
In-Depth Software Reviews: IBM, Mac, Atari, Amiga ■ FM Patch Translation
Electronic Musician
U.S. $2.95/Canada $3.95
November 1989
STUDIO SPEAKERS:
Seeking Sonic Perfection
Local Area Networks: MIDI's Next Step?
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Electronic Musician

AN ACT III PUBLICATION
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Cover: Photograph by Pierre Goavec. Thanks to the following manufacturers: Meyer Sound (HD-1), JBL/UREI (UREI 809), and Yamaha Corp. (NS-10M Studio).

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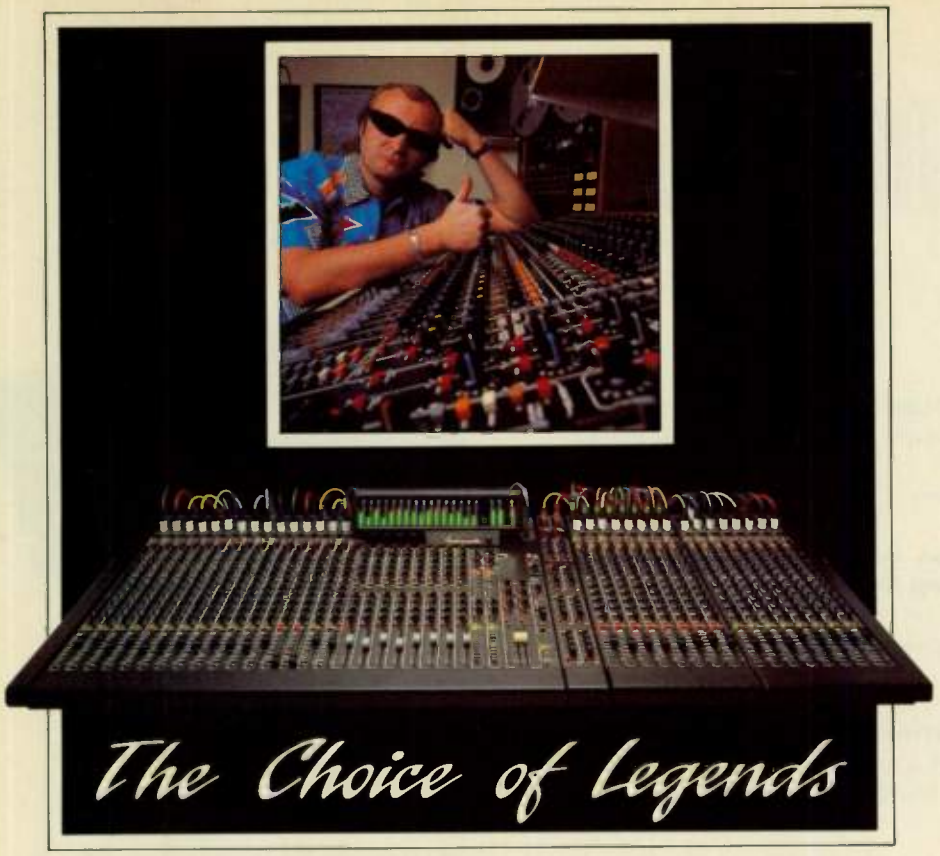

The Studiomaster Series II 16.16.2 is one of the very few affordable mixing consoles in the world which can truly offer features and audio specifications normally the privelege of top professionals.

The on-board MIDI controlled muting (MCM) system - an idea pioneered by Studiomaster - is now in 2nd generation form. MCM II responds to MIDI Note On, Note Off and Key Number information and can also READ and WRITE MIDI commands for direct communication with MIDI sequencers. The system mutes input channels and aux returns. Once mastered, it reveals a whole host of creative possibilities as well as being a very useful tool for noise elimination.

Its MIDI functions, however, are not at the expense of audio facilities. As a result, the Series II is not confined to just programming suite applications, it is a superb control room console for up to 24-track studios.

Key features of the Series II include 4-band sweep EQ (described by Sound On Sound magazine as 'simply superb'), 6 auxiliaries, outstanding on-board monitoring facilities, 100mm ALPS faders, phase reverse, 48V phantom power, expandable to 40 inputs and 24 tape monitors, rack mount power supply. Also available as 16.4.2 and 16.8.2.

Before you disregard the idea of having a mixing console tailored to your specific needs, take a look at Studiomaster's Custom Console System, Series III.

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Note New Address
For detailed color literature, contact Jim Giordano, Paul Reeve or Tony Allen at STUDIOMASTER, INC., 3941 East Miraloma Anaheim, CA 92807. Tel: (714) 524-2227. FAX: (714) 524-5095.

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FOR YOUR INFORMATION

WHAT'S NEW THIS MONTH

That little BPA logo at the bottom of the masthead this month represents an important development for us at EM. The BPA is an organization that provides an independent audit of magazine circulation figures to ensure that advertisers are reaching the number of people they think they are. Coincident with this issue, we're proud to announce EM's acceptance as a BPA Consumer Magazine member. It's just another one of the steps towards our continued success as a bigger, better, stronger magazine.

ABOUT EM (*Electronic Musician*):

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

SUBSCRIPTION SERVICES:

All subscriber services are handled by a different office from the main EM business offices. For subscription inquiries, address changes, renewals, and new subscriptions, contact: Electronic Musician, PO Box 3747, Escondido, CA 92025; tel. (800)334-8152 (outside CA) or (800) 255-3302 (CA). Do not send any other requests or items to this address. One year (12 issues) is $22; outside the U.S. and Canada, $37—all amounts in U.S. dollars. Visa and MasterCard accepted (only Visa, MasterCard, or international money orders on foreign payments). Allow 6 to 8 weeks for new subscriptions to begin or to renew current subscriptions. Postmaster: Send address changes to Electronic Musician, PO Box 3747, Escondido, CA 92025-3747.

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EM BOOKSHELF:

This mail-order distribution service (a.k.a. Mix Bookshelf) offers products (books, instructional tapes, music software, etc.) oriented toward our readership. For a free catalog, contact: EM Bookshelf, 6400 Hollis St. #12, Emeryville, CA 94608; tel. (415) 653-3307 or (800) 233-9604.

BACK ISSUES:

Single/back issue price is $3.50. For a listing of published articles, send a SASE (self-addressed, stamped envelope) to our Emeryville, CA, address and request a "Back Issue Listing."

ERROR LOG:

Occasional errors are unavoidable. We list known errors in "Letters." We compile published corrections annually for those who order back issues; to receive a copy, send a SASE to "Error Log Listing" at our Emeryville, CA, address.

CALENDAR ITEMS:

To have events (seminars, concerts, contests, etc.) listed, send dates and times *three months* prior to the event deadline to "EM Calendar Listing" at our Emeryville, CA, address.

EM NEW PRODUCTS AND REVIEW POLICY:

Manufacturers: Send press releases to our Emeryville, CA, address, attention: What's New. A release must be received three months prior to the cover date to be included in that issue. Regarding reviews, there are more products than pages available to review them. We welcome unsolicited software, books, etc., for review on a space-available basis; contact the editorial staff regarding hardware reviews.

Readers: Unless otherwise noted, EM reviews production versions of hardware/software (there are no "reviews" written from press releases). We encourage readers to scan "What's New" for new product announcements and contact the manufacturer for more information. Note: Manufacturers constantly update products, and prices and specifications stated in EM are subject to change. EM does not make product recommendations. Reviews represent only the opinion of the author.

LETTERS:

We welcome opposing viewpoints, compliments, and constructive criticism and will consider these for publication unless requested otherwise (we reserve the right to edit them for space or clarity). All letters become the property of EM. Neither the staff nor authors have the time to respond to *all* letters, but all are read. If you are having problems with your gear, please call the manufacturer, *not us.*

PROBLEMS WITH ADVERTISED PRODUCTS:

Information in ads is the responsibility of the advertiser. EM does not have the resources to check the integrity of every advertiser. However, we try to monitor ads and ensure that our readers get fair and honest treatment. If you encounter problems with an advertiser, let us know by writing to our Emeryville, CA, address. Tell us the problem and what steps you have taken to resolve it.

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Send a SASE (25¢ postage) for our author's guidelines. We welcome unsolicited manuscripts but cannot be responsible for their return.

MAIL ORDER:

While most mail-order companies are competent, sometimes there are problems. Mail-order operations operate under very strict federal guidelines; if you have any problems, contact the U.S. Postal Service for information. Order COD or with a credit card if possible. Always allow six to eight weeks for delivery; if there seems to be a problem, contact the person or company you ordered from, not EM.

DO-IT-YOURSELF (DIY) PROJECTS:

If you do not know basic electronic construction techniques, get a good book on the subject from your local electronics supply store (or try *Electronic Projects for Musicians*, available from EM Bookshelf). EM specifies parts values following international protocol, thus minimizing the use of decimal points and zeroes. A nanofarad (nF) = 1,000 pF or 0.001 µF. Suffixes replace decimal points. Examples: 2.2kΩ (U.S. nomenclature) =2k2 (Intl. nomenclature). 4.7µF (U.S.) = 4µ7 (Intl.) 0.0056 µF (U.S.) = 5n6 (Intl).

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

HELP US HELP YOU:

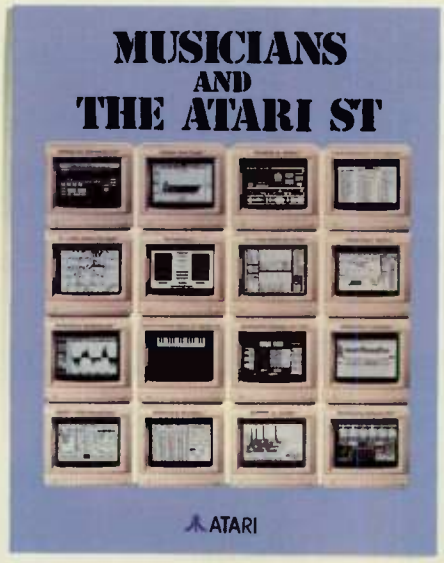
Please reference EM when asking manufacturers for product information, returning warranty cards, etc. Advertising provides our financial base, and ad purchases are based on your feedback to manufacturers about which magazines you like.

Lee's new album made use of SMPTE-Track software from Hybrid Arts™ on an ATARI MEGA 4ST. It was digitally recorded to a Mitsubishi X-850 multitrack and mastered digitally on the X-86HS at a 96 kHz sample rate. The project was co-produced by Lee Ritenour and Don Murray.

"Technically, the Atari ST handles MIDI timing better than the others. Musically, it has a great feel."

"When I went to purchase a computer, I talked to several of the top studio drummers around Los Angeles who overdub on everybody's computer tracks. I asked them which computer felt the best to them. They all told me the Atari. Whatever the technical reasons, the Atari ST just handles MIDI timing better."

LEE RITENOUR



Call now for your free copy of "Musicians and the Atari ST." You'll learn about the complete line of ATARI computers, peripherals, and accessories (MIDI-ready — not modified like other computer products) including the new laptop Stacy for musicians on the go. Also included is a free listing of over 100 software applications designed for the ST — and you.

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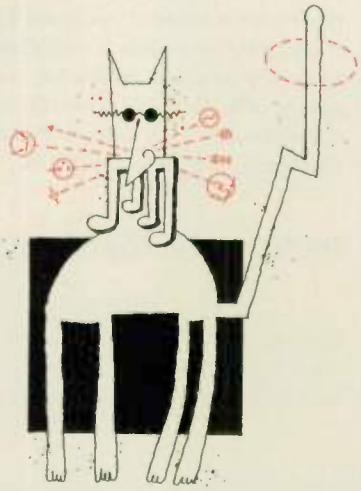
On the menu: our usual house specials of complaints and kudos, garnished with useful information and a side order of Operation Help. And don't miss our new dish, "Sampling the EM Mailbox."



MORE DO-IT-YOURSELF!

Recent articles on digital products and Pascal software diagnostics have helped me comprehend what makes this technology tick. I'm looking forward to linking my IBM clone/MIDI interface to older technology by means of MIDI-to-CV interfaces. Thanks.

Dan Becker
California

FUN WITH SIGNAL PROCESSORS

Add another effect—one of my favorite effects for voiceovers in radio production—to "Sonic Tonic" (March 1989 EM).

Pitch transposer before reverb: Send a spoken voice track (via an effects send bus) to a pitch transposer transposed down a major third. Route this output to a reverb set for 80 ms predelay and monitor the reverb wet signal only, preferably in stereo. When the original voice and reverb are combined at the console, the effect is fun—a normal voice with reverb dropped several notes deeper. This may not be musically useful, but for narrations or as a punctuator for a phrase in otherwise ho-hum copy, it's a hoot.

Al Peterson
WHEN/WRHP Radio
Syracuse, NY

MORE ON THE TOSHIBA DX900

I appreciate Steve Oppenheimer and George Petersen's work ("Letters," August 1989) in answering some questions left unanswered by my "First Take" review on the Toshiba DX900 (February 1989 issue), but respectfully disagree with some essential elements of their evaluation.

1. Steve and George closed their update by saying the DX900 has "good" sound quality. While the sound quality may not be exactly the same as a specific DAT or PCM encoder costing hundreds, and maybe even thousands, of dollars more, I personally find the differences in sound quality to be nearly imperceptible. Don't let price prejudice influence you; judge for yourself. (Also consider that the only other DAT that can record and play back a third sync track lists for $8,000.)

2. Mr. Oppenheimer misunderstood my statements when he wrote, "It is Lathrop's opinion that the DX900 sounds as good as a DAT machine." What I said was that "the DX900 is a VHS VCF with a built-in PCM processor, which means this is equivalent to a high-quality DAT recorder and top of the line VHS VCR combined in one unit." I was trying to describe the product in lay terms so that more readers could understand the nature of the product. And yes, this deck is indeed a high-quality digital audio tape recorder; I was not referring to any *specific* DAT on the market. A recent review in a competing trade publication found that tapes recorded on other 16-bit PCM encoders "sounded better when played back on the DX900."

3. You *can* record on five separate audio tracks, but not all at once. If you want separate information on the linear track you will have to use the audio dub feature. Even though the quality of the linear track is not hi-fi, it works great with sync codes. And the DX900's audio select feature lets you route either the left and right Hi-Fi tracks or, one of the Hi-Fi tracks and the mono linear track, separately to the left and right outputs of the second pair of stereo outs (during playback you are limited to only four outputs: two PCM and two Hi-Fi/Mono). If you overdub on the mono track you will find that none of the Hi-Fi information is mixed with the linear track. Unfortunately, due to EM's space limitations it was impossible to describe all these features in detail.

I wish every struggling artist could afford the gear needed to bring their music to life in the finest possible form. So far that is not possible in this world, but before assuming that 16-bit R-DAT is better, check out the DX900 for yourself. It has provided a cost-effective mastering solution for many musicians.

Rick Lathrop
Indiana

Rick—Thanks for the comments. There is no doubt that the DX900 sounds very good, and we've received many comments from people grateful that you made them aware of this machine via the pages of EM. *However, we also received one letter from someone who felt that comparing the DX900 to a DAT was "deceptive" and an "out and out lie" because the DX900 is not 16-bit.*

To that reader, let me say in Rick's defense that when he wrote the article, he could not have known that people unfamiliar with the technology would assume that comparing something to DAT automatically meant R-

DAVID POVILAITIS

DAT, recording at 48 kHz, with 16-bit resolution. There are many different types of digital audio tape recorders; for example, the R-DAT spec allows for 12-bit operation at a 32 kHz sampling rate, which the DX900 obviously surpasses. Also, "equivalent" does not necessarily mean "identical."

Regarding differences of opinion, Steve and George did a great deal of research in preparation for writing the additional information and read what they'd written to Rick for confirmation. So, although Rick may disagree with some points, Steve and George's opinions are not to be taken lightly.

