

Reviews: Roland D-70, Spectral Synthesis SynthCard, MiBAC Software and More

# Electronic Musician

U.S. \$3.50/Canada \$4.50  
September 1990

## The Basic Home Studio

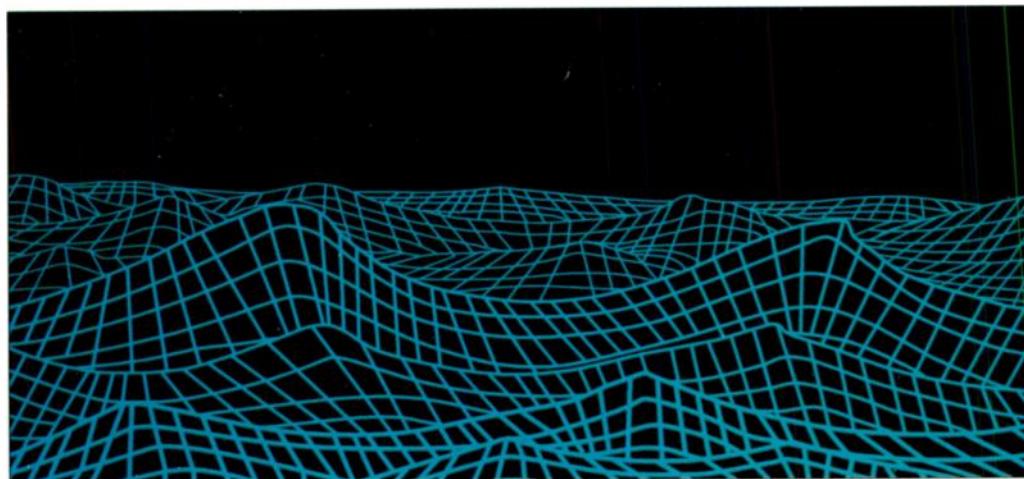
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**YAMAHA**





# Electronic Musician

AN ACT III PUBLICATION

SEPTEMBER 1990 VOL. 6, NO. 9

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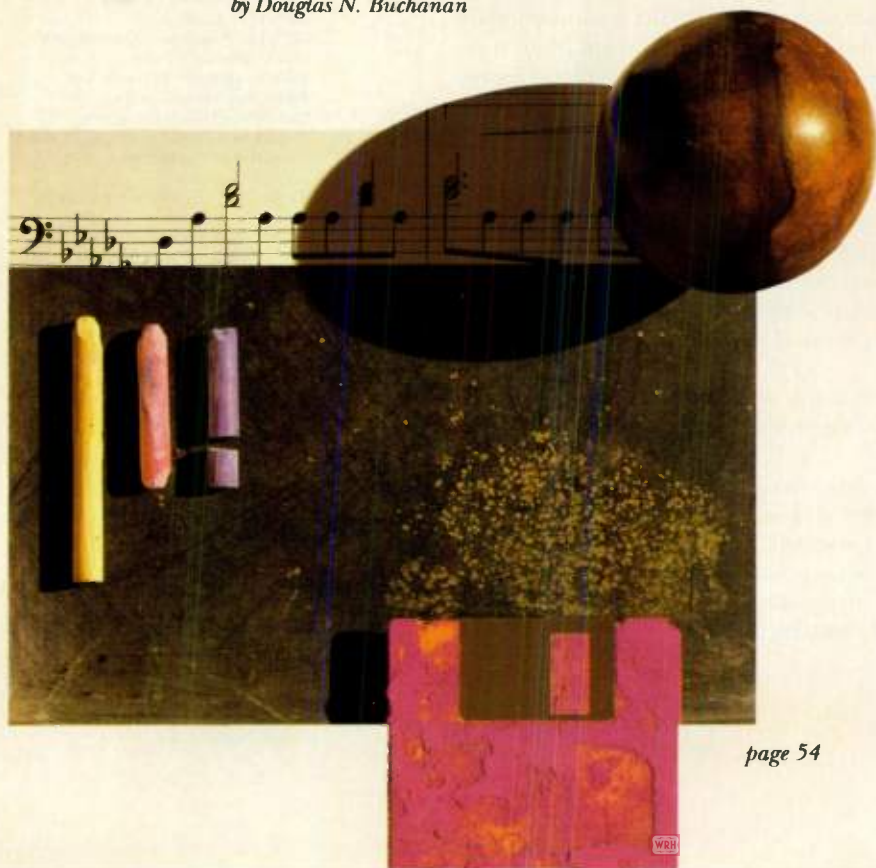
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## Music and Multimedia

*The growth of multimedia and its rapid embrace by major computer industry players should lead to interesting possibilities for electronic musicians.*



If you follow the computer industry press at all, you've undoubtedly heard some of the hoopla concerning "multimedia," the combination of text, graphics, sound, animation, and video in a single computer. Technological progress has made this combination feasible on mid- to high-priced PCs, and many creative minds are promoting it as a powerful tool for communication and education. Detractors, on the other hand, claim that the "m" word is a hype-filled answer in search of a problem. At the recent Seybold Digital World Conference, both sides heatedly discussed the issue.

Despite legitimate concerns voiced by many, the consensus seems to be that multimedia has arrived and will be growing in importance over time. To my mind, this is great news for electronic musicians and other wizards of digital audio because music and sound, although often treated as the outcast children of multimedia, are now being dragged along with it into the mainstream of computing.

A direct benefit of this development is that the producers of multimedia will need musicians to compose and add sound effects, recorded voices, etc. The jobs won't be easy, because to really take advantage of the opportunity, you'll need to have a good understanding of the multimedia creation process—no simple task. In addition, confusion about the technical procedures involved with synchronizing the music and audio with the rest of the presentation may abound. But if multimedia takes off as predicted, individuals with the right combination of talents and interests could find a lucrative outlet for their creativity.

Another advantage of the development is that mainstream computer companies like IBM, Microsoft, and Apple have begun to focus more of their efforts on MIDI and digital audio. The visual side of multimedia has traditionally been dominant, but now audio seems to be getting some of the attention it deserves. As MIDI users, we all stand to benefit. Even if the initial product offerings and implementations are somewhat limited, the technology will be advanced.

Before we can share the benefits of this growing acceptance of multimedia, however, a number of standards for music and sound need to be created, preferably across platforms. For example, a file format that would allow standard MIDI files and multiple tracks of digital audio to be combined in a coherent fashion is needed. Other problems concerning synchronization, both within presentations and to outside sources, also need to be addressed. (Apparently, *HyperCard 2.1*, which Apple is supposed to release with System 7 for the Mac, will have support for MIDI and SMPTE built in. In both purely musical and multimedia applications, this has some intriguing possibilities.)

As with any leading-edge technology, working with multimedia may prove frustratingly difficult. But for some electronic musicians, I think the lure will be too strong to resist.

While we're on the topic of multimedia and computers, I'm happy to report that we're beginning a new column this month called "The Computer Musician." The goal of the column is to cover topics that will help musicians to better understand their computers, and computer users to better understand the process of making electronic music. The first column covers the confusing and sometimes controversial topic of choosing a MIDI interface for the IBM PC and compatibles. Enjoy the issue.

*Bob O'Donnell*

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### ELECTRONIC MUSICIAN OFFICES

**National Editorial, Advertising,**

**and Business Offices**

6400 Hollis Street #12

Emeryville, CA 94608

tel. (415) 653-3307

FAX (415) 653-5142

**Southern California**

**Advertising Office**

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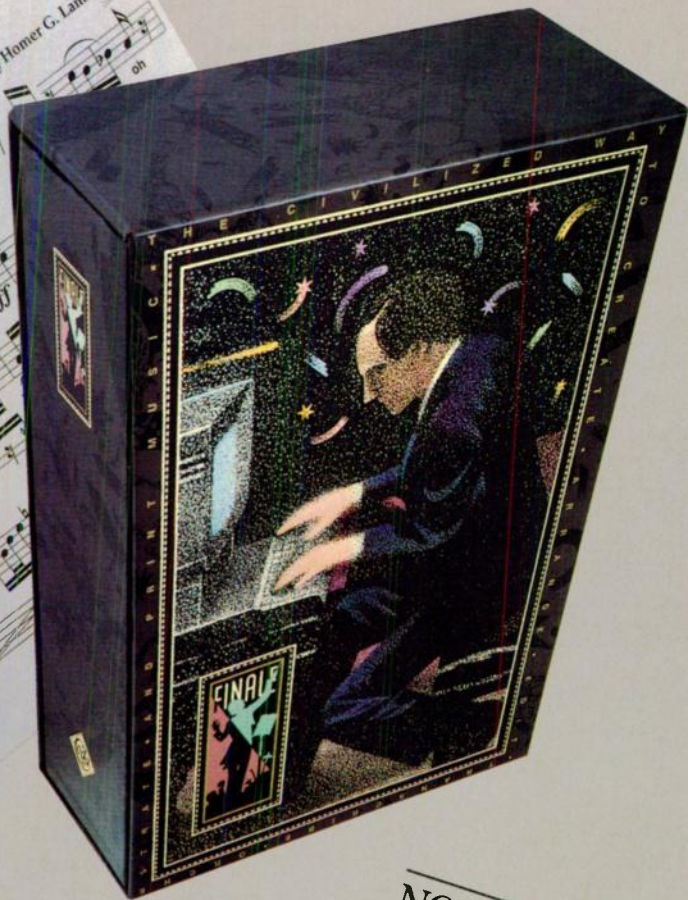
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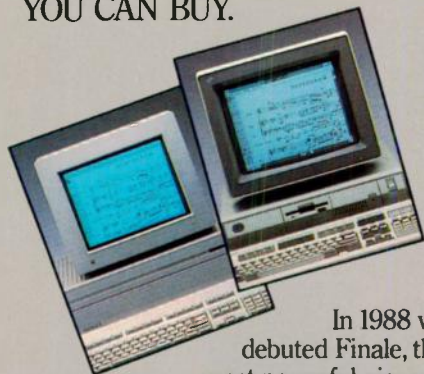




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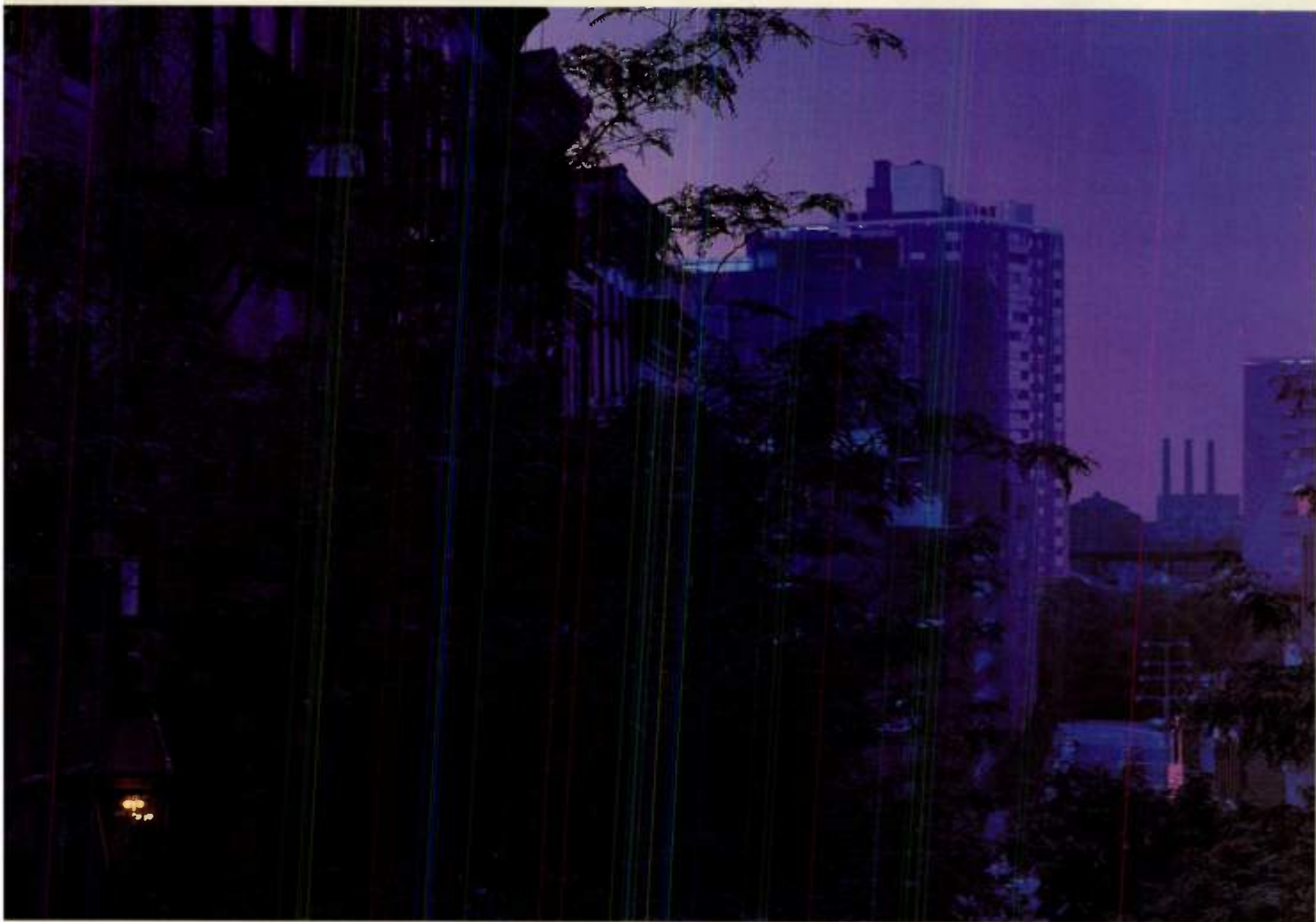
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A message from afar; corrections, comments, and questions on tape recorders; and a few DIY tips fill out this month's list of letters.



## FROM RUSSIA, WITH LOVE

I have read *EM* for two years now, thanks to good friends in the U.S. Here in Russia, there are no similar magazines, although the potential audience is more than ample. I appreciate *EM* for its excellent, friendly, readable style, its wide coverage of events and gear, and (perhaps most importantly) its complete absence of haughtiness. Many thanks to the *EM* staff for this needed and loved product!

I would like to answer the letter of Jim Sutton from Texas (December 1989 "Letters"). [Sutton responded to Craig Anderton's remarks, in the September 1989 "Letters," about the military-industrial complex. Declaring that sometimes, protecting freedom "means killing people who would take our freedoms away," Sutton advocated a technologically advanced, military "deterrent." He also unfavorably compared many music-industry people with military-industry people. —Steve O.]

We are all living in this huge, beautiful world—infinite and open to everyone. We all breathe the same air. The sun warms us, and it doesn't think I'm Russian but Mr. Sutton is American; it is one to everybody. Granted, we are living in an environment of ideology, but

I'm only a man, and Mr. Sutton is only a man. Musicians that, in his words, "tear down the moral structure of the nation, are egotistical, and have a rather limited view of the world," are people also.

In addition, I think there are more "destructive tendencies" in the military-industrial complex (it really is a "destructive complex") and that it is more awful than the "creative complex" of musicians and other artists. The "destructive complex" narrows one's view of the world and makes it polarized, avaricious, and false.

Mr. Sutton speaks of protecting "the freedoms we've come to enjoy as Americans," but where one man's freedom begins, another man's freedom ends.

**Yuri Polchenko**  
Kiev, USSR

## AN EXCELLENT ARTICLE, EXCEPT...

Thank you for the issue on tape recorders (the June 1990 issue, featuring "Basic Studio Series, Part 8: Tape Recorders"). I use analog tape machines daily, and I'm one of those individuals who believes in the warm sound and high quality possible with analog recording. Let me clarify and/or correct a few points in the article.

On page 28, third column, you state that "cassette tape is 0.15 inches wide," and later you refer to "1/8-inch" cassette tape. This is inconsistent.

On page 29, second column, you state that the playback head (properly called a "reproduce" head) lies "upstream." As my river runs, that's downstream!

Near the end of the "Recording and Playback" sidebar, you explain the differences between a record head and a reproduce head and state that "a 2-head design compromises sonic qual-

ity slightly." This used to be true, but is not necessarily so nowadays. Many current-generation tape machines (especially those manufactured by TEAC/Tascam) have sync frequency response equal to that of repro, and in some instances, these two heads are the same part number.

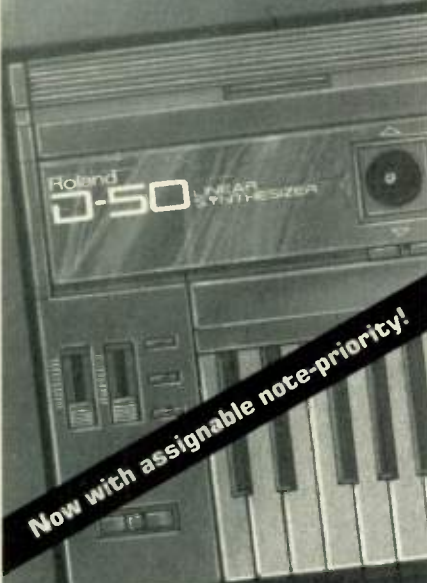
On page 36, second column, the math is incorrect on reel running times. Assuming standard 1.5-mil tape running at 30 ips, a 7-inch reel would play for about eight minutes tops, not twelve minutes as stated. The figures for a 10-inch reel (actually 10.5 inches) are correct. If you are assuming 1-mil tape, the figure for the 7-inch reel would be correct, but the 10.5-inch reel would play for about 23 minutes.

In the third column, you state that calibration and alignment are the same procedure. While the two are often done at the same time, the processes are totally different. Alignment should refer to the proper positioning of the heads, e.g., "Track 3 is playing back on channel 5. We'd better align those heads." Calibration refers to adjusting the machine's electronics.

While I'm on the subject, a lot was written, both in this article and in the one that followed ("Tale of the Tape"), about "biasing." I'm surprised you didn't mention other calibration procedures. Without the record and playback levels and EQ set properly, no amount of bias adjustment will help. I've seen many tape machines, brand new, right out of the box, badly in need of calibration and alignment, so I'm afraid I can't endorse the "stick to the manufacturer-recommended tape" method as a substitute for proper machine setup. I believe having a professional align and calibrate your machine (even brand new) is a worthwhile investment.

On page 39, third column, there's

## Multimode Expansion for D-50/D-550



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## • LETTERS

some confusion about spooling and slow winding modes. A spooling mode is a slow-winding mode typically used before storage of the tape. The process of running tape off the supply reel without having it connected to the takeup reel is called a "Dump Edit."

In the tips that followed, you mentioned cleaning the heads often but not a word on demagnetizing. After only a few hours of use, residual magnetism will begin to self-erase high frequencies from tapes. So obviously, demagnetization is a very necessary and beneficial procedure.

I hope I have clarified some of the points in your otherwise excellent article.

**Norton Lawellin**  
Minnesota

*Norton—Thanks for catching the errors and for your well-informed comments. In some cases, such as the point about 2- and 3-head machines, experts still disagree. Your points about alignment, calibration, playback level and EQ, and de-magnetization are excellent.—Gary H.*

## PARTS IS PARTS

**T**hanks for printing my tip "Electronic Drummers Get That Hi-Hat Touch" in your June 1990 issue. I just noticed an error near the bottom of the schematic on page 23. One resistor is labeled "4k7" when it should read "4.7 k." It's a minor error but may prove frustrating to a reader who is trying to construct the circuit and isn't sure whether to use a 47k or a 4.7k resistor.

**Barry Mandel**  
New York

*Barry—Because we reach out to electronic musicians worldwide (see this month's letter from the USSR), EM specifies parts values following international protocol; see "For Your Information," on page 109. In international nomenclature, 4k7 is the equivalent term for 4.7 kΩ U.S. In parts lists for regular DIY projects, we usually—I didn't say always—give the U.S. equivalent in parentheses.—Steve O.*

## INEXPENSIVE PCM ENCODERS

**I**n his sidebar "Digital Mastering on an Analog Budget" (June 1990, p.40), Craig Anderton claims that PCM encoders can be purchased for

\$500. If so, I would be extremely interested in knowing from whom.

**Dameon Likowski**  
Ohio

*Dameon—Second-hand PCM adapters are not necessarily plentiful, but they can be found. The Sony 501ES sold for \$750 originally, the Aiwa PCM-800 for \$650, and the JVC VP-100 for \$750. These are older, 14-bit units, but they sound very good and can sometimes be found second-hand for around \$500. Keep an eye out for studios selling off older gear, but also check music-related computer bulletin boards and local "shopper" newspapers.*

PCM adapters are not your only alternative for quality audio on a budget. Some relatively inexpensive, Hi-fi VCRs offer excellent audio quality, and if Congress passes the DAT bill, increased competition and the introduction of "consumer" units may drive DAT recorder prices down to the under-\$500 mark. —Craig A.

## ACHIEVING UNITY GAIN IN A NON-INVERTING AMP

**I** have just recently begun to study electronics, but according to what I was taught, the only way to achieve unity gain in a non-inverting amplifier circuit is to eliminate the input and feedback resistors, which Steve Bazeley has not done in his Mini Mixer project ("Tips," p.20, in the June 1990 EM). Yet he does state that the circuit is a non-inverting, unity gain circuit. Is he right? If so, could you please explain the theory behind why he is right and how the circuit works to produce the non-inverting, unity gain output without eliminating the input and feedback resistors?

**Jim Shunamon**  
Massachusetts

*Jim—You're quite right. The author's use of the term "unity gain" is not proper. Since the purpose of the circuit is to combine stereo into mono, it was probably intended to mean that identical signals at both inputs would produce an output equal in level to one input.—Gary H.*

## ERROR LOG

July 1990, "What's New," p.16: The published phone number for First Light Video Publishing was a FAX number. The regular telephone number is (213) 467-1700. ■



# mix•er

(mik'sēr) *noun*. An electronic device used to *mix* music. Must be clean, transparent and punchy. See Alesis 1622 Mixer. Better yet, listen to it.



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\* Total Harmonic Distortion + Noise: too low to measure \* Keyboard Magazine July 1990.



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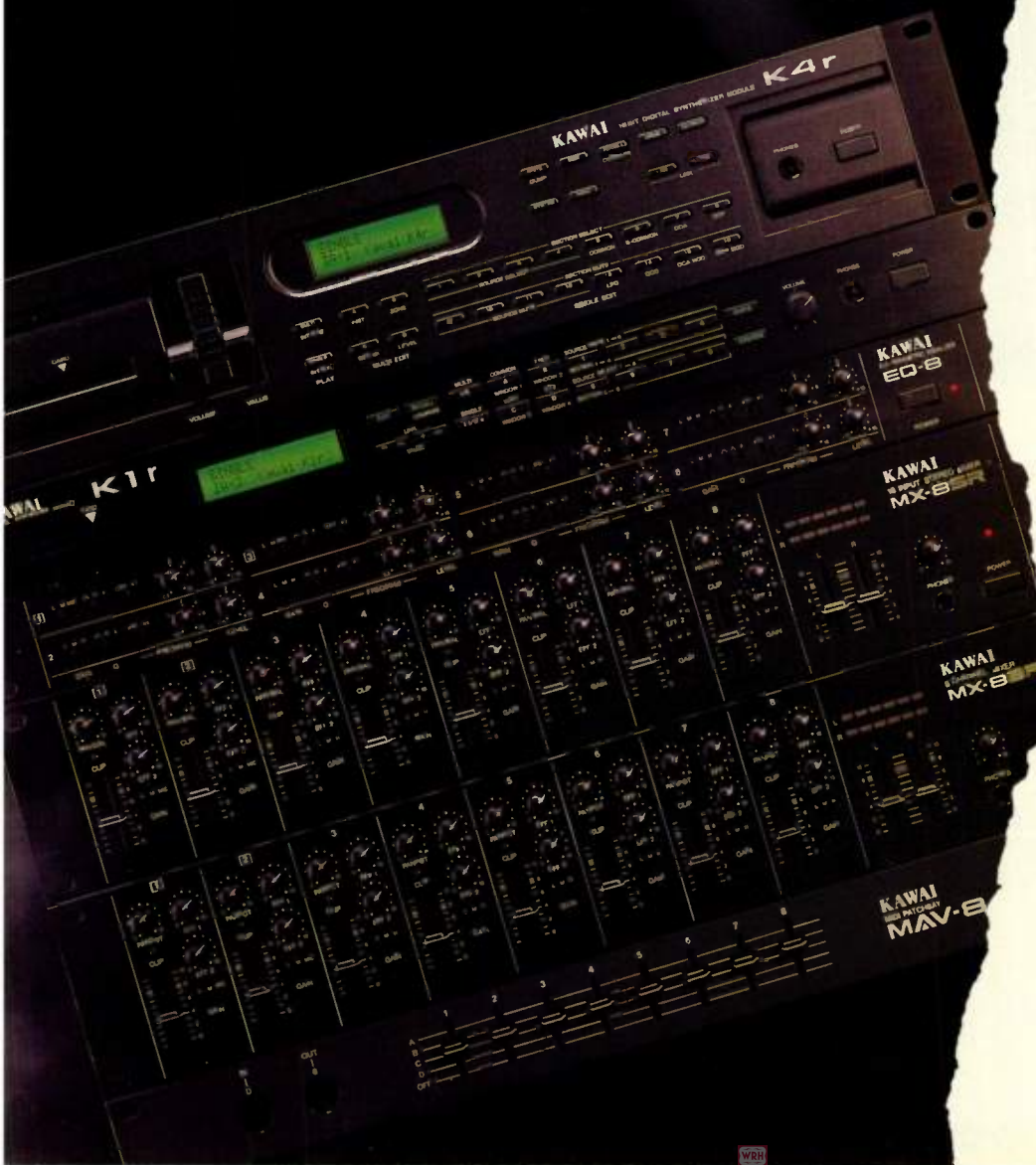
## MAV-8

4 Input/8 Output MIDI Patch Bay, Sliders Visually Indicate Patch Configuration, \$140.00.

For more information on any product write or call: Kawai Digital Products Group, 2055 E. University Drive, Compton, CA 90224 (213) 631-1771. Kawai Canada Music Ltd. 6400 Shawson Dr., Unit #1, Mississauga, Ontario, Canada L5T1L8. Prices shown are suggested retail.

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## Tools from the Catacombs: The 1990 Summer NAMM Expo

People knew in advance that they might not get what they wanted at this show—but those who tried got what they needed.

By the EM Staff



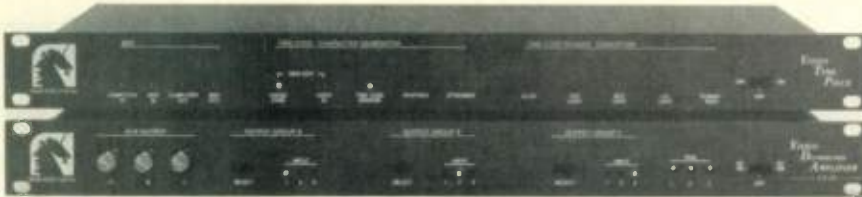
Yamaha EW20 Windjamm'r Woodwind Controller

Last year's National Association of Music Merchants (NAMM) summer show, held in Chicago, was dubbed the "Wake on the Lake," and many expected this year's return to the Windy City to be reminiscent of the catacombs, a resting place of the dead. Indeed, behind the Atari booth, a curtain failed to hide a large, empty section of exhibition hall. Many companies either skipped the show, or sent representatives but didn't exhibit.

Nevertheless, the feel of the show wasn't grim. Most exhibitors and attendees knew this would be a small show and trimmed their expectations (and budgets) accordingly. Overall, folks found the people they wanted to meet and had more time than usual to spend with each person. The show had a light, relaxed feel, and in that spirit, we "organized" our coverage via arbitrary, and hopefully humorous, departments.

Despite the show's small size, a lot of good tools appeared. In the *Pièce de Resistance* department was Mark of the Unicorn's **Video Time Piece** (\$1,195; tel. [617] 576-2760). The 1U rack-mount unit combines a VITC (vertical interval time code) or LTC (longitudinal time code, a.k.a. garden-variety SMPTE) reader/generator, SMPTE-to-MTC (MIDI time code) converter, and an intelligent character-generator. VITC capability means that the time code reader will not lose its place, even when the video is shuttled or single-stepped, because the code is part of the video signal itself. The reader/generator includes genlock, freewheel, and jam sync capabilities. The character generator inserts time code into an onscreen window and lets the operator mark "hit points" directly in *Performer 3.0*. The sequencer downloads these into the VTP, and converts them into the visual streamers used by film and video scorers. Also from Mark of the Unicorn: the **Video Distribution Amplifier** (\$495), which provides a convenient means of switching and routing three video inputs to as many as fifteen destinations without signal loss.

*Digital Domain Domination department:* Alpha Audio's **DR-2 Digital Hard Disk Recorder and Edit Controller** (DR-2 \$15,000 for 60-minute capacity; edit controller \$1,995; tel. [804] 358-3852), was designed with the needs of video editors in mind. Unlike most hard disk recording systems, the DR-2 doesn't use a personal computer for a front end. The disk unit is rack-mounted and can be controlled via the Sony serial protocol, the standard for video editing systems. Under the control of a video editor (or the optional edit controller, or even a computer with appropriate software if you so desire), the DR-2 behaves like a 2-track recorder with center-track time code, except that it can reach any point on the disk in under 0.1 seconds.



Mark of the Unicorn Video Time Piece and Video Distribution Amplifier

## MIDI CONTROL MANIA

MIDI control was everywhere. In the Brave New Controller department, Sensor Frame (tel. [412] 683-9500) showed the first production models of its **VideoHarp** (\$9,500), the harp-shaped, optically triggered, MIDI controller (described in the July 1990 "What's New"). First impression: It's fun to play and, with practice, could be used to produce good, creative music. It's also expensive (as new technology often is), a situation the company hopes to remedy.

