudioTechniques, c/o Manny's Mail Order, #8, 1600 Broadway, Suite 803, New York NY 10019.

Do you have subscription questions?
Call **(800) 888-5139.**

We Will Sell Your Electronic Music

If you have composed original Electronic Music, there now is an avenue for you to get your music to market.
- No up-front fees
- You retain all rights
- No exclusive contracts
- For an application or to receive our catalog write:

AFTERTOUCH™
Computer Musician Coalition
1024 W. Willcox Ave.
Peoria, IL 61604
ELECTRONIC MUSIC DISCOVERIES

CLASSIFIEDS WORK FOR YOU

Pricing: $8 per line (approximately 25-32 character spaces per line); seven-line minimum. Add $0.50 per bold word. Each space and punctuation mark counts as a character. $56 MINIMUM CHARGE for each ad placed.

Display rate: $80 per inch (1" minimum). Logos or display advertising must be camera-ready (width is 1 5/8"). Frequency discount rates available; call for information.

Special Saver rate: $25 for up to four lines, including first word in bold. **Only available to individuals not engaged in commercial enterprises.** No additional copy allowable for this rate.

Payment must be included with copy: check, Visa, MasterCard, or American Express accepted. Sorry, no billing or credit available.

Closing: First of the month, two months preceding the cover date (for example, the April issue closing is February 1). Ads received after closing will be held for the next month unless otherwise stated. **Cancellations will not be accepted after the closing date.** Copy changes and cancellations must be submitted in writing.

Other requirements: Full street address (PO boxes aren't sufficient) and phone number must accompany all requests, whether included in ad or not. All words to be **bold** should be underlined. Copy must be typed or printed legibly in standard upper/lower case. Copy in all capitals is not permitted. Publishers are not responsible for errors due to poor copy. Arrangement of characters may be altered in typesetting process due to space. The publishers are not liable for the contents of advertisements.

The small print: Only ads dealing with music, computers, or electronics will be accepted. No stated or implied discounts allowed on new equipment sales. Publishers reserve the right to refuse or discontinue any ad deemed inappropriate.

Electronic Musician Classifieds: Attn: Robin Boyce, 6400 Hollis St. #12, Emeryville, CA 94608, tel. **(800) 747-3703** or (510) 653-3307, fax (510) 653-5142.

Categories available
(Check one):
- ○ EMPLOYMENT
- ○ EQUIPMENT FOR SALE
- ○ INSTRUCTION & SCHOOL
- ○ PARTS & ACCESSORIES
- ○ PUBLICATIONS & BOOKS
- ○ RECORDING SERVICES
- ○ RECORDS, TAPES & CDS
- ○ WANTED TO BUY
- ○ SOFTWARE & PATCHES
- ○ MISCELLANEOUS

INSERT THIS AD IN THE _____ ISSUE OF EM.

ATTACH YOUR CLASSIFIED AD COPY ON A SEPARATE SHEET, TYPED DOUBLE-SPACED OR PRINTED CLEARLY IN CAPITAL AND LOWER-CASE LETTERS.

Company Name _____
Name _____
Address (No PO Boxes) _____
City _____ State ____ Zip _____
Phone ( ) _____
Signature _____

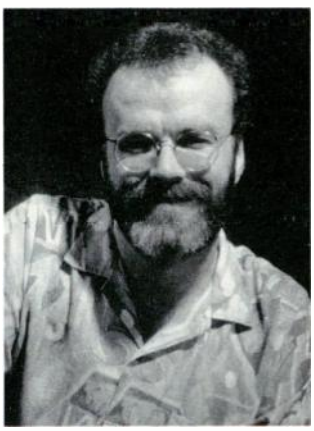
___ Display (in inches) $ _____
___ Lines @ $8 = $ _____
(seven line minimum)
___ Bold @ $0.50 additional $ _____
___ Special Saver rate = $ 25
TOTAL PAYMENT INCLUDED $ _____

○ Visa ○ MC ○ AmEx
○ Check/Money Order # _____
Card# _____ Exp. ____

Economy of Scales

The recession ain't the only thing ailing the music industry.

By Scott Wilkinson



Economic hard times are nothing new, nor are politicians' promises that prosperity is just around the corner. However, any recovery from the current economic doldrums is likely to take awhile. For one thing, solutions that have proven successful in the past—government spending and tax cuts—will only add to the crushing national debt. Not only that, the banking crisis and soaring unemployment continue to erode consumer confidence in the economy.

These difficult times have also been felt in the music industry. According to a recent article in *Billboard*, music shipments were down a staggering 11 percent in the first half of 1991 (compared to an overall downturn of 3 percent in other domestic industries). Although cassette distribution was off by 23 percent and vinyl by 63 percent, revenues stabilized because of the continued popularity of expensive CDs. Unfortunately, the "substitution effect" (consumers buying CD versions of LPs they already own) cannot continue to bail the music industry out of its difficulties much longer.

Interestingly, the industry heavyweights quoted in *Billboard* believe the recession has little impact on these figures. They place most of the blame on the industry itself, citing creative stagnation and a lack of great music as primary reasons for consumer disinterest. Also, promotion and marketing costs have increased dramatically due to the current focus on breaking expensive one-hit wonders rather than nurturing career artists.

You might think that the lower production costs of electronic music would help the situation, and in some ways they do. But technology has its drawbacks as well. For example, musicians now purchase equipment at high credit card interest rates instead of paying for studio time or additional players. These dollars go to banks, instead of being recirculated within the music industry. This fact alone contributes to higher musician unemployment and debt.