In any event, the DX900 is very cost-effective, and the difference between 14-bit DX900 and 16-bit PCM-F1 operation is, according to George and Steve, roughly comparable to the difference in frequency response between 7.5 and 15 ips on a good quarter-track analog recorder. Incidentally, I've heard rumors that Toshiba was so surprised by the favorable response of musicians to the DX900 that future products will keep the specific needs of musicians in mind.

SERIOUS QUESTIONS?

A review by Howard Massey of the Yamaha V50 in your July issue raises serious questions about your editorial integrity. Howard Massey's synthesizer school, CEM, is supported by Yamaha and other music companies. His reviews are therefore of questionable objectivity.

May I suggest that you publish this information and ask how your readers feel about it.

E. Tomlins
New York

E.—Done. As to how I feel, first off Howard told us up front that Yamaha contributes equipment to CEM, so don't think he tried to pull a fast one. Second, Yamaha is one of fifty manufacturers that supports CEM (not Howard Massey; CEM). If one gets disgruntled, many more can take its place.

Third, Howard is a well-known writer who's not going to throw away his reputation for one review (note that several reviews published in competing magazines were more favorable to the product than Howard's). Besides, his extensive experience with Yamaha gear served the readers well in explaining the V50, which is why we were happy to have him review it in the first place. I notice you didn't find anything improper in the information *contained in the review; I can't either, and I stand by the review's fairness.*

THE PRO STUDIO COMES HOME: PRO

Congratulations on the article "The Pro Studio Comes Home" (August 1989 issue). Its discussion of the democratization of the music-production process that has been made possible by MIDI, DAT, CD, and associated technologies was a perfect summation of what so many of us have been trying to do for years.

I doubt many of the forces behind the development of these technologies could have foreseen it, but their work has made it possible for artists to transcend the mediocrity that characterizes so much of the music market and to produce and distribute music that is true to their own vision, with no sacrifice of production values. They have brought the ideal of the artist in society—one who is judged on talent alone, not on marketability or hairdo—one step closer.

I also appreciated the mention of my own self-produced cassette of three years ago, *The Celtic Macintosh*, and wanted to mention that it is now available on CD, thanks to KPM Music Libraries of London, England, who have picked it up for their "Themes" production-music library. The CDs were produced from my PCM-F1 digital master, through a couple of intermediate digital stages, and sound as good as the master—if not better.

Paul D. Lehrman
Massachusetts

Paul—This brings up another interesting point: once a project is committed to digital, it's fairly easy to transfer it to different digital formats. Incidentally, readers interested in obtaining The Celtic Macintosh, *either on CD or cassette, can write to Paul at 184 Palmer St., Arlington, MA 02174.*

THE PRO STUDIO COMES HOME: CON

The Pro Studio Comes Home" was extremely disappointing since it was virtually content-free. Every one of the major points—tapeless re-

SAMPLING THE EM MAILBOX

We received lots of letters about Paul Lehrman's review of *Finale*, which were just about evenly divided between praising and attacking the program. Many writers pointed out they use *Finale* extensively in their work, and couldn't live without it; others hated it. "The Pro Studio Comes Home" generated an interesting letter from a reader who questioned the validity of trying to attain "CD-quality" in the first place, maintaining that CDs are inherently unmusical and inferior to properly pressed vinyl LPs.

Commenting on the August editorial about techno-backlash, one reader agreed with the basic thrust but emphasized the importance of learning traditional theory as a way to open doors to jobs in film scoring, arranging, and related fields. In response to the June editorial on ROM upgrades, we keep getting letters from readers who are very unhappy that, despite sending in their warranty registration, they are not informed of ROM upgrades, even for fairly major improvements. The industry needs to figure out a solution to this problem—and fast.

Finally, Rick Krizman, the producer and co-composer of *Soft Wave* (the subject of a story by Robert Carlberg in the July 1989 issue) says Robert's theory of it being recorded in a megabucks studio with factory patches is all wrong: "It was recorded in my home-built garage 8-track studio on an out-of-pocket budget and mixed to a rented PCM-F1. While it's true we did rely heavily on the 'factory' sounds of the saxophones, acoustic piano, and Latin percussion, the synth sounds were almost completely original and often stacked from vintage instruments such as the ARP 2600...and Rhodes Chroma." He also suggested we spend fewer pages on reviews, and devote more attention to the people who are actually making music with all this gadgetry.

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

— Jay Graydon.
Producer, Engineer, Songwriter, Studio Guitarist. Grammy Winner.

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

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

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

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

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 progammable effects processors.

The Alesis Data Disk

The Alesis MMT-8 MIDI Sequencer won't do your taxes or spreadsheets, but it *will* play your music in the pocket. And that's the *musical* bottom line.

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cording, "DAT is good," and so on has been covered in other articles. The lack of any new information, plus the self-serving, breathless quote "This is awesome!," from a big-name engineer, made the article seem nothing more than a long advertisement for Craig's new album. And don't think I missed the graphics in Robert Carlberg's article in the previous issue ("Help us review all these reader tapes") in which Craig's new label, Sona Gaia, was shown at least ten times. Just a coincidence.

I was interested in the article because I've done the same thing myself. My self-produced, MIDI-mixed-to-PCM album, *Ascending Ayers Rock*, is distributed by New Leaf, Atlanta, GA. And I did it without the help of a "major label," big-name engineer, or 60 column-inches of cover story in EM.

Karl Moeller
Arizona

Karl—A friend once accused me (jokingly, I think) of making and producing albums just so I'd have stuff to write about. In a way, though, that's true, and I feel an obligation to explore new technologies and report on them. And please note that the "awesome" quote was deliberately chosen to comment on the quality of sound, *which can be produced by today's home recording setups, not the music itself. After all, if I was to claim that all this technology produced CD-quality sound for cheap at home, I figured it would help to have someone with credentials back me up.*

Regarding Carlberg's featuring of a Sona Gaia recording, no one at the magazine has any input into what Robert will or will not review, or when. And don't think I got any thank-you notes from Sona Gaia; some people at the label were very distressed about Robert's using the album as a means to lampoon various styles of reviews. So yes, you are correct, it was entirely coincidental.

Concerning "needing" the help of a big-name mastering engineer, I still believe, as stated in the article, that musicians should not work entirely alone or attempt to master a commercial release at home. As for 60 column inches of cover story, I'd written nine cover stories in the year prior to the August issue, many of them longer, so this isn't such an unusual occurrence. I could easily have sold "The Pro Studio Comes Home" to any one of several other magazines, but the opinion of the editorial staff was that the readers would find it interesting. Not everybody knows how all this technology fits together, nor the extent to which it will change the economics of the industry, which is perhaps why out of all the comments received regarding the article yours was the only negative one.

GOOD NEWS FOR D-50 OWNERS

For those who like to use sysex patch dumps to configure their synths for a sequence, and thought that it wasn't possible for the D-50, take heart! There is a way and it's not in the manual.

To send sysex patch info, press the MIDI button and go to MIDI menu 3. Press the button below Exclu and use the inc/dec buttons or joystick to set it to P-Dump. Then press Exit. Now whenever you select a patch, its sysex data will be sent via the MIDI out port.

The P-Dump feature should not be selected when you are using program changes because it slows them down.

Roger Hoilman
Sound Lab Productions
Delaware

OPERATION HELP

Address all Operation Help requests specifically to "Operation Help" c/o the magazine. This assures us that you understand that we will print your address and (if supplied) phone number.

Siel DK80: I own a Siel DK80 that was practically given to me three years ago without a manual. I understand most of the parameters and functions and can use it fairly well, but when I turn the volume control knob to "0," I still get sound from it. Can anyone tell me why? Also, can anyone get me an owner's manual? Craig Aulford, 118 E. Ingham Ave., Trenton, NJ 08618; tel. (609) 989-1456.

Akai AX-80: I am in need of Akai AX-80 information. User groups or informed users please contact me regarding possible expansion capabilities, patches/techniques, modifications, and all other info that could expand its functionality. Joe Oldenburg, 307 Balfour Dr. #223, Winter Park, FL 32792; tel. (407) 671-4778.

Roland TR-707: I'm looking for a librarian for the Roland TR-707 that will work with the "1986, 1987" version of TOS on the Atari 1040ST. *GrooveStore*, by Thomas Beutel (February 1987 **EM**) is not compatible with this version of the language. Carl J. Hafner, 1 Pine View Terrace, Montvale, NJ 07645; tel. (201) 391-5639

360 Systems MIDI Patcher (8x8)

Farfisa pedal: I need a volume pedal controller for a Farfisa Duo organ. Tedat, 5572 N. Leonard, Chicago, IL 60630; tel. (312) 989-7546.

ERROR LOG AND UPDATES

May 1989, "Ghost in the Machine, Part One," p. 72: The procedure described for the Korg M1 only shows the ROM version number (and only in some models). To reset the M1, depress the Int, Card, and Combi buttons while powering up. For the M1r, depress the Int, Combi, and Program buttons while powering up. This operation will erase all sequence and voice data.

July 1989, page 108: The photo of 360 Systems' 8 x 8 MIDI Patcher was actually the older and discontinued 4 x 8 version. We apologize for any confusion this may have caused.

August 1989, "*RandoM1*: A Patch Generator/Librarian for the Korg M1": An editor's note stated that an Atari ST owner must have *LDW BASIC* to use the program. More precisely, LDW BASIC, which is no longer available, is needed to compile the listing into an executable program; any ST user can run a compiled program file. **EM** readers can purchase the compiled program and source code on disk for $6.00 postpaid from the author: David Snow, 9824 Maple Leaf Dr., Gaithersburg, MD 20879.

September 1989, "New Life for Old Gear: The MIDI Retrofit Story," pg. 42: In the schematic, IC 44, pin 29 should connect to pin 4 of the PC900 (not pin 6). ■

Finally, MIDI programmable equalizers that make sense.

99 memory locations and one button. That's it. Set your levels and push a button, the MEQ 14 will do the rest.

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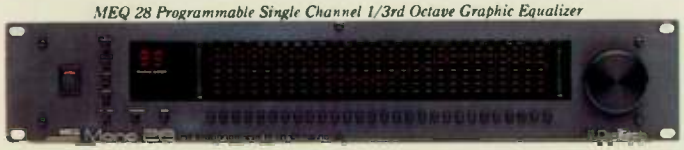
DigiTech

Start at the top

MEQ 28 Programmable Single Channel 1/3rd Octave Graphic Equalizer



MEQ 7 Programmable Quad Channel 1-1/3rd Octave Graphic Equalizer

More new goodies with which to be dazzled and delighted, including the advance scoop on a MIDI CD and new 16-bit stereo sampler from E-mu.

K. PETZKE

E-mu Systems Emax II 16-bit stereo sampler

NEWS FLASH

Passport, with Warner New Media, unveiled the world's first *MIDI CD* at the MacWorld Expo in Boston. The disc contains a MIDI sequence that's synchronized to two audio tracks; vocals are on one channel and the instrumental accompaniment is on the other. When the disc is played on the JVC XLG512NBK CD player (the only one currently equipped with a MIDI out jack), the multichannel sequence, optimized to work with a Roland MT-32, plays along with the audio tracks. A quantized version for use with a music notation package appears on three other MIDI channels. Once recorded into a sequencer and saved as MIDI file, the song can then be printed out by any music notation package that reads standard MIDI files. The beta version of the disc, which only has one song, can be purchased for $20.

Passport
625 Miramontes St.
Half Moon Bay, CA 94019
tel. (415) 726-0280

Warner New Media
3500 W. Olive Ave.
Burbank, CA 91510
tal. (818) 955-9999

Apple Computer has officially released the *MIDI Manager Toolset*, the long-awaited system software and utility that allows true musical multitasking on the Macintosh. MIDI Manager permits MIDI data to be shared by music applications, running under MultiFinder, that are modified to work with it. The software uses a graphic patch bay analogy that allows the user to create the appropriate routings. It is available from APDA (Apple Programmers and Developers Association) for $30 but will also be licensed to current MIDI developers, who will include it with updates of their existing programs.

Apple Computer
20525 Mariani Ave.
Cupertino, CA 95014
tel. (408) 996-1010

Hot on the heels of its success with Proteus, E-mu Systems has announced the *Emax II*, a new 16-voice, 16-bit stereo sampler available in keyboard and rack-mount versions that's scheduled to retail for $3,495. One megabyte of RAM, expandable to eight, is included in the base machine, and an internal 40-meg hard disk is available as an option. (A Turbo version with 4 meg of RAM and the hard disk will cost $6,495.) Four pairs of polyphonic stereo outputs and a SCSI port fill the instrument's back panel, and an improved version of the additive synthesis features found on the Emax SE fills some of its innards. Each of the instrument's sixteen voices are stereo, meaning that using built-in chorusing or stereo voices will not decrease polyphony. Like the Proteus, the Emax II's outputs can be configured as effects send/return loops. Finally, the instrument can read existing Emax disks.

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

SOUNDS

Roland introduces three ROM cards ($74.95 ea.) for the R-8 drum machine. The *Electronic* card contains electronic drums and percussion, as well as a selection of TR-808 sounds; the *Jazz* card has brushed snare, sizzle

Roland R-8 ROM Cards

(riveted ride) cymbals, and a specially tuned jazz set; *Ethnic Percussion* includes such Asian and African percussion as tabla, baya, and Japanese hand drums.

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

Valley Productions has developed a datacassette of 64 original sounds ($32.50 ppd.) for the Akai EWV

2000 wind-controlled synthesizer. The datacassette comes with data sheets and a brief tutorial on programming basics and the tape interface.

Valley Productions
PO Box 3220
Ashland, OR 97520
tel. (503) 488-2492
or (503) 773-2113

Neutrile ProFi Connectors

Syntaur Productions has released *Soundset 2* ($17.95/set; $29.95/both sets), its second set of 40 programs for the Ensoniq ESQ-1, ESQ-M, and SQ-80 synthesizers.

Syntaur Productions
11116 Aqua Vista #2
No. Hollywood, CA 91602
tel. (818) 769-4395

TAPED INSTRUCTION

Key Connection offers the *Guided Tour of the Kurzweil 1000 Series Synthesizers* ($49; California residents add $3.43 tax), an audio cassette tutorial. Kurzweil training specialist Mark Schecter teaches, step by step, the use of every feature of all K1000 models. The complete package includes four cassettes, printed QuickNotes, a glossary, and an index with cross-references to the Kurzweil manuals.

Key Connection
3735 Maple Ave.
Oakland, CA 94602
tel. (415) 530-8064

PARTS

Neutrik USA introduces *ProFi* phono connectors ($17.14/pr., $24.96/pr.), available with nickle- or gold-plated casings. A special ground shell retracts into the connector body as the signal post is inserted into the phone jack; the ground shell makes contact first, eliminating grounding noise.

Neutrik USA
1600 Malone St.
Millville, NJ 08332
tel. (609) 327-3113

POSTERS

Castalia Publications has published the *MIDI Poster* ($6.95 regular, $14.95 laminated; $3 p/h for mail orders). This 2 x 3-foot, full-color MIDI reference source includes a keyboard with overlaid MIDI note numbers, a MIDI wiring flow chart, a glossary, and sections explaining MIDI troubleshooting, patch bays and thru boxes, and drum machine operation.

Castalia Publications
PO Box 2503
Petaluma, CA 94953
tel. (707) 778-7635

MIDI

The Fatar *Studio 88* MIDI controller ($995; $1,095 with flight case) offers a weighted, 88-key, velocity-sensitive keyboard with one split point. The *Studio 88 Plus* ($1,495 with flight case) has three split points, pitch and mod wheels, 99 programs, and up to sixteen MIDI channel assignments per patch and per split.