Not Brave or New But Useful and Inexpensive Controller department: Gulbransen introduced the **Crystal Series** of MIDI retrofits for grand piano. An "opto-electronic" triggering mechanism installs under the piano keyboard—according to the manufacturer, any competent piano technician can install it—and its continuously variable sensor scans key motion at a rate of 500 times/second. The data is converted to MIDI information via any of three interfaces. The CGS2, a 16-voice multitimbral, onboard synth, with 1.5 MB (54 sounds, at present) of ROM-based, 16-bit, stereo samples, is available. First impression: The sensor looks like an excellent design, the MIDI interface seems useable if you can work within a basic, no-extras MIDI implementation, and the synth is, well, inexpensive.

"Stand On It" MIDI Controller department: Applied Research & Technology (ART) offered the **X-11 MIDI Master Control** (\$129; tel. [716] 436-2720), a heavy-duty, MIDI program change footpedal controller. A display shows the patch

number, while LEDs display which patch is active.

The Wind Controller In The Windy City department goes to Yamaha's **EW20 Windjamm'r** MIDI controller (\$650; tel. [616] 940-4900). Featuring sax or recorder fingerings, a thumbwheel controller, 4-octave range, tuning, and transposition options, the Windjamm'r, which is being sold by the company's band instrument division, also includes a stand-alone 64-voice (presets only) FM synthesizer with reverb. The synth can play with up to 8-voice polyphony and can respond on up to four MIDI channels.

Yamaha's Synthesizer, Guitar, and Drums (SGD) Division announced the release of the **TG77** (\$1,995; tel. [714] 522-9011), the rack-mountable version of—you guessed it—the SY 77 (reviewed in June 1990). The TG77 has more individual outputs (a total of twelve), an expanded user interface, and a

new set of preset sounds.

*New Life for Guitar Controllers department:* Gibson showed **MAX** (\$1,795; tel. [818] 503-0122), a 1U rack-mount, MIDI guitar converter with two independent MIDI outs, and solid audio signal-routing features. The system is designed for use with standard electric guitars. Audio features include a programmable, stereo effects-routing system with four loops; a programmable mixer with auxiliary inputs, three stereo line inputs, and four effects returns; a digital tuner; a system-controlling, multiple footswitch; and memory for 100 presets. MAX can use magnetic, in-

frared, piezo, or Roland pickups for its pitch-to-MIDI conversion, but no pickup comes with the system. For those looking for a more inexpensive option, Gibson's **Widget** MIDI guitar converter (\$599) is a stand-alone unit that includes its own hexaphonic pickup.

## A SURPRISING WEALTH

*Cheap 'n' Clever department:* Coe-Weiser, Inc. introduced **Tech-Tape** (tel. [208] 343-6994), which has a strong adhesive on the edges and a glue-free cable trough in the middle. Hopefully, this spells an end to gummy cables. It's available in 4-, 6-, and 8-inch sizes and in black and yellow hues (with more colors planned).

*On The Horizon department:* It wouldn't be NAMM without multiple product announcements from Alesis. The **SR-16** drum machine, shown in prototype form (est. \$399; tel. [213] 467-8000), is scheduled for release in time for Christmas (presumably 1990). The unit features over 100 sounds, including stereo samples, and Dynamic Articulation, which incorporates timbral changes as a function of velocity, so that a soft drum hit *sounds* soft, etc. The manufacturer considers the new machine a complement to, not a replacement for, the HR-16 and HR-16:B. The **MicroVerb III** (\$249) abandons the 1/2-rack format of its predecessors for a full 1U rack package, and has 256(!) preset sounds arranged in sixteen banks of sixteen apiece. The banks are all named by the type of reverb or effect, giving a very comprehensive selection. Alesis also introduced an update for the **QuadraVerb** (\$499), called **QuadraVerb Plus** (upgrade \$30), adding sampling (with start, end, and loop-point editing), 8-tap delay, ring modulator, and resonator programs. In the You Can't Have it All department: There's no way to save your carefully looped QuadraVerb Plus samples. Alesis also upgraded the **DataDisk** (\$499), **DataDisk SQ** (upgrade \$30) adds real-time recording and playback of MIDI performance data (sequences). Both updates are compatible with the original products.

*New Spinoffs of Proven Technology de-*



Sensor Frame VideoHarp



Yamaha TG77 Tone Generator



Want these great  
sounds in a rack?

Now  
available-  
the  
SQ'R!



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ease-of-use. The SQ-1 raises that standard to a new level with its unique sound and flexibility.

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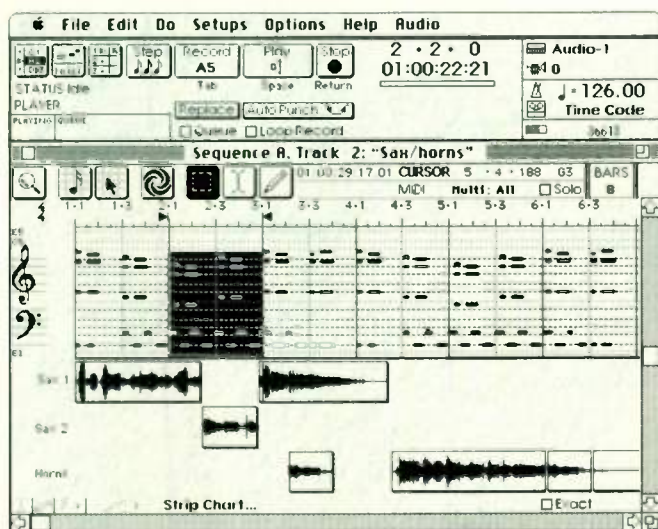
THE TECHNOLOGY THAT PERFORMS



# Opcode Now Gives

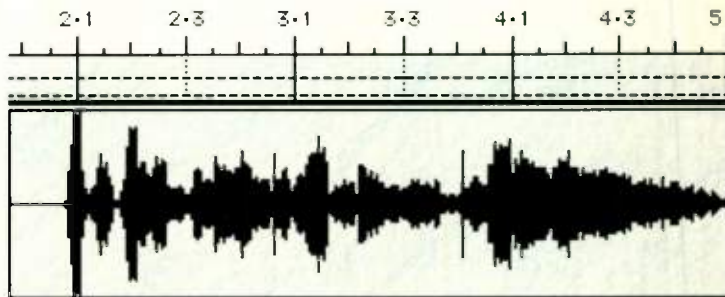
## Introducing Studio Vision

Opcode's Vision sequencing program for the Macintosh was voted "Best Music Software Innovation of the Year" by the readers of Keyboard Magazine. Wait'll they check this out. Studio Vision combines all the features of Vision with the ability to record CD-quality audio direct to disk along with your MIDI data. Studio Vision works in conjunction with Digidesign's Sound Tools Digital Recording System and runs on any Macintosh II series computer or the SE/30.



*The control bar and graphic editing screen of Studio Vision.*

Using Studio Vision and Sound Tools, you can play back two mono digital audio channels simultaneously—with the ability to record as much audio as your hard disk space allows. The program incorporates the speed and convenience of non-destructive editing of the digital audio right along with the MIDI—use commands such as cut, copy, paste, clear, merge, and strip silence. Studio Vision includes SMPTE synchronization and full automated mixing of the digital audio tracks with pan and volume control. Add Digidesign's DAT I/O digital interface for compatibility with most professional digital audio tape recorders. For a simpler setup, Studio Vision also works in conjunction with Digidesign's Audiomedia card. The power of Studio Vision with either hardware system eliminates most multitrack syncing situations when combining MIDI and "live" tracks.



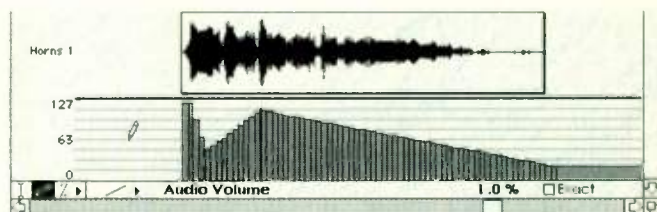
*Studio Vision has non-destructive editing of the 16bit digital*

## Record Vocals Too!

Studio Vision is the future of computer music recording. It's not just for MIDI keyboards, it's for any "live" instrument—guitar, saxophone, or vocals! Recording artist Thomas Dolby says: "You've got the best sequencer and the best recorder combined into one... you have an idea and ten seconds later you hear it... your creativity as an artist is not trampled on by technology slowing you down."



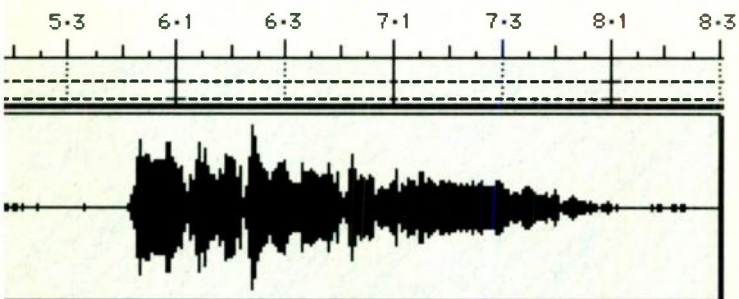
Use your standard MIDI instruments to record "basic tracks" like drums, bass, and keyboards. Then use the digital audio tracks to record the guitar, vocals or sax solo. Record a few takes of the sax solo and cut and paste from each of them to get the perfect take. Record one great chorus and paste it at each chorus in the song. Merge and offset background vocals for richness. Studio Vision's extraordinary flexibility allows you to record separate takes of digital audio onto any number of tracks.



*Automated mixing of volume and pan in Studio Vision.*



# Voice to Your Vision



*audio channels, plus all the editing commands in Vision!*

Studio Vision dynamically allocates them onto the two playback channels. Now you've got your whole song on the Mac—from instruments to vocals.

And Studio Vision is ready for the next steps in technology: as the Macintosh and DSP (Digital Signal Processing) hardware get faster, Studio Vision will play back more than two channels at once.

## Post Production

For post production, Studio Vision combines MIDI sequencing with the ability to record "voice overs" integrated with the music. Using SMPTE sync you can immediately check audio and video, and perform intricate audio edits instantaneously. Cut out a cough or noise here, swap sentences there, and adjust the music to fit the contour of the dialog all on the same screen. Isn't it nice to use just one computer keyboard?

Audition sound effects stored on hard disk before opening them, choose the one you want and place it on a specific SMPTE number, then lock up to video. Convenient.

Track A1: "Sound EFH"					
▶	3	3	112	01:00:25:06:14	
◀	11	3	58	01:00:40:11:57	
	4	1	0	01:00:26:01:33	4 Events
•	1	2	237	01:00:21:01:27	Gun Shot 8 1
•	1	4	128	01:00:21:26:53	Door Slam 8 3
•	3	2	412	01:00:25:00:66	Car By 1 8 1
•	3	3	112	01:00:25:06:14	Tires scrch 3 8 2

*List editing with SMPTE times of digital audio sound effects.*

## What Price Perfection?

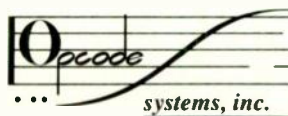
You may be thinking this is awesome—but how much? With a Macintosh II (or SE/30), Opcode's Studio 3 (or any MIDI interface), Digidesign's Sound Tools or Audiomedia, and a hard disk, you're up and running with Studio Vision. And for an integrated MIDI setup, Studio Vision works closely with Galaxy, Opcode's universal librarian.

So if you've been waiting for that really big breakthrough in music technology, or if you're still using that same old MIDI sequencer synced to tape—think smart and go to your local Opcode dealer and hear how Opcode has brought voice to the Apple Macintosh with Studio Vision. Call Opcode for a free brochure and the name of your nearest dealer.

# Studio Vision™

## Specs

- Full MIDI sequencing capability with graphic and list editing
- 16bit 44.1Khz direct-to-disk recording (mono: 5 megabytes per minute)
- Playback of two digital audio channels
- Recording of digital audio limited only by hard disk space
- Non-destructive editing of digital audio
- Simultaneous integrated editing of MIDI and digital audio
- Full automated mixing of digital audio and MIDI tracks
- Compatible with all digital audio formats
- Digidesign Sound Tools or Audiomedia owners need only purchase Studio Vision
- SMPTE synchronization (except with the Audiomedia card)
- Upgradable from Vision



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3641 Haven, Suite A  
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# The Smart New Angle On Mixing

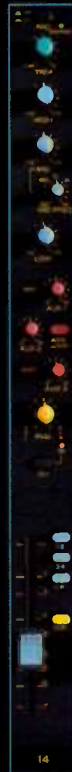


## INTRODUCING THE TOA CX SLANTBACK.

TOA's engineered big performance into a compact board where sleek lines and ergonomic controls are just the start. Priced-right, sounds-right, it's shaping up to be another intelligent innovation from TOA.

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Choose 16 or 12 channels with 2 additional line level slider-controlled stereo inputs. And, CX SlantBacks are feature rich, including 4 group outputs, stereo L/R outputs, 3 aux outs and 1 mono sum out.



### NIMBLE.

A spacious, easy-to-handle layout with luminous soft-top controls makes the CX SlantBack sure to the touch — even in low light. The slant back eases setup and changes, all of which just might make TOA the easiest-to-use mixer ever.

### SILENT TYPE.

Of course there's wide, flat frequency response, noise below -130dB (EIN) and minimal distortion. Add optional transformer-isolated I/O's and guarantee absolute freedom from interference and ground loops.

### ROAD WARRIOR.

CX SlantBack is designed around a rugged cast aluminum frame and components that stand up to touring's hard knocks. Heavy duty reliability is just as welcome in tamer surroundings — conference, church and performing arts installations — where legendary TOA quality makes contractor callbacks obsolete.

### QUICK-CHANGE ARTIST.

Mix to four subgroups or direct to stereo L/R, all monitored by six peak-reading LED meters, switchable to monitor ten functions.

### FINE TUNED.

Precise control comes from a staggered-dial three-band EQ with sweepable mids and independent pre, post and switchable sends.



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## ● WHAT'S NEW

**partment:** Kawai reps were excited about a new application of K-4-style, wave-table synthesis, the **XD-5 Percussion Synthesizer** (\$895; tel. [213] 631-1771). Its 256 16-bit (sampled at 44.1 kHz) percussion wavesamples form the material from which custom sounds can be synthesized. Patch memories are provided for 64 internal, and 64 external, percussion sounds, which can be combined in sixteen Multi drum kits for access of up to 88 sounds at once, each with its own tuning, level, and panning adjustments. The unit includes stereo outputs and six individual outputs. **MIDI Slider Control Fanatics department:** Kawai's **MM16 MIDI Processor/Remote Control** (\$295) offers 16-channel MIDI mixing, among other possibilities, with its seventeen front panel faders, MIDI merge/split and spillover functions, and patch-editing via sysex. Kawai renamed and released the **KC-10 Spectra** (\$695), a 16-bit PCM sample-based, 14-voice multitimbral, velocity-sensitive wavetable synth with a full-sized keyboard designed to be strapped over the shoulder. It was shown at the winter NAMM show as the **KL1** (see the May 1990 "What's New").

**New Spinoffs of Combined Proven Technologies department:** E-mu Systems used the relative intimacy of the show to introduce the **Proformance/1** and **Proformance/1+** (\$499 and \$599, respectively; tel. [408] 438-1921) 16-bit stereo piano modules based on the company's high-flying Proteus technology (combined with that good, old, piano technology). The basic model features a variety of piano sounds, while the "Plus" also includes electric pianos, organs, vibes, and basses (see the August 1990 "What's New" for more). E-mu also showed the previously announced **Proteus/2** (\$1,495 with 192 preset locations, \$1,795 for the XR version with 384 preset slots), the orchestral version of the **Proteus/1**.

**Good Things in Small Packages department:** Several companies, including Steinberg/Jones, Dr. T's, Digidesign, and other well-known companies clustered around the Atari booth, but the biggest buzz in Atari Land came from a "small" company—Gadgets by Small—who introduced a new version of **Spectre GCR** (\$299; tel. [303] 791-6098), a plug-in cartridge that lets the Atari ST run Macintosh software. Also demonstrated was their **MegaTalk** board (\$299), which supports MIDI and AppleTalk/LocalTalk and was displayed running Coda's *Finale*, Opcode's *Vision*, and Passport's

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Jim Pierson-Perry,  
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## ● WHAT'S NEW

*Master Tracks Pro* on a Mega ST.

*Let Your Fingers do the Walking* department: ZimmerWorks's **Zeebar** fingerstrip (\$149; tel. [606] 223-1888) is a pressure-sensitive, sound modulating strip that produces control signals for Ensoniq keyboards, replacing the control voltage (CV) pedal. The Zeebar is compatible with the Yamaha Breath Controller (using a common adapter) and the Anatek Pocket Pedal (with an optional, impedance-matching adapter); compatibility with other synths is being researched. The fingerstrip can also be installed under the keyboard of compatible, non-pressure-sensitive keyboards, such as the ESQ-1, to add channel aftertouch. The Zeebar was displayed controlling an EPS that was loaded with samples from *CineTunes* and *Maestro Sounds* EPS libraries (\$349), which are organized in an IBM-style tree directory and offered exclusively on 45 MB removable, SyQuest cartridges. The *CineTunes* library focuses on contemporary sounds, horns, etc., while the *Maestro* library is oriented toward thickly layered synth textures. There is a small amount of duplication.



ZimmerWorks Zeebar

Both products are distributed by Eltekon (tel. [818] 441-8174), a manufacturer of storage media for computer and MIDI data.

*Relative Bargain* department: Brother International's **PDC-100 Pro Disk Composer** (\$399; tel. [201] 981-0300) is a 32-track, disk-based sequencer with 128 KB of RAM, real-time and step-time recording, and editing functions. All sixteen MIDI channels are available on all tracks, song position pointer is supported, and sysex data can be saved in the same file with song data. Brother also displayed its 2-way **Clearfield studio monitors** (\$349 for PB-6 powered model, \$249 for BR-165 unpowered model), which boast a 60 Hz to 20 kHz frequency response.

*You Can Get There From Here* department: **Sendit** (\$349 tel. [818] 841-1078) of-

fers a 4-in/3-out effects-routing solution for the old problem of too few effects sends on your mixing board. Inputs, which come from the board's insert points or other access points, are routed through Sendit to parallel back panel inputs, so the original access point is still available.

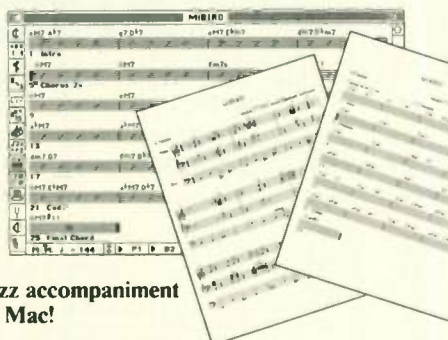
*Remote Possibilities* department: Sansui displayed its **MD-R7** (\$249; tel. [203] 286-0498), a MIDI-to-smart FSK converter and remote controller (including auto punch-in/out with song position pointer) for the company's MR-6 and WS-X1 multitrack cassette decks. The MD-R7 also sends MIDI program change and start/stop messages.

*The Southern Hospitality* department: Peavey proudly showed off its heritage by celebrating its 25th anniversary with a rollicking party and dealer show at its headquarters in Meridian, MS, just prior to the NAMM show. Among the many new products on display was the **DPM-V3** (\$1,499; tel. [601] 483-5365), a rack-mount version of the DPM-3 synth with additional outputs and more room for waveform RAM, and the **Pro-fex** (\$999), a guitar multi-effects processor.

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— David N. Baker, jazz composer, educator, and multi-instrumentalist, Indiana University

At last, a Macintosh MIDI program that has what every jazz musician wants: the sophistication and intelligence to create music that's exciting to play along with. At the click of a button you can be jammin' with the song of your choice. You choose the key, tempo, style, form, then type the chord progressions . . . and MiBAC does the rest!



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MiBAC requires a Macintosh Plus or later model with two disc drives, MIDI interface and MIDI synthesizer(s) capable of producing piano, bass and drum sounds. Notation printed using Deluxe Music Construction Set, a trademark of Electronic Arts. Macintosh is a registered trademark of Apple Computer, Inc. MiBAC is a trademark of MiBAC Music Software, Inc.

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## SHOW BUZZ

In an attempt to renew enthusiasm for the summer show, NAMM announced that next year's June Expo will be in New York City, and, for the first time, the show will be open to the public for one day. Apparent reaction was mixed: Some East Coast folks noted that it has been nearly three decades since the last Northeastern NAMM expo, and the Big Apple offers every kind of food and entertainment imaginable, 24 hours a day. Many manufacturers from outside the Northeast feared high lodging and labor prices, and long cab rides (the show site, the Javitz Center, is far from the major hotels).

The consumer day could offer manufacturers and buyers a chance to observe public reaction to new products. Then again, some fear it could be a zoo. If you've always wanted to see a NAMM show but couldn't scam a pass, this appears to be your best chance. ■



# WE ONLY MAKE PROMISES WE CAN KEEP.

**F**or many years, a great percentage of our consumers have been very insistent that we (Peavey) "get into the keyboard business...." From our vantage point, it seemed that the major competitors in the synthesizer market seemed to be changing models virtually every year! To an observer—at that time—of the electronic keyboard market, it seemed rather apparent that this industry segment had evolved a "vicious cycle of obsolescence" that seemed to rob players of an adequate "service life" for the products they bought. For the player to get the new "trick sounds," he was forced to buy the "latest and greatest" keyboard with the aforementioned "obsolescence cycle" happening every fifteen to eighteen months...a short time indeed for a major purchase such as an electronic keyboard!

I always told people that unless (and until) we (Peavey) could come up with something "truly different" and something that would solve the rapidly increasing "cycle of obsolescence," we would continue to opt out of the chaotic synthesizer "fractus."

Then, in 1987 we began researching the possibility of a software-based system as opposed to the conventional (then and now) hardware-based synths whose basic operating systems are "fixed" in custom LSI chips.... Our "software-based synthesis" would actually change the entire operating system as opposed to simply changing patches and modifying some parameters through software.... Our approach utilized a system of "phase modulation," and at long last, we proved that this system does, in fact, break the "vicious cycle of obsolescence" that created a lose/win situation: Keyboard players lose; manufacturers win.

In January of 1989 we introduced the DPM 3...entirely designed, programmed, and built in the USA.

As I promised, Peavey would only enter the keyboard market when we had solved the problem of hardware obsolescence.

What we have done is create an incredibly advanced instrument dedicated to the needs of the musician, rather than the manufacturer.

The DPM 3 is the realization of that promise.

Hartley Peavey  
CEO Peavey Electronics

**PEAVEY** **DPM™ 3**



# MIDI Interfaces for the IBM PC

By David (Rudy) Trubitt

*You may not need an MPU-401-compatible interface for your Big Blue or clone, but before you decide, you had better understand the alternatives.*



ELWOOD SMITH

If you are looking for a MIDI interface for an IBM PC or compatible system, don't consider it a simple hardware purchase. The interface you use will have a big impact on the software you'll be able to run. Unlike the Macintosh or Atari ST, there is no serial communication driver built into the PC's operating system. For that reason, interfaces and software are not automatically compatible. But there is a *de facto* standard: Roland's MIDI Processing Unit (MPU-401).

When it was introduced in 1984, the principal selling point of the MPU-401 was Intelligent mode, which takes care of many important MIDI tasks without bogging down the PC's central processor. The IBM PCs of 1984 had less power than today's models, so the MPU's processing capabilities were useful. Roland offered the MPU-401 chips to other companies, making it easy for them to make compatible products of their own. Enough MPU-style interfaces were sold that nearly every software company had to support it to stay competitive. This is still the case: Even programs designed specifically for non-MPU interfaces usually offer MPU-compatible versions.

The MPU-401's biggest advantage today is software compatibility. If you want to run the largest number of programs, especially shareware, you should be looking at an MPU-compatible interface.

Today, the typical PC-compatible has increased in power to the point that it doesn't need the help Intelligent mode offers. Also, Roland's MPU-401 chips discard MIDI time code (MTC) messages when in Intelligent mode. As an alternative, the MPU can operate in—you guessed it—Dumb mode (also called UART mode), which does pass MTC mes-

sages. In this case, the computer is responsible for everything, and all features of Intelligent mode are lost. Many developers who support the MPU-401 today are using Dumb mode, despite the extra work it entails. This means that users pay for unused features.

Several manufacturers have taken the basic MPU-401 and added additional MIDI ports and SMPTE read/write capability. These interfaces function like a plain MPU-401 unless the software is specifically written or updated to support the additional features. Check with the software manufacturer to find out if their software supports any "extras" that your interface provides.

## NON-MPU-401 INTERFACES

MPU-401-compatible interfaces must be installed in an expansion slot, forcing laptop users to seek alternatives. Many laptops use a MIDI interface that works with the printer port, either serial or parallel. You'll have to call your software vendor to find out if their programs support these interfaces, as none of the serial or parallel interfaces are MPU-compatible.

To achieve the MIDI rate of 31.25 kilobaud, serial MIDI interfaces run the PC's serial port at higher rates than were originally intended. In most cases, this is no problem, although one software vendor cited potential throughput problems in dense datastreams. There are a number of serial interfaces available, and they are gaining support among software vendors.

The parallel port has some potential advantages over the serial port as a host to a MIDI interface. Surprisingly, there is only one parallel port MIDI interface on the market today, the Eclipse HRS-3000.

*text continued on page 28*



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The real-time features of Sound Globes are awesome. ♦Bruce Rathbun, owner

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## • COMPUTER MUSICIAN

### IBM PC MIDI Interfaces

Manufacturer	Model	In	Out	Thru	MPU	Sound	FSK	Smart FSK	SMPTE	Price
<b>PC Bus Interfaces</b>										
Brown-Wagh	Sound Blaster	1 <sup>1</sup>	1 <sup>1</sup>	0	N	Y	N	N	N	\$239
Computer Music	CMS 401-II	2	2	0	Y	N	N	N	N	\$129
Supply (CMS)	CMS 444-I	1 <sup>2</sup>	1 <sup>2</sup>	0	Y	N	N	Y	Y	\$249
	CMS 444-II	2	2	0	Y	N	N	Y	Y	\$259
	CMS 101	1	1 <sup>3</sup>	0	N	N	N	N	N	\$ 69
IBM	Music Feature	1	1	1	N	Y	N	N	N	\$495
Music Quest	PC MIDI Card	1	1	0	Y	N	N	N	N	\$119
	MQX-16	1	1	0	Y	N	N	Y	N	\$199
	MQX-16S	1	1	0	Y	N	N	Y	Y	\$249
	MQX-32M	2	2 <sup>4</sup>	0	Y	N	N	Y	Y	\$349
	Optronics Tech. Basic MIDI	1	1	1	N	N	N	N	N	\$ 99
Roland	MPU-IPC	1	2	0	Y	N	Y	N	N	\$170
	LAPC-1/MCB-1	1	2	0	Y	Y	Y	N	N	\$745
Voyetra	V4000	1	1 <sup>5</sup>	0	Y	N	N	N	N	\$179
	V4001	1	1 <sup>5</sup>	0	Y	N	Y	N	N	\$199
	V4001/CS <sup>6</sup>	1	1 <sup>5</sup>	0	Y	N	Y	N	N	\$239
<b>Serial Interfaces</b>										
KEE	MIDIATOR MS-101	1	1	0	N	N	N	N	N	\$119.95
	MIDIATOR MS-103	1	3	0	N	N	N	N	N	\$179.95
	MIDIATOR MS-114	1	4	0	N	N	N	N	N	\$229.95
Passport	MIDI Transport <sup>7</sup>	1	3	0	N	N	N	Y	Y	\$459
<b>Parallel Interfaces</b>										
Eclipse	HRS-3000	3 <sup>8</sup>	3 <sup>8</sup>	0	N	N	N	N	N	\$269 <sup>9</sup>
<b>Micro Channel Interface</b>										
Roland	MPU-IMC	1	2	0	Y	N	Y	N	N	\$350

"Sound" refers to onboard sound synthesis capabilities (a metronome doesn't qualify). "MPU" refers to MPU-401 compatibility.

<sup>1</sup> SoundBlaster cannot use MIDI in and out simultaneously.

<sup>2</sup> CMS444-EXB expansion rack adds four MIDI ins, four outs, and LED monitor; \$279. Extra I/O not MPU-401-compatible.

<sup>3</sup> Can upgrade to 1-in, 4-out CMS-404 for \$39.

<sup>4</sup> The two MIDI outs are independent, providing 32 channels.

<sup>5</sup> With optional Quad Pack, four non-independent MIDI outputs provided.

<sup>6</sup> Supports pre-MIDI, 5-volt clock sync and converts to/from FSK and MIDI clock.

<sup>7</sup> Same model works with Atari ST and Amiga.

<sup>8</sup> HRS-300 must select one of three inputs, non-merging. Same signal sent to all three outputs.

<sup>9</sup> Price for package that includes interface, sequencing software, cables, and videotape.



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

— Jay Graydon.

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

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

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

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

And now your work can be stored and retrieved instantly on 3.5 inch floppies with the Alesis Data Disk. It's a direct MIDI to disk, 800K capacity, universal data storage medium for the MMT-8 and virtually any other MIDI hardware — like Alesis drum machines and programmable effects processors.



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## ● COMPUTER MUSICIAN

### BUILT-IN SOUND AND PREPACKAGED SYSTEMS

Several manufacturers make cards that incorporate interfaces with onboard synthesizers, which are well-suited for

educational applications. Game software can also take advantage of this type of device for generating sound effects and music that are synchronized with the onscreen action.

### IRQs: NINETY PERCENT OF THE PROBLEM

**I**f you're having a problem installing an interface card in your PC, your MIDI interface and some other card may both be trying to use the same *interrupt request line*, or IRQ.