Of course, there's no doubt the recession *has* affected the industry directly. Customers are still drawn into stores by big hit recordings, but they don't buy additional titles along with the hits anymore. This leads retailers to be more selective about their inventory, and independent releases are the first to get cut from purchase orders—even though they offer some of the most creative answers to the stagnation mentioned earlier.

Mick Jagger asked in 1968, "So what can a poor boy do/But sing for a rock 'n' roll band?" Well, actually, that's a start. Entertainers enjoy a lot of power in our society. As in the Depression of the 1930s, music and movies can boost public morale by providing temporary escape from the stress of economic uncertainty. More importantly, creative folks everywhere can encourage people to find solutions to domestic problems rather than simply "naming and blaming" as some artists (and politicians) tend to do.

The record industry can do its part by lowering the cost of music. For example, CD manufacturing costs have dropped dramatically, yet their selling price remains disproportionately high. The recent resurgence of acoustic music and emergence of home studios demonstrates a trend toward lower production budgets, which should be reflected in retail prices.

If electronic musicians can't afford the latest hot products, they should get more creative with the equipment they have. To paraphrase Steven Stills, if you can't be with the gear you love, love the gear you're with. The equipment of a few years ago can still be used to create a dynamite demo or even a final master tape with the single addition of a relatively inexpensive DAT recorder. Despite my earlier comments, technology *can* contribute substantially to making music affordable again if it's used intelligently.

Ultimately, we must face the fact that our economic resources are becoming more limited. Gone are the days when record companies spent big bucks indiscriminately and took risks on unknown artists with nothing but a spark shining through a lousy demo. However, our creative resources remain truly unlimited, and it is there we should focus our attention. By coming up with good material and using available technology to make good demos and master recordings for less money, we can help get the music business going again to the benefit of us all.

(Thanks to Joanna Cazden for her invaluable insight and assistance.)

Scott Wilkinson *is the former editor-in-chief of* Home & Studio Recording *and* Music Technology *magazines.*

REAL VERB

While the competition's been spending time creating clever names for their reverb products, we've been developing real sounding reverbs. And we've put them in our new DSP 256XL* and DSP 16.

THE COMPETITION GIVES YOU MICRO, AD, MULTI, MIDI, QUADRA, AND UNI; DIGITECH GIVES YOU REAL REVERB

Using our proprietary real-time development system, we created algorithms which simulate the halls, cathedrals, rooms, chambers and other ambient environments found in the real world. Then we took these environments and used them to develop the finest selection of real reverb effects available. Each with a rich, smooth, warm sound and texture that gives life to every note you create.

Go ahead. Visit your DigiTech dealer today. Try our new DSP 256XL and DSP 16 effects processors and experience what real reverb sounds like. And some other great effects too!

DSP 256XL ($439.95 sugg. retail)
- ❑ 24 different effects, up to 4 at a time
- ❑ 256 programs (128 user-definable, 128 presets)
- ❑ 20-bit VLSI processor
- ❑ 20 Hz to 20 kHz bandwidth, 90 dB S/N ratio
- ❑ MIDI controllable
- ❑ Stereo/mono input and output

Effects: Stereo, Ping-pong, Multi-tap, Doubling and Slap-back Digital Delays; Infinite Repeat; Comb Filter; Digital Sub and Output Mixers; Chorus; Flange; Large/medium/small Room and Hall, Gated, Reverse, Ultimate, and Room Simulator Reverbs; 9-band Graphic & 3-band Parametric EQs; Low Pass Filter

DSP 16 ($299.95 sugg. retail)
- ❑ 16 different effects
- ❑ 128 presets
- ❑ Stereo input/output
- ❑ MIDI changeable programs
- ❑ 16-bit processor
- ❑ 20 Hz to 16 kHz bandwidth, 90 dB S/N ratio

Effects: Large, Medium, Small Room, Gated, Reverse, Hall, Special FX and Ultimate Reverbs; up to 1.5 seconds Stereo Digital Delay, Ping Pong, Multi-tap, Slap Back, Doubling, Tempo, Sound-on-sound Layering, Echo

DigiTech
The Sound of the '90s

5639 South Riley Lane
Salt Lake City, Utah 84107
Manufactured in the U.S.A.

H A Harman International Company

* Current DSP 256 owners can purchase our DSP 256XL upgrade chip. See your DigiTech dealer.

We've Added Something To The Mix.

Spirit.

There's something more to making music than the act of playing, singing, or mixing well. There's the spirit, that illusive energy that lifts your performance to new heights, producing music that exceeds your expectations.

That same energy is the essence of Soundcraft's newest line of multi-track and sound reinforcement consoles, the Spirit line.

With price tags that rival semi-professional entry-level consoles, Spirit makes available Soundcraft's innovative technology to anyone with a need to produce truly professional sound. The same sound that has distinguished Soundcraft in top recording studios and concert halls throughout the world.

Spirit Live consoles, with a unique mono bus, come in three models: 8x3, 16x3 and 24x3. Spirit Studio consoles, with inline tape monitoring, come in two models: 16x8x2 and 24x8x2. For the price, you won't find a fuller array of professional features than those in the Spirit line. To add Spirit to your mix, visit your authorized Soundcraft dealer.

Soundcraft SPIRIT

Soundcraft USA/JBL Professional
8500 Balboa Boulevard, Northridge, CA 91329 A Harman International Company