Music Industries Corp.
99 Tulip Ave.
Floral Park, NY 11001
tel. (516) 352-4100
or (800) 431-6699

The half-rack size Pelican *MIDI Processor* ($149) features MIDI channel changing, merging, and event filtering on any channel. It includes two independent MIDI ins, MIDI thru, multiple outs, selectable patch points, and LED data indicator.

Future Music Inc.
Pelican Systems Div.
Box 1090
Reno, NV 89504
tel. (800) 367-6434
or (702) 826-6434

Castalia MIDI Poster

SYNTHESIZERS

Ensoniq released the *VFX SD* music production synthesizer ($2,595). In addition to the features found on the original VFX, the new model adds a 24-track, 25,000-note (expandable to over 75,000 notes) sequencer, an 800 KB, double-sided, 3.5-inch floppy disk drive capable of storing sequence, patch, and system exclusive data; two auxiliary outputs (dry signal out); enhanced effects algorithms; and 41 new drum and percussion sounds.

Ensoniq Corp.
155 Great Valley Pkwy.
Malvern, PA 19355
tel. (215) 647-3930

TELECOMMUNICATIONS

MIDI users are welcome on the *MIDI-Exchange*, a free (donations accepted but not required) bulletin board service run by the San Francisco

Singular Solutions A/D64x Analog/Digital Interface

MIDI User's Group. Transmission rates are 300 and 1200 baud. Online documentation and membership forms are provided.

MIDI-Exchange
PO Box 640608
San Francisco, CA
94164-0608
tel. (online only)
(415) 771-1788

PERIPHERALS

Singular Solutions is shipping the *A/D64x: Analog/Digital Interface* ($900 to $1,000) for NeXT computers. The interface, designed for both analog and digital signal capture, provides 16-bit A/D conversion, 64 times oversampling, and a three-stage anti-alias filter. Sampling is supported at 32, 44.1, and 48 kHz. The system includes balanced and unbalanced analog inputs, digital (AES/EBU) inputs, a mic preamp with +48V phantom power, and a defeatable lowcut filter.

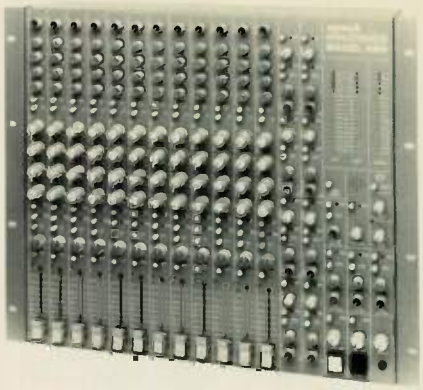
Singular Solutions
959 East Colorado Blvd.
Pasadena, CA 91106
tel. (818) 792-9567

Fatar Studio 88 MIDI Controller

MIXERS

Speck Electronics' rack-mountable *Model SSM Synth Supermixer* ($3,925; expander $3,300) offers 12 Hz to 160 kHz bandwidth; eight effects sends; parametric EQ; mute, solo, and kill switches (the latter only disables the dry signal); and many more features optimized for mixing electronic instruments. Up to two 16-channel expanders can be added to the 12-input main unit, for a total of 44 inputs.

Speck Electronics
925 Main St.
Fallbrook, CA 92028
(619) 723-4281



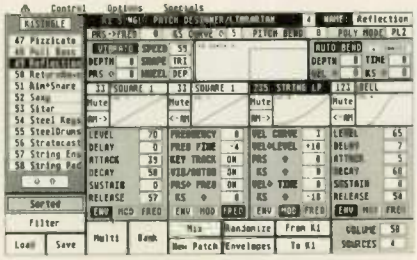
Speck Model SSM Synth Supermixer

• WHAT'S NEW

SOFTWARE

EPS Sense ($50 plus s/h), a sound-editing system for the Ensoniq EPS/EPS-M and IBM-PC/XT/AT compatibles with DOS 2.1 and later, offers a tree structure showing a complete overview of all instruments, layers, and wavesamples in memory as well as the currently selected sound; graphic envelope editing; waveform display and data transmission via MIDI.

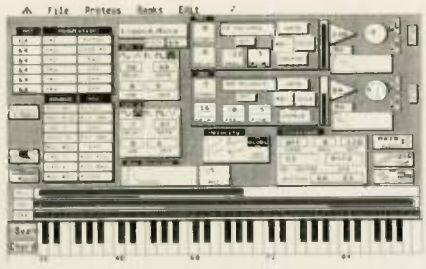
Jeffrey M. Richter
and Donna Murray
3502 Village Bridge Apts.
Lindenwold, NJ 08021
tel. (609) 346-0943
(after 6 p.m. EST)



Musicode K1 Voice Development System

Musicode offers the *K1-VDS Voice Development System* ($89) for the Kawai K1 and Atari ST. The program integrates a graphic editor/librarian with randomize and mix features and a sequencer that supports the standard MIDI file format. Screen and patch data may be printed out, and patches may be selected and edited while a sequence is running.

Musicode
5575 Baltimore Dr.,
Suite 105-127
La Mesa, CA 92042
tel. (619) 469-7194



Protezoa E-mu Proteus Editor from Interval Music Systems

Interval Music Systems has announced *Protezoa* ($139), a new editor/librarian for the E-mu Proteus and the Atari ST. In addition to standard features, Protezoa has a sophisticated user tuning editor, permits parameter adjustments to be made via MIDI messages, such as mod wheel, and supports editing of up to six Proteuses at once.

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

REV UP

Akai (tel. [817] 336-5114) released V. 2.0 software for the Akai-Linn MPC60 MIDI Production Center and ASQ10 MIDI sequencer. The upgrade is free except for installation of the four chips, and adds support for four sets of 16 MIDI output channels each, simultaneous 16-channel recording, individual track volume control, and much more...**KAT** (tel. [516] 481-3004) released software V. 2.0 for the drumKAT (free to registered owners). Each "kit" can be assigned a name, the Tap Tempo function has been expanded, and trigger interaction suppression has been implemented (preventing cross-triggering of external pads on the same stand). A riff generator, optimized for drummers, has been added...**Ensoniq** (tel. [215] 647-3930) released EPS operating system 2.4, available free from dealers. Several new features have been implemented, including a tap tempo function, and bugs have been fixed in the Quantize function, Delete Sequence command, Load Song disk operations, and more.

CALENDAR

October 28-29 Songwriter Expo '89. Los Angeles Songwriters Showcase (LASS); tel. (213) 654-1665.

November 7-10 Sony APR-5000 technical service training course. Sony Professional Products, 1400 W. Commercial Blvd., Ft. Lauderdale, FL 33309; tel. (305) 491-0825, ext. 186.

November 13-17 Sony APR-24 technical service training course. See above. ■

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In Canada: Yamaha Canada Music Ltd., 135 Milner Avenue, Scarborough, Ontario M1S3R1

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TIMBUK3

Pat & Barbara K. MacDonald

Fostex Equipment: D-20 Digital Master Recorder, E-8 MTR, 4030/4035 Synchronizer / Controller, 4010 SMPTE Time Code Generator, RM-865 and RM-900 Near-Field Reference Monitors, T-20 Headphones.

Recent Projects: TIMBUK3's first album, "Greetings from TIMBUK3" (I.R.S.), was recorded on a B-16 (forerunner of the E-16). Their third and newest album, "Edge of Allegiance" (I.R.S.), is the first digital project for the group. They use a D-20.

Graham Nash

Member, Rock & Roll Hall of Fame

Fostex Equipment: E-16 MTR, 4050 MIDI Remote, T-20 Headphones.

Recent Projects: Graham's recent solo album, "Innocent Eyes" (Atlantic) was recorded in Los Angeles, Hawaii and Massachusetts. Most of the compositions and arrangements were worked out at home on his E-16. The hit "Shadowland" from CSN&Y's latest album, "American Dream" (Atlantic), was recorded on the E-16.

FOSTEX PRO

Tom Scott

Musician/Composer

Fostex Equipment: E-16 MTR (2), E-2 Master Recorder, 4030/4035 Synchronizer / Controller, 4010 SMPTE Time Code Generator, T-20 Headphones.

Recent Projects: Nationally recognized band leader of "The Pat Sajak Show", Tom's latest albums are "Streamlines" and "Flashpoint" (GRP Records). He also scored the NBC TV Movie "American River", and the film "Sea of Love" starring Al Pacino features his distinctive sax.

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Stewart Levin

Musician/Composer

Fostex Equipment: B-16 MTR, 4030/4035 Synchronizer/ Controller, 4010 SMPTE Time Code Generator, T-20 Headphones.

Recent Projects: Stewart writes the music for several popular TV shows — "thirtysomething", "The Wonder Years", "The Dick Van Dyke Show '88" — and he scored the feature film "Heathers."

MIDI Programming in C, Part Three: Patch Librarian Basics

If you did your homework from Parts One and Two, you're ready to "roll your own" simple, IBM-compatible patch librarian.

By Jim Conger

In Parts One and Two (September and October 1989 **EM**), we programmed your computer to send and receive MIDI messages. If you are feeling adventurous, the next logical project is to write a patch librarian program. Patch librarians send and receive the internal settings of a synthesizer and allow you to edit the settings on the computer's screen. I'll use the Roland MT-32 as an example to get you started.

Synthesizer patch librarians consist of three basic operations:

- Sending and receiving MIDI data from the synthesizer's memory via MIDI system exclusive (sysex) messages
- Allowing the user to edit the data (windows, menus, etc.)
- Storing and retrieving the patch data on the computer's disk

The second and third operation are common to most computer programs, so we won't spend time on those topics here. Let's concentrate on communicating with the synthesizer. In Part Two we created the *testmidi.c* program. This program is ideal for trying out some sysex commands.

Sysex messages are the window the MIDI standard leaves open for sending instrument-specific data such as sound parameters. Most if not all MIDI-equipped synths support sysex access to the synth's internal settings.

SYSTEM EXCLUSIVE MESSAGES

Sysex messages have the following general format (in hex; see sidebar "Hexadecimal Base-ics" in Part Two):

F0	Start of a sysex message.
##	The manufacturer's ID number; 41 is Roland, 43 is Yamaha, etc. Frequently, a second byte distinguishes different models.
##	Command byte; says what type of message this is (request for data, transmission of data, acknowledge, etc.).
##	Data bytes; all data bytes have to be less than 80 hex (high bit zero).
F7	End of sysex message.

You have to dig into your synth's MIDI implementation guide to find out which messages are supported. For a patch librarian, we are looking for a RQD (Request Data) and WSD (Want to Send Data) message or equivalent.

You also have to think about how the data is organized during transmission. Older synths tend to send the data out in fixed blocks. The new synths have started using "address mapping." This means each parameter in the synth can be accessed individually by using its address.

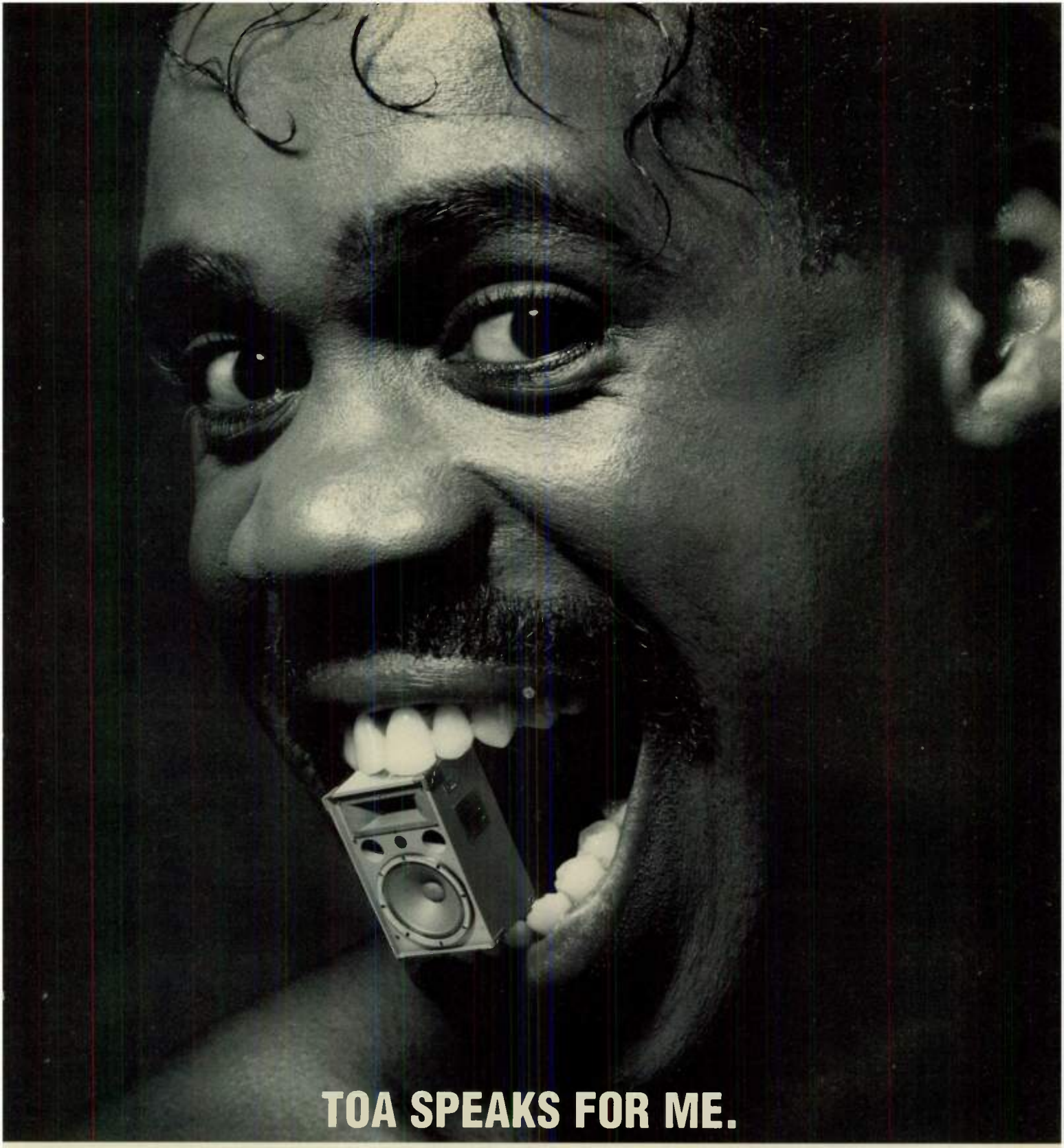
One other general consideration has to do with error checking. Most sysex protocols check the integrity of the transmitted data by sending along a checksum. This is a number that, when added to the sum of all the data transmitted, equals zero. As we are limited to seven bits within the sysex message, the checksum only checks the seven least significant bits of the sum.

AN EXAMPLE: THE ROLAND MT-32

The MT-32 provides a good example of an address-mapped synth. You can use the testmidi.c provided last month to try out some data requests. Here is the sequence of data bytes you should send to dump the first sixteen bytes (10 hex) from the MT-32's memory. The address of those bytes is 00 00 00 to 00 00 0F.

F0	Start sysex message.
41	Roland's ID.
01	Device number = basic MIDI channel. The MT-32 starts up with MIDI channel 2 being the lowest channel.
16	Roland's model number for the MT-32.
41	RQD or ReQuest Data.
00	Address, most significant byte (7 bit).
00	Address, middle byte (7 bit).
00	Address, least significant byte (7 bit).
00	Size of data, most significant byte (7 bit).
00	Size of data, middle byte (7 bit).
10	Size of data (16 decimal), least significant byte (7 bit).
70	checksum = 0 - sum of least significant bits (left 7 bits) of address and data bytes.
F7	End sysex message.