IRQs are a way for parts of your PC (such as a MIDI interface) to tell the CPU to stop what it's doing and take care of something that can't wait (such as reading incoming MIDI messages). This request is made by toggling the state of a pin on the expansion bus. If two cards are trying to toggle the same pin, the CPU may lock up. MPU-401 interfaces normally

are shipped using IRQ2.

Other plug-in devices also may be set to IRQ2, and some Leading Edge and Tandy 1000s use IRQ2 for disk control or other functions. If the offending card cannot be removed to have its IRQ number changed, you'll have to change the IRQ settings on the MIDI interface. Most newer interfaces have user-selectable IRQs, but your software must be able to use the alternate IRQ or it won't recognize the presence of the interface. Many new programs offer user-selectable IRQs, but older programs and shareware may not have this ability.

Some systems of this type, such as the IBM PC Music Feature card (which includes an onboard Yamaha FB-01 synth), are not MPU-compatible. Roland's LAPC card (reviewed in the July 1990 **EM**), on the other hand, combines an MPU interface with a Roland MT-32 synth. In some cases, the MIDI implementation of game-oriented boards may be limited, so read the fine print.

Most MIDI interfaces include some type of tape sync capability as part of their design. However, in nearly every case, the signals that they put on tape are incompatible with each other (with the exception of the four different frame rates of SMPTE).

### WHO'S DRIVING THIS THING ANYWAY?

To transmit and receive MIDI messages, a special software program called a *device driver* is used. The application program communicates with the driver program, rather than with the interface itself. Typically, a device driver is designed into each application program,





and drivers are incompatible from program to program.

To achieve the blissful state of *device independence*, in which the user selects software and hardware without concern for compatibility, a system-wide driver must be written to support a number of interfaces, and programmers must agree to support the protocols used by that driver. Such a driver can also be designed to manage access from several programs simultaneously in a multitasking environment, such as Microsoft Windows 3.0.

Playroom Software is close to releasing its *MIDI Executive* program, a driver for several popular interfaces that can also manage more than one interface and application simultaneously. Playroom is encouraging other soft-

ware vendors to support *MIDI Executive*, but *MIDI Executive* requires the Windows environment, and most current PC users are still using DOS without Windows. Also, it is almost certain that Microsoft will offer some sort of MIDI support in future versions. Although Microsoft's offering may be less sophisticated than Playroom's, there is a possibility that the two will compete for developer support. A solution like Playroom's could be a real step forward for MIDI on the IBM PC. (For a more in-depth look at *MIDI Executive*, see "Musical Multitasking" in the April 1990 EM.)

In summary, let your software needs drive your hardware purchase. If you aren't sure of your future needs, an MPU-401-compatible interface is a safe choice. If you are put-

ting together a system primarily to run one package, ask the software vendor for a recommendation.

#### MANUFACTURERS OF IBM PC MIDI INTERFACES

- ▼ Brown-Wagh Publishing; tel. (408) 395-3838.
- ▼ Computer Music Supply; tel. (800) 322-MIDI or (714) 594-5051.
- ▼ Eclipse; tel. (800) 456-6434 or (214) 238-9944.
- ▼ Kee Electronic Enterprises; tel. (800) KEE-MIDI, ext. 10, or (817) 560-1912.
- ▼ Mix Bookshelf (IBM PC Music Feature); tel. (800) 233-9604 or (415) 653-3307.
- ▼ Music Quest; tel. (800) 876-1376 or (214) 881-7408.
- ▼ Optronics Technologies; tel. (503) 488-5040.
- ▼ Passport Designs; tel. (415) 726-0280.
- ▼ RolandCorp US; tel. (213) 685-5141.
- ▼ Voyetra; tel. (800) 233-9377 or (914) 738-4500.

**David (Rudy) Trobitt** would consider a MIDI brain implant if it were MPU-401-compatible.

*Let your  
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As Serious As You Can Get.

# Studio, Sweet Studio

*Putting together or maintaining a MIDI-based home studio requires knowledge of the necessary elements and a systems-oriented approach.*

A

refuge . . . a state of mind . . . a home for musical thought and feeling, where every element works together seamlessly to create music. That's what every studio is hoped to be. To satisfy the needs of the musical artist within the bounds of available resources is the goal of every studio designer. When the facility in question is a personal-use MIDI studio there are as many ways to reach that goal as there are people.

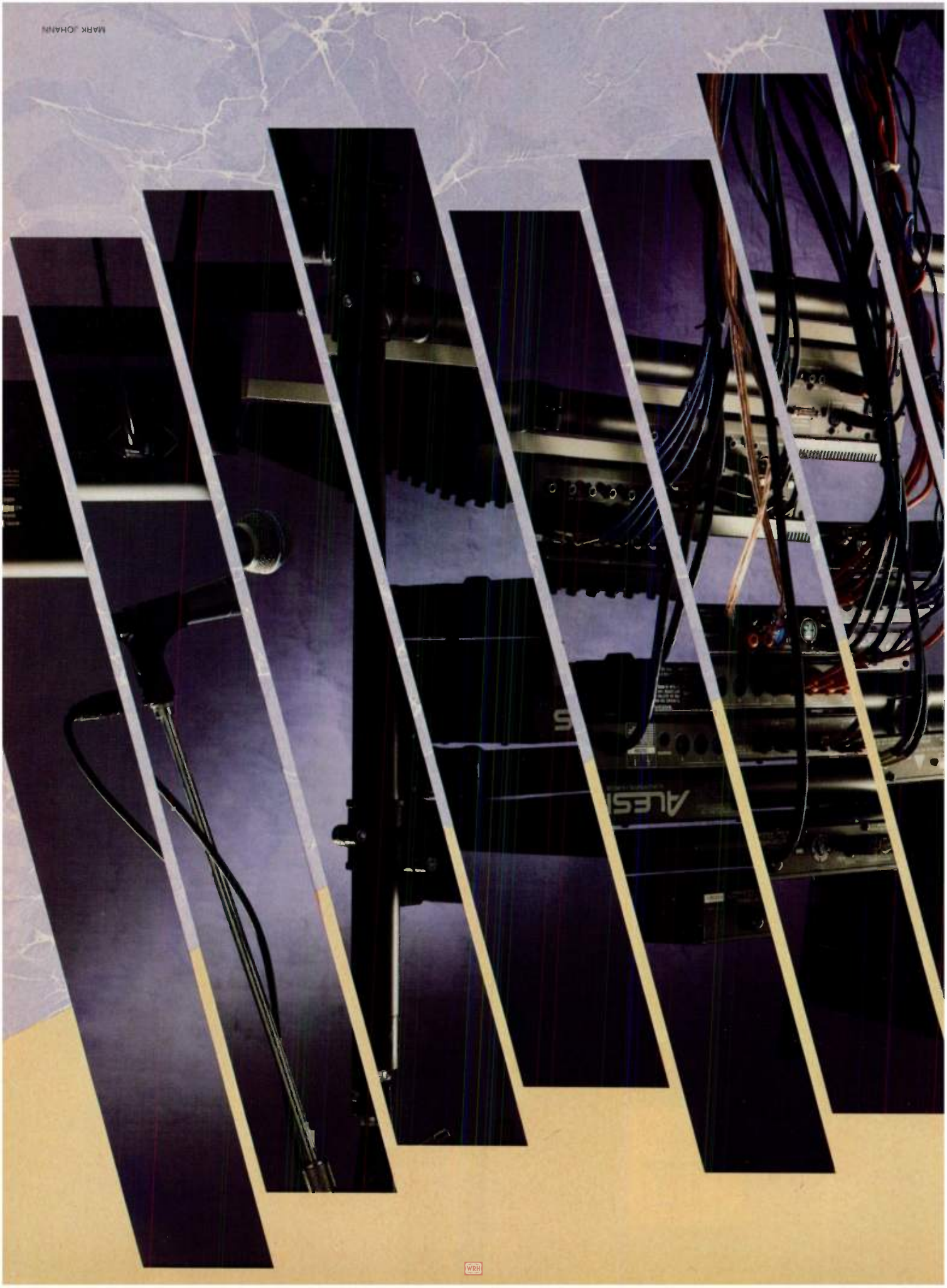
What goes into putting together a MIDI studio from scratch? How should one go about upgrading an existing setup? Can the desired system be put together without selling all your worldly possessions? What combinations of equipment are the most useful? For the beginner, these questions can seem overwhelming. Even seasoned MIDI vets can be bewildered by the myriad possibilities that modern music technology can provide.

Whether it's your first time, or your fiftieth, there are a few basic questions that need to be asked when considering plans for a MIDI-based studio. When you have the answers to these, you will be in a good position to plan your dream system.

*By Jeff Rona, Bob O'Donnell, and Gary Hall*









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## ● HOME MIDI STUDIOS

1. *What is the intent of the studio or system, and what is the end product to be?* The reasons for owning a personal music facility range from pure private pleasure, to full-time professional production. The purpose and intended output of the system will do much to define a reasonable budget and the choice of equipment.

2. *What are your musical needs?* Are you a self-contained composer? Do you regularly play with others? Do you sing or play non-MIDI instruments? Do you play hard rock, new age, fusion, or hip-hop? Also, do you expect to perform outside with your system, or will it remain at home?

3. *Is some, or all, of the equipment already onhand?* You may be faced with cobbling a system together from various pieces of equipment that you, or others, already own. If you own a personal computer, for example, much of your planning will be defined by the computer you already have.

4. *How much space is available?* In home situations, space is usually somewhat constrained, and a great deal of creativity can be expended in getting the desired system together in such a way that it can be used effectively without inducing claustrophobia.

5. *Realistically, how much are you ready to spend?* Do you intend to buy most of your equipment in one swoop, or do you expect your facility to grow one piece at a time? By establishing your budget range and the expectations of what your money will buy, you will focus your planning and avoid needless frustration.

6. *Finally, just how much of a project do you want this to be?* How does your studio fit in with your life? Are you turned on by MIDI systems of doom, with racks and racks of gear and patch cords by the dozen, or are you looking for something simple and clean—a spot to sit down and play at the end of a day, without much of a thought for mixers, MIDI channels, and software?

### CHARACTERISTICS OF MIDI STUDIOS (OR HOW TO KNOW ONE WHEN YOU SEE IT)

All studio systems have three, often forgotten, things in common that do not relate directly to the equipment used.

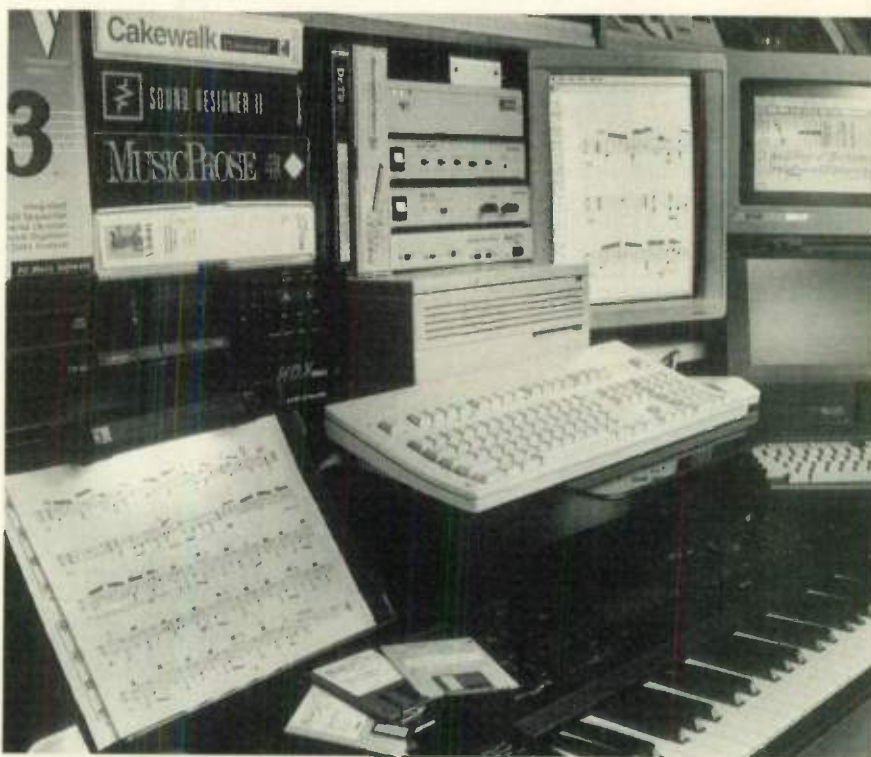
1. *They have to be somewhere.* Sometimes the space that is available will define the nature of a system, and some-

times the reverse is true. It is always a wise idea to plan for future growth. Unless you get into ingenious swing-away arrangements, the minimum space required is that needed to sit and play at a keyboard instrument, or to stand by a 19-inch-wide rack and play your axe. At the other end, if you play with groups of people and/or you're putting together a major multitrack recording rig, you'll need a decent amount of floor space.

2. *They require AC power.* Even the rock-bottom minimum system needs

two outlets, and power cables seeking outlets seem to proliferate like mad when systems grow. Take some time to consider your needs. You will want to consider simple surge protectors (mandatory), more elaborate (and expensive) line conditioners, or even uninterruptible power supplies. For an excellent discussion of AC power for the home studio, see "Getting Wired—A Power Primer" in the April 1990 *EM*.

3. *They need furniture for the gear to sit on.* This point is universally true, yet so little pondered. There's nothing worse



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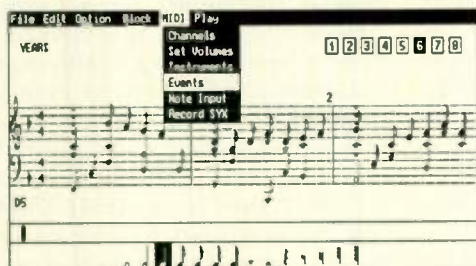
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## • HOME MIDI STUDIOS

than having a disorganized mess of gear that discourages, rather than encourages, your creativity (see "Studio Ergonomics" in the May 1990 *EM*). The key ingredient to a well-designed studio layout is access to everything from a single place, so you can play, sequence, mix, and record without needing to leave your chair.

## BLOWIN' THAT SOUND AROUND

Whatever instruments, recorders, or other sound-making gear you end up getting, you're going to need the means to amplify and reproduce those gorgeous rippling waves of sound. Naturally, you'll want a *mongo* system to do it justice (am I right?). Depending on your needs and budget, you might:

- Stick to headphones (not recommended).
- Use your home stereo. Works great if you don't play loud.
- Get a dedicated monitoring system tailored to your particular needs. If you are doing serious recording, near-field monitors are the way to go in most home facilities (see "Choosing and Using Near-Field Monitors" in the November 1989 *EM*). If you're jamming and/or gigging at all, get an amp and speakers with enough power-handling capacity to survive the decibel wars (and for good measure, use some ear plugs so you can survive them).

## PUTTING THE FUN BACK IN FUNDAMENTALS

Enough of this fraud and trickery, let's make some noise! If your needs are not especially elaborate, you may find that a "workstation" suits your needs well. These wonderful machines combine a keyboard synthesizer, drum sounds, sequencer, and effects processing in a compact and cost-effective package. Because everything is integrated in one package, you don't have to worry about hooking it up. The current workstations are responsive, yet powerful music production systems that can match quality and function with much more elaborate and expensive systems of individual products.

Instruments which fit into this category include Roland's D-20, Ensoniq's new SQ-1, and Yamaha's SY55 on the lower end of the price spectrum (list prices of \$1,595 or under), and Korg's M1, T1, T2, and T3, Yamaha's SY77, Peavey's DPM-3, Roland's W-30, and Ensoniq's VFX<sup>SD</sup> and EPS on the higher



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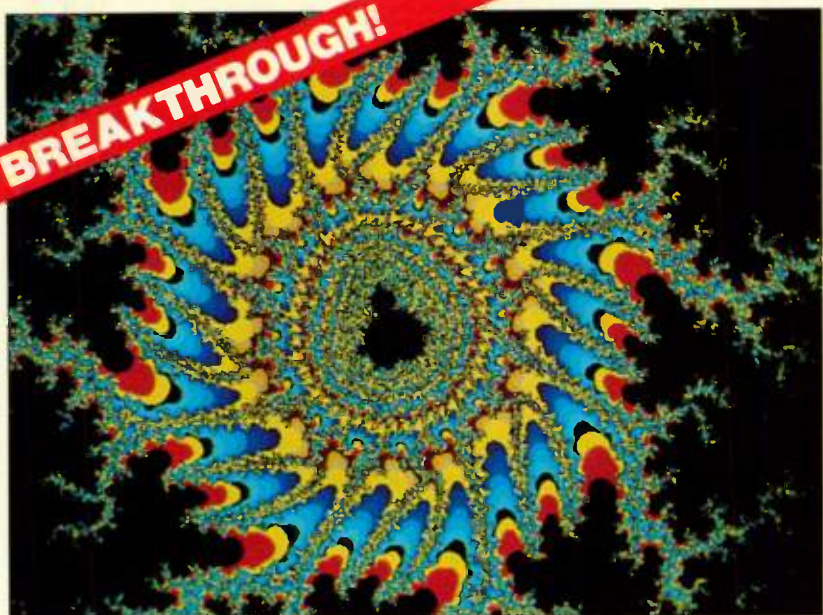
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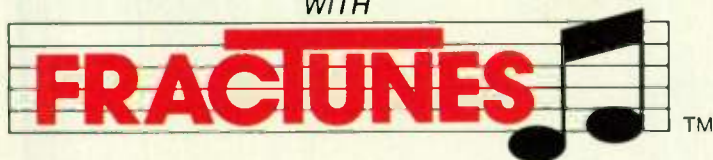
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## ● HOME MIDI STUDIOS

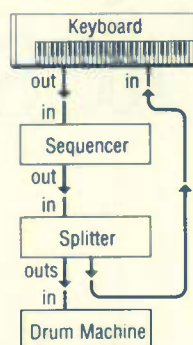


Figure 1a

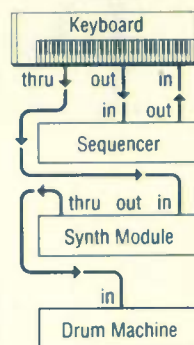


Figure 1b

**FIG. 1:** (a) You can use a MIDI splitter or thru box in a basic MIDI system to route the MIDI output from one device to several others; (b) alternatively, you can simply use the MIDI thru jacks provided on most MIDI instruments.

end (list prices of \$1,999 and up).

Great as they may be, workstations do have trade-offs. For instance, the sequencers on many workstations don't have the note capacity, or many of the editing functions, found in dedicated sequencers or computer sequencing programs, and the signal processing options also are more limited than can be achieved with external effects. Newer instruments offer a wider varieties of sound, but even in the best case, every instrument has a distinctive sound character. Ultimately, relying on a single instrument for all your sounds will limit your sonic palette. If you want a diversity in sound, you may want to have a few different instruments, each based on a different synthesis or sampling technology.

## ELABORATIONS

Once you get past the “one-instrument-out-through-the-speakers” level, the possibilities proliferate, and your budget for patch cords, power strips, and other “glue” items will increase dramatically.

The sound-making, sound-capturing, and sound-manipulating elements that make up a home studio vary wildly, depending on the applications you have in mind. Ideally, you should know your interests and the goal you'd like to achieve with your studio before you start putting it together (remember the serious six). Realistically, these will evolve as you become more familiar with the technology and its possibilities.



**Controllers and instruments.** Most people start out with a keyboard synthesizer or perhaps a sampler. These instruments actually perform two functions: They serve as an "input device" on which to play and they generate sound. In larger systems, these functions are often separate. Starting out, you should consider whether a dedicated controller, without onboard sound generating capability, meets your needs. If you play percussion, guitar, or wind instruments, the controller you want may or may not be available with built-in sounds.

Synthesizers and samplers abound these days in nearly every price range. Important features that separate one instrument from another include: polyphony, or how many notes an instrument can play at once; multitimbrality, or how many

different parts it can play at once (i.e., a strings patch, an icy electric piano, and an organ sound); and programmability, or how easily it can be used to create new sounds. Sound quality is a highly subjective judgment, but less expensive instruments are often noisier and of poorer fidelity than more expensive instruments. Two final considerations include versatility, or how wide a variety of sounds its sound generation method is capable of producing, and MIDI implementation.

Needless to say, the reviews in **EM** (and other magazines) are an excellent source of information relevant to choosing your instruments. It's a

good idea to spend time talking to other musicians, as well, to find out what the current reputations of var-

ious companies and products are.

If you don't need the latest technology, second-hand equipment can be a tremendous bargain. An astute eye can sometimes pick up quite serviceable gear at literally a fraction of the original cost, or that of a current equivalent.

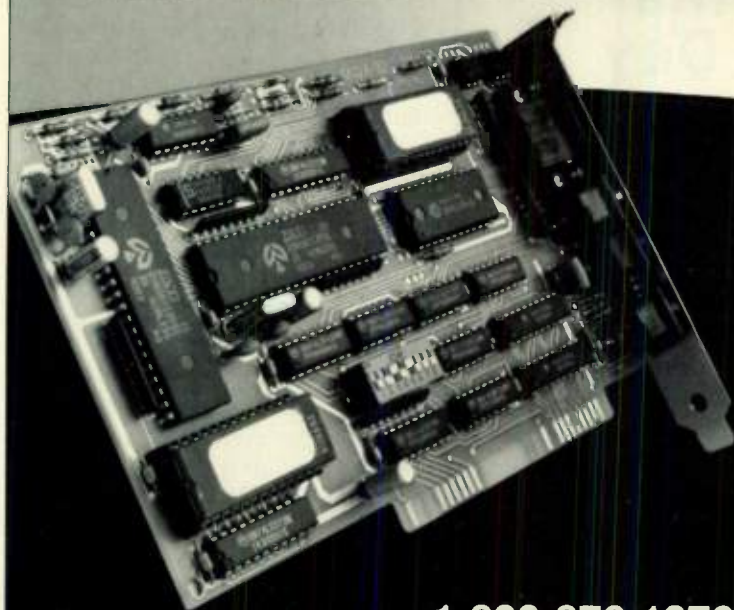
## SOUND INVESTMENTS

**Mixing console.** Now that you are looking at multiple audio sources, it's time to start thinking about the next key piece of the sound system: the mixing console. Your exact needs will depend as much on your recording system (discussed later) as it does on your monitoring needs, but you must have enough input channels to support all of your instruments, as well as effects sends and returns, tape returns, etc. Mixer channels are an expensive commodity, even with the most cost-effective new designs. Very often, smaller line mixers can be used to supplement limited input channels.

**Signal processing.** Consider your signal processing needs at this point. It's probable that you'll have one or more

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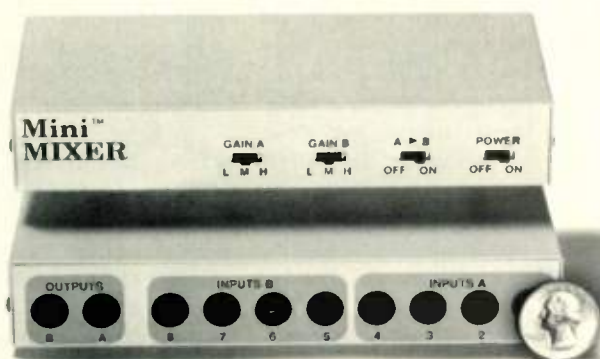
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### ● HOME MIDI STUDIOS

of those great digital multi-effects machines that are so prevalent today, and you just might tend to overlook the needs for such utilitarian and creative devices as compressor/limiters and equalization. If your recording activity includes any acoustic or electric (as opposed to electronic) instruments, it is highly recommended that you get at least one good dynamics processor.

**Microphones.** Speaking of acoustic instruments, don't forget to budget for microphones. MIDI musicians sometimes forget that instrumental material often serves as a foundation for a vocal. To a high degree, your selection of microphones will determine the quality of sound that you can achieve

### THE COMPUTER: THE SOFT MACHINE

Although not necessary for all systems, a computer forms the core of many home MIDI studios (see "The New Computers: Platforms for the '90s" in the April 1990 **EM**). A computer can be a versatile workhorse, providing a number of music, and non-music, functions. With the right software, a computer is a musician's second-best friend.

If you do not already own the computer you intend to use, you have a decision ahead. The most popular choices are IBM PCs and compatibles, the Apple Macintosh, Atari ST, and Commodore Amiga. Price will be a factor, but you should also think about other tasks for which you intend to use the computer. Another important consideration is the selection of software available to run on your computer (though many popular programs now run on several different computer platforms, i.e., Mac and IBM). An old piece of advice, and one that still has merit, is to find the software you want to run, and then buy the computer that runs it. A wide variety of sequencing programs, the most popular MIDI application, are available for the IBM, Mac, ST, and Amiga computers from a number of companies.

With the exception of the Atari ST, any computer you choose will need to a MIDI interface to link it to the rest of your equipment. These range from very simple "dumb" interfaces, up to highly intelligent instruments that read and write SMPTE time code and can route, filter, and merge multiple inputs and outputs.



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## • HOME MIDI STUDIOS

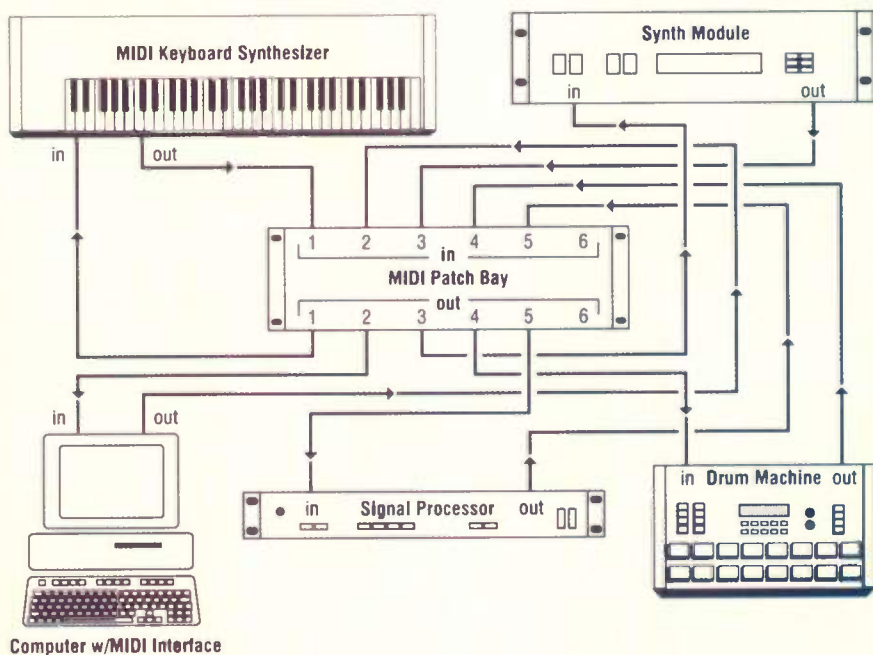


FIG. 2: A MIDI patch bay greatly eases reconfigurations of MIDI systems by allowing you to connect the input and output of every device once and then reroute the data as needed.

### GETTING THE SOUND DOWN

You'll almost certainly want a way to record your musical efforts. For many home artists, a sequencer serves as the primary means of creating music. If this is to be the case in your studio, choose your hardware sequencer or sequencing software carefully, because you'll probably spend a lot of time with it.

The use of sequencers has changed the role of multitrack recorders, but even if your system is completely MIDI-based, and you won't be recording acoustic parts, a 2-track tape machine for your final mix is essential. You can use anything from a decent portable cassette machine to a reel-to-reel deck or a high fidelity Digital Audio Tape (DAT) recorder.

If you sing or play an acoustic or electro-acoustic instrument such as guitar, bass, piano, drums, etc., you will want some kind of multitrack tape recorder. These are available in a huge range of prices (\$500 and up) and configurations, from 4-, 6-, and 8-track cassette to 8-, 12-, 16-, or 24-track reel-to-reel recorders. Many of the available multitrack cassette machines have mixers built into them, which can be very effective in a compact studio. Today, it is simple to synchronize a sequencer with your tape machine for greater versatility. By "locking" your sequencer to

an FSK or SMPTE track on your tape machine, you won't need to record the synthesizer or drum machine parts on the multitrack tape. Many sequencers, MIDI workstations, and computer MIDI interfaces provide some means of sequencer synchronization. If they do not, you will need to add a tape synchronizer to your shopping list. Working with "virtual tracks" (sequencer-driven synth parts) locked to multitrack will increase your need for mixer input channels. It may seem incongruous to have a 40-input console tied to a 4- or 8-track deck, but it makes perfect sense in context.

### JUMPING IN

Once you know what instruments will be in your studio, and you have them arranged in the approximate physical configuration in which they will be used, you'll be anxious to plug it all in and get busy. Slow down. Deciding what to connect to what and making the proper connections isn't always as easy as it first appears.

Unless you chose the option of a single workstation with a sound system, you probably have a sizable array of AC power connections, audio inputs and outputs, and MIDI jacks to connect. Getting the most out of your array of gear depends on getting all of these to-



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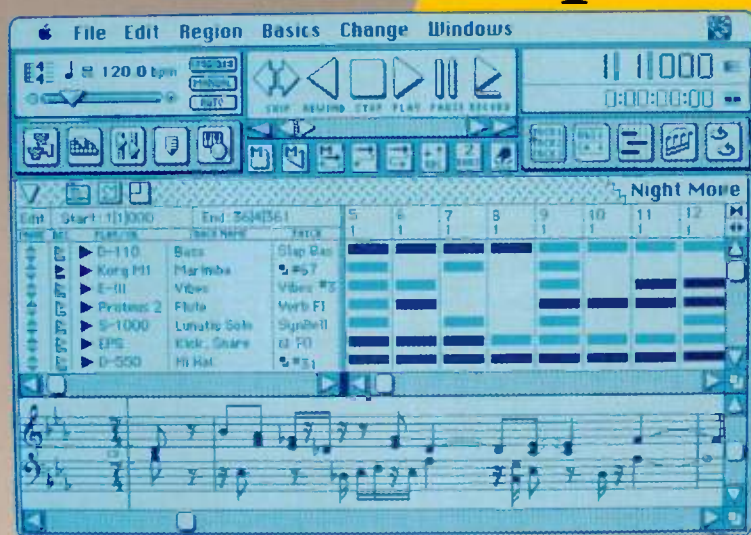
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## ● HOME MIDI STUDIOS

gether in a way that ensures proper performance and offers flexibility, without getting in the way.