ILLUSTRATION BY J. OTTO SIEBOLD



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When the MT-32 gets this stream of data, it will respond by sending back a system exclusive message containing the requested data. In this case we requested sixteen bytes, starting at the beginning of the MT-32's memory. The re-

C Language MT-32 Dump Request

```
/* dumpmt32.c   Dump MT-32 contents to screen, 16 bytes at a time */
/* link with io401.c                          - Jim Conger  1989 */

#include <stdio.h>          /* library function header files */
#include <conio.h>
#include <ctype.h>
#include "io401.h"

#define BUFSIZE 100         /* how big to make data buffer */
#define ROLID   0x41        /* ID for Roland equipment */
#define EXCLON  0xf0        /* MIDI Exclusive On */
#define EXCLOFF 0xf7        /* MIDI Exclusive Off */
#define MT32ID  0x16        /* The MT-32 ID number */
#define RQD     0x41        /* Exclusive code for Request Data */
#define ESC     27          /* ASCII for escape char */


main()
{
    int i, j, k, n, m, a1, a2, a3, d1, d2, d3, checksum;
    static int mdata[BUFSIZE];  /* store midi data here */

    clear_input();      /* pull any waiting data off of mpu */
    putcmd(UART);       /* put MPU-401 in UART mode */
    set_delay(50);      /* slow midi to not confuse MPU (fast 386 only) */

    a1 = a2 = a3 = d1 = d2 = 0;
    d3 = 0x10;
    printf("\nESC to quit, any key to continue.\n");

    while (1){
        if(kbhit()){
            n = getch();
            if (n == ESC)       /* quit if ESC key pressed */
                break;
            j = 0;
            while ((i = getdata()) != -1){  /* read in MIDI data until none */
                mdata[j++] = i;             /* add new data to buffer */
                if (j > BUFSIZE - 1){
                    printf("\n*** MIDI data overflowed buffer ***");
                break;
                }
            }
            if (j){                         /* if the buffer has some data */
                printf("\n");
                for (k = 0; k < j; k++)     /* print all in one shot */
                    printf(" %02x", mdata[k]);
                printf("\nAscii: ");
                for (k = 0; k < j; k++){    /* show ascii too */
                    if (mdata[k] <= 0x20 || mdata[k] > 0x7E)
                        printf(".");
                    else
                        printf("%c", mdata[k]);
                }
            }
            putdata(EXCLON);    /* send the complete exclusive message */
            putdata(ROLID);
            putdata(1);         /* unit number 1 - see text notes */
            putdata(MT32ID);
            putdata(RQD);
            putdata(a1);        /* address bytes */
            putdata(a2);
            putdata(a3);
            putdata(d1);        /* data bytes */
            putdata(d2);
            putdata(d3);

            checksum = a1 + a2 + a3 + d1 + d2 + d3;
            putdata((0 - checksum) & 0x7F);
            putdata(EXCLOFF);
            delay(1000);                /* only needed on fast computers */

            a3 += 0x10;
            if (a3 & 0x80){             /* increment address, 7 bit numbers */
                a3 = 0;
                a2 += 1;
                if (a2 & 0x80){
                    a2 = 0;
                    a1 += 1;
                }
            }
        }
    }
    putcmd(RESET);
}
```

LISTING 1: dumpmt32.c, a program to dump MT-32 sysex patch data to screen.

sponse will look something like the data below:

F0 41 01 16 42 00 00 00 01 30 18 32 0C 00 01 00 50 07 00 00 00 00 00 00 21 F7

The first four bytes are the same as those sent. Byte 5 is 42 hex, a DAT (data) message. The next three bytes are the address of the data requested (00 00 00). Next are the sixteen data bytes, corresponding to the MT-32's Patch Temp area for timbre 1. The last two bytes are the checksum and the F7 hex end system exclusive.

You can ask for more than sixteen bytes at a shot. No matter how large a chunk is requested, the MT-32 limits data to 256 bytes per message. After a 256-byte message, the MT-32 pauses and waits for a 43 hex ACK (acknowledgment) message, like:

F0 41 01 16 43 F7

This lets the MT-32 know that the last message was received, so it can continue. If you do not get the checksum right, when you send your data request, you will get a 4E hex ERR (error) message:

F0 41 01 15 4E F7

Finally, the MT-32 will send a 4F hex RJC (rejection) message if it does not know what to do with the last sysex message it received.

THIS MONTH'S C PROGRAM: dumpmt32.c

Dumpmt32.c provides the nucleus of the sysex data capture for an MT-32 patch librarian. To get it running, compile it with io401.c (from Part One). Once started, it dumps the memory contents of the MT-32 to the screen, sixteen bytes at a time. The contents are shown in both hex and ASCII. (ASCII is handy if you are looking to pick out a patch name.) You will need the MT-32 MIDI implementation guide to make sense out of all the hex data.

There is one little hitch in the MT-32's sysex implementation. For some reason, the tenth request for sixteen bytes of data results in the MT-32 doing nothing. You can get around this by adding one to the unit number (third byte of the sysex message). This advances the address map by 10 hex. When unit = 2, the address is 00 00 00, just as when unit = 1, the address 00 00 10.

There is so much in an MT-32 that few people have learned to program it. After you've filled the screen a few times, you will probably be surprised to find you have only seen the data for the eight active sounds and the percussion section. To see all the data for all 128 sounds in the MT-32's memory requires that you select a new set of eight patches before each dump. Of course, you can automate this by selecting patches on each channel with MIDI program change messages.

FINISHING UP

Writing this reminded me of the times I stared at a synth's MIDI implementation chart, wondering what the overworked Japanese engineer was thinking when he handed his illegible notes to the English translator. Reading the MIDI implementations is one of life's trials, but the rewards are worth it.

Jim Conger *is the author of* C Programming for MIDI *and* MIDI Sequencing in C.

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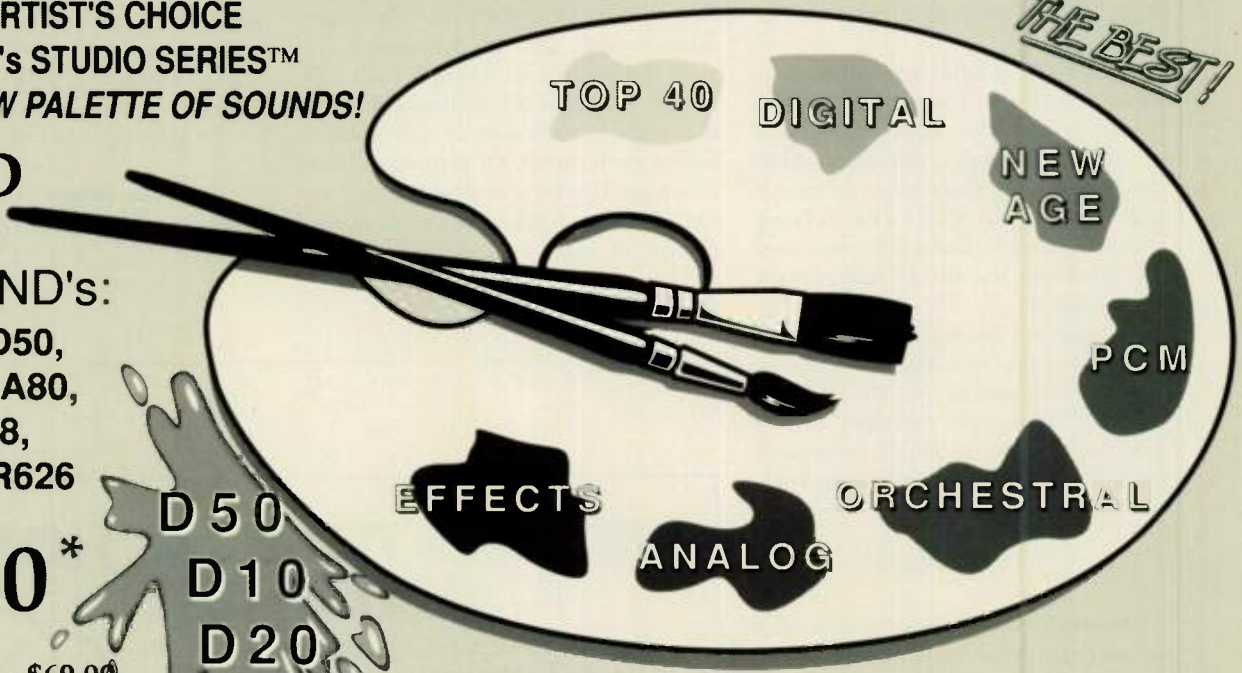

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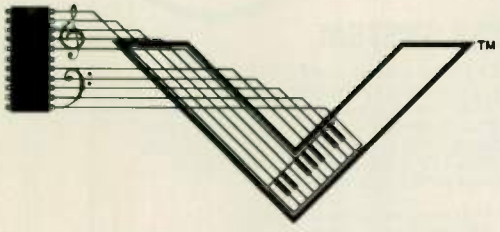

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FM Synthesis: 6-Op to 4-Op Program Translation

Want 6-op sounds from your budget 4-op FM synthesizer? Here's a method for translating some of the existing library of 6-op sounds over to your 4-op machine.

By Richard Viard

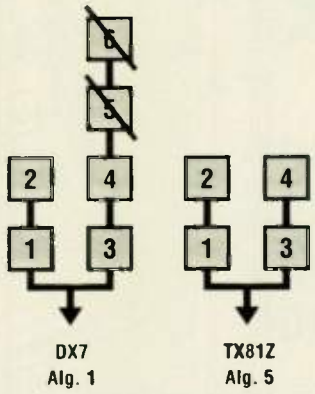

FIG. 1: DX7 algorithm 1 is identical to TX81Z algorithm 5 if operators 5 and 6 aren't used.

The Yamaha DX7 probably has had more sounds developed for it than any other synthesizer, which is great if you own a DX7 or other 6-operator FM synthesizer. However, if you have a 4-operator synthesizer like the extremely popular TX81Z, your patch choices are more limited.

Using a TX81Z mostly as an expander for a DX7, it always seemed that I liked the DX7 sounds better and couldn't find their equivalent on the TX81Z. So, I decided to do something about it. The technique described here lets you "port" (translate) a great many 6-op, DX7-type sounds over to your TX81Z (or just about any other 4-op synthesizer), thereby increasing your sound library. While not all patches can be successfully translated, you'll be surprised at how helpful this technique can be.

This article is for fairly advanced programmers, and you have to be familiar with the parameters for both 6-op and 4-op instruments (refer to your owner's manual if you need help). Then again, if you are not a programming expert, this might be a good place to start.

Monitor both instruments through good speakers, and use a mixer so you can set them for the same level and switch between them. Set up both units so you can read the displays and reach the controls easily.

LIMITATIONS

Six-op patches using features not included on a 4-op synth (for simplicity's sake, we'll refer to the 6-op synth as "DX7" and the 4-op synth as "TX81Z") will not always transfer successfully. Always check whether a 6-op patch has any of the following before you start:

- Pitch EG levels different from 50. The TX81Z does not have a pitch envelope generator, so set all levels to 50 on the DX7 to disable the Pitch EG. Listen to the patch; if it's still worth porting over, proceed.
- Patches using a low, fixed frequency (1.0 Hz) for a carrier operator. Set the frequency to ratio 1.00 and again judge whether the sound is worth translating.
- Crucial level-scaling settings. The TX81Z only scales -Lin Right with a break point of approximately MIDI note C1. One compromise is to adjust different operator output levels, but the scaling will be different. This makes it difficult to transfer patches with a split or "scaled" keyboard (i.e., different from left to right).
- Sounds using LFO wave Saw Down for pitch modulation (many electronic drum sounds).
- Complex envelopes whose Level 1 setting is between 40 and 85, or whose Level 4 setting is greater than 0. On the DX7, set Level 1 to 99 and Level 4 to 0 and consider if the patch is still worth transferring.

Fortunately, lots of very good DX7 sounds do not include any of these limitations, or sound satisfactory with the above changes.

THE ANALYSIS PROCESS

Select a DX7 sound for translation and enter the edit mode. Check for limitations (as described earlier) and observe which algorithm the patch uses. As you play a note, mute each operator one at a time using the operator on/off function and look for any operators that contribute little or nothing to the sound. Lots of DX7 sounds use only three or four operators, or have some operator output levels set too low to be heard. Now try to find an algorithm on the TX81Z that corresponds to the DX7 algorithm with its unused operators removed.

Fig. 1 shows DX7 algorithm 1. If we find that operators 5 and 6 aren't needed, and neither is feedback, then algorithm 5 on the TX81Z is the exact equivalent. However, when comparing, be aware of some possible problems. For example, in Fig. 2 it appears that DX7 algorithm 2 is similar to TX81Z algorithm 5 if operators 5 and 6 aren't used. However, feedback is applied to operator 2 on the DX7 and operator 4 on the TX81Z, so you would need to transfer operator settings

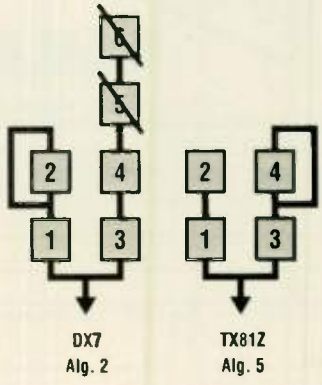

FIG. 2: Although DX7 algorithm 2 is similar to TX81Z algorithm 5 if operators 5 and 6 aren't used, feedback is applied to operator 2 on the DX7 and operator 4 on the TX81Z.

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for operators 1, 2, 3, and 4 to TX81Z operators 3, 4, 1, and 2 (respectively). This preserves the same sound.

If all six operators are necessary for a patch, you can use two different 4-op Voices (in Yamaha terminology), grouped in a Performance, to get up to eight operators. This technique limits the number of notes you can play at the same time, so it is probably most applicable to lead or bass sounds.

START PROGRAMMING

Initialize a TX81Z voice and start programming from the top of the Parameter Edit page. Follow the DX7 to TX81Z transfer chart (Fig. 3). Compare algorithms and try to find one on the 4-operator synth that matches the algorithm used on the DX7; set the feedback amount if applicable.

You may have to adjust some of the LFO values by ear, since the chart values are approximate and represent only a point of departure. The AMS value for a 4-op synth is the same for all operators, so pick an average of the DX7 values.

When entering the frequency values, you will not be able to get small increments (the TX81Z Frq. Fine value moves 0.06 steps at a time). The trick is to multiply the DX7 Frq. ratios by 1.5 and transpose middle C down a fifth (e.g., if DX7 = C3, TX81Z = F2). This will allow you to get Frq. values such as 1.49, 1.50, 1.51, and so on (start with Frq.

DX7	TX81Z/4-OP SETTINGS, WITH COMMENTS
Algorithm	Found via analysis and comparison
Feedback	Same value; make sure it affects the same operator
	LFO WAVEFORM
Triangl	Triangl
Square	Square
S/Hold	S/Hold
Saw up	Saw up
Saw dwn	No equivalent
Sine	Triangl
	LFO SPEED
6	13
14	20
21	25
32	30
41	35
56	40
65	45
	LFO DELAY
30	02
36	05
34	10
41	15
48	20
49	25
59	30
70	40
78	45
82	50
88	55
93	60
97	65
PMD	Same value
AMD	Same value
SYNC	Same value
PMS DX + 2 = TX value	Round off to nearest value
AMS DX -2.33 = TX value	Round off to nearest value
Vel. Sens	Same value
Freq	Same value (or DX x 1.5 = TX); Frq. ratios only, set middle C = F
Detune	Same value; change frq. ratios for ±4 or more
	ENVELOPE GENERATOR
Rate 1 - 3.19	AR value (TX Lev 1 = 99)
Rate 2 - 3.19	D1R value
Level 2 - 6.6	D1L value
Rate 3 - 6.19	D2R value
Rate 4 - 6.6	RR value (TX Lev 4 = 0)
Level 3	If DX Lev 3 is greater than 0, Lev 3 - 6.6 = D1L; if DX Lev 3 = 99, TX D2R = 0
Output Level	Same value; set these at the end of the translation process
	RATE SCALING
DX - 2.33	TX value
Level Scaling	Same value if -LIn right with Break Point around C1; otherwise compensate with output level
Key Transpose	Same value (or down a fifth if Frq.ratios were transposed)

FIG. 3: DX7 to TX81Z transfer chart.

Coarse set to 1.41 then adjust Frq. Fine to 1.49; start with Frq. Coarse set to 0.87 to get 1.51). The 4-op detune parameters are also limited (-3 to +3). If further detuning is needed, change the Frq. ratios as described above.

There's no need to consider the waveform since the DX7 only generates sine waves (W1 on the TX81Z). However, you can use different waveforms later to "polish" the patch and simulate the fullness of 6-operator sounds.

ENVELOPE TRANSLATION

The next step is to reproduce the DX7's 5-stage envelope with the more limited TX81Z settings. Fig. 3 gives formulas for envelope parameter translation. Note that on the TX81Z, Level 1 is fixed to 99 and Level 4 to 0. If DX7 Level 3 is 99 (the sound sustains as long as the key is down), set the TX81Z D2R to 0. For patches using special envelopes to create double attacks, try using the TX81Z's Delay function (Effect 1, accessed in performance mode). Envelope shift is not featured on the DX7, so we won't use it at this point.

Leave the output levels as they are for now, then set the scaling parameters.

Unless your DX7 has been retrofitted, it will not save Function data for each patch; therefore, set the TX81Z Function data (pitch wheel, modulation wheel, breath controller, etc.) as desired. Next, enter the Key Transpose value and don't forget to transpose down a fifth if you multiplied the Frq. ratios by 1.5. Notice that fixed frequencies are not affected by this technique; do not multiply them.

THE FINAL COAT

Polishing the patch involves listening and comparing. Go back to the Output Level page on the TX81Z and set operator 1 to match the DX7 setting. Compare both sounds by switching from one to the other, making sure you play the same note with the same dynamics. Start with middle C.

Compare the attacks; the TX81Z AR is usually a little too fast. Then compare the sustains (R3/D2R). Hold a key down as long as the sound lasts (a stopwatch might help for long sustain sounds), then check the release (R4/RR). While playing short notes, listen to how long the sound takes to decay and adjust the TX81Z values if needed.

At this point, the envelopes on both instruments should sound the same at

● 6-OP TO 4-OP

	1 Car	2 Mod	3 Car	4 Mod	5 Mod	6 Mod
On/Off	☒	☒	☒	☒	☒	☒
EGRate	69 99 99 49	58 27 99 47	46 99 99 46	58 27 99 0	58 27 99 0	58 27 99 0
EGLev	99 14 99 0	99 89 88 0	99 99 99 0	99 99 95 0	99 89 87 0	99 89 88 0
Scaling	0 A-1 0	0 A-1 0	0 A-1 0	10 C3 0	4 C3 6	0 C3 26
Curve	-Lin -Lin	-Lin -Lin	-Lin -Lin	+Lin -Lin	+Lin +Lin	-Lin -Lin
Output Level	99	83	99	82	80	75
Vel RSc AM	0 2 0	3 1 0	0 2 0	0 1 0	0 1 0	0 1 0
Freq	r 1. 01 +2	r 1. 01 -2	f 1.0 00 0	r 1. 00 0	r 1. 00 +5	r 1. 01 0
M Coar Fine Det						

Pitch EG	Rate	99	67	95	60
	Lev	48	50	50	50

Range - Vel - RSc -

LFO Wave | Spd 37 | Del 0 | PMD 2 | AMD 71 | PMS 2 | Sync Off | Mode -

Algorithm 2
Key TP C2
Feedback 7
Key Sync Off

DX7

OPERATOR	op1	op2	op3	op4
on/off	ON	ON	ON	ON
out level	99	67	99	82
freq. type	RTO	RTO	RTO	RTO
fix range	255	255	255	255
freq. coarse	4	4	3	3
freq. fine	8	8	6	6
detune	+0	+0	+0	+0
	1.50	1.50	1.51	1.51

ENVELOPE

attack rate	11	14	21	18
decay 1 rate	31	8	14	8
decay 1 level	15	15	15	13
decay 2 rate	0	0	0	0
release rate	6	1	6	6
eg shift	OFF	OFF	OFF	OFF

SCALING/SENS

rate	1	0	1	0
level	0	0	0	0
ams on/off	OFF	OFF	OFF	OFF
sens eg bias	0	0	0	0
key vel	0	0	0	3

voice name: X-PANDER
algorithm no. 5
feedback 7

LFO
waveform sync OFF
speed 33 delay 0
amp mod depth 0 sens 0
pitch mod depth 0 sens 5

FUNCTION
mode POLY mid C = F 1
portamento FULL rev rate 0
porta time 0 pb range 2
vol 40 pitch 0
pitch 0 amp 0
amp 0 eg bias 0
pitch 50 p bias +0
amp 0

TX81Z

FIG. 4: The top shows the printout of parameters for "X-Pander," a DX7 patch. Below is a translated version of the same patch for the TX81Z.

middle C. Try playing higher notes and check if they remain similar. If not, adjust the Rate scaling (set it higher if the envelope is too long, lower if it is too short). Repeat this operation with all carrier operators, monitoring only one operator at a time. Then turn on a modulator and its related carrier, adjust its output level (which will sometimes need to be set lower than the DX7 level), and repeat the Envelope/Rate scaling adjustments.

If it is difficult to hear the modulator's envelopes in context with a carrier, you can set the DX7 to algorithm 32 and the TX81Z to algorithm 8, and mute all other operators. The modulator then becomes a carrier and you can adjust its envelope more precisely. However, don't forget to reprogram both synths to their original algorithms.

Repeat these procedures for all four operators, then turn them all on (except, of course, for any not used on the DX7). At this point, the sounds should be very similar, if not identical. I usually save the patch at this point and start experimenting with different waveforms, envelope shifts, EG bias, scaling, etc., to see if I can improve upon the basic sound.

As a practical example of how all this works, refer to **Fig. 4**, which shows a DX7 patch and its translated equivalent for the TX81Z.

THE REWARDS

This might sound like a lot of work, but as you become familiar with the process, you will get results without taking too much time—and learn a lot about programming as well. I usually spend less than 30 minutes per patch and get fantastic results. Percussion sounds are my favorite since the envelope is not as critical as it is in complex, sweeping sounds. Have fun and remember, what you hear is what counts; don't get fooled by the numbers.

Richard Viard *studied composition and arranging in France and in Boston, MA, where he founded Sound Force Productions, a jingle and film music production house. He also performs with R&B/funk band Rendez-Vous and is a part-time songwriter, arranger, and graphic artist as well as a guitar instructor.*

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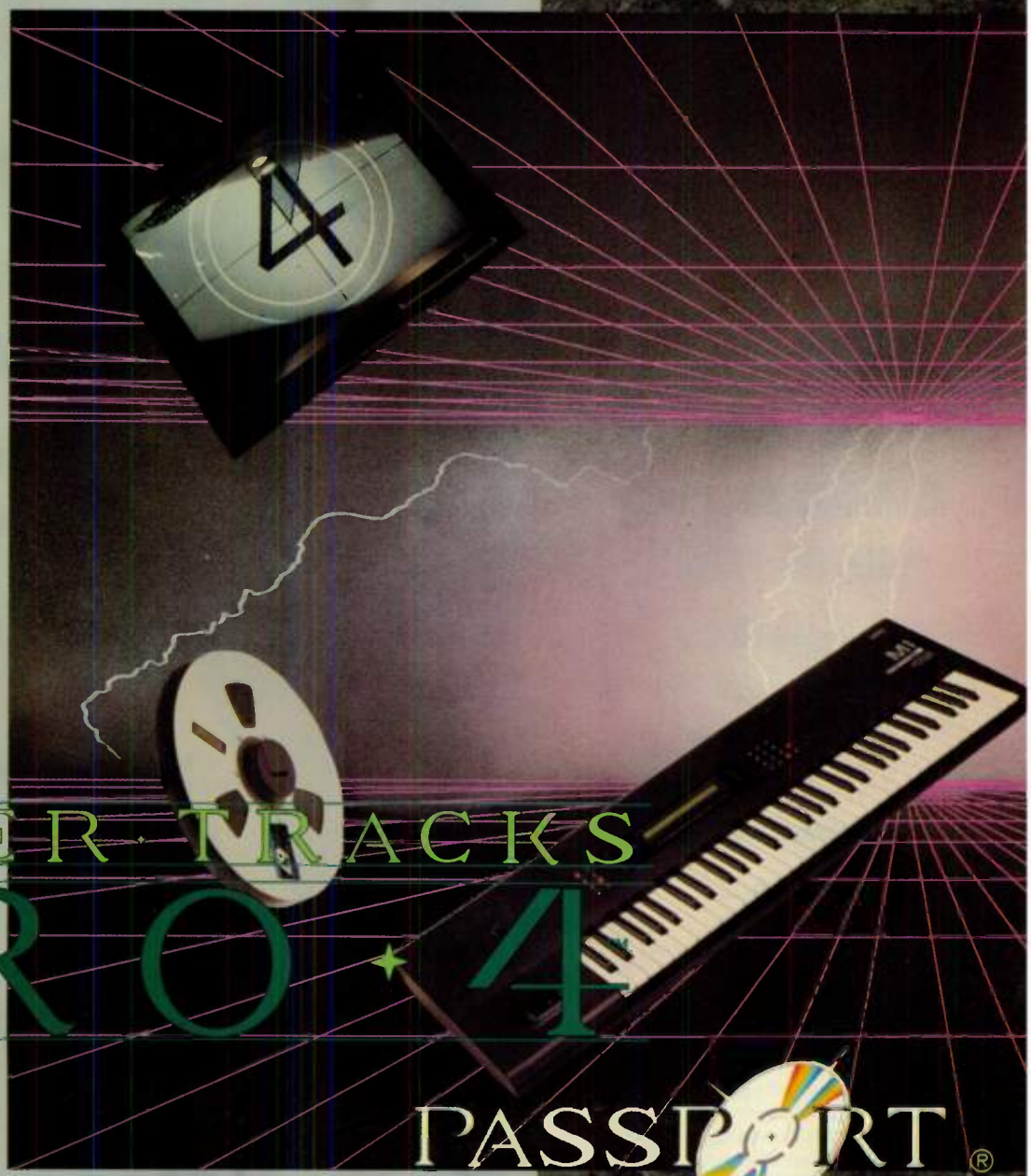

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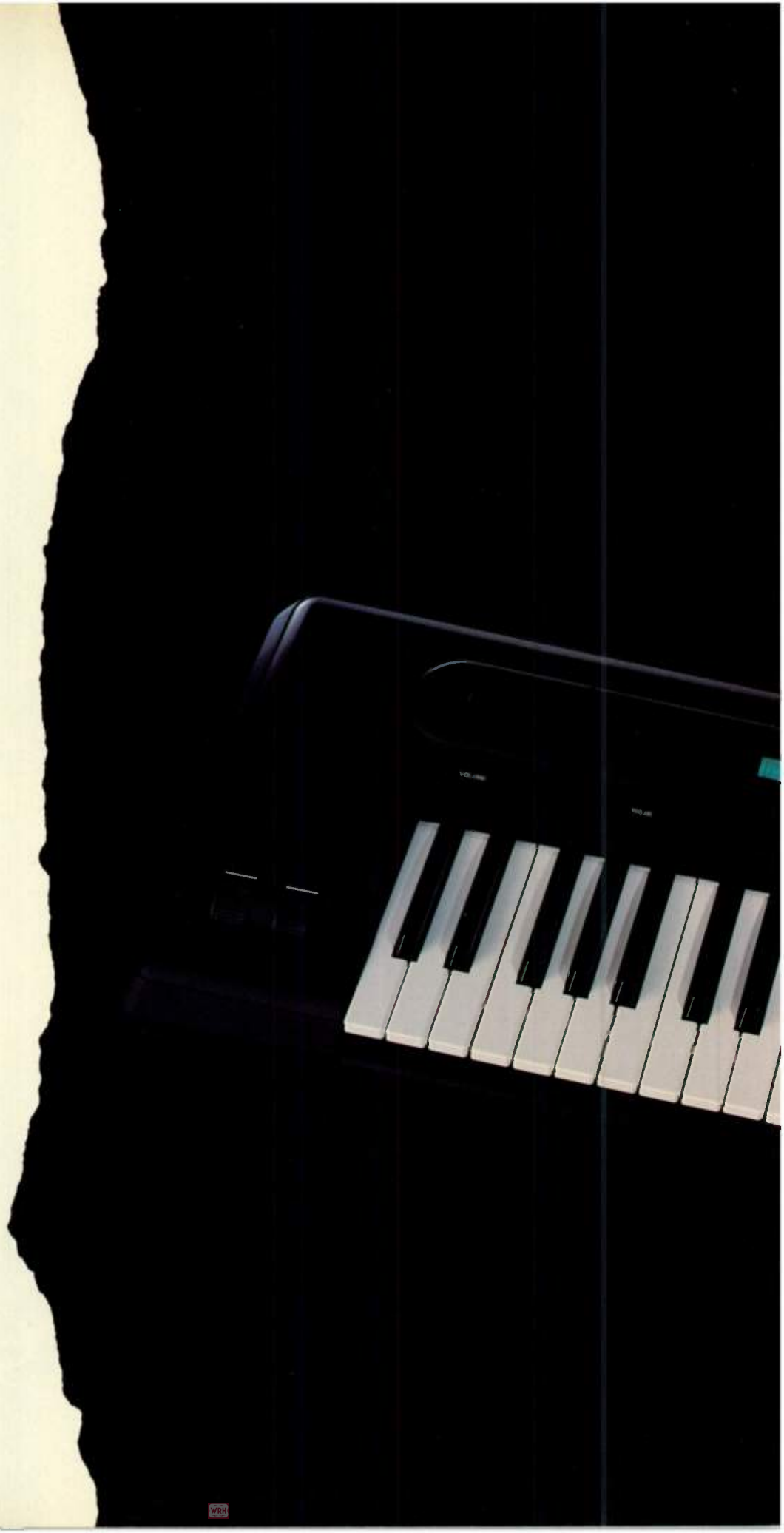

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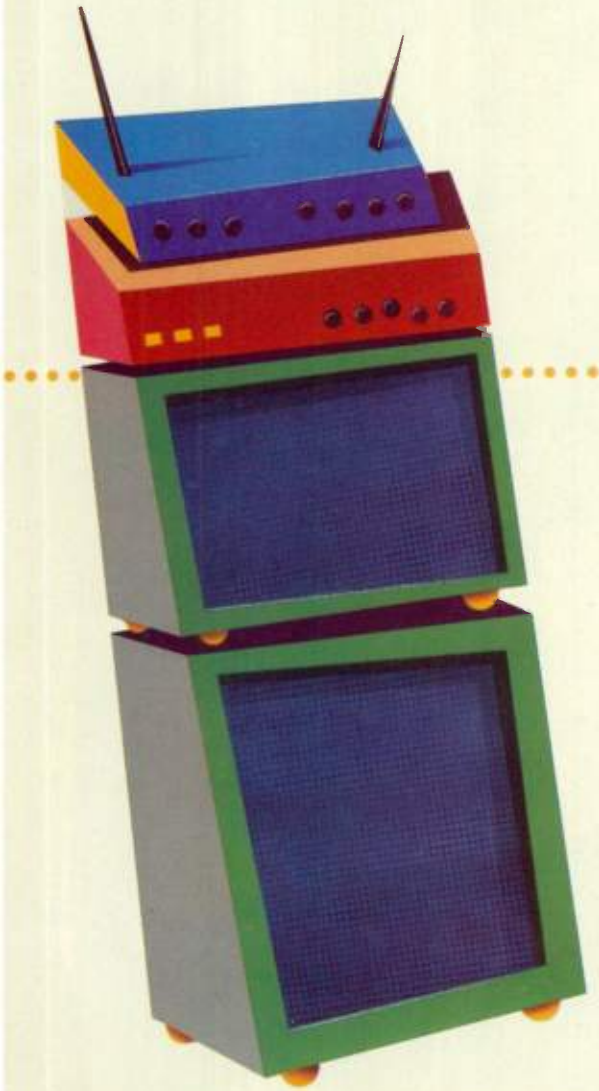
Choosing a Wireless System

For those who are ready to free themselves from the ties that bind a live performance, here's the basic info on wireless mic and instrument technology.