In every studio, there are three major systems of wiring: AC power, audio, and control signals (MIDI). You'll need cables, and perhaps splitters and other routing devices, for each of these systems. Start by taking stock of all the inputs and outputs you have in each category. Then sit down and work out a reasonable way to deal with each wiring system.

**AC Wiring.** As mentioned before, you will have to determine if you have enough outlets (where you need them) and adequate power to meet your needs. If not, go to the hardware store or electrical supply house and get multi-outlet power strips and wall-mounted distribution boxes to meet your needs. Take the time to lay out the strips in appropriate locations, and plug in all of the AC plugs and power supplies you have. Tie groups of cables together where feasible, using removable ties. (Always use removable ties. It's likely that you will change things periodically.)

**Audio Cabling.** Count up the individual sound generating outputs and the number of input jacks. Note the connector type in each case. Then sit down, preferably with paper, and work out a routing of signals appropriate to the equipment and your needs. Count up the cables of each type, and measure the distances involved.

If you are combining synths and samplers with so-called "semi-pro" equipment, you may have a lot of 1/4-inch phone jacks connecting to RCA jacks. You can deal with these by buying RCA cables (buy good quality cables) and RCA-to-phone plug adaptors. From your list of connections and lengths, you can create a complete shopping list for cables and adaptors.

If your system has a multitrack, 2-track, mixer, effects, and a number of synths, you may well want an audio patch bay. These rack-mount devices consist of several rows and columns of female jacks, usually in standard 1/4-inch phone plug format, that let you send a signal from any point in your studio to anywhere else by simply plugging a small patch cord from a source jack to a destination jack. However, patch bays can get expensive. For many people, a judicious combination of

"normal" connections with a smaller patch bay is a good arrangement.

### CONFIGURING MIDI

For many newcomers to MIDI, cabling is an area fraught with confusion. There are a large number of ways to connect the MIDI instruments in your studio together to form a system.

For beginners, let's start with the basic configuration of a keyboard, sequencer, and drum machine (see Fig. 1a).

MIDI output from the keyboard goes directly into the sequencer's MIDI in. The output of the sequencer goes to a MIDI splitter, or "thru box," which sends the signal both to the drum machine and back to the master keyboard (in order to play back anything you play on the keyboard). You can do away with the splitter altogether and add a synth module to the system by using the MIDI thru of the keyboard and connecting it to the in of the module and then routing its thru to the in of the drum machine (see Fig. 1b). A splitter or MIDI patch bay is recommended, however, because it gives you the most reliable MIDI signal and allows for easier

expansion in the future (you are planning to upgrade your studio soon, aren't you?). When you do decide to add other synth modules, you can simply continue to connect the MIDI output of the splitter to the MIDI ins of each new unit.

Beware of possible MIDI feedback loops. When an instrument receives the same MIDI messages it sends out, it tries to play the same notes twice. If the instrument is set to echo incoming MIDI messages, a feedback loop is created, and the sequencer will be jammed with data, causing hangups and other weird anomalies. To avoid this common problem, you need to turn local control (and MIDI echo) off on your synthesizer, which disconnects the keyboard from the sound-generating portion of the instrument, but still allows the keyboard to send MIDI data via its MIDI out jack when you play it, and turn on the MIDI echo or thru option on your sequencer, which takes incoming MIDI data and sends it back out the sequencer's (or computer MIDI interface's) MIDI out port. You'll be able to hear what you play, and avoid a potential feedback loop.

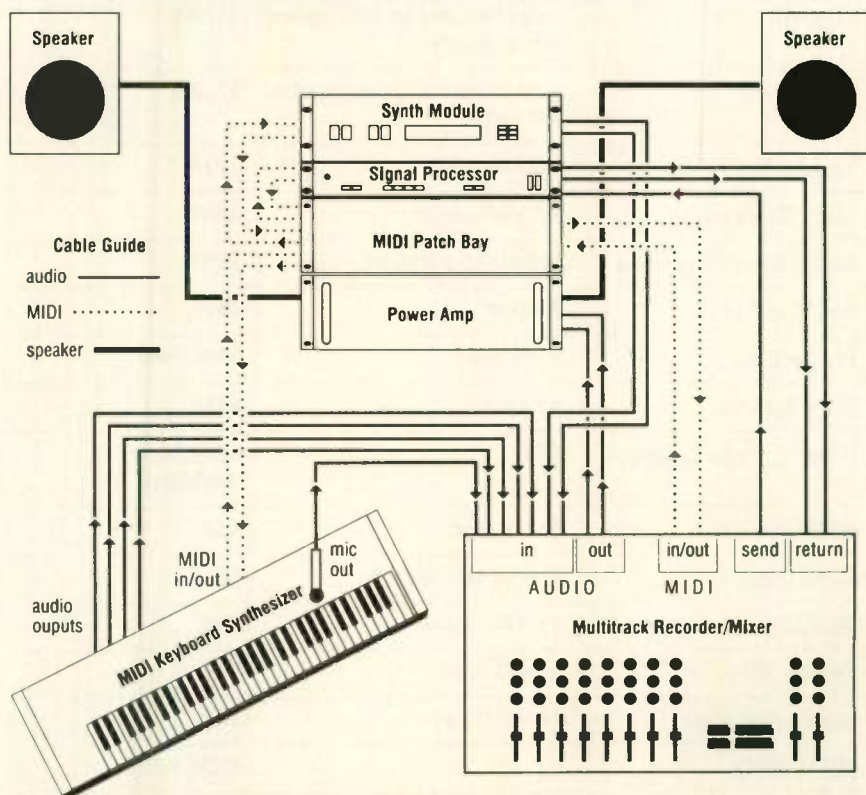


FIG. 3: A diagram of the home studio shown on the cover, displaying all the proper audio and MIDI connections.

## ● HOME MIDI STUDIOS

### PATCHING IT UP

If the number of instruments and other MIDI devices in your studio starts growing larger and you start needing to change your studio's MIDI setup more frequently, it's time to consider a MIDI patch bay. Like an audio patch bay, a MIDI patch bay will keep you from needing to reach around and unplug and replug the cables in your studio every time you wish to change from a sequencing or live performance configuration to a patch- or sample-editing session with a computer. You create and store settings in the patch bay, which route MIDI ins to MIDI outs of the various instruments and devices in your studio (see Fig. 2). More sophisticated patch bays can merge the MIDI data from two or more sources, a feature which comes in handy in many situations, such as working with patch editor software or playing multiple MIDI controllers into a sequencer at once. Some patch bays also include MIDI processors that let you transform, convert, scale, transpose, filter, chan-

nelize, and delay MIDI messages. In most cases, you can get by quite well without these things, but they're invaluable on the occasions you do need them.

### SETTING YOUR SIGHTS

As good and informative as talking in general concepts about putting together a MIDI-based home studio may be, ain't nothin' like the real thing. To tie everything together, we've diagrammed the home studio setup pictured on the cover of the magazine, including all the necessary wiring, in Fig. 3. We've also included a small chart containing brief descriptions and the list prices of the various components. Please bear in mind that real-world, "street" prices are often as much as 25-30% less.

Except for a computer and MIDI interface (which would probably be the first component to add), and a cassette deck or other 2-track recorder, this studio is about as complete and well-organized as you could want it to be. It's got all the necessary ingredients to make lot of music. As it stands, the stu-

dio is based around the Korg M1 while sequencing, and the Tascam 644 during recording. All audio is routed through the mixer built into the 644 and all MIDI is routed through the Digital Music Corp. MX-8. The Alesis MIDIVerb III is patched into the system via the effects send/return bus of the 644. The Yamaha TG55 is controlled via the MIDI output of the M1. Tape synchronization is handled by the 644, which can convert the MIDI song position pointer messages generated by the M1's sequencer into a sync code that it automatically records on track 4. The Shure Beta 58 allows you to record vocals, or any other acoustic sounds, onto the 644, and the QSC amp and JBL speakers allow you to hear the results of your work. Finally, the Ultimate Studio Organizer keeps everything in its proper, ergonomic place.

### CONCLUSIONS

Make your studio a *personal* facility. Select the equipment that will meet your needs without wiping out your bank account. A good MIDI studio can be expensive, but by starting small and slowly building it up, you can start creating music right away and continue to add capabilities along the way. On the other hand, most music stores are willing to grant significant discounts if your purchase a great deal of equipment from them all at once. Just check your cash flow. Remember that part of what you pay for when buying equipment is the expertise and support of the store from which you make your purchase. Sometimes the lowest price isn't always the best bargain. Don't be afraid to ask lots of questions before you purchase any new equipment, and be sure you feel good about the person from whom you are buying.

The equipment you buy today should be able to last a long time. Yes, new, less expensive, and more amazing instruments are right around the corner, but that will always be the case. Don't use that as a reason to delay getting your studio started. Have fun putting your studio together and never lose sight of its ultimate goal: helping you to make great music.

*Jeff Rona is the president of the MIDI Manufacturers' Association. Bob O'Donnell is the editor of EM. Gary Hall is an associate editor of EM.*

COMPONENT	DESCRIPTION	LIST PRICE
Korg M1	Keyboard workstation with built-in sequencer, drum sounds, and effects	\$1,999
Tascam 644	4-track cassette recorder/mixer with built-in MIDI tape sync	\$1,495
Yamaha TG55	Synthesizer module	\$995
Alesis MIDIVerb III	Multi-effects processor	\$349
Digital Music Corp. MX-8	MIDI patch bay/processor with merging	\$395
QSC Model 1100	Power amp	\$568
JBL Control 5	Monitor speakers	\$395/pair
Shure Beta 58	Microphone	\$258
Ultimate Studio Organizer	Stand	\$344.50 as configured
MIDI Cables	8 total @ \$8/cable	\$64
Audio Cables	11 total @ \$12/cable	\$132
Mic Cable	1 total @ \$25/cable	\$25
Speaker Wire	12 feet @ \$1/foot	\$12
Multi-outlet strips	2 total @ \$15/strip	\$30
<b>TOTAL PRICE</b>		<b>\$7,061.50</b>

A complete list of all the products shown in the home studio featured on the cover and diagrammed in Figure 3.



"The VFX<sup>SD</sup> has the best performance sequencer I have ever laid hands on—it is so intuitive it's like a MIDI mind probe!"

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Keyboardist, producer-Simple Minds,  
Pet Shop Boys, Jethro Tull, The Bee Gees

"Compared to other hardware sequencers, the SD's event-editing features are stunning. This is one of the most complete synth/sequencer systems we've ever seen."

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## The Dimensions of

# DELAY

From the whisper of a butterfly's wings beating in the air to the loudest crescendo of a symphony orchestra, all audio can be described by two parameters: amplitude and time. If you want proof, consider how phonograph records work. There's a groove that goes past the stylus at a certain rate, such as  $33\frac{1}{3}$  RPM (the time parameter). Meanwhile, the groove's width represents amplitude. The stylus converts amplitude changes over time into an electrical signal, and the result is audio. All the other terms we use to describe sound and music—pitch, timbre, rhythm, melody, form and so on—are just ways of describing different kinds of variation in amplitude and time.

We can perceive these changes of amplitude because, luckily for us, our ears are sensitive to how air moves. The tiny twitches of air molecules against our eardrums tell us about the location and nature of people and objects in our environment. More interestingly, they allow for communication in the form of music and speech.

Okay, so how do air particles doing the molecular Watusi give us all of this precise knowledge? A sound expresses its information as a particular pattern that is analyzed by our ear-brain combination. For example, a rise and fall in air pressure that occurs once is

a transient event that has no context and therefore doesn't convey anything to us by itself. If that same rise and fall repeats a few dozen to a few thousand times a second, we perceive it as a continuous tone. If this pattern of variations begins and ends within a second or two, we may call it a "note." If the event repeats regularly, we hear a pulse. A sequence of notes gives rise to rhythm. And following a note at one frequency by another note at a different frequency starts getting into the land of melody. Music is what happens when we combine these different levels of structure so that they click together into something coherent.

We are so predisposed toward recognizing musical patterns that a pattern followed by a similar (but not necessarily identical) pattern may not be perceived as two separate events. Instead, the second pattern may be heard as a repetition, or delayed version, of the original pattern. This may be because we constantly compare what we hear against what has come before it.

We deal with sound delays in day-to-day life in the form of acoustic echoes. These are so much a part of ordinary sound perception, that we seldom notice them, yet they form much of the basis of our ability to

When a plane is  
delayed, it's no fun.  
When an audio signal is  
delayed...well, that's  
where the fun begins.



BY GARY HALL



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### • DELAY

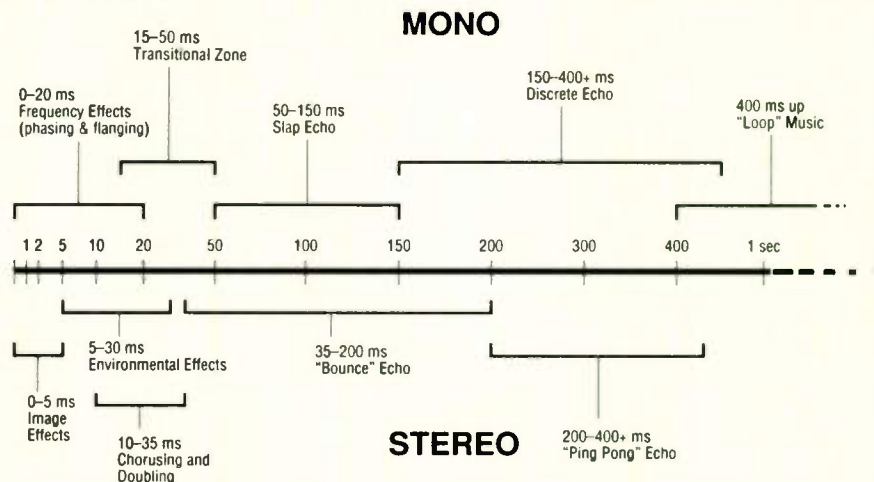


FIG. 1: The continuum of delay effects in mono and stereo.

locate and identify sounds in nature (see "An Ear for Processing" in the July 1990 EM).

The upshot of all this is that when we apply delay in recording and performance, we are toying with a basic human need and ability to find order in the world around us. We're also controlling amplitude and time at an extremely basic level. Whether creating audio illusions not possible in any real acoustic space, or trying to accurately simulate a specific acoustic environment, delay is one of the most powerful tools we have for playing with the listener's perception. Let's examine our various options in using delay.

### THE LEVELS OF DELAY

How time delay affects sound depends on the delay time itself, along with the amplitude and frequency content of the delayed signal compared to the original. The presence of any other delays, and any differences between the sounds that arrive at the left and right ears, are also of critical importance.

The sonic characteristics of different delay times are usually related to specific delay time ranges (e.g., "chorusing falls in the 10 to 35 ms range"). In reality, these are not as precisely defined as they are usually presented. In particular, at short delay times, the effect is vastly different for stereo than mono. With that caveat in mind, following are some typical effects correlated to approximate delay times. Fig. 1 illustrates the overlapping ranges of various delay effects.

**■ Image Effects (0 to 5 milliseconds, stereo):** Delay times of less than a couple of milliseconds primarily affect imaging, but only when the original signal predominates in one ear and the delayed signal predominates in the other. When heard over headphones, the sonic image tilts strongly to the ear receiving the non-delayed signal. (This happens because our auditory system uses the difference in path length from one ear to the other as a key cue in determining lateral direction of sound in nature. This effect was explored in

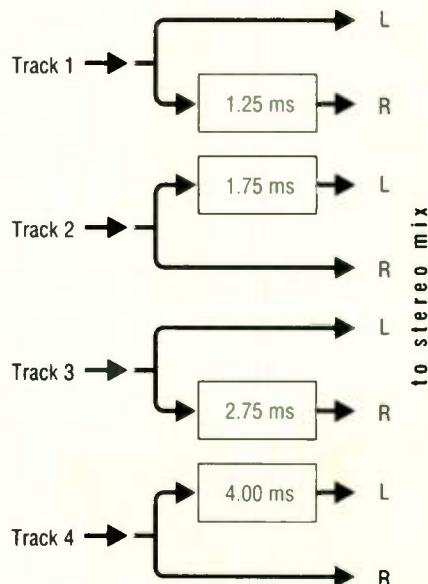


FIG. 2: Using delays to add imaging to a stereo mix. Note the use of different delays and alternation of which channel precedes the other.



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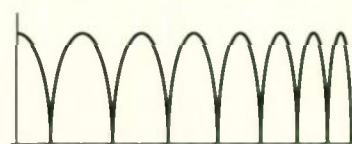
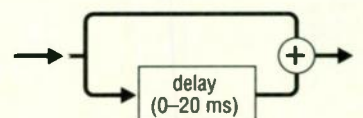
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## ● DELAY

some depth in the July article.)

Over loudspeakers, the effect is far less distinct, due to the blending of sound from each speaker with reflected sound from the listening environment. Generally, you'll hear a spread of the stereo image that changes as you turn your head or change position. Small time delays between channels can help build separations between tracks in a production; to embed imaging information in the tracks, use small delays of differing values for different tracks, and alternate which speaker channel receives the non-delayed signal (Fig. 2).

Be careful when applying this technique; effects that sound subtle over loudspeakers can be excessive when



frequency response

FIG. 3: Comb filter configuration and frequency response.

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monitored on headphones. Also, check that the mix works in mono. These small delays may cause phase cancellations (discussed later) when the left and right channels are mixed. When recording or mixing using short delays, regularly check the mix over headphones and in mono for unwanted side effects.

## ■ Frequency effects (0 to 20 milliseconds, mono):

The potential range of human hearing extends from 20 Hz to 20,000 Hz. The corresponding period of oscillations for this range is 50 milliseconds to 0.05 milliseconds. Delays in this range have dual identities, as they lie in the same range as the actual periodic oscillations of pitched sounds. These effects dominate in the range of 0 to 10 milliseconds (corresponding to frequencies of 100 Hz and up). Beyond that range, the perception of frequency changes overlaps with a sense of separation of independent events (more on this later).

*continued on page 70*



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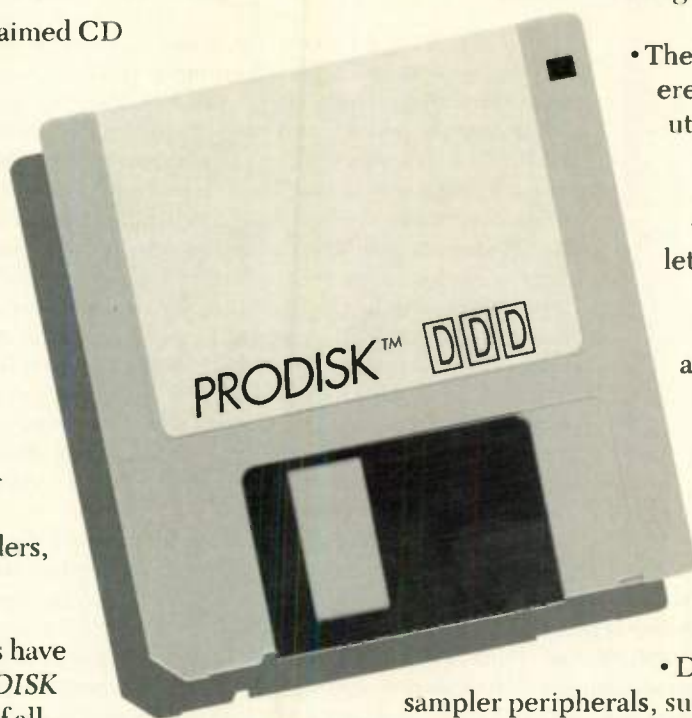
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# MUSIC EDUCATION SOFTWARE

By Lorenz Rychner

**T**HE COMBINATION OF music and computers certainly is nothing new. **EM** has reported on many applications of music software, including sequencing, sound programming and storage, MIDI data processing, and sample editing. But there is an often overlooked area where music and computers come together, and it doesn't necessarily involve MIDI: music education software.

Music education is something of a paradox in this country. Music classes and music budgets are way down on the list of priorities in most school systems, yet the nation's music product output per capita appears to be the highest in the world. Where, and how, do budding, "wannabe" musicians learn? One of the answers is the home computer. Many parents use their computers for MIDI work and wish to involve their children in music with the help of the computer. Some working musicians want to improve in such fundamental areas as theory and ear training. Undoubtedly, some **EM** readers also teach music to supplement their incomes. There is plenty of help in that area, too.

Upon opening this Pandora's box, it soon becomes obvious that "educational software" can be understood to mean any of three things: a teaching tool, a self-instruction tool, or a music-production package—sequencers, notation programs, etc.—marketed primarily to the education community. For the purposes of this Guide, I didn't consider the latter category. Many such programs can serve educational purposes, but those are adaptive uses rather than primary purposes.

The boundary between a teaching tool and a self-instruction tool becomes blurred in some cases, but overall, the vast majority of the programs are written for beginners, and the guidance of a teacher is essential. Most of the beginner's programs are intended for children, with a style of presentation that resembles computer games.

At the beginner's level, learning about music involves a lot of repetition, sometimes *ad nauseam*. Computers, with their game-like visual presentation, can help to break the tedium. Simple tones confirm the right or wrong input from the user, and scores are kept by many programs for further review by the student or teacher to monitor progress.

It comes as no surprise that the Apple II series of computers is well represented. Long ago, Apple made deep inroads into schools and education of all kinds (giving new meaning to the old saying about apples for the teacher). This is in stark contrast to the area of music productivity software where MIDI programs on the Apple II are an endangered (although not extinct) species.

Now that it's back-to-school time, you may want to think about using your computer to improve your musical skills, help you teach music, or stimulate your child's musical interests.





STUART WATSON



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## ● MUSIC EDUCATION

### SOFTWARE AND THE TEACHER

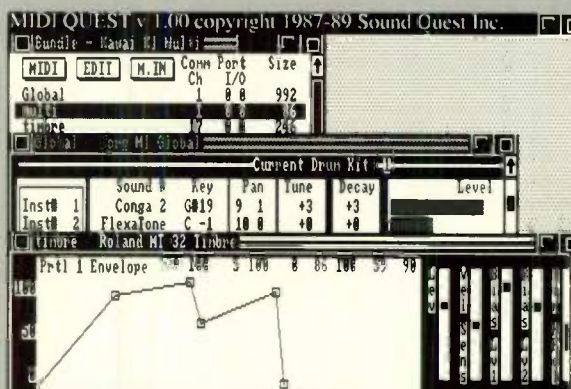
If you attended a contemporary music school, your curriculum would be carefully balanced to develop a variety of skills. Although some skills are best learned from a teacher, others can be acquired with computer-aided instruction. Some of the most effective educational software teaches ear training, which develops your ability to hear and identify pitches (relative pitch), intervals (the relationship between two pitches), chords, and scales. Music-reading skills—based on recognition of notes and rhythmic patterns—along with memory-enhancement and music theory knowledge, also can be improved with computerized drills.

Even beyond the beginner's level, a trained teacher can be assisted, but not replaced, by a microprocessor. At every level, much of the software is designed as a teaching tool or supplement. For instance, if your keyboard technique is rudimentary at best, you may be able to improve with help from the computer. If you're serious about studying technique problems beyond simple fingerings, personal instruction is of inestimable value. Similarly, software publishers provide some aids to improvisation, but improvisation includes a large subjective element, which demands a human guide. Harmonic structures can often be analyzed several ways, depending on how you hear and interpret the chord progression, and while a theory program might show you several alternatives, it can only answer the questions it is programmed to handle. Finally, a teacher can help you establish a comprehensive course of instruction that takes advantage of written material, listening to recorded music, personal instruction, and computerized educational tools.

### READING THE CHART

How should you read the chart accompanying this article? Because owners of one type of computer might not be interested in programs that only run on other systems, the computer-related information is next to the product names. Look down the column headed by your computer type and stop at any entry in the column. To the left, you'll see the program's name and the publisher or distributor. In the Computer column, you'll find the system requirements and the recommended retail price. By looking across the remaining

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## • MUSIC EDUCATION

columns, you'll get summary information about the program. Some programs require a keyboard, some give you the option of using MIDI, and others don't use MIDI at all.

**Focus** indicates the educational purpose of the programs. In some cases this simply restates what is obvious from the program's name. This column reflects entirely the information given by the publishers. "Chords" points to programs that emphasize the knowledge of chords as the correct combination of notes. For example, the screen shows a chord in notation, and the student uses the computer's keyboard to type a number reflecting the correct selection from a screen menu of solutions. "General" is a grab-bag for programs that either deal with something (defined by the program's name) that are not in an easily defined category, or deal with more than one category.

In ear-training programs that stress intervals, the computer generates two consecutive tones, and the student

types what he or she thinks the interval is. There are differences in the way the computer deals with wrong answers: Some programs allow for several tries before proceeding to the next exercise, while others simply move on and reflect the mistake in the grade posted at the end of the exercise. Note-recognition programs introduce and identify notes on the screen, usually on a beginner's level. Reading programs encourage accurate hand-to-eye coordination for playing notes recognized on the screen. Rhythm reading involves pattern recognition and, in some instances, the tapping of rhythms to screen prompts. The tuning program is specialized; the computer generates pitches that are slightly out of tune, and the student has to use the computer keyboard to adjust the tuning to a correct level.

Most programs involve sound of one kind or another. The sound-generating capabilities of the computers and their built-in speakers are limited, so the programs with MIDI can enhance the in-

## SOURCES OF EDUCATIONAL SOFTWARE

**Alfred Publishing Co., Inc.**, 16380 Roscoe Blvd., PO Box 10003, Van Nuys, CA 91410-0003; tel. (818) 891-5999.

**Ars Nova**, PO Box 637, Kirkland, WA 98083; tel. (800) 445-4866 or (206) 889-0927.

**Baudville**, 5380 52nd St. SE, Grand Rapids, MI 49508-9765; tel. (616) 698-0888.

**Britannica Software**, 345 4th St., San Francisco, CA 94107; tel. (800) 572-2272 or (415) 597-5555.

**Coda Music Software**, 1401 East 79th St., Minneapolis, MN 55425; tel. (612) 854-1288.

**Computers and ME, Ltd.**, 10 Ashbrook Rd., Exeter, NH 03833; tel. (603) 772-8850.

**Conduit**, PO Box 388, Iowa City, IA 52242; tel. (319) 335-4100.

**CTM Development**, 1013 South Claremont St. Suite #1, San Mateo, CA 94402; tel. (415) 573-8945.

**EduSoft**, PO Box 2560, Berkeley, CA 94702; tel. (800) EDU-SOFT or (415) 548-2304.

**Electronic Courseware Systems, Inc. (ECS)**, 1210 Lancaster Dr., Champaign, IL 61821; tel. (217) 359-7099.

**Ibis Software**, 90 New Montgomery St., Suite 820, San Francisco, CA 94105; tel. (415) 546-1917.

**Maestro Music**, 2403 San Mateo NE, Suite P-12, Albuquerque, NM 87110; tel. (505) 881-9181.

**MECC**, 3490 Lexington Ave. N., St. Paul, MN 55126; tel. (800) 228-3504 or (612) 481-3500 ext 527.

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

**Mix Bookshelf (distributor)**, 6400 Hollis St. #12, Emeryville, CA 94608; tel. (800) 233-9604 or (415) 653-3307.

**Notable Software**, PO Box 1166, Dept. EM, Philadelphia, PA 19105; tel. (215) 736-8355.

**Pygraphics**, PO Box 639, Grapevine, TX 76051; tel. (817) 481-7536.

**Thinkware (distributor of Take Note)**, 130 9th St., #303, San Francisco, CA 94103; tel. (800) 369-6191 or (415) 255-2091.

**University of Delaware; Customer Services, Academic Computing and Instructional Technology**; Willard Education Bldg., Newark, DE 19716; tel. (312) 451-8162.



teraction and sound quality. The **Audio Source** column tells you if the sound comes from the computer's internal speaker, or from a MIDI instrument that needs to be connected to headphones or some means of amplification. Some programs support MIDI as an option, or use it for input but not for sound-production. The **MIDI Instrument** column indicates whether or not MIDI is used in the program.

Many of the programs listed use copy protection. In the case of programs running on IBM and compatibles, copy protection sometimes means that an installation procedure has to be followed where DOS needs to be copied onto the purchased program disk. This is less than friendly, especially on single-drive systems.

Many programs generate grades so students and teachers can evaluate achievement. In some cases, the grades are only displayed onscreen, but often they can be saved to disk, and some programs can provide printouts.

#### OTHER STUFF

The chart is by no means complete or exhaustive. The original listing exceeded 80 titles, but due to space limitations, some types of software are not included. Alfred Publishing and ECS in particular, have a significant number of programs not listed here.

For instance, keyboard technique programs (available from ECS, who has a huge line of music-education software) mostly involve fingerings, where the student types in suggested fingerings for a sequence of notes displayed on the screen. Memory-training programs (ECS), require the student to retain and correctly reproduce a series of notes flashed before them. Alfred Publishing's *Basic Band Computer Tutor* program, produces a musical background for the band student. It ties in with Alfred's *Basic Band Method* and works for all band instruments on a beginning level. Most of the titles not on the chart are beginner's programs, many of them designed for children.

If you can't find what you want on the chart, try the various publishers and distributors listed in the sidebar. (Mix Bookshelf, in particular, handles software from many different manufacturers, including ECS and Alfred Publishing, and can give you more details on many of the programs.)