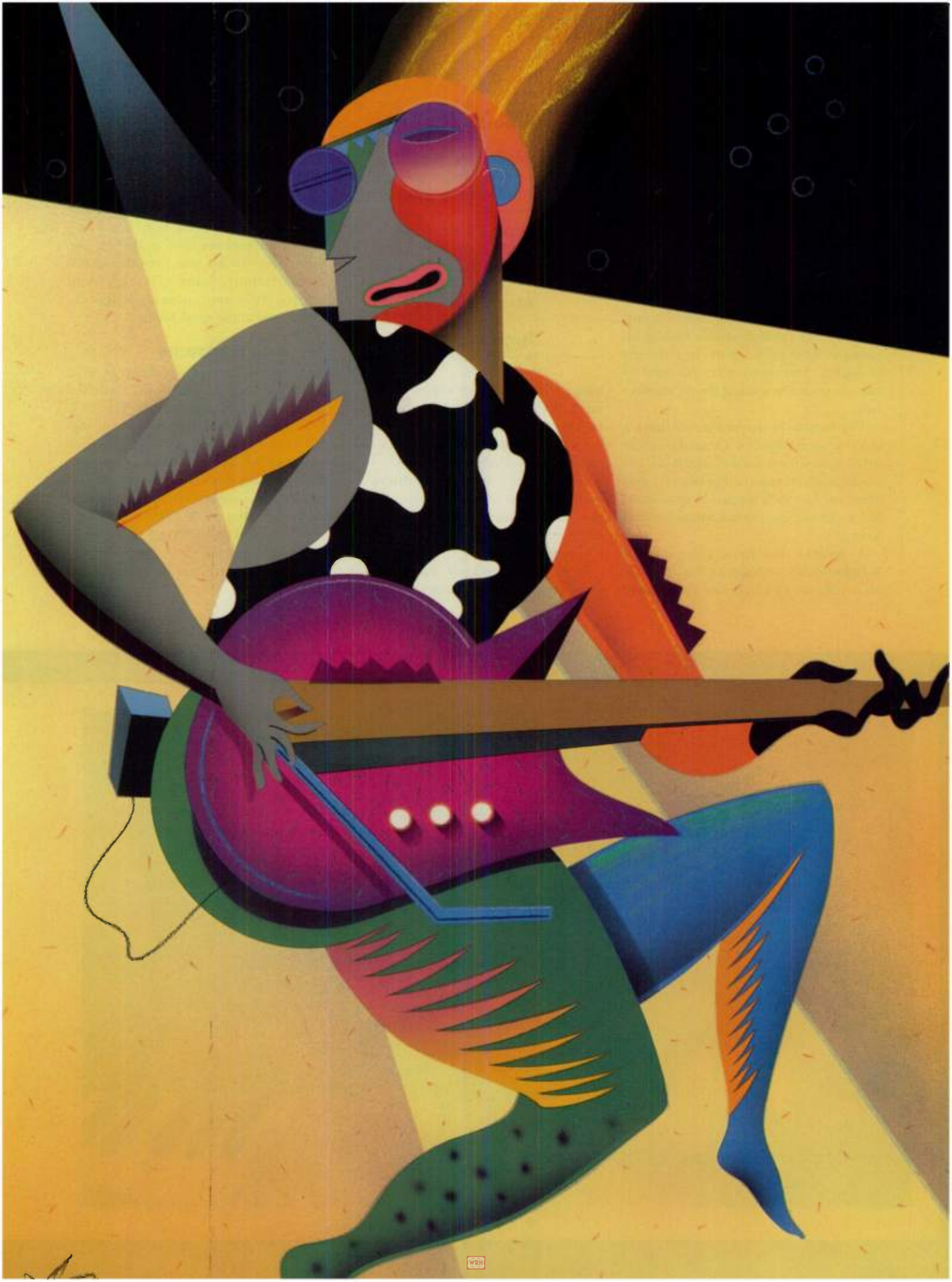


Editor's Note: *The following article is adapted from the pamphlet* User's Guide to Selecting a Wireless System *prepared by the marketing and engineering staffs of Nady Systems, Inc., a manufacturer of wireless devices. While we normally don't excerpt information from manufacturer's bulletins, this article covers the subject in an objective and helpful manner, and has been checked with independent experts as well as other wireless manufacturers for accuracy and freedom from bias.*

Wireless systems are not created equal, because, as with everything else, design decisions affect quality and price. You may be on a budget, or be willing to spare no expense to get the most sophisticated, top-of-the-line technology available. Whatever your needs, though, it's important to purchase carefully so that your system meets those needs. This article explains terminology and design configurations unique to wireless systems, and provides a series of listening tests for evaluating system performance. • As with most electronics products, wireless microphone systems are constantly becoming more compact and offering better performance at lower prices. This is due primarily to three main factors: the advancement of semiconductor technology, which allows system miniaturization and lower costs; the application of audio companding to wireless, resulting in systems with dynamic range very nearly equal to their wired counterparts (i.e., the same mic element in a wired configuration); and the use of diversity reception to conquer the "dropouts" that plagued early systems.

By the Staff of Nady Systems, Inc.

JOHN KLEBER



WIRELESS SYSTEM CONFIGURATIONS

A wireless microphone system is a miniature FM (frequency modulation) broadcasting system. The receiver component is commonly portable and connects via audio cable to a mixing board, amplifier, or video camera audio input. The receivers are powered in various ways: stationary units are AC or DC powered; receivers designed for field use have internal batteries or battery packs.

The transmitter component is available in three configurations: handheld, lavalier bodypack, and instrument bodypack. Transmitters are powered by batteries, usually a single 9-volt, alkaline type.

The handheld transmitter includes a microphone element (manufacturers offer many models also available for popular wired mics), transmitter, and antenna. All this is housed in what looks like a conventional microphone without a cord.

A lavalier transmitter is a small bodypack with a connector for a lavalier microphone (a small mic that either hangs around the user's neck or clips to one's clothing out of sight). Most popular lavalier mics can be used with this bodypack, which also provides bias power for the lavalier mic.

Manufacturers typically don't address a system's range because there is little variation due to FCC limitations.

Instrument system transmitters are bodypacks with a short patch cord and a ¼-inch connector that plugs into the electronic instrument, usually an electric guitar.

One receiver and one transmitter on the same frequency comprise a system. Several systems can operate in the same area as long as they are on different frequency channels. The number of channels that can be used simultaneously at the same location depends on the quality and type of front end filtering the manufacturer uses (the front end is the part of the receiver that "grabs" the signal out of the air and provides initial amplification). Some VHF high-band systems allow up to twenty wireless microphones at the same facility.

OPERATING FREQUENCIES

Wireless systems are regulated by FCC (Federal Communications Commission) rules and regulations. The FCC sets limits on RF (radio frequency) signal power and assigns the frequencies available for wireless system operation. Part 15, subparts D and E, of the FCC book allows low-power communication devices on the 49.83 MHz band, with power limited to 10,000 μV/m at 3 meters. Unfortunately, this portion of the RF spectrum is susceptible to noise and interference.

Part 90 of the FCC regulations allows wireless systems to use business radio service frequencies on a shared basis, and these can be licensed by nonbroadcast, commercial users. Part 74 of the regulations allows for use of "VHF high-band" frequencies, with power limited to 50 mV. These VHF high-band frequencies, operating from 150 MHz (megahertz) to 216 MHz and also used by TV channels 7 through 13, are currently the best available for wireless microphone system operation, but can be licensed only by broadcasters and video production companies.

It's important to note that the use of these frequencies by TV stations varies from place to place, so wireless manufacturers must preset frequencies for the geographical area of use. If your group travels around and your geographical area of use will vary, the FCC has recently designated eight channels between 169 MHz and 172 MHz for this purpose. However, because this frequency band is so narrow, only about four channels will be able to operate simultaneously without interfering with each other.

UHF wireless systems (400 to 470 MHz; 900 to 950 MHz) are also available, but do not offer any particular advantage in terms of range, audio quality, or freedom from dropouts. They tend to be more expensive than VHF units because the design and manufacture of UHF systems is more complex. Also, there have been reports of sensitivity to interference in situations where a VHF system would generally function without problems, though sometimes the reverse is also true. Advantages to UHF systems are that they generally tend to be smaller than VHF units, and there is some relief from the crowded VHF bands.

A WORD ON SPECIFICATIONS

Regarding the range of a wireless system, manufacturers typically don't address this area in published specs because there is little variation due to the FCC limitation on power. The range of all VHF high-band systems is virtually the same—about 250 feet effective, up to about 1,500 feet under optimum line-of-sight conditions (i.e., nothing obstructing the path between transmitter and receiver). The range of the less expensive 49 MHz systems is about 100 feet effective, and up to 250 feet optimum.

For professional use (speakers, singers, musical instruments), a wireless system should have a dynamic range of better than 100 dB. Furthermore, when tested, a given microphone element used in a wireless system should yield the same figures for signal-to-noise and frequency response as when wired.

Also remember, although manufacturers' specifications can provide you with rough guidelines, they are not the final word on a product. The only real issues are how well a system works within its usable range and its sound quality.

THE DIVERSITY OF DIVERSITY

The military initiated research into diversity reception technology to ensure that critical communications were received with no dropouts (interrupted

reception). This technique uses two separate antennas and receivers, along with comparator circuitry that senses which receiver is receiving the strongest signal at any given moment and selects the best output. They concluded that this post-detection diversity receiver switching was the only mathematically sound way to eliminate dropouts.

Professionals shied away from the early generation wireless equipment because of dropout problems. There are several types of dropouts (also known as null spots), the most difficult being multipath cancellation. In this case, out-of-phase signals arriving at the receiver from multiple reflections cancel each other and cause the audio signal to fade in and out depending on the transmitter's position. Multipath dropouts can occur in highly reflective environments such as those with metal I-beams or lighting equipment.

The term "diversity reception" originally described the use of two or more receiver front ends, each with a separate antenna. These days, manufacturers use the term "diversity" to describe any receiver with more than one antenna, even if the receiver in question has only one front end. Three types of diversity system designs are:

■ *True Diversity*—two complete RF receiver front ends and two antennas, with smart switching circuitry to select the strongest receiver output or the signal with the lowest distortion level. (*Of those manufacturers consulted, one said that there is no such thing as "true" diversity except as claimed by manufacturers of that type of device; several others had no objection to using the term.—VE*)

■ *Phase or Space Diversity*—electronic circuitry changes antenna phasing when it detects a drop in antenna signal strength.

■ *Antenna Diversity*—isolation amplifiers and a summing network combine signals from three antennas. The theory here is that even if out-of-phase signals cancel at two of the antennas, it is unlikely that this would happen at the third.

Of these systems, true diversity is generally considered as having the functional advantage. Because of the two complete RF front ends, true diversity comes out ahead in comparison testing, and it is as fast to set up as nondiversity systems—the two antennas needed are usually mounted on the receiver. Of

course, higher performance does require a higher price tag, so other types of diversity systems are available in lower-cost wireless systems. Also note that nondiversity systems may be perfectly serviceable in most situations, but diversity systems minimize dropouts far more effectively.

TESTING THE DIVERSITY SYSTEM

Luckily, you don't have to be an RF expert to test the performance of a VHF wireless diversity system. However, you do need a system that offers the ability to switch to a nondiversity mode of operation. (Not all diversity systems offer this feature. If that's the case, you won't be able to perform this test.)

1. Set up the wireless system according to the manufacturer's instructions. Be sure the squelch is adjusted properly. If you can perform this test in the place you'll use the system, all the better.

2. Switch the system to nondiversity operation. Usually you will choose either channel "A" or "B," not the "A-B" combination that indicates diversity reception is on.

3. Walk away from the receiver speaking into the microphone. Go at least 100 feet out, if possible, and up to 200 feet. Note where you experience either "buzz" zones (places where you hear buzzing noises) or dropouts. Mark these places with chalk because you will need to go back to them later.

4. Go back to the receiver, switch to diversity reception, then return to the chalk marks. If the diversity system is effective, the buzz zones and null spots will have disappeared. Now walk around within the same general area and listen for new dropout spots and any audible diversity switching.

If all null spots have disappeared and you hear no switching noise, the system you are testing works as it should. If new null spots have developed, the diversity system is not working effectively. If you do hear switching noise, it is being generated by a diversity system that switches back and forth between inputs too often. Some do this continuously; any audible switching deteriorates audio quality, so "smart" sensing circuitry has been developed to switch only when necessary.

COMPANDERS AND NOISE REDUCTION

Companders (short for compressor/expander) can mask the noise inherent

in radio transmission by compressing audio information when it's transmitted and expanding it when received. The process is similar to noise reduction companders used in recording, such as Dolby and dbx. Not only does compansion reduce the noise in the signal, it also increases the effective dynamic range (up to 120 dB in some systems) and lowers the potential for dropouts.

However, not all noise reduction systems are the same, so check the specs and use your ears. Wireless systems with companding circuitry should deliver clear audio without extraneous noise. To check frequency response, specs can be somewhat helpful, but the real test is to compare the wireless sound to the sound of the same mic element when wired. The response should have the same crispness and clarity, without any loss of brightness. The more uncolored the sound, the better.

Some undesirable audio effects caused by poorly designed compansion circuits include *pumping* (inaccurate input/output signal tracking), *breathing* (audible changes in background hiss level), and poor transient response, especially with low-level signals.

Note that these tests do not apply to wireless designs using compressor/limiters rather than compansion, as we feel they are not as suitable for professional applications.

TESTING FOR AUDIO DEGRADATION

1. Use the mic wired. At a very low volume, say something like "ha, ha, ha," noting the way the "ha" is sustained.

2. Repeat with the wireless mic. Is the system cutting off the "ha," forcing it lower than it should be? If so, the compander is mistracking.

Here's another test to detect undesirable audio effects.

1. Set levels as high as possible before the system feeds back. Since it's difficult to get a very high level with omnidirectional, lavalier microphones, try having an assistant take the mic/transmitter into another room, while you work the controls and listen to the monitor.

2. Your assistant should now make a slight noise into the mic (a high-pitched "ah" should do). This will cause the compander to "open up" and allow background noise through.

This test can be very revealing. Some systems will add hum and hiss to whatever background noise already existed. You may also hear the "ocean roar" or "shhh" associated with breathing. Of course, the less noise the better, though even the best of the wireless systems available today will reveal a slight bit of breathing in this test.

The real test is to compare the wireless sound to the sound of the same element when wired.

Avoid systems with excessive hum, hiss, or breathing, especially if these traits correlate with overload sensitivity.

ABOUT DYNAMIC RANGE, S/N RATIOS, AND HEADROOM

Dynamic range measures the difference, in dB, between background noise and the point when a system will overload and therefore be distorted. Dynamic range affects headroom (the range from 0 dB to the distortion point) as well as S/N (ratio of maximum signal to background noise). While dynamic range is pretty specific, the S/N specification is more ambiguous because it can be measured several different ways and the method is not always specified.

Again, it's usually best to rely on what you hear. A system with inadequate headroom will overload when you shout into the mic. Also, some may have excessive background noise.

For best results, perform this next test using the P.A. that you intend to use with your wireless. You'll also need a handheld wireless mic and a wired mic with the same element, or a lavalier mic you can use either wired or plugged into a wireless bodypack.

1. Plug the wired mic directly into the P.A. system.

2. Shout into the microphone, attempting to overload it. Set mixing board or amp levels just below the point where you overload. Note this setting.

3. Now use the wireless with your P.A. Be sure to set the output level on the wireless receiver so the signal is comparable to the wired mic. When you shout into the wireless mic at the setting just below the previously determined overload point for the wired mic, there should be no overload distortion.

TESTING AN INSTRUMENT WIRELESS

So far we've been testing wireless mic systems. The effects of high-gain tests for instrument wireless systems are even more pronounced—it's like using a microscope instead of the naked eye. You may now hear the noise floor accentuated, for example.

1. Connect the instrument to the amp with a standard cord, then turn on the amp and set it to a high-gain (master volume) setting.

2. Set the wireless receiver output for a signal comparable to the wired output. Alternately plug the wireless receiver cord in and out and listen for changes in the sound.

Better systems will be as quiet as the amp itself; there will hardly be any discernible change in hiss as you alternately plug the receiver cord in and out. With budget systems, in addition to more noise there may be breathing, or an audible effect that sounds like the sympathetic rattling of a snare drum. This rattling noise is especially apparent when you pluck high notes on a guitar with the instrument's volume adjustment set low.

WRAPPING UP

Comparing the sound of wireless systems is the best test to conduct when considering your purchase. Other than that you can compare manufacturers' spec sheets. However, since, as with all audio specs, manufacturers use slightly different criteria in their measurements, remember that such comparisons can only be a rough guide.

For more accuracy, you can conduct your own bench tests. To find out how, send for the pamphlet *User's Guide to Selecting a Wireless System* from Nady Systems, Inc., 1145 65th St., Oakland, CA 94608. This pamphlet covers tests for frequency response, harmonic distortion, and S/N ratio. You will need a noise/distortion analyzer (such as Heathkit 5M-5250), an audio signal generator (such as Heathkit model 16-5218), and a pink noise generator (optional).

Good luck in your search and stay wireless. ■

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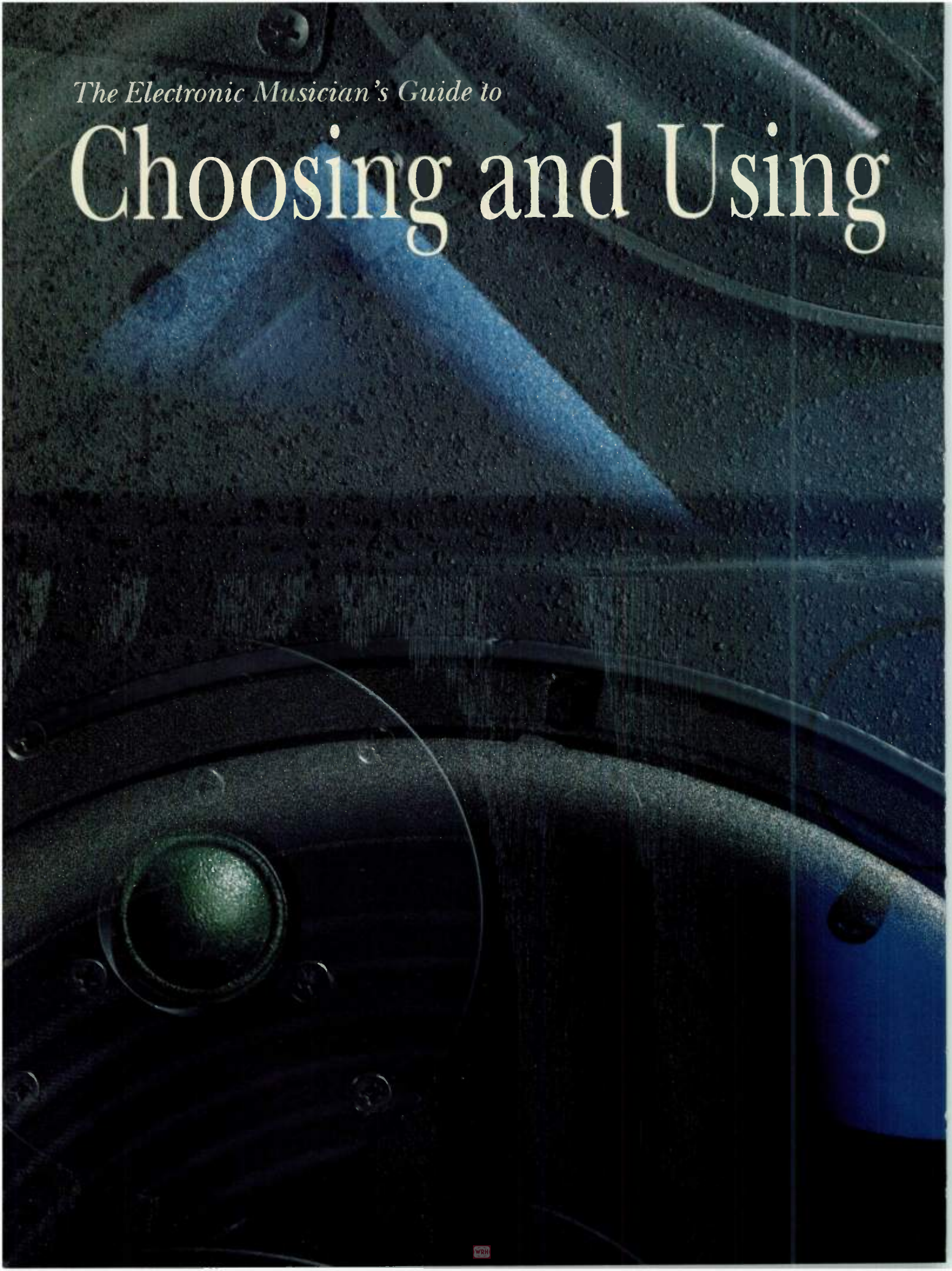

Near-Field Monitors

By George Petersen

What kind of speakers do you need to monitor home-recorded tapes or listen to your synths, samplers, and other electronic gear? The answer lies below...

THE PATTERN IS A FAMILIAR ONE. You've been assembling your dream music studio bit by bit, drooling over magazine ads and reading reviews for the latest digital doodads. Somehow during this quest to acquire, though, you never quite got around to getting a pair of real studio monitors. Why? Because that important purchase had always been delayed in favor of some wünderbox with gobs of nifty buttons to push, flashy front panel displays, and, of course, some familiar-looking, 5-pin connectors on the rear panel. Besides, you've been using your trusty stereo speakers and they've been just fine—or so you thought...

With the exception of high-quality, audiophile-type speakers, however, the design philosophy used to make stereo speakers and studio monitors is very different. The function of most home-type speakers is to make the end product sound as good as possible, while the *raison d'etre* of the studio monitor is to reveal flaws in the audio material so they can be fixed *before* it reaches the intended audience.

The problem often manifests itself in poorly balanced mixes. In fact, that and the need to clearly hear subtle differences in timbre while editing synth patches or samples are why any home studio setup should be equipped with a decent pair of studio monitors. Unfortunately, most small studios aren't.

One simple way to test if your speakers are giving good, accurate balances is by listening to a cassette of your mix on a variety of systems, from car speakers and Walkman-type portables, to boom boxes and your friends' stereos. Pay particular attention to the way different tracks blend in relationship to each other, especially

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The goal is to demystify the important concepts and topics regarding how to use these elements and arm you with the practical information you'll need to make intelligent buying decisions. Regardless of your technical level, we're sure you'll find something interesting in every article. Read, learn, and enjoy. —Bob O'Donnell

PIERRE GOAVEC

cymbals, hi-hat, and percussive FM synthesizer patches. If the balance doesn't sound consistent on different systems, your studio's monitors may be at fault.

ACOUSTICAL CONSIDERATIONS

Another important point is the effect of room acoustics. The placement of the monitor speakers is critical, as is the acoustical nature of the room. A loudspeaker system that exhibits "perfect" sonic performance in the confines of an anechoic (reflection-free) test chamber will sound completely different in a real-life environment. As a simple test, try making some A/B listening comparisons to two identical speakers, with one placed in a corner at floor level and the other at chair height, at least three feet from any wall surfaces. The differences between the two should be quite apparent: the interaction between the floor speaker and the adjacent wall and floor surfaces will emphasize low-frequency response, while the chair speaker will appear brighter, with markedly less bass.

This elementary example truly pales in comparison to the complex acoustical realities occurring in the listening environment. The listener first perceives the direct sound from the speakers and then hears reflections off the room's walls, floor, ceiling, furniture, equipment, etc. This uncontrolled splattering of reflected and direct sounds creates two things: a difficult situation for critical listening and a lot of jobs for highly paid acousticians and studio designers.

I know what you're thinking—I'm going to tell you the only solution is to spend a fortune hiring expensive consultants and architects. [Glad you asked: in fact *Mix*, our sister publication, publishes a directory of studio designers, acousticians and suppliers in its August issue each year. Call (415) 653-3307 for back issue information.] A few affordable, low-cost options do exist, however. The cheapest is to monitor using headphones; while this eliminates the dreaded room-to-speaker interface, there are other disadvantages, from exaggerated stereo imaging and ear fatigue (a very real problem when listening at high levels for several hours) to the inability to hear outside warnings—i.e., air raid sirens—in time to make it to the fallout shelter.

NEAR-FIELDS TO THE RESCUE

Fortunately, the laws of physics help provide a sensible alternative. With all other things being equal, the ratio of direct to reflected sound varies proportionally with the distance of the listener to the source, in this case, a speaker. Basically, this means that when you are up close you mainly hear the direct sound, and as you move farther from the speaker, the amount of reflected sound you hear increases dramatically, as shown in **fig. 1**. By listening to speakers that are approximately one meter away, the effects of the room acoustics are greatly reduced. The phenomenon is known as near-field monitoring, a term originally coined by acoustics authority Ed Long of Calibration Standard Instruments, a company that manufactures a variety of studio monitoring systems.

Unfortunately, not all studio monitors are suitable for near-field applications. Since listening must be done at close quarters, it is important that the combined image of the drivers be coherent at close distances. Therefore, systems for near-field applications have closely spaced drivers or employ a coaxial-type design, where the high-frequency drivers are located on the same axis as the

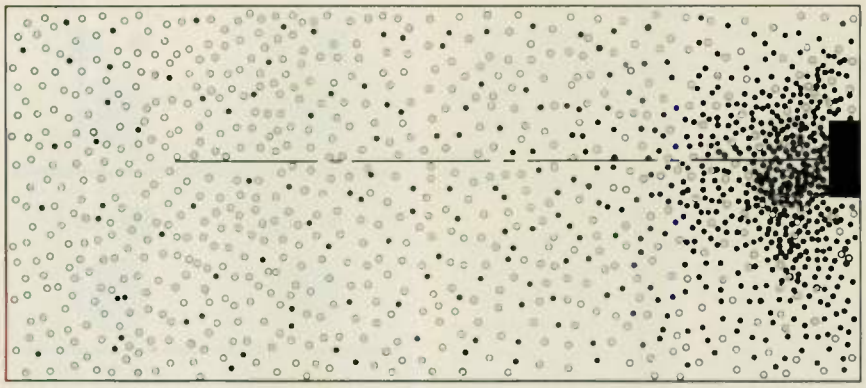

Fig. 1: Sound behavior of a nondirectional speaker in a "typical" room. The open circles represent the reverberant field, while the black circles show the direct sound. The chart, courtesy of JBL Professional, is taken from *The JBL Sound System Design Reference Manual*, by George Augspurger and John Eargle.

woofers. **Fig. 2** shows two different JBL monitors: the 4412's drivers are tightly clustered for close-in monitoring, while the 4410's vertical line array is designed for greater listening distances.

Although near-field monitoring reduces the effects of the listening space, also be aware of the how speaker placement can affect monitor performance; even in the near field, speaker placement is critical. Best results are usually achieved when the monitors are spaced equidistantly, with the listening area at the apex of an imaginary equilateral triangle. **Fig. 3** shows a common near-field monitoring arrangement, where the spacing between the two monitors is about the same as the distance from the listener to each speaker.

High-frequency elements should be placed at ear level, usually with each monitor aimed slightly inward toward the listener. This creates a "sweet spot," where the listener is precisely on-axis with the monitor, providing the most accurate perception of the sound. The sonic character of many speakers changes dramatically when heard off-axis (a phenomenon known as "off-axis coloration"), and precise placement can

Fig. 2: Two JBL monitors: the line array spacing of the components in the Model 4410 (at left) is suited for longer listening distances, while the components in the JBL 4412 are tightly clustered for closer listening.

greatly reduce such anomalies.

To hear the effects of off-axis coloration, listen to a monitor while facing it, then compare that to the sound heard when listening to that same speaker after taking a step to either side, or above or below the monitor. Typical symptoms of off-axis coloration are a loss of high-frequency information or a change in the midrange characteristics; low-frequency information is largely nondirectional in nature—therefore, bass response is generally unaffected by off-axis listening.

Note the width of the sweet spot and try to remain in this area when making level and balancing decisions. Problems can arise if you try to make sonic changes while you're out of the sweet spot—for instance, reaching to adjust gear in a rack located off to one side.

Another placement consideration is the monitor's design. Most versatile, perhaps, are those monitors that are oriented in mirror-imaged pairs; these provide the most possible placement combinations (**Fig. 4** shows eight variations).

MONITOR TYPES

Most speaker systems fall into a few basic categories: those having sealed or vented enclosures. Sealed designs—also referred to as acoustic suspension types—mount the speaker components on the outside of an airtight cabinet, which prevents the escape of the air displaced by the woofer's rearward motion. The increased air pressure within the cabinet acts as a springboard to push the woofer's cone forward. Vented systems—sometimes called bass-reflex systems—have one or more openings (vents or ports) that create a small amount of phase cancellation at the woofer's resonant frequency, while increasing bass response at a lower frequency. The resonant frequency refers to the point where the speaker's mechanical efficiency is at its highest level, a figure determined by the size, mass, and stiffness of the speaker cone.

Though often the case, ports are not necessarily located on a monitor's front surface; for example, the Tannoy PBM-8 uses a rear-ported design. Vented monitors typically require a larger enclosure than their sealed counterparts; however, this disadvantage is offset by an increase in efficiency (more sound-per-watt input) and extended low-frequency response.

One novel design approach uses coaxially mounted speakers, usually some sort of tweeter or other high-frequency unit, mounted in the center of a bass reproducer. This method gives the impression that the sound is coming from a single point source, which improves coherence, especially at close listening distances. Among the companies producing these coaxial, point-source monitors are UREI, Tannoy, and Fostex.

Not surprisingly, the actual components used in a loudspeaker system have a greater effect on a monitor's sound than the enclosure itself. In the present state of transducer technology, low-frequency reproduction is handled exclusively by comparatively large-diameter woofers with cones ranging from six to fifteen inches in size. As a rule, speakers used for mid- and high-frequency reproduction in studio monitors are either of the direct radiator-type (such as cones and domes) or some sort of compression driver/horn combination.

Direct radiator designs offer a smooth response and a wide dispersion of the reproduced sound, yet they are less efficient than horn/compression driver combinations, meaning they cannot produce the very loud levels attainable by horn systems. In near-field applications, however, extremely loud reproduction is seldom required.