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<ul style="list-style-type: none"> <li>• Big Noise Software</li> <li>• C-Lab</li> <li>• Coda</li> <li>• Anatek</li> <li>• Hybrid Arts</li> <li>• Intelligent Music</li> <li>• Opcode</li> <li>• Jim Miller</li> </ul>	<ul style="list-style-type: none"> <li>• Mark of the Unicorn</li> <li>• Music Quest</li> <li>• Dr.T's</li> <li>• Passport Designs</li> <li>• Sound Quest</li> <li>• Steinberg</li> <li>• Temporal Acuity</li> <li>• Thought Processors</li> </ul>	<ul style="list-style-type: none"> <li>• Twelve Tone</li> <li>• Voyetra</li> <li>• Musicator</li> <li>• LMP</li> <li>• Digidesign</li> <li>• ECS</li> <li>• and more!</li> </ul>
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# GUIDE TO MUSIC EDUCATION SOFTWARE

	Macintosh	Apple II	Atari ST	Commodore	IBM-compatible	Focus	Level	Audio Source	MIDI Instrument
Program (Publisher or Distributor)	Price Min. RAM	Price Disk Size	Price Min. RAM Monitor Type	Price Model	Price RAM/DOS Disk Size Interface Graphics Card		Child Beginner Intermediate Advanced Pro	Speaker MIDI	Required Optional No
<b>Alfred's Basic Piano Theory, Levels 1-5 (Alfred Publ. Co.)</b>	\$59.95 512K	\$49.95 3.5 & 5.25	\$49.95 520 C & M	\$49.95 C-64	\$49.95 DOS 2.2 3.5 & 5.25	Theory	Child Beginner Intermediate	Speaker	Optional
<b>Alfred's Basic Adult Piano Theory (Alfred Publishing Co.)</b>	\$59.95 512K	\$49.95 3.5 & 5.25	\$49.95 520 C & M	\$49.95 C-64	\$49.95 DOS 2.2 3.5 & 5.25	Theory	Beginner	Speaker	Optional
<b>Music Achievement Series (Alfred Publishing Co.)</b>	\$249.95 512K	\$199.95 3.5 & 5.25	\$199.95 520 C & M	\$199.95 C-64	\$199.95 DOS 2.2 3.5 & 5.25	Chords	Beginner to Advanced	Speaker	No
<b>Practical Theory, Vols. 1-3 (Alfred Publishing Co.)</b>	\$149.95 ea. \$399.95 set 512K	\$119.95 ea. \$299.95 set 3.5 & 5.25	\$119.95 ea. \$299.95 set 520 C & M	\$119.95 ea. \$299.95 set C-64	\$119.95 ea. \$299.95 set DOS 2.2 3.5 & 5.25	Theory	Beginner to Advanced	Speaker	Optional
<b>MIDI Jazz Improv. 1 &amp; 2 (ECS)</b>	\$99.95 ea. 1 MB	\$79.95 5.25	\$79.95 ea. 1040 C & M	n/a	\$79.95 512K/DOS 3.2 3.5 & 5.25 MPU/Music Feature CGA	General	Advanced	MIDI	Required
<b>Keyboard Jazz Harmonies—M (ECS)</b>	\$99.95 1 MB	\$79.95 5.25	\$79.95 1040 C & M	\$79.95 C-64	\$79.95 512K/DOS 3.2 3.5 & 5.25 MPU/Music Feature CGA	General	Advanced	MIDI	Required
<b>Keyboard Extended Jazz Harmonies—M (ECS)</b>	\$99.95 1 MB	\$79.95 5.25	\$79.95 1040 C & M	\$79.95 C-64	\$79.95 512K/DOS 3.2 3.5 & 5.25 MPU/Music Feature CGA	General	Advanced	MIDI	Required
<b>Functional Harmony, 4 disks (ECS)</b>	n/a	\$39.95 5.25	n/a	n/a	\$39.95 512K/DOS 3.2 3.5 & 5.25 MPU/Music Feature CGA	Chords	Advanced	Speaker	No
<b>Guitar Wizard (Baudville)</b>	\$34.95 128K	n/a	n/a	\$29.95 C-64	n/a	Identify notes, etc., on guitar fretboard	Beginner to Advanced	None	No
<b>Listen 2.1 (CTM)</b>	\$99 128K	n/a	n/a	n/a	n/a	Ear Training	Beginner to Pro	Speaker MIDI	Optional
<b>Perceive (Coda)</b>	\$99 512K	n/a	n/a	n/a	n/a	Ear Training	Beginner to Pro	Speaker MIDI	Optional
<b>Pyware Ear Trainer (Pygraphics)</b>	n/a	\$79 5.25 IIfx or 128K IIGS	n/a	n/a	n/a	Ear Training	Beginner to Pro	MIDI	Required
<b>Tuner (Conduit)</b>	n/a	\$40 5.25	n/a	n/a	n/a	Tuning	Beginner	Speaker	No
<b>Camus: Melodic Dictations (Conduit)</b>	n/a	\$40 5.25	n/a	n/a	n/a	Ear Training & Dictation	Intermediate to Advanced	Speaker	No
<b>Take Note (Thinkware)</b>	n/a	n/a	\$79.95 520 C & M	\$79.95 Amiga	n/a	Ear Training	Beginner to Pro	Speaker MIDI	Optional



	Macintosh	Apple II	Atari ST	Commodore	IBM-compatible	Focus	Level	Audio Source	MIDI Instrument
Program (Publisher or Distributor)	Price Min. RAM	Price Disk Size	Price Min. RAM Monitor Type	Price Model	Price RAM/DOS Disk Size Interface Graphics Card		Child Beginner Intermediate Advanced Pro	Speaker MIDI	Required Optional No
<b>Practica Musica (Ars Nova)</b>	\$125 1 MB	n/a	n/a	n/a	n/a	Ear Training	Beginner to Pro	Speaker MIDI	Optional
<b>Note Tresspassing (Notable)</b>	n/a	\$35 5.25	n/a	n/a	n/a	Note Recognition	Beginner to Intermediate	Speaker	No
<b>Musical Match-Up (Notable)</b>	n/a	\$35 5.25	n/a	n/a	n/a	Chords	Beginner to Intermediate	Speaker	No
<b>Play It By Ear (Ibis)</b>	n/a	n/a	n/a	n/a	\$99.95 512K/DOS 2.0 3.5 & 5.25 MPU/Ad Lib/Sound Blaster Hercules/VGA/CGA mouse	Ear Training	Beginner to Pro	Speaker MIDI	Optional
<b>Guido (U. of Delaware)</b>	n/a	n/a	n/a	n/a	\$95/lesson, 6/\$475 256K/DOS 2.0 3.5 & 5.25 MPU/Music Feature CGA 2 drives	Ear Training	Beginner to Advanced	MIDI	Required
<b>Music Theory (MECC)</b>	n/a	\$59 5.25	n/a	n/a	n/a	Theory	Beginner to Advanced	Speaker	No
<b>Note-Us, Part 1-3 (Computers and ME, Ltd.)</b>	n/a	\$129.95 5.25	n/a	\$129.95 C-64	n/a	Reading	Beginner to Advanced	MIDI	Required
<b>Maestroscope Music Theory Series, Level 1-4 (Maestro Music)</b>	n/a	\$150/level 5.25 \$165/level 3.5 (w/print)	n/a	n/a	n/a	Theory	Beginner to Advanced	Speaker	No
<b>Maestroscope Theory Readiness Series, Level A-C (Maestro Music)</b>	n/a	\$165/series 5.25 & 3.5	n/a	n/a	n/a	Theory	Child	Speaker	No
<b>Maestroscope Rhythm Drills (Maestro Music)</b>	n/a	\$45/5.25 \$55/3.5 (w/print)	n/a	n/a	n/a	Reading Rhythms	Beginner to Intermediate	Speaker	No
<b>Maestroscope Rhythm Reading (Maestro Music)</b>	n/a	\$85/5.25 \$95/3.5 (w/print)	n/a	n/a	n/a	Reading Rhythms	Intermediate to Advanced	Speaker	No
<b>Note Wizard (MIDImouse Music)</b>	n/a	n/a	\$69.95 520 C & M	n/a	n/a	Note Recognition	Beginner	MIDI	Optional (Req. for audio)
<b>Scale Master (MIDImouse Music)</b>	n/a	n/a	\$69.95 520 C & M	n/a	n/a	Scales	Beginner	MIDI	Optional (Req. for audio)
<b>Chord Magic (MIDImouse Music)</b>	n/a	n/a	\$69.95 520 C & M	n/a	n/a	Chords	Beginner	MIDI	Optional (Req. for audio)
<b>Rhythm Time (MIDImouse Music)</b>	n/a	n/a	\$69.95 520 C & M	n/a	n/a	Reading Rhythms	Beginner	MIDI	Optional (Req. for audio)
<b>Magic Piano EduSoft</b>	n/a	\$49.95 5.25	n/a	n/a	n/a	General	Child	Speaker	No
<b>Notable Santa Britannica Software</b>	n/a	\$9.95 5.25	n/a	n/a	\$9.95 128K/DOS 1.0 EGA, CGA, Hercules	Reading, Keyboard Drills	Child	Internal Computer	No

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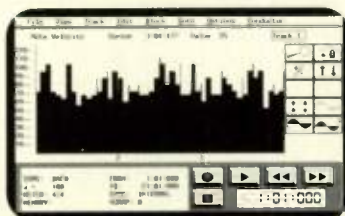
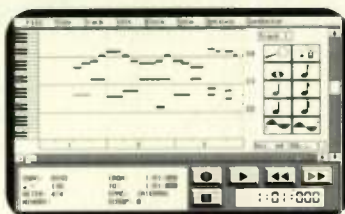
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## • MUSIC EDUCATION

### LEVELS OF PROFICIENCY

As is the case with many other types of educational materials, one of the most important variables is the level of proficiency at which each program is aimed. Is it necessary for a user to have some previous knowledge of music theory in order to benefit? Is the program written for self-study, or is it intended to be used in a teacher-student situation?

Since this article is not a product review, and there are far too many programs to attempt a thorough analysis (EM reviewed *Take Note* in the September 1989 issue and *Practica Musica* in the May 1990 issue), I have had to rely largely on information supplied by the publishers, particularly with regard to each program's style of presentation. This means that, in some cases, the information, especially that regarding the educational level of each program, is suspect. The coding system used here is not meant to be rigorous: One company's "Intermediate" may be ahead of another's "Advanced." Often an "Intermediate" designation comes about simply because the program is the second in a series in which the first is labeled "Beginner." The designation "Child" is used for programs that are aimed at an elementary school, or earlier, level.

The overwhelming majority of music education programs, no matter what their code on the chart, are at the beginner's level when compared to the skills of musicians with enough proficiency to play gigs and make a living from it. Many of these programs have been ported from the Apple II, and some—especially a number of the programs aimed at children—appear to be simplistic, so make sure you get a money-back guarantee or examine the program before you buy. There are some good ones out there, though, so don't give up. Whether you're a teacher, a music-hungry student, or a gigging musician who needs to strengthen his or her grasp of fundamentals, the appropriate educational software might help you to improve your musicianship.

**Lorenz Rytner** used to arrange and play keyboards in Switzerland and Australia. He was sane, then. Now he heads the synth department at L.A.'s Grove School Of Music.

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# Channel Output MODIFICATION

By Douglas N. Buchanan

This simple "mod" allows Emax sampler owners to remove any of the audio channels from the stereo mix outputs and, in effect, provides a separate stereo send. For example, you could add echo to piano, horns, and bass in the stereo mix and introduce gated reverb on the snare drum channel without the snare intruding on the stereo mix. The audio signal paths are not being modified so there's no need to worry about adding noise. The idea came from the SSM 2047 IC data sheet lurking in the murky depths of the *Emax Service Manual*. It's a mystery why E-mu didn't give the user simple access to this built-in feature of the sound output chips in the first place.

This mod works for both keyboard and rack-mount Emaxes. The Emax II replaces this section with digital processing, so the modification will not work with that product.

**Emax rack:** A half-height rack panel installed in the existing space in your equipment rack above your Emax is effective and potentially very attractive. Use a 19 x 7/8-inch plastic or metal strip for the rack-mount switch panel. Plexiglass or acrylic, 3/16-inch thick, is cheap or free (look for scrap pieces), and it's easy to work with.

**Emax keyboard:** For the keyboard version, you'll have to improvise a little bit. Find a small, low profile box for the switches (you can use an 8-position DIP switch instead to save space) and decide where to mount it. You can use Velcro to stick the box somewhere on the keyboard case. By using a 9-pin plug-and-socket combination, the switchbox can be removed easily. Anticipate what best suits your setup before you start building.

•  
Give  
your  
Emax  
control  
over  
the  
stereo  
mix  
content  
without  
adding  
noise.  
•

If you feel up to it, you can drill holes for switches directly into the Emax case (on the back panel, for example), or you can make one rectangular hole and flush-mount an 8-position DIP switch. *Important:* Locate the new hole positions from the *inside*. If you drill blindly from the outside, you might go through a circuit board.

## OPENING THE UNIT

Read through *all* instructions and unplug the Emax AC cord *before* you begin.

**Rack Emax:** With the Emax upside down, remove the ten screws from the perimeter of the bottom panel. Lift off the bottom panel *carefully*, so as not to strain the ribbon cable, and flip it over. Rest it on a thick telephone book (or something similar) to ensure there is no strain on the ribbon cable while you're working on the circuit board that is attached to that bottom panel.

**Keyboard Emax:** With the Emax upside down, remove the ten screws from the perimeter of the bottom panel. Set the panel aside.

## THE FOURTEEN STEPS

Any reference to IC numbers 30 to 37 indicates the SSM 2047 chips on the *analog* circuit board, *not* the similarly numbered ICs on the main CPU board. Be sure to refer to the schematic diagram when soldering.

1. Using your meter, adjust all of the trimpots to approximately 1,500 ohms between terminals 1 and 2.

2. Solder one end of ribbon conductor 1 to terminal 2 of R1.



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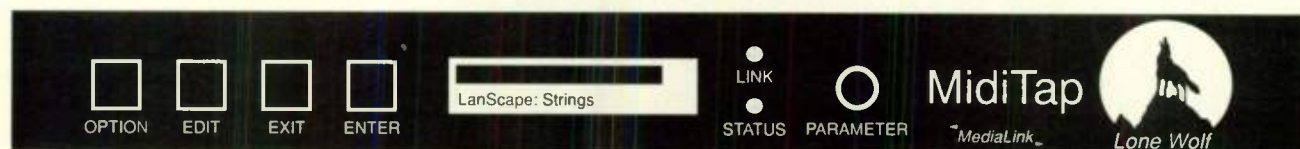
The MidiTap is a single-space, rack-mount unit which lets you name, access, filter, merge, connect and control every piece of MIDI gear in your studio...

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- Name, configure and control your studio in your terms
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## ● EMAX MOD

3. Solder one end of ribbon conductor 2 to terminal 2 of R2.

4. Repeat step 3 for the remaining trimpots.

5. Solder one end of ribbon conductor 9 to pin 18 of IC30 (the +10V source).

6. Connect a short (1-inch) piece of hookup wire between R1 terminal 1 and IC 30 pin 1.

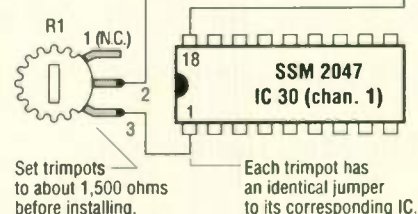
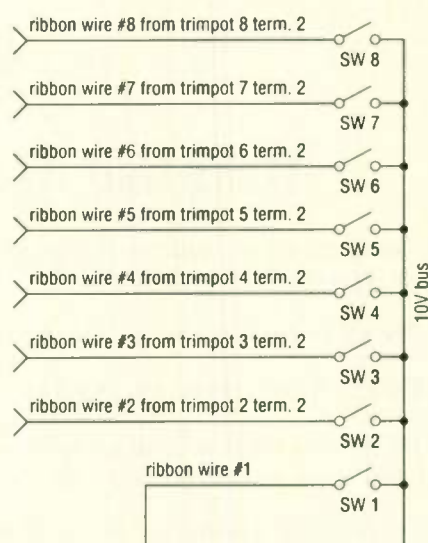
7. Repeat step 6 for each trimpot and corresponding IC (R2 to IC31, R3 to IC 32, etc.).

*Note:* The trimpots should be glued,

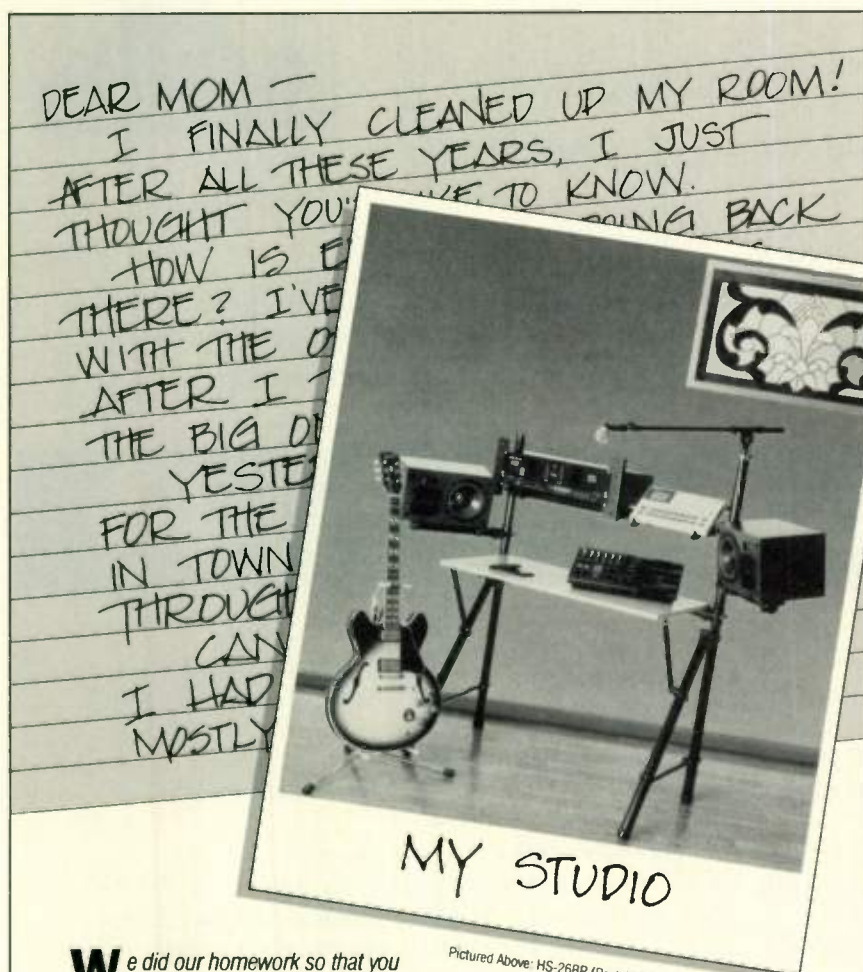
with 5-minute epoxy or silicone, onto the top of the SSM 2047s after they are adjusted. If you like, use some tape to hold them in place until final adjustments have been made, and you're ready to stick them down for good. Use a small amount of adhesive and don't drip any on the IC pins. Neatness counts!

8. Drill, file, and otherwise prepare your new rack panel, switchbox, or Emax case and then mount all the switches.

9a. *Emax rack:* Route the free end of



Schematic for Emax Modification



Pictured Above: HS-26BP (Rack Rails and Mic Adapter optional)

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**ULTIMATE**

the new ribbon cable through a vent slot in the top of the Emax case, near the front panel.

9b. *Emax keyboard:* Route the free end of the new ribbon cable through a vent slot in the bottom panel or through any other desired hole in the case.

As mentioned, if you want a really hip-looking mod, forget the external box for switches and mount the toggle or DIP switch(es) directly in the Emax.

10. Solder the free end of ribbon conductor #1 to one contact of switch #1.

11. Repeat step 10 for each of the remaining ribbon conductors and corresponding switches.

12. Join the remaining eight switch contacts together with hookup wire and connect ribbon conductor #9 to any one of those common contacts. This common connection between all the switches is now the +10V bus.

13. Test it. Plug in and turn on the sampler. **Warning!** Keep your hands and tools away from the live power supply and other circuits.

Program eight sounds that are assigned to eight separate channels and listen only to the stereo mix. Plug your stereo headphones into the left/stereo output jack. (Yes, it was designed to drive headphones.) Play the channel 1



sound and toggle the channel 1 switch. You should hear the channel 1 sound cut in and out accordingly; if not, see "Troubleshooting." Play the channel 2 sound, toggle the channel 2 switch, and listen again. Repeat the test for each sound/channel and corresponding switch.

**14a. Emax rack:** Once you have the modified unit working, unplug the AC cord, do a final inspection, secure the new wiring, and carefully replace the bottom panel, avoiding strain on the original ribbon cable.

**14b. Emax keyboard:** When all is well, unplug the AC cord, do a final inspection, secure the new wiring, and then replace the bottom panel.

#### TROUBLESHOOTING

With the switches closed, measure the voltage at pin 1 of each IC. Pin 1 of each SSM 2047 IC (30 to 37) should "see" approximately +1.5 V when the switches are closed. Adjust the trimpots accordingly.

Pin 1 of the SSM 2047 chip is actually the Pan Control input. However, it was designed to shut off the stereo outputs when the correct voltage is applied (approximately +1.5 volts). If the applied voltage is not quite right, you might hear a faint audio signal panned to the left or right output when you engage

#### PARTS LIST

##### SWITCHES AND TRIMPOTS

- R1-8 5k trimpots (e.g., Radio Shack #271-217)  
Adjust these to about 1,500 ohms before installing them.
- SW1-8 SPST switches (e.g., Radio Shack #275-8062) or one 8PST DIP switch

##### OTHER PARTS

- 9-conductor ribbon cable (30" or more depending on your design choices)
- 22- or 24-gauge, insulated, solid, hookup wire (about 24 inches)
- 19" x 7/8" plastic or metal rack panel (rack Emax only)

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## ● EMAX MOD

CAVEAT  
CONSTRUCTOR

**T**his modification has been checked by the EM staff and by members of E-mu's service department and is believed to be complete and accurate. E-mu personnel observed that because of variations in the SSM 2047 ICs, there may be some leakage of "muted" channels into the main outputs.

It is assumed that the modification will be attempted only by a person experienced in soldering techniques and general electronic servicing. (Static discharge precautions are a very good idea.) It is also taken for granted that the installer will use heat-shrinkable tubing, cable ties, etc., where appropriate for cable strain relief, connection insulation, and a clean-looking, durable job. Finally, work carefully; it's *your* gear.

This modification is performed at your risk and will void your Emax warranty. Neither the author, *Electronic Musician*, nor E-mu are responsible for any resulting damage.

—EM Staff

your cutoff switch (assuming you are playing a sound on that channel of the Emax). With the switch closed, adjust the trimpot slightly to eliminate any audio signal in the left and right outputs.

If your switches still don't seem to function properly, it's time to check for all the embarrassing stuff: sound/channel programming mistakes, wiring mistakes, "cold" solder joints, solder "bridges," etc.

## SHARE AND ENJOY

Congratulations! You've added a spiffy new capability to your Emax sampler. By the way, if you somehow managed to do violence to any of the SSM 2047 chips, replacements are available from E-mu as part number IL 331. Call E-mu at (408) 438-1921 for current pricing.

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# Myth #2:

**"You don't need Perfect Pitch; all you need is good Relative Pitch."**

David L. Burge explains:

**W**hat you need is a *great ear*. To get it, we must consider *both* Perfect Pitch and Relative Pitch. Each is a *specific skill* which draws out and actualizes your own natural talents.

"Let's compare the two:

"Relative Pitch deals with *pitch relationships*. When tones are played together, they can create distinct patterns of sound: a *major* chord, a *minor* chord, an *augmented* chord, or more complex sounds like a *dominant thirteenth sharp five* chord.

"Relative Pitch is the ability to *recognize* these sound patterns by ear.

"Perfect Pitch, on the other hand, tells you the EXACT PITCHES you are hearing.

"Suppose I play this chord:



"By ear, Relative Pitch can tell you it is a *dominant seventh chord*.

"With Perfect Pitch, you'd hear that it's a *D dominant seventh* chord.

"Let's run that by again:

"The *overall sound* of the chord has a dominant seventh quality. Your Relative Pitch can tell you this.

"But *which* dominant seventh chord is it? *G* seven, *F#* seven, *E* seven? This is where your Perfect Pitch comes in.

"Perfect Pitch tells you the *exact* *pitches* you are hearing—D, F#, A, C.

"Of these four tones, your Perfect Pitch automatically locates 'D' as the

ROOT of the chord, which tells you it's *D* dominant seventh [D7].

"You now have a complete picture of the music you're listening to—all by ear alone.

"See how Perfect Pitch and Relative Pitch work together?

"Without Perfect Pitch, you'd only know the *kind* of chord, not the actual tones.

"Without Perfect Pitch or Relative Pitch—well, you'd be listening in the dark. And you'd be missing a ton of tonal information about the music you're hearing. Time for a complete ear tune-up!

"Tuning your ear is simple. It only takes about 15-20 minutes each day. And you can start easily from wherever you are right now. All you have to do is *listen*—no music reading is required.

"You know that music is a *hearing* art. So the more you can hear, the more *all* your skills will multiply. A tuned ear gives you an edge which cannot be matched by any other talent.

"Remember: Perfect Pitch and Relative Pitch are the *two fundamentals* of musical perception. Both are absolutely essential if you want the *complete* musical picture—with maximum success and enjoyment from your music."

To be continued . . .

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## Let's correct the myth:

Perfect Pitch and Relative Pitch are the two fundamentals of musical perception. To tap your full creative potential, you need *both*!

Combining the delayed signal with the original sound produces an effect on frequency content called *comb filtering* (Fig. 3). Frequencies whose periods relate harmonically to the delay time are alternately cancelled and reinforced, yielding a characteristic frequency response that, with its prominent peaks and notches, looks somewhat like a comb. Comb filtering is most pronounced with equal levels of direct and delayed signals.

■ **Moving combs:** Comb filters constantly occur in real life, as reflections of sound from nearby floors and walls blend with the direct sound. Generally the levels are not exactly matched, so notches in the frequency response are correspondingly less deep.

Another characteristic of acoustic comb filtering is that the response changes as the relative positions of the sound source, the listener, and the reflected surface change. If the relative change is fast, the changes in frequency response are accompanied by Doppler pitch-shifting caused by the relative motion of source and listener.

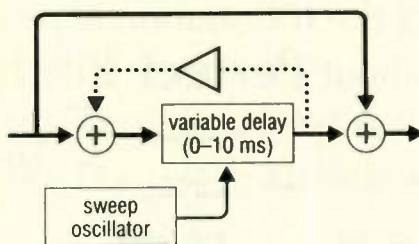


FIG. 4: Flange configuration. Feedback path may be used to add emphases.

Both of these phenomena are simulated (in exaggerated form) in flanging, which mixes the direct signal with a duplicate signal subject to a changing delay (Fig. 4). The factors that determine the depth and richness of a flanging effect are the mix of direct and delayed signal (equal mixes give more dramatic results), the range of the variation in delay time (usually expressed as a ratio; e.g., 10:1, 100:1, etc., with higher ratios giving a wider sweep range), and the presence of recirculation (regeneration) of the delayed signal. Different combinations of delays in the left and right channels can

add stereo imaging effects and enrich the shifting patterns of cancellation and reinforcement.

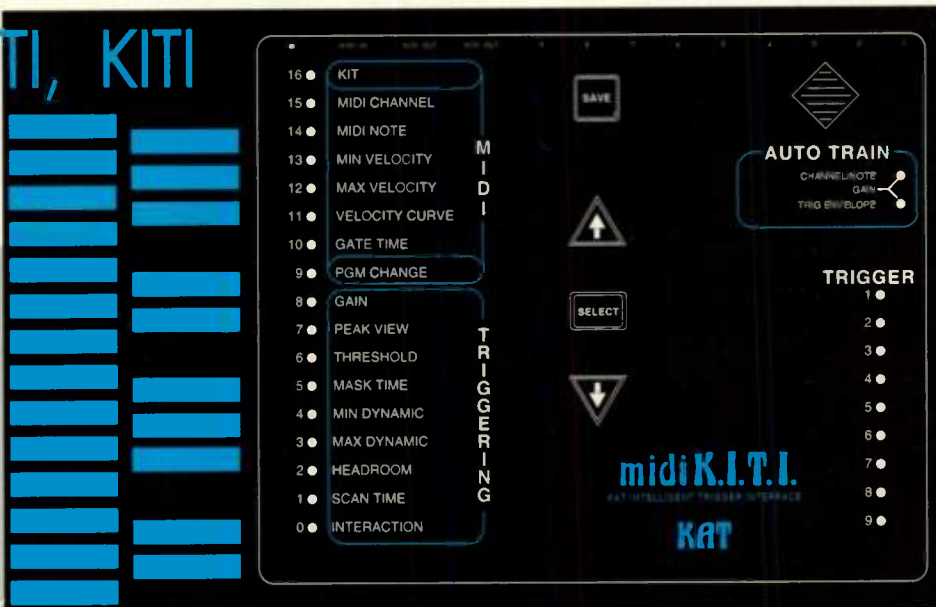
■ **Resonant combs:** Using recirculation with short delay times strongly emphasizes those frequencies at the delay period and their harmonics. Increasing the feedback gives this resonance a perceptible decay time; extreme amounts of feedback give a sharp, metallic ringing. Inserting filters into the feedback loops affects the timbre of this ringing, and adjusting delay time affects the pitch. This phenomenon can be taken so far as to be considered a means of synthesis in itself.

Some multi-effects units offer elaborate, multi-voice resonant comb programs (Fig. 5) that are quite versatile. Adding extreme combs to percussive sounds produces a sort of "space kalimba" effect. More subtly, try playing a sampled violin, piano, or guitar into a resonant section that has been tuned to simulate the formants and string resonances of the physical instrument. Used judiciously, this can help add realism and life to synthesized sounds.

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■ **Transitional delays (15 to 50 milliseconds):** In this delay range, image and frequency effects shade into effects that are more echo-like, and we can begin to hear transient events "smear" out as a result of the delay. If the source material has a lot of transient content, we may well hear the delay as a separate entity, rather than a composite sound. However, sources with slow attacks and decays usually mean that frequency filtering and imaging effects will predominate. This delay range corresponds to a frequency range of 20 Hz to 50 Hz, the lowest octave and a half of human hearing. Sounds in this range are on the borderline of being heard as tones or as repeating events.

■ **Environmental effects (2 milliseconds and up):** Delays can be perceived as reflections from immediate environmental surfaces, provided that they:

- ▼ are lower in level than the direct sounds;
- ▼ are heard interaurally (that is, they are given a different pan in stereo from the undelayed sound); and
- ▼ have less high frequency content than the direct sound.

If any of these conditions are violated, then our brains will tell us that something is unnatural. Used in music and recording, the effect of environmental reflections provides a combination of image and frequency effects.

■ **Pitch-bending effects:** Many common processing effects that occur at shorter delay times (chorusing and flanging in particular) involve delays which change over time. A smooth and continuous

change in delay results in a transient pitch change, referred to as Doppler pitch shift. Doppler shift is common in chorusing and doubling effects but is used infrequently with longer delays because even very slight timing shifts produce large, difficult-to-control pitch changes.

Shifting a comb filter's delay time varies the center frequencies of the notches and peaks, but also creates a subtle pitch shift component. Both of these factors contribute to the sense of motion characteristic of flanging.

■ **Separation effects (doubling and chorusing; 10 to 35 milliseconds):** Setting delay levels and pans so that environmental reflections are not suggested creates an effect of a separate, but equal, sound source. The principle behind doubling is that the ear will treat the delayed signal as another sound source because the two occur at different times. However, in practice, a simple delay is not enough to create a credible doubling effect; introducing small pitch shifts by altering the delay time will give a more realistic effect.

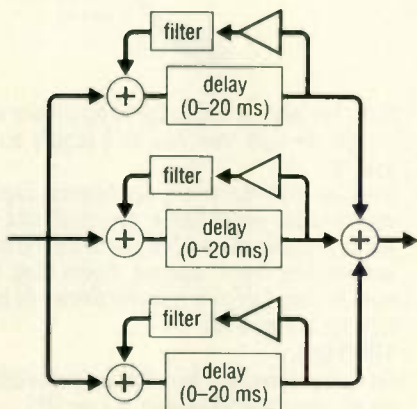


FIG. 5: A multi-voiced resonator program. All delays, feedback gains, and filter cut-off frequencies are independently variable.



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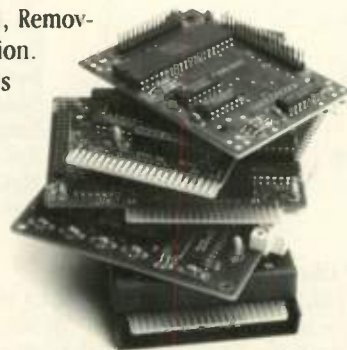
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SampleVision

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Master Tracks Jr.

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## • DELAY

Periodic shifts (i.e., LFO-induced) are less convincing than random shifts, but not if the random changes occur too quickly. Also, one of the traditional ways of generating random shifts—the sample-and-hold waveform—often changes too abruptly to be useable. It's better to use a smoothed sample-and-hold, which acts more like a triangle wave LFO whose speed varies randomly within a certain range.

Using a pitch shifter tuned at, or very near, unity creates a very convincing illusion of two independent sources if you pan the unshifted and shifted signals to opposite stereo channels. Many pitch shifters do not have a true unison, other than bypass. When the tuning is placed very close to unity, the result is a kind of random phase modulation.

Chorus, in theory, creates the sound of a large number of sound sources playing identical lines *en ensemble*. In reality, chorus is, or can be, a wonderful means of enriching a sound that simulates rather than duplicates the ensemble effect. The line between doubling and chorus is a blurry one, and sometimes it seems that any doubling setting that is a little too pronounced to be realistic is called "chorusing."

Fig. 6 shows a classic chorus sound used by a number of performers and recording engineers. The key ingredient is to modulate one or more pairs of delays in opposite directions from each other. This creates a rich sound that doesn't obscure the original pitch, because if one delay is slightly sharp the other will be slightly flat by an equivalent amount. Thus, the pitch shifts tend to cancel out, at least as far as your ear's ability to identify the pitch center is concerned.

■ **Slap echo (50 to 150 milliseconds, mono or stereo):** In this range, a sound's delayed repeat is pretty much distinct from the original. However, sounds with very slow attacks and decays will still tend to blend. (Such sounds often obscure many of the effects we are talking about, because the ear usually uses the sounds' initial transient to correlate the direct and delayed sounds.)

In mono, the effect is that of a fast stutter, or a repeat of the sound. Depending on the characteristics of the sound and the relationship between the levels, slap echo may also "fatten"

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## ● DELAY

the sound, or broaden the attack. In stereo, a "ricochet" effect occurs, which may cause listeners to jerk their attention from the undelayed to the delayed speaker. To accentuate this effect, put the delayed sound through a bandpass filter to cut the high and low end, feed the signal to reverberation and delay one channel of the reverb output (the one opposite the "dry" version of the delayed sound) by 50 to 100 ms.

■ **Discrete echo effects (150 to 400 milliseconds):** In this range (the "Echo-plex" zone) delayed sounds are clearly and fully distinct from the original and are heard as separate repetitions.

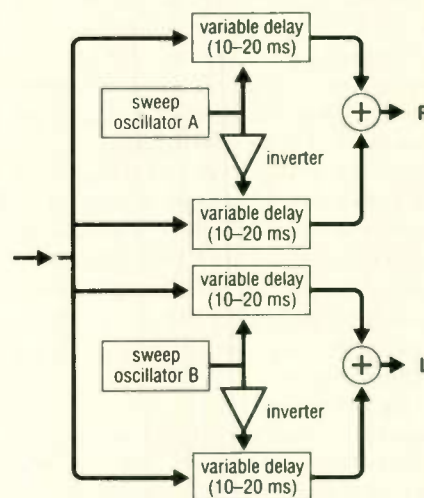
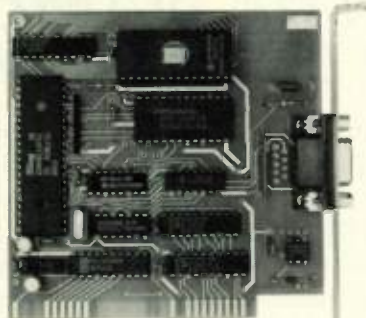


FIG. 6: A classic stereo chorus. Oscillators A and B run at slightly different rates.

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Breathes there a guitarist or vocalist who has not thrilled to hear the repeat, repeat, repeat, of their licks fading off into the air?

It is often important to select delay times that work rhythmically with the music (see "The Well-Tempered DDL" in the February 1986 *EM*). For some musical styles, it's best if delay times synchronize with the beat. The following equation gives the number of milliseconds in one beat for a given tempo in beats per minute:

$$\text{Delay in ms} = 60,000 \div \text{tempo in bpm.}$$

In other instances, you may want delays that specifically do not correspond to the beat. These tend to "cut across" the dominant beat and gain their power from their very lack of an



easily discernible relationship to the main beat.

It is easy to overuse echo, since it is a popular effect so use caution. Crowding too many repeating delays into a mix turns it into an indistinct wash. Controlling the signal going to the delay, either with effects sends at a mixing console or with footpedals, can regulate the amount of echo. This also lets you do tricks such as add echoes selectively (just to the tail ends of phrases, for example) by feeding only the signal you want echoed into the delay line. When you pull back on the input level, the echoes will continue but no subsequent sound will be echoed.

#### ■ Delay loops (400 milliseconds and up):

When delays become long enough to equal musical bars, phrases, and sections, we get into an area that some call "loop music," also popularized as "Frippertronics" by guitarist Robert Fripp (June 1987 *EM*). Other practitioners of loop music include such musicians as David Torn (July 1987 *EM*),

Brian Eno, Steve Tibbetts, Roger Miller, and Andy Summers. Loop music is virtually a subculture unto itself, and we can scarcely do justice to it in the context of a general article on delay. Look for a more complete exploration of this rich realm in an upcoming issue.

#### DON'T DELAY—USE DELAY!

Alas, we only have enough space to allude to a few of the effects that occur with delayed audio signals (and we haven't even touched on reverberation). The interaction of audio delays with human hearing is rich and subtle. The details of these relationships of level, frequency content, delay modulations, and stereo pan can radically affect the nature of the effects heard, and in many cases, sonic ambivalence is what gives an effect its strength.

As you experiment with delay, use your ears and your mind together. Think about what happens when you apply delays or any other kind of processing. Listen to how one effect works

with another. Consider the nature of the sounds themselves and the music in which you use them. No signal processing occurs in a vacuum; there is always a rich interaction of one sound against another. Use these interactions to your own advantage, and you'll achieve sounds that can leap out and grab the listener's attention.

#### REFERENCES

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Lubin, Tom. *Shaping Your Sound with Reverb and Delay*. Los Angeles: First Light Video Publishing, 1988.

*EM* associate editor **Gary Hall** designed the *Lexicon PCM42*. One of his hobbies is collecting Japanese, animated, ninja, rock-and-roll westerns on video.

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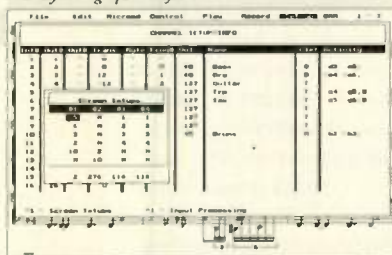
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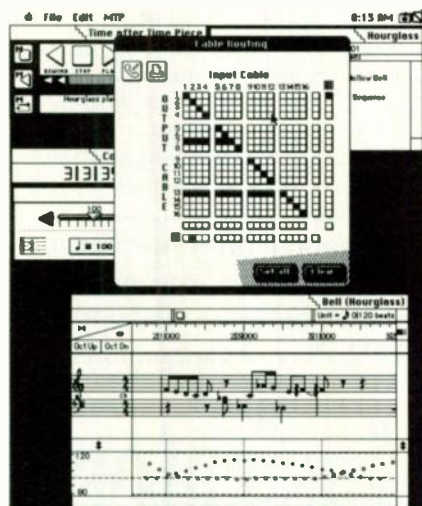


## First Takes

### Mark of the Unicorn MIDI Time Piece (\$495)

By Dan Phillips

*This month, we examine an integrated Mac interface/MIDI patch bay, an entry-level sequencer, and a universal editor/librarian.*



Desk accessory for the MIDI Time Piece.

It wasn't so long ago that I thought sixteen MIDI channels were all I'd ever need. After all, my original studio used only three. With the advent of multi-timbral synths, however, this margin of comfort has completely eroded. An Ensoniq VFX can use up to twelve MIDI channels at once, and when combined with a Kawai K1, a Roland MT-32, and a Yamaha TX81Z—hardly an elite rig—it's quite possible to require more channels than the 16 or 32 available with standard Macintosh interfaces and software. To overcome this problem, you either have to cripple your equipment by limiting the number of chan-

nels they'll receive (if the synths allow this), or you'll have to constantly reconfigure your studio, perhaps aided by yet another device, a MIDI patch bay. Mark of the Unicorn is now offering a third alternative, in the form of their new MIDI Time Piece (MTP) and Version 3.42 of *Performer*, their power sequencing program.

The MTP provides an integrated SMPTE generator/synchronizer and an 8-in/8-out Macintosh MIDI interface and patch bay in a single rack-space box. With sixteen channels for each of eight separate cables, discrete control of 128 MIDI channels is possible. For truly demanding applications, the user can network up to four MTPs, two per serial port, for an incredible 512 channels. At present, only *Performer 3.42*, a free upgrade to owners of Version 3.0, has the software provisions to deal with the MTP's extended capabilities.

A special Fast mode, for use with the MTP, allows the program to transmit MIDI data at the full speed of its serial ports, which is between two and four times the MIDI bandwidth. The logjam potential, even with a mere (!) 128 channels, is pretty high, and this option does help. MIDI channels/cables now may be named in *Performer*, so that instead of specifying cable 1, channel 7, you can simply select "EmaxII track 7" from a user-definable menu. Also new to the program is the option of editing MIDI note data in standard musical notation, along with the familiar graphic and event-list displays.

Almost all MTP functions are controlled via a Macintosh desk accessory, supplied with the unit, that can function by itself, with *Performer 3.42*, or with third-party software. The DA's Cable Routing function controls the MIDI patch bay to direct any of the possible

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

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

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

**the EM rating system**



sixteen inputs per serial port to any of the outputs on that port, as well as allowing more limited communication between MTPs on different ports. The Event Muting screen enables filtering of a number of data types to be set separately for each MIDI channel of each input and output cable. Pretty fancy. Similarly, the Channel Mapping window controls rechannelization of each MIDI channel for each cable, input, or output. All three of these screens feature an easy-to-use graphic matrix interface. Although the MTP can only hold a single configuration at a time, the settings may be stored as Macintosh files by the DA.

The SMPTE/MIDI sync section is thorough but straightforward. Time code may be read and generated in all four frame rates, starting at any point in the 24-hour SMPTE range, controlled and monitored from the Macintosh. A software volume control, offering five different output levels for striping, is a refined touch. SMPTE received at the audio input is automatically regenerated, allowing the restoration of degraded time code. Incoming SMPTE may be converted to either MIDI time code (for use with third-party programs) or Mark of the Unicorn's Enhanced Direct Time Lock, which uses less bandwidth than MIDI Time Code. Once the time code has been converted to a MIDI format, it may be sent to any or all of the output cables in addition to the Macintosh, allowing synching of external sequencers (*Performer* also can transmit song position pointer).

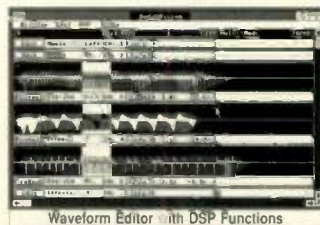
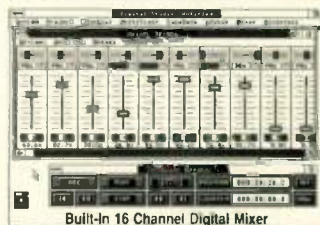
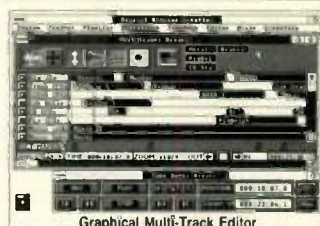
Mark of the Unicorn's advertising for the MTP pushes the potential of the single unit's 128 discrete MIDI channels, and I was curious to see how many of those channels could actually be used simultaneously. With a Mac IIfx, using Fast mode, two channels of sixteenth notes, at 120 bpm, on each of the eight cables (sixteen channels total) was enough to induce very slight rhythmic inaccuracies. In a more acid test, transmitting 96 channels of simultaneous note-ons at any tempo resulted in severe timing problems. This is probably due to the processor speed more than the interface (although 16 MHz isn't exactly slow), and normal use probably will rarely require more than sixteen tracks of 16th notes. If you can't use them all at once, though,

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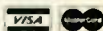
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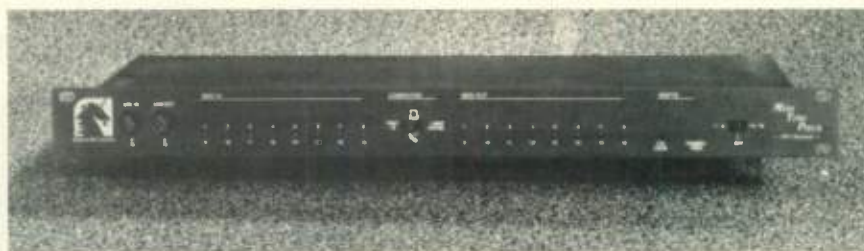
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## ● FIRST TAKES

what good are those 128 channels?

Well, instead of thinking of them as a tool to realize Wagnerian orchestral scores, perhaps they should be looked at as an extension of the patch bay capabilities. By using *Performer 3.42* to assign cables and channels, the user can maintain a consistent sequencing environment, with each channel of each device assigned to a unique MIDI address. No more hunting through external patch bays for the correct setup (let's see, M1 on modem port channels 3 and 4, D-50 on printer channel 14...). Instead, it's all there on the Mac, with every instrument always available. Until real, audio-oriented IANs become affordable, this technique seems quite attractive.

It would appear that Mark of the Unicorn is banking on the appearance of successively more powerful Macintoshes. This is the same bet that Apple has made with various memory and power hungry systems and applications and, to date, it has proven to be a good one.



Mark of the Unicorn MIDI Time Piece.

The only real problem with the MTP is that, for the time being, no software other than *Performer* can access the individual cables or use the fast communication mode (though other manufacturers are planning to support it). This means that, when working with a librarian, it may be necessary not only to load a different patch bay configuration to route the MIDI properly, but also to physically switch the MTP into slow mode. Until more software supports the MTP, the former is unavoidable, but I feel that it's more inconvenient than necessary to have to actually walk

over to a rack and flip a hardware switch before sending a bank of programs or a sample dump. According to the manufacturer, a software switch accessible through the DA wasn't possible.

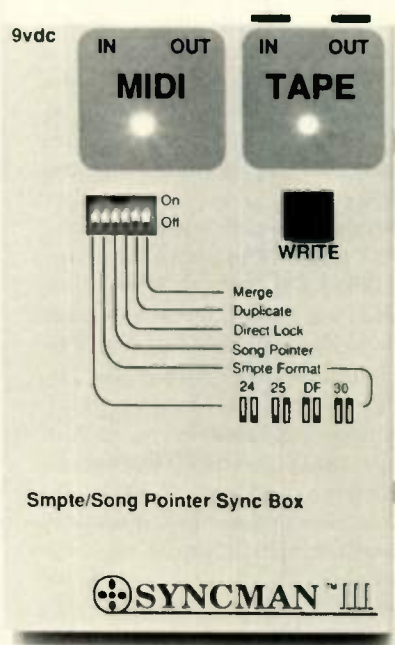
That's a minor annoyance that I think is more than made up for in the rest of the device. The depth and power of the MTP, characteristic of Mark of the Unicorn's products, simply blows away the competition. MIDI/SMPTE sync, 8 x 8 MIDI patch bay with muting and channelization, eight discrete ins and outs—I'd buy that for \$495.

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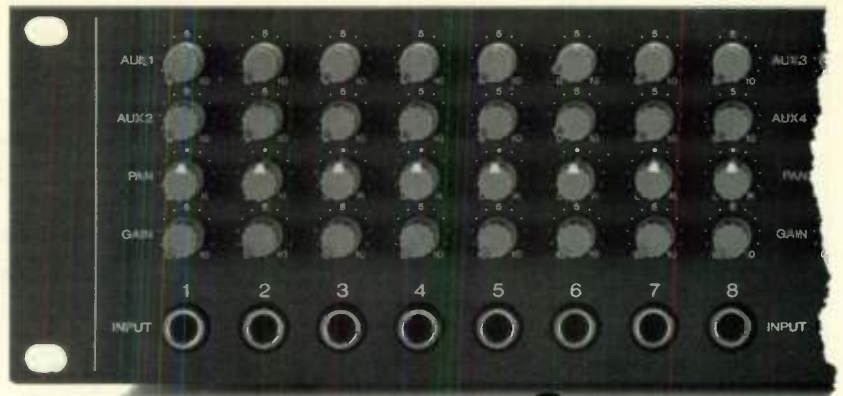
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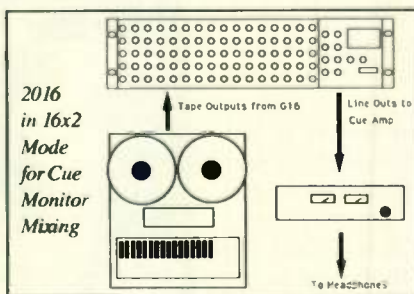
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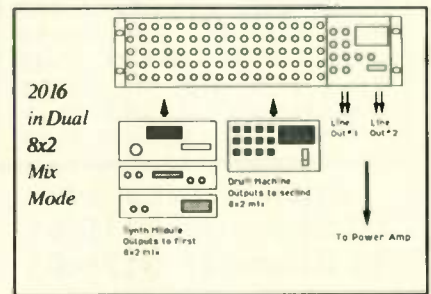
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## • FIRST TAKES

(Thanks to Mike Brodhead and Korg Research and Development for making their equipment available for this review.)



OVERALL

Value 9  
Features 9  
Ease of Use 7

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*Don Phillips is a Bay Area-based composer and MIDI consultant. He sings and plays keyboards in the band Rapid Transit and, occasionally, even sleeps.*

**Sound Quest MIDI Quest  
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(\$250)**

By K.K. Proffitt

**M**IDI Quest is a powerful universal librarian/editor with an intuitive graphic user interface. This *tour-de-force* from Sound Quest runs on most popular personal computers, including the Macintosh, Atari ST, Amiga, and IBM PC-compatibles. Not only files, but drivers and templates, are compatible across different computer platforms, which is an impressive accomplishment. The program contains five well-developed, almost bullet-proof elements: a universal librarian, a universal editor, a database, a sound checker, and a driver creator.

The most impressive feature of this tweaker's delight is its ability to play type 0 standard MIDI files (a single-track, multichannel sequence file) while editing sounds in real time. For MIDI studios with multitimbral sound modules (or multiple modules), the edit-while-looping feature makes this package a must-have for music production using virtual tracks.

I tested the IBM PC version (for the XT, AT, PS/2, and C1) on an 80286-based AT, with both Roland MPU-401 and Music Quest MQX-32M MIDI interfaces. Devices with multiple ports (e.g., the MQX-32M card and the Yamaha C1 computer) are fully supported. Users of older, 6 MHz ATs must put the MPU-401 into Dumb Receive mode for most transfers, and the Dumb

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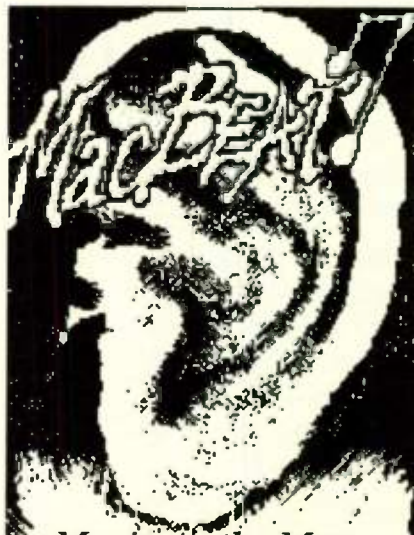
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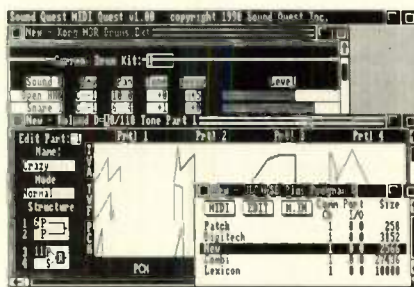
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SoundQuest MIDIQuest edit screen

mode is also required for all transfers when using the MQX cards. This option, as well as all other window options, may be saved as a user configuration.

**MIDI Quest** comes with over 100 editing templates, supporting more than 35 instruments (some instruments have multiple templates to support different data types), and over 250 librarian drivers that support more than 70 instruments. Among the sound modules I tested were a Casio CZ-101; Roland MT-32 and D-550; Yamaha FB-01, TX816, and DX7; E-mu Systems Proteus; and Oberheim Matrix-1000. Editing templates for sounds in the Proteus, TX816, MT-32, and D-550 are complex and reflect the capabilities of the instruments through clever, well-balanced visual layouts.

To my knowledge, all features for the boxes I tested are supported in the template implementations. (*This is not the case for all templates, however; for instance, the M1 template is not complete.*—SO) Although the screen consists of overlapping windows, the edit window explodes to full screen width to take advantage of every available pixel. The Proteus screen is a particularly fine example of good graphic architecture. Commonly used features, such as volume, are given correspondingly larger area. Parameters which have less fine resolution, such as LFO frequency, have smaller gadgets. A clean layout minimizes the eye-fatigue factor common in programs with cluttered screens.

The MT-32 displays are also thorough in their implementation. Owners who have never inspected the innards of their MT-32s closely may want to edit the tuning from the Japanese/Euro-pean standard of 442 Hz to the American 440 Hz.

A help window, called "Fast Tips,"

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## ● FIRST TAKES

contains documentation that enabled me to dispense with the manual after installation. Fast Tips was especially helpful when I pulled my geriatric DX7 out of its case for a client who preferred it to my TX816.

You can copy, paste, and swap patches within a bank or between banks. The Bank Editor also features three types of patch randomization. In most cases, you can audition individual patches directly from the bank by clicking on them. A file-conversion utility

allows you to import files from most editor/librarian programs by other manufacturers.

The database can store an entire MIDI setup and can contain any combination of MIDI sys ex data. You can sort the database by manufacturer, instrument, file size, time, or file name.

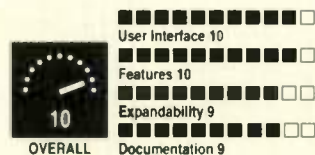
The collection of Sound Checker utilities provides a flexible event-generating environment. You can test notes, chords, and arpeggios. If your sequencer generates type 0 MIDI files,

you can tweak the sounds for an entire song in real time. Exiting a sequencer to load individual librarian/editors is time consuming and destroys spontaneity. Using the standard MIDI file format enables *MIDI Quest* to coordinate a variety of products and gives the legions of XT and AT owners some of the benefits available to those running multitasking environments. It's also much more stable than loading a host of TSR individual librarians. A version of *MIDI Quest* that runs under Microsoft Windows is slated for January 1991.

A Driver Creator is included for those who speak fluent sys ex. The manufacturer estimates that once you learn the technique, you can program a driver for a new piece of equipment in about twenty minutes. A template maker, called "Tech Quest," will be available in a \$100 upgrade slated for this fall.

Customer support and access to the company via electronic mail are almost as important as the product itself. Sound Quest maintains a support BBS so that new sounds, conversion routines, templates, drivers, and demos may be accessed via modem. Customer support should always be included when considering a software purchase, and I was able to reach Sound Quest using their support line whenever needed. In addition, *MIDI Quest* is not copy-protected.

This program disproves the theory that universal editor/librarians are too "generic" to be thorough. After playing with *MIDI Quest*, I tossed my individual librarians into a box I call the Olduvai Gorge.



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**K.K. Proffitt** is the president of *Regis King, Ltd.*, a music production company based in the Nashville, Tennessee, area. Her favorite instrument is the noise gate.



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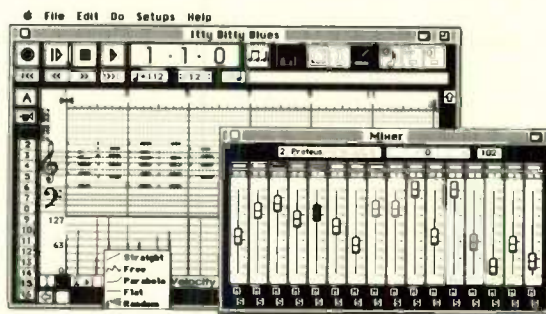


## Opcode Systems EZ Vision (\$149)

By Wheat Williams

**E**Z Vision is an inexpensive, scaled-down, version of Opcode's powerful Macintosh sequencing program, *Vision* (reviewed in the August 1989 *EM*). However, *EZ Vision* contains some innovations that, at this writing, even *Vision* lacks. Also, *EZ Vision* is the first program from Opcode that is not copy-protected.

Opcode desires to provide "casual" sequencer users with a program unencumbered by advanced features that they are not likely to need. (For those whose needs outgrow the "junior" program, Opcode provides an upgrade to *Vision*, normally a \$495 list, for \$350.) For instance, *Vision* provides both graphic and event-list editing, but *EZ Vision* supports graphic editing only, since it is more intuitive. The display scrolls during playback, and precise edits can be located by "scrubbing" the music back and forth with the mouse just as if the sequence were a real analog tape.



EZ Vision Strip Chart and Mixer window

*EZ Vision* records, with 480-ppqn resolution, onto sixteen tracks and displays notes in its Edit window as bars of varying length on a piano-style "grand staff." While recording, incoming data can replace or overdub onto an existing track. Loop recording is possible, and *EZ Vision* has very flexible punch-in options.

The program makes understandable tradeoffs between ease-of-use and flexibility. Each of *EZ Vision*'s tracks can only record information on a single MIDI channel, and it is impossible to

record on multiple channels simultaneously, so I was out of luck with my 6-channel, MIDI guitar controller. Also, there is no convenient way to combine, or strip data out of, tracks. There is also no way to filter out continuous controller data while recording, and polyphonic aftertouch is not supported.

This contrasts sharply with the impressive ease

with which note and controller data can be edited onscreen. *EZ Vision*'s Strip Chart provides a graphic display of note-on velocity and all types of controller data, as well as the sequence's tempo. Data can be altered or drawn in by various pencil tools, including a parabola tool for those all-important exponential *crescendos* and *accelerandos*. A variable-density thinning tool can be used to reduce unwanted continuous controller data.

Quantization and step-time recording also meet pro standards. When

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## ● FIRST TAKES

entering notes in step time, note durations can either be selected from a pop-up menu, or painted onto the screen with the Paintbrush icon.

A position-sensitive editing tool changes only the note's attack time, pitch, or duration, depending on what part of the note you grab when you hold the mouse down. Any time you click on a note, it gets played over MIDI.

The program leads one to think of composing music in sections. A song can be constructed from up to 25 separate, shorter sequences, which could represent, for instance, verse, chorus, and bridge. The biggest limitation is that although each sequence can have a different time signature, you can't have measures with different time signatures within a sequence. Once you record several multi-

track sequences, you open the Arrangement window, which displays each sequence as a block. Then you can cut, copy, paste, and drag these blocks around in different orders to create a composition. This makes reorganizing the entire structure of your song a snap.

*EZ Vision* is compatible with Opcode's universal editor/librarian program, *Galaxy* (\$249; see "Complete Control: Universal Editor/Librarians" in the June 1990 *EM*) and supports Apple's *MIDI Manager*. With *Galaxy*, *EZ Vision* can automatically refer to all your synth programs by name rather than by MIDI program change numbers. You can type in all your names manually, but it

would be much better for beginners if Opcode had included ready-made lists of presets from some popular synth

models, as Electronic Arts did with its similarly priced *Deluxe Recorder*. (In fact, Roland's CM-32L L/A synth is available bundled with a version of *EZ Vision* that includes a list of preset names, and Digi-design plans to offer a similar package for its MacProteus Macintosh card.—SO)

The program's user interface is great. Convenient, pop-up menus provide selections for all sorts of parameters, and I can't rave about *EZ Vision*'s context-sensitive, online help feature enough. All you have to do is point at any menu item or icon (button), hold down Command-Shift-Option, and click the mouse. Up pops a window that tells you exactly what that feature does and how to use it. This is excellent for all of us who hate digging through the owner's manual in search of answers to specific questions. (Incidentally, *EZ Vision*'s manual, while thorough, contains numerous typos and a less-than-consistent style.)

My favorite feature is the Mixer window. This is a virtual MIDI line mixer, with a mouse-controlled, 1 1/4-inch-

*EZ Vision can display each track's data in one of sixteen colors, and you can view and edit multiple tracks simultaneously.*





throw fader and stereo pan pot for each channel. Each fader sends out either MIDI controller 7 (volume) or note-velocity information, and you can record any fader or panning moves that you make during playback into the sequence. Alternatively, you can paste individual "snapshots" into selected points. The controller information generated is recorded into each track's Strip Chart, so it is also possible to further edit mixer moves there. The recorded faders move on playback as well. The potential that this provides for the home hobbyist is exciting. You can totally automate the mixdown of the MIDI instruments in your studio—even dynamically control the relative volumes of individual instruments within a multitimbral synth—through the simplest of mixers.

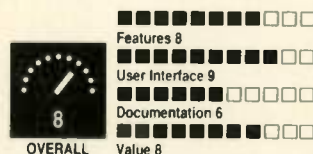
This is the first Mac sequencer program I know of that uses color. If you have a Mac II-series machine with a color monitor, it displays each track's data in one of sixteen different colors, and you can view and edit multiple se-

quence tracks, simultaneously. *EZ Vision* effectively squeezes much more information into a single editing window than other sequencers can, and it looks "way cool." However, the program and its editing features work just fine in black-and-white, too.

*EZ Vision* reads and writes both types of standard MIDI files, and its files can be opened by *Vision*. It also can import and export directly to, and from, the formats of two music notation programs, Electronic Art's *Deluxe Music Construction Set* and Mark of the Unicorn's *Professional Composer*. I wasn't able to try it with *Professional Composer*, but I found that *EZ Vision* worked well with *DMCS*, with certain limitations. It is worth noting that both notation programs can create music that is too complex for *EZ Vision* to import properly.

The program, as expected, lacks features more likely to be required by professionals, such as multiple MIDI channels on each track and SMPTE support. *EZ Vision* can transmit (not record)

system exclusive information and allows you to import a MIDI file (from a librarian program such as *Galaxy*) containing sysex data. Complete sysex setups then can be transmitted as part of the sequence playback. You can also enter sysex data in hexadecimal format. Overall, *EZ Vision* is a good choice for a first-time sequencer purchase. It is easy to learn, its features are solid, and it has the support of a long-respected company.



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**Wheat Williams** wants to buck the trend of *EM* authors listing their academic degrees by confessing that he doesn't have one. He is, however, still a swell guy.

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# TASCAM

## Roland D-70 Super L/A Synthesizer

By Robert Rich

*Roland's sample-based L/A synthesis has evolved to a new level with this lean, clean, music-making machine.*

**F**ollowing the explosive era of the MIDI revolution, the watchwords in synth technology today are consolidation and progressive refinement. This phase is typified by Roland's newest flagship instrument, the D-70. Good-sounding, easy to program, and a joy to play, the D-70 is hardly revolutionary, but it represents culmination of trends in modern instrument design.

The D-70's voice architecture uses an extensive base of acoustic and synthetic samples in ROM, including percussion. These may be expanded using U-110-compatible sample cards or a new type of card designed especially for the D-70. Sample-based voices are subject to extensive filtering, enveloping, and modulation. The ability to layer up to four voices at one time provides a considerable degree of freedom in the

performance editing, 76-note velocity- and aftertouch-sensitive keyboard, and 30-note polyphony with 5-part multi-timbral capabilities (plus a rhythm part). With its ability to control up to four MIDI channels from different keyboard zones, the D-70 makes an excellent master keyboard.

In comparison with some of the competition, the D-70 lacks a few features, but the instrument makes up for it with a solid overall design. It has neither a disk drive, nor a built-in sequencer, and its effects don't respond to MIDI controllers. It sends and recognizes channel aftertouch, but only recognizes polyphonic aftertouch. The instrument's strength is a clean, smooth sound. The effects are quiet, and the timbres have little of the graininess that has plagued some other digital synths. The D-70's sound is by no means perfect—some samples cause occasional clicking noises, and the filter distorts easily at full resonance—but the bass is punchy, and the highs are crystal clear without being piercing. The string sounds are fat and silky, and the "analog" sounds are almost organic.

### LONGER, YET Milder

At a glance, the D-70's 6-octave keyboard sets it apart from most other synthesizers on the market. The keyboard is weighted, but not much, with a synth-type action that is more substantial than, say, a VFX keyboard, but not as deep as most "weighted" actions. It feels good, and the extra octave is a major asset for piano repertoire or multi-instrument splits.

To the left of the keyboard lies Roland's standard pitch bend/modulation lever, along with three sliders placed conveniently above the lever. The first slider controls volume (and sends MIDI controller 7 messages). The middle slider, labeled "Cl," can be

creation of new sounds. The sound resources are rounded out by a respectable set of internal effects.

Operationally, the assets of the D-70 are a large, backlit liquid crystal display (LCD), function keys and special navigation buttons for easy editing, assignable front panel sliders for real-time

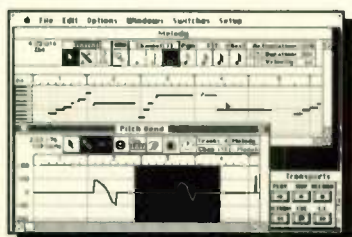




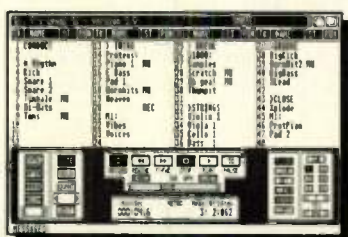
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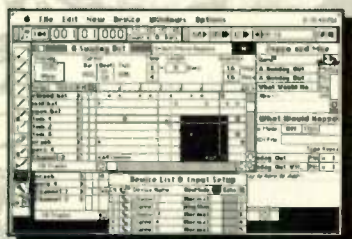
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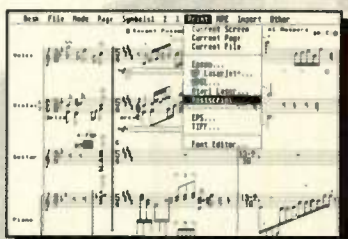
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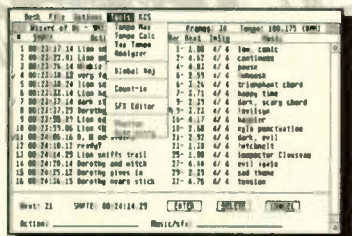
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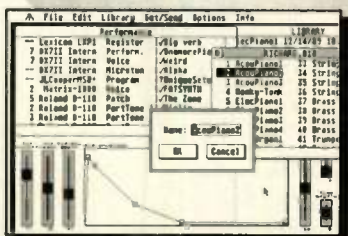
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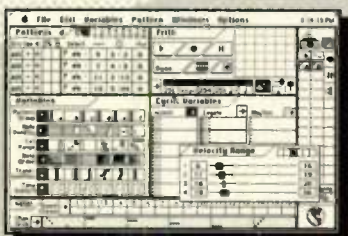
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## ● ROLAND D-70

assigned (along with an expression pedal), to control voice parameters such as filter cutoff, LFO depth, or portamento time. The Brightness slider on the right acts as an overall filter-cut-off control (to the delight of old analog junkies like me).

The front panel sports a big, backlit, 40-character by 8-line LCD, a nicety that is becoming common on the newest synths from Japan. Displays like this can help make programming a pleasure and may save you from spending

extra money on patch-editing software (assuming you don't need the librarian features such software usually offers). Five function keys and an Exit key under the display help you navigate menus, and a programmable User key lets you jump directly to the most often-used edit screens.

### GET REAL(TIME)

To the left of the display lies the Tone Palette and a number of buttons dedicated to real-time timbral control.

Each of the four sliders corresponds to one of four Tones in a Patch (more on the voice hierarchy later). By pressing one of the buttons to the left of the sliders, you can select a group of parameters for the sliders to modify. Parameters include Tone level, pan, tuning, filter cutoff and resonance, and envelope attack and release. Buttons in this section also let you select Solo (i.e., monophonic) mode and Portamento, as well as Play, Edit and PCM Card modes. Edits in the Tone Palette affect only the patch you are working on at the time, whereas edits in the Tone Edit menu affect all patches in which that Tone is used. When you press the Play and Edit buttons at the same time, the D-70 will send out individual note-off messages for every note on every MIDI channel. I wish every piece of

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### Product Summary

#### PRODUCT:

Roland D-70 Super L/A Synthesizer

#### MAIN FEATURES:

76-note keyboard with velocity (and channel aftertouch for onboard sounds); 30-voice polyphony, reduced to seven voices when four tones are layered; multitimbral (up to five Patches and one Rhythm); low/high/band pass filter with resonance; reverb, echo, chorus, flange effects; 119 internal PCM samples; 128 Tone memories, 128 Patch memories, and 64 Performance memories; RAM and PCM card expansion; accepts Roland SN-U110 PCM cards

#### PRICE:

\$2,395

#### MANUFACTURER:

Roland Corp. U.S.  
7200 Dominion Circle  
Los Angeles, CA 90040-3647  
tel. (213) 685-5141





MIDI gear had a panic feature like this.

To the right of the display, you'll find cursor control keys and the inevitable Increment and Decrement buttons, augmented with Roland's standard data wheel for quickly spinning through values. Bank keys and Number keys let you select programs for editing or storage; as in other Roland instruments, the D-70's Tone, Patch, and Performance memories are organized into banks of eight. Another row of eight keys lets you navigate among Performances, Patches, Tones, RAM cards, and such. This row also include those dangerous keys, Command, Write, and Enter, which let you destroy forever your precious factory presets.

Speaking of presets, if you're not happy with the D-70's internal samples (or even if you are), a glimpse at the rear panel should cheer you up. Here you will find three card slots. Two of these slots hold PCM cards for additional sample data, and the third holds a RAM card for storing patches and other programmable data. Since the D-70 can read Roland's SN-U110-series ROM cards, a large library of additional samples already exists. Roland also plans to release cards specially designed for the D-70, which will take advantage of its Differential Loop Modulation feature (more on that later).

The remainder of the back panel hides the power switch, memory-protect switch; display contrast control; MIDI in, out, and thru; three control-pedal inputs (expression, switch, and hold); and five audio output jacks. Left and right Direct outputs bypass the effects processors, left and right Mix outputs give you the whole bowl of soup, and a stereo headphone output duplicates the Mix output without disconnecting it. You can send tones separately to either the Direct or Mix outputs, which provides some flexibility.

#### WHAT YOU HEAR

Let's all recite the litany, "When an instrument comes with preset sounds, those sounds had better be good, because we'll be stuck with them forever." This holds true for both acoustic and electronic instruments. When a company releases a machine with ROM-based samples, the sounds it includes can make or break the machine regardless of any additional features.

Roland seems to have heeded this

maxim. The samples inside the D-70 are among the best I have heard (see sidebar). Overall, they have very little hiss, a minimum of grit and grunge, good split points for the multisamples, and good loops. My only complaint is an occasional click at the end of the release stage on some sounds. I have not figured out whether this comes from the samples themselves or some other voice parameter. (I checked the envelopes, and it's not their fault.) Despite the clicks, I was impressed.

#### VOICE ARCHITECTURE

The D-70's architecture somewhat resembles a labyrinthine and multi-layered pyramid. Actually, its not so confusing once you figure out Roland's hieroglyphics. Among the resources provided by the D-70 are a wealth of TL/As (Three-Letter Acronyms). Understanding the D-70 primarily involves understanding its terminology: PCM, DLM, WG, TVF, TVA, Media, Tone, Tone Palette, Patch, Part, Performance, User Set, and Effect. Got it? I'll try my best

*Keyboard* magazine recently complained that

#### Cakewalk Professional 3.0

"is full of so many extras that we're beginning to feel like we'll never be able to finish this review." Of course, while sympathetic to the reviewer's plight, you may regard this abundance of features in a more positive light.

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### ● ROLAND D-70

to describe the hierarchy in English.

The **Tone**: A voice starts out as a **Tone**, which employs a wave generator, a pitch envelope, a filter with its own envelope and a choice of four velocity curves, an amplifier with its own envelope and velocity curves, and an LFO that can modulate any of the above with triangle, sine, square, sawtooth, or sample/hold waveforms.

The wave generator plays a PCM sample chosen from internal memory

*The D-70's*

*Time Variant*

*Filter sounds*

*excellent,*

*with one exception.*

*It tends to distort*

*when near full*

*resonance.*

or a ROM card. Nestled inside the wave generator is an interesting feature: Instead of simply playing the sample, you can select **DLM**, which stands for Differential Loop Modulation. To quote from the D-70 manual, "DLM does not simply loop the specified area of data, but calculates the difference between each point of the data, and creates a loop using data that corresponds to this difference." Hmmmm.... I experimented quite a bit with DLM and found that it almost invariably turned a sample into digital garbage (have you ever listened to a modem or a fax machine?). On rare occasions, however, DLM created some interesting, buzzy timbres that sounded pretty good when filtered.

The Pitch parameters of a tone include LFO, pitch envelope, and Key Follow. Key Follow, also found on the D-50, lets you stretch or shrink the octave for alternate equal-tempered tunings or stretch tunings, even allowing you to reverse the keyboard so that high becomes low. I wish Roland would implement a proper microtuning feature, as Key Follow is simply insufficient for any-

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thing besides crude stretch tuning.

The D-70's Time-Variant Filter sounds excellent, with one exception. It tends to distort when near full resonance. Distortion is common when a filter resonates, but digital distortion is a lot less pretty than analog distortion. On the good side, the filter lets you select among lowpass, highpass, or bandpass modes, which can give sounds quite a bit of expressive range.

**The Patch:** Once you build a Tone, you combine it with others into a Patch. Each Patch contains a Tone Palette consisting of two Lower Tones and two Upper Tones, along with information about split points, a choice of four velocity curves, output assignments, effects assignments, and such. If you choose

to activate all four tones within a patch, you will reduce the D-70's polyphony from 30 voices to seven, as each voice will consist of four separate elements.

**The Performance:** Next up the hierarchy comes the Performance. Each Performance contains five Parts and one Rhythm setup. A Part is just a Patch that is assigned by the Performance to specific MIDI parameters. A Rhythm setup consists of a keyboard map of samples from the Rhythm presets. A Performance allows the D-70 to simultaneously play five Patches and a Rhythm track when controlled externally through MIDI. (If you are trying to play four-way, layered patches in a multitimbral performance, you will quickly use up the D-70's 30 voices.) A Perfor-

mance also assigns the Expression pedal and Effects parameters, along with MIDI channel and controller assignments and output velocity curves. One interesting parameter found in the Performance menu is Analog Feel, which appears to randomize the pitch of each note to fatten the sound.

You can arrange five Performances into a User Set for quick access via function keys. There are ten User Sets. Little features like this seem aimed at making the D-70 into a great keyboard for live performance.

**Effects:** The D-70's effects sound great, even if they don't have the bells and whistles found in some other instruments. The D-70 has two effects modules, reverb and chorus. Individual

## A Guide to the D-70's Internal Samples

In a sample-based synthesizer, the waveforms and samples in ROM represent the database of sounds available for modulation and modification. The quality of those samples is a critical element in the overall sound of the instrument. In the D-70, samples are arranged in three banks, loosely described as "acoustic," "synthesizer," and "percussion."

The so-called "acoustic" instruments include four acoustic pianos, arranged from muddy to bright. They have good split points about every fifth, and excellent loops, but the attack transients sound a bit muffled for my taste. They're great when combined. The three electric pianos are generally excellent and realistic. However, some of these were responsible for the mysterious clicking mentioned in the review. Four electric organs, arranged from smooth to percussive, proved very clean. The Reed Organ is one of the few bad ones in the bunch: it's muddy, with warbling loops. The acoustic guitar seems musical but not realistic, and the two clean electric guitars and one distorted guitar are very good. You get *nine* basses (why so many?). The five slap basses are bright and clean,

with harmonics at the high end of keyboard. The fingered, picked, fretless, and acoustic basses are generally good, but the acoustic sounds muddy.

The Choir's splits are audible but not too annoying, and it has good loops. The two string patches seem identical but are rich and fat, with excellent loops. There are lots of brass, including Soft Trumpet (fat, with a good "blat"), three trombones, Brass (bright and splatty, not to my taste), three different saxes. In general, the brass patches are very useful and realistic, even the saxophones. The flute is muddy but usable, and the shakuhachi is technically good but musically annoying. The mallet and ethnic instruments include excellent marimba, vibes, and balophone; berimbau (slightly noisy, but works great with resonant bandpass filter); kalimba (overly bright with rattles, somewhat limited); and cymbalon, i.e., hammer dulcimer (mediocre on its own, but great with reverb and filtering).

There are 44 synthesizer samples, mostly short-loop waveforms. I'll try to describe them in generic terms, with comments where applicable. One of the D-70's strongest points are its string sounds, which are

fat and silky. You get a variety of other synth sounds, including airy, D-50-like digital sounds and breathy attacks; synth bass waveforms a la Minimoog; pulse, triangle, and sawtooth "analog" waves; some short loops (sax, organ, etc.); several versions of white noise, most of which sound somewhat digital; bell sounds that range from fluffy to bright, some with audible loops; pizzicatos and harp attacks; and grungy digital waveforms (luckily, there are only a couple of these).

Twenty-eight percussion sounds fill out the D-70's internal sample collection, most fairly realistic, with good attack transients and clean decays. The drum kit sounds feature five snares, all very good; four kicks; two toms, big sounding, but a bit noisy; a hi-hat and two cymbals that have bad loops (these are tough to get right). Other percussion includes sticks, cabasa, cowbell, old analog percussion sounds such as TR-808, etc. Forget the handclaps, and please, spare me the orchestral hits.

Despite my occasional criticisms, I think this represents a very useful choice of samples. The emphasis tilts heavily towards traditional sounds.

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### ● ROLAND D-70

Patches can be assigned to either, but not both. In order to get both reverb and chorus on a single sound, you must define the chorus as "pre-reverb," causing every chorused sound to get reverberated. Reverb programs include three rooms, two halls, gated reverb, and mono and stereo delay, with programmable sustain time, level, and feedback. Chorus programs include three types of chorusing, a flanger, and a short delay, with programmable level, delay, feedback, and modulation depth and rate. Oddly, both the depth and rate controls seem to change only the rate of modulation. The effects all sound very good, with only a bit of warble on very long reverbs, and very little hiss is added to the final output.

### CONCLUSIONS

A short review could never do justice to every feature listed in the D-70's 200-page owner's manual. I chose to focus on its internal sound at the expense of some of the MIDI features, which seem optimized to make the D-70 a good choice for a master keyboard controller.

What the D-70 lacks in pizzazz, it makes up for in quality. It compares quite favorably to other recent digital keyboards in both price and sonic fidelity. Its best features are its long keyboard, excellent performance interface, 30-voice polyphony, and smooth fat sound. The synth's voice architecture is simple to understand and yields musical results (once you absorb the terminology). Most of the internal ROM samples sound excellent, as do the filter and built-in effects.

Although the D-70's excellent sound quality may be its best feature, its sound is not without flaws. As mentioned, the filter distorts at extreme resonance settings, and certain sounds emit occasional clicks. I have heard similar problems on other keyboards, so don't let my complaints scare you. This is a surprisingly versatile instrument, capable of sounding bright and airy, smooth and fat, "digital" or "analog." It may not be revolutionary, but the D-70 is a very complete and professional keyboard.

**Robert Rich** composes electronic music. He likes strange noises, especially geological ones. His latest album, *Sirata*, featuring Steve Roach, recently was released on *Hearts of Space Records*.

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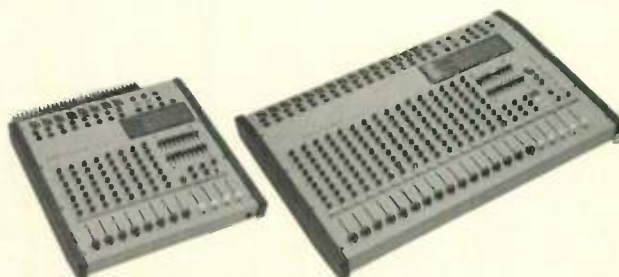
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## Spectral Synthesis SynthEngine

by Dennis Miller

*Most musicians  
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If you have an IBM PC AT or compatible computer and plan to buy a sampler, you owe it to yourself to consider the Spectral Synthesis SynthEngine—a DSP-based hardware/software system that turns your computer into an extremely capable sampling system. The standard configuration is 16-bit stereo, 8 MB of RAM, and a sample-editor program, but what you *don't* get may be even more appealing: Forget about difficult operating systems, hard-to-read displays, and limited sample storage. And, you don't even have to dedicate your whole PC to the process.

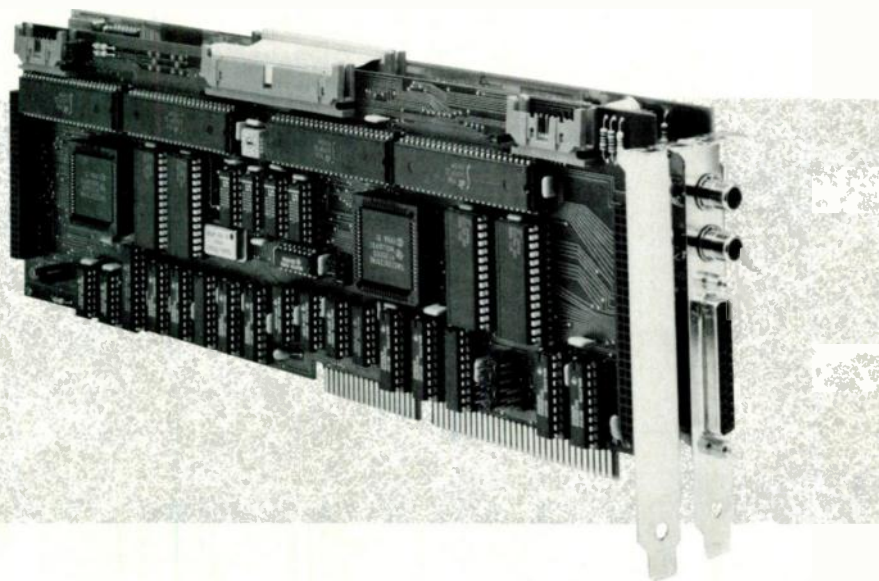
Spectral's system is built around a dual DSP, single-slot hardware card, the Synthcard. It includes up to 4 MB of sample RAM and you can install up to seven cards if you have the slots. A second card, the FlyBy Bus Controller Board, handles communications to and from the SynthCard(s), freeing up your computer's bus for other tasks. An external box contains stereo A/D and

D/A converters, as well as digital I/O. Two supporting software programs are currently available—*SynthEngine Sampler* and the *AudioVision Graphic Sound Editor*—but Spectral has also announced the imminent release of a synthesis and processing package called *AudioCAD*. A multitrack, hard disk recording system (requiring additional hardware and software) is slated for release this year.

The Spectral system is available on a component basis or as complete turn-key systems including the computer. The package reviewed, which includes 8 MB of RAM, the FlyBy card, A/D/A converters, and software (no computer), lists for \$6,995. A 4 MB system lists for \$4,995. The system requires an 80286 or 80386 AT or compatible with at least two card slots, a mouse, and Microsoft *Windows* (2.1 or later). Power users will want the 80386 for greater speed, more than two slots, and a large hard disk—which is not just for samples, since the system files use a little over a megabyte. A color monitor is highly recommended (especially for *AudioVision*) but not required.

In some ways, Spectral's system works like—and is as easy to understand as—any other sampler. But there are some major advantages to Spectral's approach. First, the system is customizable. Since the SynthCard hardware drives all the software programs, you can pick and choose whatever features you want, perhaps selecting just the sampler now and adding the editor later. Also, you can easily install software enhancements as they become available. Second, since the hardware is modular, you can replace or upgrade individual parts of the system, adding 18- or 20-bit A/D/A converters if they became available, or extra RAM.

Spectral uses Turtle Beach's *SampleVision* file format but also provides a





conversion utility to pull in Digidesign's *Sound Designer* and other formats, giving compatibility with existing standards and immediate access to literally thousands of sounds. Since both the hardware and software are designed with expansion in mind, the system should remain viable for years to come.

Spectral's system is comparable to, and in some respects surpasses, some of the finest dedicated samplers on the market. There are direct digital inputs and outputs, multi-stage amplitude and filter envelopes for shaping sounds over time, and built-in signal processing. The SynthEngine system can also be treated as a MIDI sound module, with extensive enveloping and modulation control in response to velocity, aftertouch and continuous controllers. As of this writing, MIDI sample dump standard is not supported, but will be addressed in an update, according to

the manufacturer.

The system is easy to install. Within 30 minutes of unpacking the box, I had my computer playing 16-bit audio. The SynthEngine cards and bus controller are factory-configured, so no user modifications are necessary unless your system has peripherals that conflict with the interrupt vectors used by the SynthEngine.

#### THE SAMPLER

Spectral's *SynthEngine Sampler* program is graphics-oriented, with a menu line at the top of every screen offering a

wide and well-organized range of options. All features are just a mouse click or two away, and multiple onscreen windows let you view numerous parameters simultaneously.

When you first run the program, a configuration window provides for system setup (number of SynthCards installed, sampling rate, analog or digital input, etc.). Most parameters are remembered until changed. The file structure progresses from raw sound samples (which we'll just call "samples"), to *instruments* (which include a wide range of parameter settings for each sample), to a *patch* that contains a number of instruments.

Building an instrument is a logical process whereby you select one or more samples, then move through various menus to edit the associated parameters. *Auto-create* will automatically assign default parameters to a specified sample file; otherwise, to build an instrument manually (or edit an existing one), you begin with a Main Instrument Definition window (fig. 1). Here, you name the instrument, assign it a MIDI channel, choose the number of

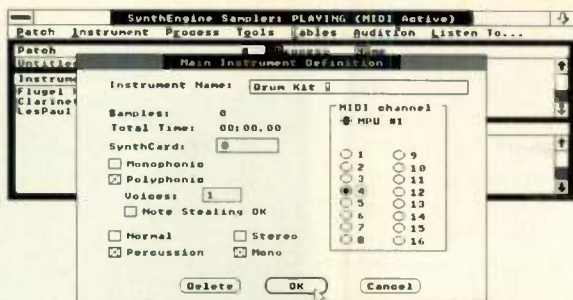


FIG. 1: SynthEngine Sampler's Instrument Definition window displays numerous parameters in a single screen.

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## • SPECTRAL SYNTHESIS

voices to allocate, select playback mode (mono or poly), and specify "normal" or "percussion" (un-pitched) playback mode. The number of voices available varies with memory, sample rate, playback mode, and the instrument's complexity. The maximum is sixteen un-pitched sounds per SynthCard installed, and can go as low as four per card for stereo, pitched samples at a high (44.1 or 48 kHz) sample rate.

The Assign Sample Files window lets you assign the source sample(s) to your instrument. Each sample can be activated over a specified velocity and/or pitch range, allowing for fancy switching and zoning.

In the Loop window, you can set up to eight loop points for each sample in the instrument and adjust the tuning (pitch) within the looped area. The sustain and release loops are unidirectional. While the manual isn't completely clear about looping, I found it easy to set loops because all the choices are given in the form of menus.

For quick and dirty FM, use the Pitch Control window to define any signal in the system as a pitch modulation source. I created a 440 Hertz sine wave using a synthesis program called *Csound*, loaded it into the sampler, then used the waveform to modulate a short piano sample—with very interesting results. Using a sub-audio wave would produce vibrato. You can also transpose the sample pitch up or down three octaves, set the pitch wheel range, or create any number of individual tuning tables.

A similar menu allows customizing the instrument's volume parameters, and it's here that the SynthEngine really shines. The amplitude envelope functions are very fancy: User-definable, 64-segment envelopes can be drawn, saved, and mapped onto any instrument. In addition, a different envelope can be activated according to a specific pitch or velocity range (Fig. 2). I built a mellow, FM instrument that had a long, slow attack and decay with low, soft notes; playing high, loud notes gave a rapid envelope. You can even

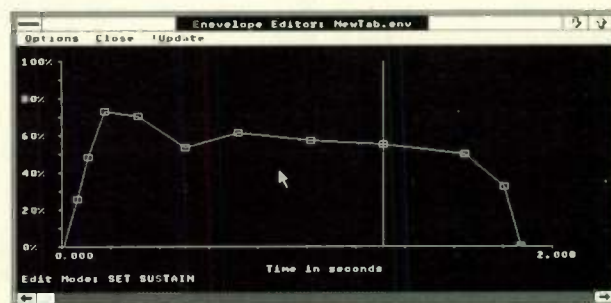


FIG. 2: 64-segment envelopes can be drawn for amplitude or filter control.

scale all of an envelope's values to a percentage of the original, or "normalize" to increase an envelope's levels so as to cover the maximum dynamic range. These functions are so easy to use that they encourage, rather than inhibit, experimentation. The only prob-

## Product Summary

### PRODUCT:

SynthEngine Sampler and DSP Hardware Component System

### TYPE:

PC-based sampling and editing software with DSP hardware components.

### SYSTEM REQUIREMENTS:

IBM AT or compatible; 640 KB RAM; Microsoft *Windows*; CGA or VGA display; hard disk drive; mouse; MIDI interface optional.

### FEATURES:

Onscreen sampling and editing with MIDI- controllable playback; 4 MB sample RAM per card; 16-bit stereo analog I/O; AES/EBU and S/PDIF digital inputs and outputs; multi-segment filter and amplitude envelopes.

### PRICE:

8 MB 2-card system, \$6,995; 4 MB 1-card system, \$4,995.

### MANUFACTURER:

Spectral Synthesis  
18568 142nd Avenue NE  
Woodinville, WA 98072  
tel. (206) 487-2931





lem with the envelopes is that the initial value is always zero. I prefer to start out at maximum and work down.

Once all instruments are defined and assigned to MIDI channels, you can set up a patch consisting of any combination of instruments. The total number of instruments that can fit in a patch depends on the size and complexity of each instrument (all the instruments in a patch must reside in RAM). MIDI program change commands can change patches, but this can be a slow process if lots of samples need to be loaded.

One of *Sampler's* more unusual MIDI talents is that it can play back standard MIDI files from within the program, eliminating (for some applications) the need for an external sequencer. However, sequence editing may be awkward, as only tempo can be altered from within the program. In order to edit, it's necessary to switch to a sequencing program, then save the results of the edit so that *Sampler* can read the file. You can create a standard MIDI file in your sequencer, return to *Sam-*

*pler* and set up the instruments on the channels you want, then "load" and play the file. You'll hear the sounds playing back on the tracks you've selected for them and, if MIDI thru is on, the other tracks will be sent out the MIDI port. At present, you can't actually access instruments created in *Sampler* while working in your sequencer, but hopefully this will be addressed by the release of a MIDI multitasking utility (such as Playroom Software's *MIDI Executive*), or perhaps a developer will come up with a sequencer program designed to work directly with *Sampler*. The program provides a set of utilities designed to process sound or control data. One of these is a MIDI Control Filter that takes incoming MIDI controller data (controllers 0 to 31 are supported) and offsets, scales, or transforms the values.

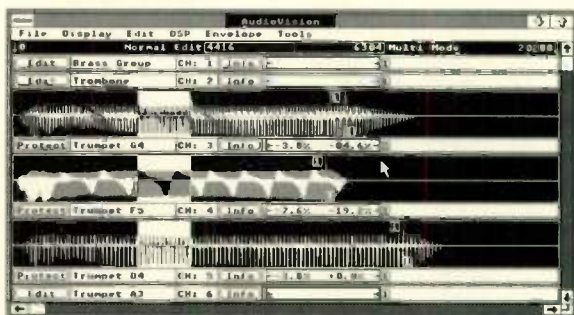


FIG. 3: AudioVision allows single or multiple files to be displayed and edited.

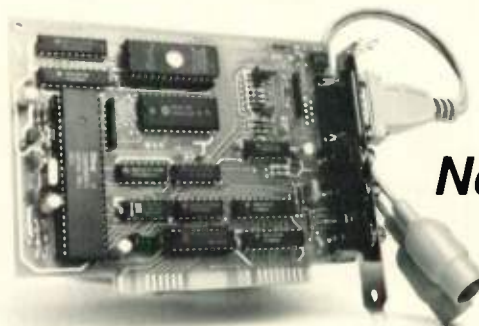
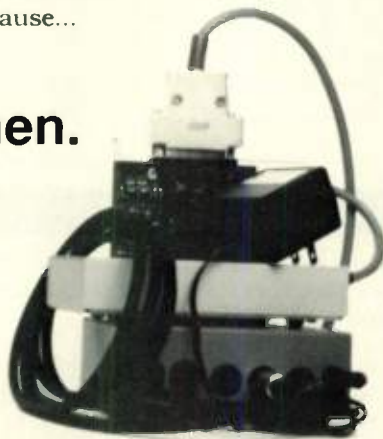
These are mapped onto whatever internal parameter you choose. For example, you can assign MIDI controller 01 (mod wheel) to the control filter and connect it to the gain of one of *Sampler's* mixer channels so moving the mod wheel varies the channel level.

Audio delay is straightforward. The parameters include delay time, feedback level, and input/effect balance, which are all alterable in real time. You can also send an analog signal into the A/D converter and process it like

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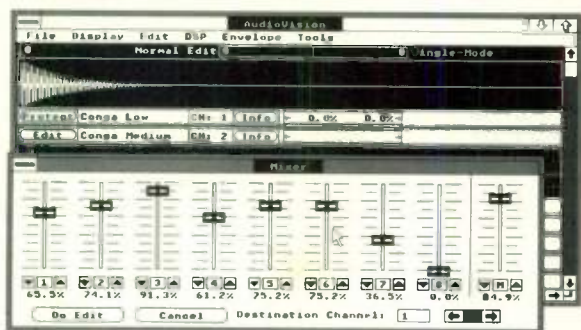


FIG. 4: The Digital Mixer can be controlled from an external MIDI remote unit.

any internally generated signal.

The program's Table functions provide a different type of processing. Here, you can create a velocity curve function that maps an incoming MIDI velocity value to any outgoing value, or create a complex and arbitrary tuning table specifying exact values, in Hertz, for every note.

### THE EDITOR

If you're making your own samples, or just downloading sounds from a bulletin board, you'll need to tweak and edit them. Because the SynthEngine reads and writes files in Turtle Beach's *SampleVision* format, if you already own that program, you're covered. Spectral's own *AudioVision* (also available as a separate program) is a powerful tool for editing multiple samples and is well integrated with the rest of the system. While its current list of tools is not as comprehensive as *SampleVision*'s (there's no FFT analysis, for example), the instantaneous update and playback capabilities provided by the DSP chip are unique.

Up to sixteen samples can be loaded into *AudioVision* at a time, depending on memory. (A status window in *Sampler* tells you exactly how much memory is left). Up to eight files can be displayed simultaneously on a standard monitor, and more if you have a larger, high-resolution model. A scroll bar allows you to see the rest of the files you've loaded (Fig. 3). You can edit a single sample, or have changes made in one sample affect others as well—such as truncate all your files by the same amount, or define the same envelope for each sample.

*AudioVision* lets you preview a sound in several ways, which is very useful. To hear an entire sample, just click the mouse on its name or play a note on

your MIDI keyboard. Playback can also occur only between two markers set anywhere in the file, or you can play sounds over an eight-octave range with an onscreen, piano-style keyboard. A built-in sequencer can store a few dozen notes for automatic playback. In addition, you can hear up to eight files at the same time, thanks to a mix

option. A MIDI remote unit (such as the Lexicon MRC, Blue Sky Logic MIXI, or J.L. Cooper FaderMaster) could control the onscreen mixer faders (Fig. 4).

*AudioVision*'s looping capabilities can also affect a single sample file or multiple sample files. In the latter case, the up to eight different loop points you can set per sample will be used for all samples. It's easy to audition loop settings—just move the loop start and end markers around in the sample while it's playing back. A crossfade loop feature is available if you want to "smooth out"

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the start and end points. All loop settings can be saved when a file is closed.

*AudioVision* provides a useful set of DSP utilities (accessed from the DSP menu) including Filter, Fade In/Fade Out, Invert, Mute, Gain Control, Mix, Normalize, Reverse, and Time Slipping (which inserts silence at the head of a sample). I found the filters (lowpass, highpass, band, and notch) to be especially well implemented.

The Filter window displays the selection of available filters and two rows of knobs (Fig. 5). The top row sets the filter's center or cutoff frequency, Q, input, output, and bypass levels. The bottom row of controls assign an envelope to a filter. Once you've created an envelope, the knobs in the top row determine how much the various filter characteristics will be modulated by the envelope. You might have cutoff frequency move downward over the entire length of your sound, or slowly raise the Q level. Time varying filters are useful for creating long, slowly changing timbres. I had no trouble designing some very interesting effects.

Several *AudioVision* envelope functions are very sophisticated but just a bit tricky to learn. One of the most unusual is "Extract Envelope," which analyzes a sample's amplitude contour and stores it as an independent envelope that can be assigned to other samples. Fit to Envelope adjusts a destination sample's contour to that of a designated source sample. (However, you can't expand or compress an envelope to fit a sample's length.) You can also draw envelopes directly onto a sample displayed onscreen. You don't have to save any of your changes if you don't like the results, since you're always working on a copy of the original file.

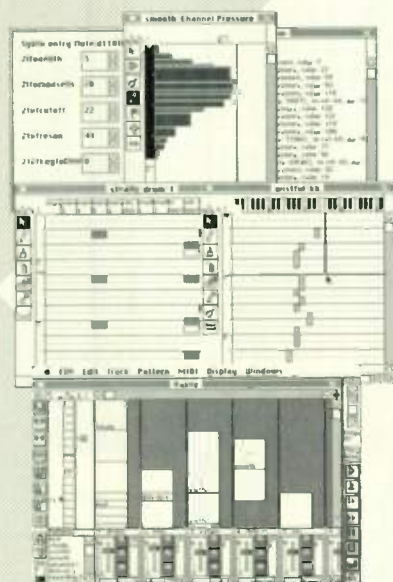
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The ADDA 2216 16-bit A/D and D/A Converter, which is mounted outside of your computer's chassis to avoid the noise associated with the computer's switching power supply and high-speed bus, uses 64 times input oversampling and eight times output oversampling. Available sample rates are 32, 44.1, and 48 kHz. In an A/B comparison of source and sampled sounds, the converter seemed to add no coloration as I played up and down the keyboard. The overall sound was crisp, and jumped right out of my speakers.

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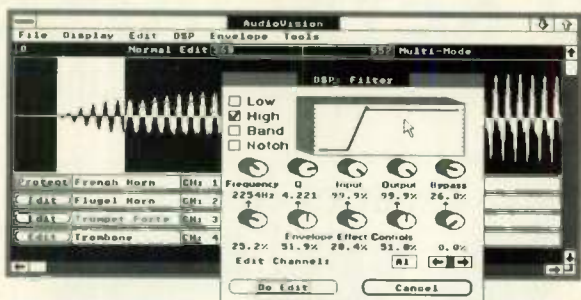


FIG. 5: The DSP filter window provides control of AudioVision's four digital filters in real time.

reo digital inputs and outputs, compatible with the AES/EBU and S/PDIF (CD and DAT) standards. If your CD player or DAT has a digital output, you can sample directly into your computer and can master directly to DAT while remaining entirely in the digital domain.

#### DOCUMENTATION AND DEVELOPER SUPPORT

Each software program is documented in a separate ring-binder. Since the company doesn't know which software you're going to buy, they've put the

similar, and it really should not be too difficult to find your way around once you have acquired a feel for the system. There's no index, but to be fair, there is a very clear table of contents as well as an extensive glossary in each manual. Spectral also tells me that a new set of documentation and an extensive reference manual are planned.

Spectral Synthesis makes a comprehensive support package available to qualified developers. It is to be hoped that software and hardware engineers outside of Spectral's offices will con-

tribute some exciting new capabilities to the system over time.

tribute some exciting new capabilities to the system over time.

#### THE FINAL SAMPLE

While some of the features of the Spectral SynthEngine are available on today's high-end hardware samplers, the two big advantages mentioned earlier—seeing everything on a CRT in a comprehensive, intelligible format, and hardware/software modularity—give the SynthEngine a compelling edge. The programs are complex, and you won't find much in the way of online help, but there aren't many systems that advance sampling technology as far as the SynthEngine does. This one is for real.

*Acknowledgement: Thanks to Jeffrey and Fred at Wurlitzer Music in Boston for technical assistance.*

**Dennis Miller** directs the music

theory program at Northeastern University. After a fifteen year break, he's back on stage, doing live processing of 16-bit sound files. It's not going over with the wedding crowd, but he hopes they'll learn to love it.

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**PA411D) 1990 HOW MIDI WORKS**, Dan Walker. This supplementary manual for the intermediate-level MIDI user discusses multitimbral synths, MIDI workstations, music software and recording considerations. Recently expanded and revised to include a history of MIDI, a current equipment listing and a new look at applications. ©1989, 187 pp. (Spiral) \$24.95

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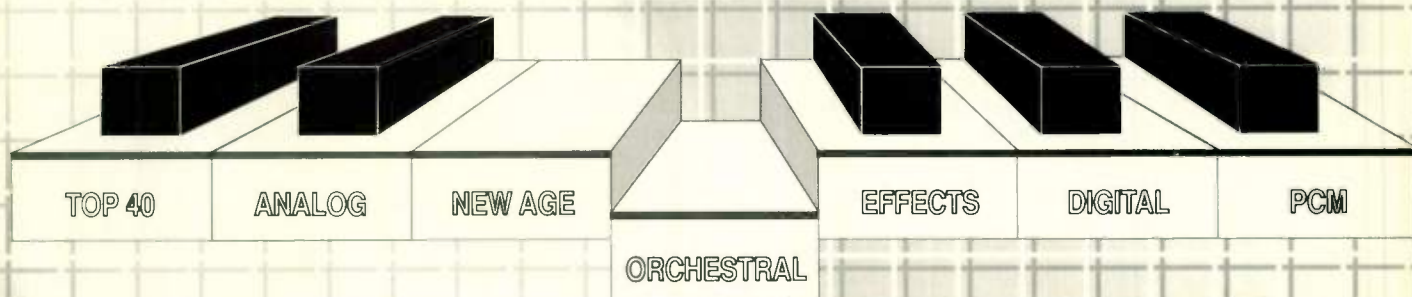


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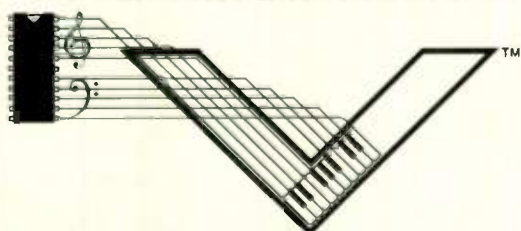
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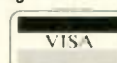
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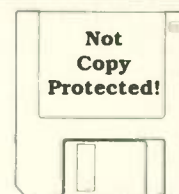
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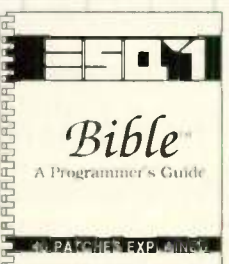
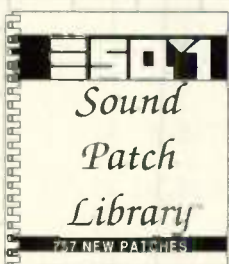
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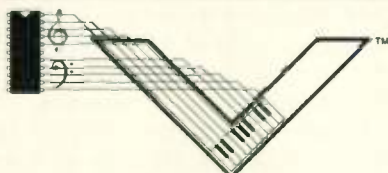
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## MiBAC V.1.2 Jazz Improvisation Software

By Lorenz Rychner

*If you have a  
Mac-based MIDI  
rig, you don't have  
to wait for the band  
to practice your  
jazz improvising.*

A

musician's life would be easier if a patient, knowledgeable backup band were available night or day. There have been some ingenious attempts at solutions to this need, the most recent of which is MiBAC Music Software's *MiBAC* program for the Macintosh. This package instantly creates bass lines, piano accompaniment, and drum patterns based on tempo, chord changes, style, and form information entered by the user, then plays them back via MIDI. You enter the basic data, make a few simple choices, click on Play, and jam.

The package, consisting of two disks and a spiral-bound manual, requires a Mac Plus or better and MIDI instruments to produce bass, piano, and drums. *MiBAC*, which is not copy-protected as of Version 1.2.2, is compatible

with Apple's MIDI Manager, a copy of which is included with the program.

The main screen, Chord Entry View (see Fig. 1), looks like a simple chord chart, with the chords positioned over a staff containing one-beat rhythm slashes. Tools and Control palettes provide access to frequently used functions.

Setup is simple, as you can either configure *MiBAC* for your system, or vice versa. MIDI channels default to 1 for piano, 2 for bass, and 10 for drums, but you can change them to match your setup and save the new settings. Overall volume for each instrument can be adjusted, as can the velocity responses. The key signature and tempo also are definable.

The program generates drum notes for three toms, snare, bass drum, open and closed hi-hat, crash and ride cymbals, and a countoff, but different drum sets can be created and saved. To change the default note numbers, simply click on the drum-note field and play the key or pad that generates that sound on your instrument. The program will enter the right number for you, and you can save the new assignments.

The intro can be up to sixteen measures long, the chorus from one to 96 measures, and the coda up to sixteen measures (see Fig. 2). The total number of measures is limited by available memory. With 1 megabyte of RAM, you can repeat the chorus as often as desired, up to 480 measures. If you have more than 1 MB of RAM, you can use the Set Memory Limits command to increase the number of measures.

Before entering chord symbols, you need to pick a style. The program offers Jazz 4/4, Jazz 3/4, Latin (straight eighths), and Slow Four (played as triplets in 12/8) styles. Each of the former three styles have three tempo-depend-

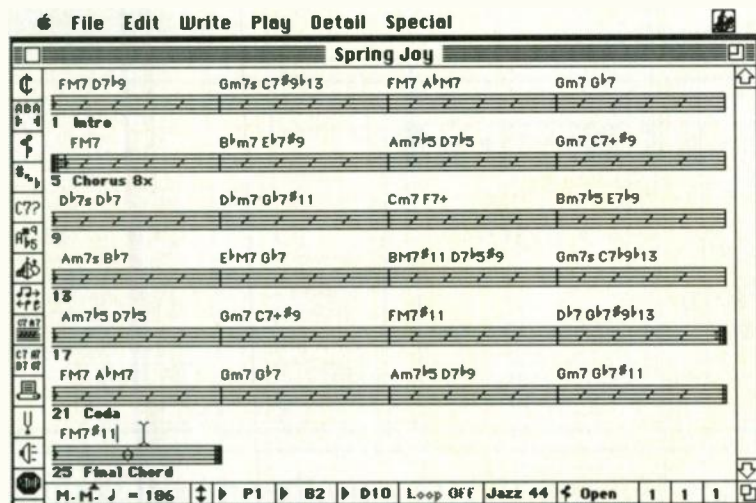


FIG. 1: MiBAC's Chord Entry View, with Tool Palette (left) and Control Palette (bottom).



ant substyles, Ballad, Normal, and Up Tempo, that reflect the different rhythmic ideas commonly used at the various tempi, and you can define the tempi at which the substyles change. The Jazz 3/4 style only allows for one chord symbol per measure (on the downbeat), and the other three styles allow two symbols (but only on beats 1 and 3).

Chord symbols may be typed in, copy-and-pasted from the Chord Help dialog box (see Fig. 3), or selected from a menu. The Chord Help dialog box offers a number of useful features. You can change the symbols to suit your preferences and, while in Chord Help, can audition the various chord types by clicking on them. You can also select open (widely spaced) or closed (block) piano chord voicings from the Control Palette in the main window.

The selection of available chord types is large, but if you want *MiBAC* to play a chord over a specific bass note

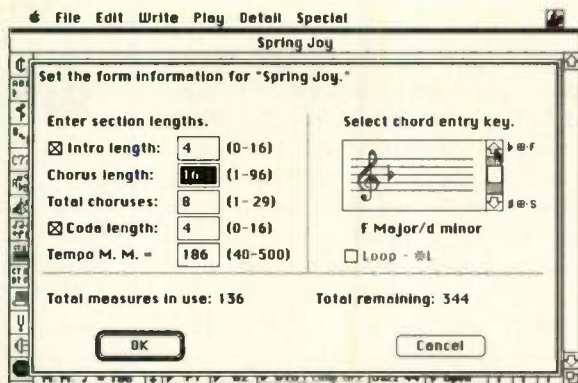


FIG. 2: Form, tempo, key, and loop are set in the Form dialog box.

other than its root, seventh, or flatted seventh, you're out of luck. This means no pedal-point bass, no chord over its third, fifth, sixth, etc., unless you export the sequence as a standard MIDI file and edit it in a sequencer. The manufacturer is aware of this limitation, and it is being considered for a future update (no promises). I suppose you can't expect to get every possible feature, and this program already has lots of options.

Before creating the parts, the program checks the chord symbols against the symbols in the Chord Help dialog box. If a chord symbol was entered incorrectly, an alert box appears, and the measure in question is highlighted. If you don't like the default symbols, you can use the Edit Quality menu command to customize them. Once satisfied, the program takes a couple of seconds to create the parts. Playback includes an optional countoff and octave transposition can be set separately for each part.

I started with Jazz 4/4 (the default setting) at a tempo of 120 bpm, with open voicings in a sort of 16-bar blues. There were a lot of nice things going on that immediately set it apart from any "auto" bass-and-chord-generator I have heard. The bass seeks out downward, chromatic approaches to downbeats (but also approaches chords from below), doesn't do too many 1-3-5 movements, and occasionally inserts a welcome, pull-off-style, rhythmic "skip" (always the same, although displaced). The drums are mostly cymbals (a couple of nice splash accents) with some bass and snare, much better and less obtrusive than the "oom-chah" I've heard elsewhere.

## Product Summary

### PRODUCT:

MiBAC V.1.2

### TYPE:

Jazz improvisation software for the Macintosh

### PRICE:

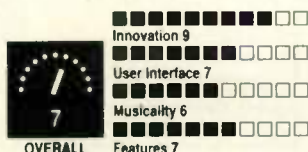
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### MAIN FEATURES:

Generates bass, piano, and drum parts; easy chord entry; MIDI playback; reconfigurable MIDI setup; four available jazz styles with substyles; exports standard MIDI files; prints chord charts; MIDI Manager-compatible

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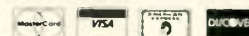
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### ● MIBAC

The piano plays an average of two "stabs" per measure. The piano changes are rarely sustained for more than two beats, and while the piano algorithm's author clearly listens to a lot of jazz, the piano comp lacks a sense of purpose. On the whole, of the three instruments, the piano is the least convincing because of a lack of variety in inversions and stiff feel, while the bass part was the best and most natural-sounding.

The Latin style, at tempi above 120 bpm, was the most convincing, with some nice licks. The Jazz 4/4 is nice, too, but Slow 4 (12/8) doesn't settle down, and the drum triplets get to be a bit much. In Latin, Jazz 4/4, and Slow 4, the drums periodically hiccup for a split second. The program is structured around small sections of one to four measures each, and apparently, the drum parts are switching, with the result often being a missing note. At first, I wanted to fire the drummer, but the programmers feel they can isolate and correct this rapidly. The problem doesn't occur in Jazz 3/4.

The manufacturer has provided a lot of features that can be used to lend interest to an arrangement. Consecutive choruses, or individual measures, can change style. Using Tweak Time, the bass part can be shifted behind the beat, for a laid-back feel, or ahead of (on top of) the beat. Random substitutions can be made from a group of 28 preselected chord qualities, including the common 9, 11, and 13 tensions and various suspended, diminished, augmented, and other altered chords. In Play mode, you can turn off any instrument, "on the fly," by using the arrowheads in the Control Palette (at the bottom of the main window). You can't make other adjustments "on the fly," though; selecting any menu or Tool Palette item brings the sequence to a grinding (and not at all precise) halt.

Several features are useful in live performance, notably the Play Multiple command, which plays up to ten songs in succession with a user-definable delay between songs. The program can calculate the duration of each song or set of songs based on form, style, and tempo.

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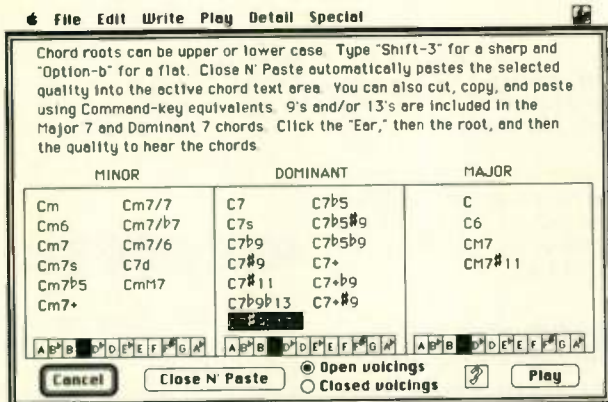


FIG. 3: The Chord Help dialog box offers a variety of chord types and two voicing options.

Most important, standard MIDI files can be saved and exported, opening the way for expansion of *MiBAC*-generated charts into complete compositions.

On the down side, the feel is rigid; a "humanizing" feature would be welcome. Chord changes on beats 1 and 3 only are a bit limiting, and in

shows properly spaced chords.

A few computer problems emerged. Sometimes, opening *MiBAC* MIDI files produces a main window partly filled with garbage. *MiBAC* hung MIDI notes on my bass parts almost every time I stopped or completed the sequence. On occasion, the all-notes-off command crashed the program, and it

the main window, the second chord in a measure is not placed over beat 3 on the chart, where it should be; instead, it's placed over the "and" of beat 1. The Chord Display View window (which, in contrast to the main window, just has chords and the appropriate barlines, without rhythm slashes, key signatures, section markings, etc.),

wouldn't launch until the Mac was rebooted. MIDI Manager's *Patch Bay* desk accessory has an all-notes-off button that works better, but you have to open the DA, click the MIDI Driver icon, then click the all-notes-off button while your sound source drones on. (*According to the manufacturers, the MIDI file garbage and all-notes-off crashes are corrected in Version 1.2.1.*—SO)

The program does what it promises. It provides a musically useful background for jazz improvisation, based on information from the user. Many of the drawbacks could be corrected in updates, and others reflect the fundamental difficulties inherent in creating an accompaniment program. In addition, the price recently was lowered to \$125, making the program a good value. Does it sound good enough to be considered music in its own right? Not in my opinion, but let's face it, jazz is the hardest style to sequence. This program makes you feel like playing, and that's a great concept. ■

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## Tools for Composers

Becoming actively involved in the creation of music often requires mastering many technical skills. Can—and should—that be changed?

By Chris Meyer



**M**ost advances in the creation of music that have occurred in the past decade, particularly in the area of electronic instruments and music software, have been aimed at what I call "the technicians." High-end hardware is designed to allow ever-more-detailed performance and/or programming; high-end software allows the editing of sound in finer and finer detail. Conversely, entry-level instruments and software, aimed at allowing more people to participate in the creation of music, seem to lower the degree of technical proficiency needed only by providing preset sounds, rhythms, and chord backings (in other words, by providing preset performances, programming, and music theory). In essence, these "user-friendly" tools merely raise the art of making music slightly beyond a passive listening experience.

For many, however, the price of going further is spending several years learning (and maintaining) the specialized, technical skills required to play a musical instrument. Even if one uses step entry on a sequencer to get around this, one still has to be familiar with a great deal of music theory—under-

stand notes, scales, melody, etc.—to create a satisfying, original piece of music. This is a steep technical hill to climb.

I think manufacturers should make an effort to appeal to the composer in us all. Most of us can hum along with the radio, anticipating the direction of the melody line or the position of a drum fill without having heard the particular song before. We know what song structure sounds "right," or at least have ideas of how we'd like a song to be assembled. We can make judgments such as "the brass should be louder" or "the bass line should be more active." In short, there are those of us who are more interested in and able to work with the overall shape and feel of a composition than the details that comprise it (i.e., the individual notes, inflections, and mathematical relationships between the notes).

So, let's envision instruments and software aimed at the composer instead of the technician. A "compostation" (as opposed to a music technician's "workstation") might be something that would provide building blocks of rhythm and melody—arrangement, permutation, tempo, and instrumentation—that the composer could shape on the structural level. A composer's instrument would not just present a preset family of instruments, but would also allow the user to assemble new instruments by specifying them in common terms such as, say, the attack of a trumpet, the sustain of a string section, or the tone of a classical guitar. An accomplished performer could then be redefined to include someone who is particularly sensitive to and adept at shaping the progress of a musical line, but doesn't actually play the notes. A particularly sympathetic composer might create a piece of music (distributed, in standard MIDI file format, via CD + MIDI) that allows the listener to

act as a secondary conductor, adjusting the levels of various instruments along with the tempo and perhaps even the phrasing.

Before a lynch mob gets formed, let me state that I don't think the efforts many have already invested in learning fingerings, envelopes, and counterpoint are worthless. Some technicians have become excellent composers based upon their deep relationships with particular instruments or harmonic systems. Accordingly, a complete "composition" station should also allow the opportunity to enter individual notes or percussion points; a complete instrument should allow the user to directly remold its timbre.

If we were to treat composition as a separate-and-equal path to creating music, more beginners would get a chance to become actively involved with music. We who are not beginners but don't have time to practice skills or study scales would appreciate it, too. We have the technology; now we need to create tools with which composers, not just technicians, are comfortable.

(P.S. I can't take credit for creating all of the above from scratch: Inspirations have included the macro instruments of Tod Machover and Joseph Chung, all from the MIT Media Lab; some of the more advanced editing facilities in Blank/Passport's sample editing program *Alchemy*; the *Interactor* software created by Morton Subotnick and Mark Coniglio from The Center for Experiments in Art, Information, and Technology [at Cal Arts]; and personal conversations with composers Morton Subotnick and John Lifton.)

To borrow from William Gibson, Chris Meyer, long-standing member of the MMA Technical Standards Board, engineer for Sequential Circuits, Digidesign, Marion Systems, and now Roland, is indeed "a very technical boy."





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