The compression driver, a relatively small-diameter diaphragm with a similarly sized voice coil, moving within a comparatively large magnet structure, is attached to a horn. Due to the horn's amplification action (which works in the same way that a small sound from a musician's lips is made much louder by a trumpet) and the large magnet structure, the horn/driver combination is very efficient at converting a small amount of input wattage into large sound pressure levels (SPL). As a rule, compression drivers must be manufactured to extremely precise tolerances. Consequently, they cost more than direct radiator systems.

One major advantage of horn/driver systems is that the shape and size of the horn can be tailored exactly to meet specific applications. For example, **Fig. 5** shows two horn systems used in a coaxial configuration. The flare and depth of the UREI 809's horn has a highly controlled pattern, with a tightly defined

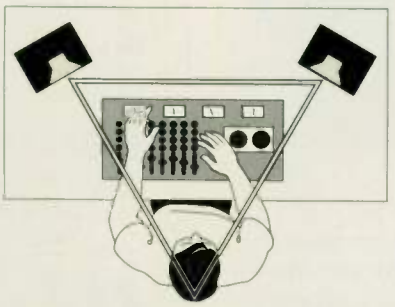

Fig. 3: This monitoring arrangement, with the distance between speakers approximately equal to the speaker-to-ear distance, provides a good starting point.

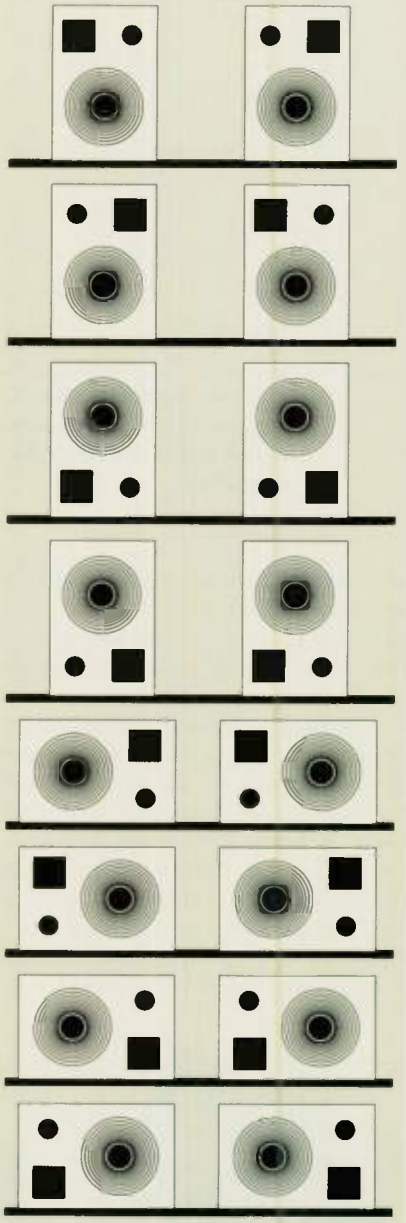

Fig. 4: A mirror-imaged monitor pair offers up to eight different placement configurations.

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"...this is one heck of a smart box, with an excellent manual ... this may be just what the doctor ordered..." Lorenz Rychner — MUSIC TECHNOLOGY

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sweet spot, while the Tannoy NFM-8/DMT's Dual Concentric design uses the woofer cone itself as an extension of the tweeter's horn flare, creating a wide dispersion pattern.

SPECS AND RAZZAMATAZZ

Interpreting specifications from speaker manufacturers can be regarded as either high art or a real chore, depending on one's mood and outlook. Yet you can tell a lot about a company and its speakers by taking a good look at the spec sheets.

The most important (yet most cajoled and overhyped) bit of information on that glossy brochure is "frequency response," which is a measurement of the range of frequencies that a given loudspeaker can reproduce. The *ideal* system would reproduce all frequencies at an even level; this is referred to as a "flat" response. Unfortunately, frequency response alone is virtually useless without some sort of determinant, often expressed as something like ±3 dB.

Theoretically, a 3-inch transistor radio speaker could have a frequency response of 20 Hz to 20 kHz; but at the extreme ends of the scale, response may be -70 dB. Since every 10 dB of change represents a doubling (or halving) in perceived volume, the amount of 20 Hz energy being reproduced in our example is infinitesimally small.

A monitor's *sensitivity rating* gives you an idea of the system's overall efficiency. It is usually expressed as the number of decibels the monitor will produce, given a 1-watt input, measured at one meter (1w/1m). Near-field monitors are usually heard from a distance of about one meter, so their sensitivity rating is quite important. Typical ratings range from about 84 to over 100 dB (1w/1m), with most direct radiator monitors falling into the 87 to 93 db range, while horn-type systems run 95 dB and higher.

In *real* terms, if your monitor has a sensitivity specification of 90 dB (1w/1m) it will provide 100 dB from a 10-watt input; 110 dB from a 100-watt input; and reaching 120 dB would require a 1,000-watt input—at which point your poor little near-field monitors would have emitted a pungent whiff of black smoke and then laid very quiet. On the other hand, a hot horn system with a sensitivity of 100 dB would reach the 110 dB level with a mere 10-watt input, and an ear-shattering 120 dB could be reached with 100 watts.

By combining this knowledge of sensitivity with a monitor's maximum power rating, you can tell whether any given monitor will be loud enough to suit your tastes. As a point of reference, I do most of my studio listening at levels ranging from 80 to 95 dB—occasionally louder, depending on the material. Either of the two systems I happen to use offer plenty of level with more-than-adequate "headroom," meaning they're capable of delivering a suitable average monitoring volume, while allowing for undistorted reproduction of loud transients.

The number of components that ought to be in a good monitor is not as simple to determine. Obviously, no single speaker can

Fig. 5: UREI 809 and Tannoy NFM-8/DMT monitors.

The reason to buy an Otari is because it's *your* music.

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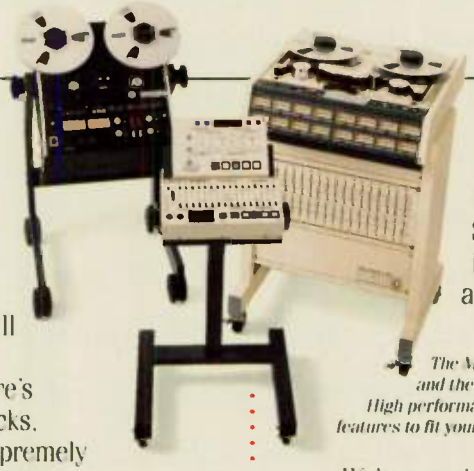

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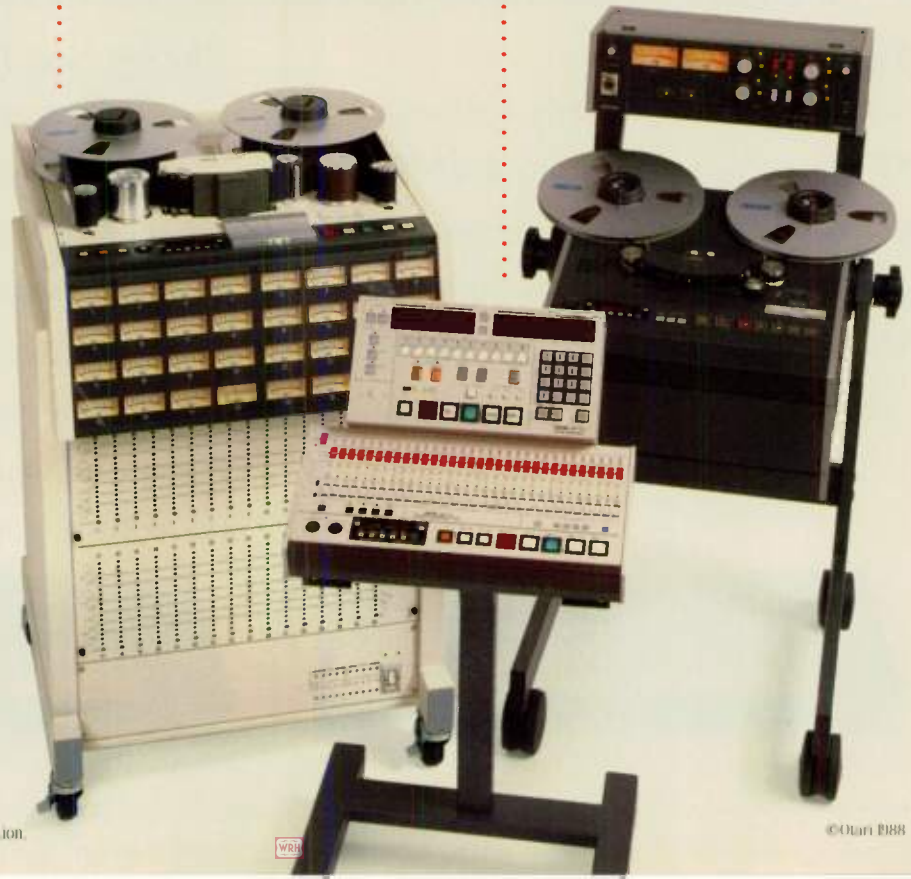

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faithfully reproduce the entire audio spectrum, but is a 2-way system (using a woofer and a combination mid/high-frequency driver) any better than a 3-way system (with woofer, MF, and HF components)?

Not surprisingly, a well-designed 2-way system is better than a lower quality 3-way system, but there is no automatic correlation between the number of frequency-divided sections in a monitor system and its suitability for any purpose. While dividing the audio reproduction load among many specialized drivers seems to be a good idea, in theory at least, reality rudely points to the fact that you need crossover networks to route each portion of the audio spectrum to its respective driver (see the "Speaker Crossovers" sidebar for more details). This process will introduce a certain amount of phase errors, some of which may adversely affect the audio quality. Also, the physical realities of near-field monitoring limit the number of drivers you can cluster together, while still maintaining a coherent sound image. Therefore, most—if not all—near-field monitors are either 2- or 3-way systems.

FEATURES

Depending on the manufacturer, near-field monitors are equipped with a variety of nifty features that can make your life a lot easier. Starting from the back, check out the input terminals, which can range from a simple screw fastener to gold-plated, 5-way binding posts. The latter are extremely versatile, accommodating banana plugs, spade lugs, test prods, and bare wire of various gauges bent to go around or through the post.

Self-powered speakers, with internal amplifiers, provide a complete, matched monitoring system. They may be a good choice for the traveling engineer who is looking for a reliable, consistent reference when working in different studios. The Electro-Voice Sentry 100EL (see Fig.

Fig. 6: (top) The Electro-Voice Sentry 100EL features an internal 50-watt amplifier, while the Meyer Sound HD-1 monitors (bottom) include internal biamplification and control processing.

6) is the powered version of the popular Model 100 near-field; and JBL/UREI makes the Model 6210, a compact power amp that can be mounted easily on the back of most monitors.

Removable front grilles are a necessity on the monitor's face. While the grille "cloth" may be said to be acoustically transparent (and may come close to this ideal), other problems stem from diffraction effects and edge reflections caused when sound from the high- and mid-frequency drivers reflect off the wood or plastic frame that holds the cloth. Does the front grille really cause a lot of sonic problems? I like that old adage—if in doubt, take it out.

With computer and video monitors becoming more of a regular fixture in studios today, many near-field speakers now incorporate internal magnetic shielding to cut down or eliminate the picture distortion that occurs whenever a large, magnetic structure is placed near a video display. I have found that the degree of protection offered varies widely. With some models this means within three to six inches without picture degradation, while others could be placed alongside a video or computer monitor without ill effects. In any event, be careful to keep any magnetic materials (sample disks, software programs, digital tapes, etc.) well away from the near-field monitors—just in case, since any speaker's magnetic fields can damage information on magnetic media.

Another point to consider is mounting accessories. Some manufacturers offer optional mounting brackets for their speakers, while third-party suppliers, such as OmniMount Systems (North Hollywood, CA), can provide a wide range of versatile, high-quality mounting systems. If you are planning to place your near-fields on top of your mixing board, first be sure that the board's meter bridge can handle the weight, and secondly, see that the speakers can be safely balanced. Simple, removable (yet secure) mounts can be fashioned easily from a few plywood pieces and a little ingenuity. Another alternative is to make some floor height stands that will hold the speakers at a convenient listening height.

FOR THE BEGINNER

Speaker Crossovers

A crossover is simply an electronic circuit that splits a full-range signal and routes it to different components within a speaker system. Crossovers generally fall into two basic types: active or passive. The latter, which are generally located within the speaker cabinet, are simpler and thus far more common. Active crossovers split the line-level signal and route these to two or more amplifiers, which in turn are connected directly to individual speaker components. This process is called bi-amping when two amps are used, tri-amping with three amps, and so on.

The crossover point is the frequency at which these splits occur. A 2-way system has a single crossover point that routes the signal to two speakers that reproduce low and high frequencies; a 3-way uses two crossover points to divide the signal among low-, mid-, and high-frequency speakers. Manufacturers use the frequency response and power handling capacity of each speaker component in the system to determine optimal crossover points in passive systems. With active crossovers, you are free to select your own crossover points; however, it's best to start with the manufacturer's recommendations, since many mid- and high-frequency reproducers can be damaged by operation at a crossover point that is too low.

EVALUATIONS

Armed with a knowledge of specifications, features, and design types, you are now ready for the most difficult challenge of all: listening evaluations. It would be nice if people could just pick up a couple of pairs of monitors in their price range and take them home for a couple of weeks to make the final decision on the most appropriate model. Unfortunately, it may even be difficult to find all the models you want to check out in a single location, making simultaneous A/B comparisons a virtual impossibility.

There are, however, a couple of tricks that can help simplify the process. The most important tool you need is a reference point, such as a couple of compact discs with wide dynamic range and well-recorded vocals and/or solo instrumen-

NEAR-FIELD MONITOR MANUFACTURERS

The following companies manufacture systems designed for near-field monitoring applications. Prices stated are suggested retail for a pair (in the least expensive cabinet finish), rounded off to the nearest dollar. In addition to the models listed, there are a number of consumer-type loudspeakers—such as those manufactured by ADS (Wilmington, MA), B&W (Buffalo, NY), Celestion Industries (Holliston, MA), and KEF (Chantilly, VA)—that are popular with engineers who record classical music and may be suitable for electronic music applications.

Fostex RM-780

▼ Auratone
Box 698
Coronado, CA 92118
tel. (619) 297-2820
Models: TV6, $349; T66, $495; QC66, $595.

▼ Calibration Standard Instruments
PO Box 2727
Oakland, CA 94602
tel. (415) 531-8725
Models: MDM-4, $1,190; MDM-TA2, $1,290.

▼ Digital Designs
125 W. Main St.
El Centro, CA 92243
tel. (619) 353-1290
Models: LS-6, $299; LS-161, $379; LS-261, $519.

▼ Electro-Voice
600 Cecil St.
Buchanan, MI 49107
tel. (616) 695-6831
Models: MS-802, $600; Sentry 100A, $720; Sentry 100EL (self-powered), $1,500.

▼ Fostex
15431 Blackburn Ave.
Norwalk, CA 90650
tel. (213) 921-1112
Models: RM-765, $550; RM-780, $660; RM-900, $798.

▼ Frazier
Route 3, PO Box 319
Morrilton, AR 72110
tel. (501) 727-5543
Models: CAT-38, $568.

▼ JBL Professional
8500 Balboa Blvd.
Northridge, CA 91329
tel. (818) 893-8411
Models: Control 5, $375; Control 10, $1,100; Control 12, $1,500; 4406, $470; 4408, $570; 4412, $1,350; 4425, $1,990.

▼ Klark-Teknik
30B Banfi Plaza, N.
Farmingdale, NY 11735
tel. (516) 249-3660
Models: Jade MkII, $2,295 (including amplifiers).

▼ Meyer Sound Labs
2832 San Pablo Ave.
Berkeley, CA 94702
tel. (415) 486-1166
Models: HD-1 (High Definition Audio Monitor), approx. $3,100 (including amplifiers).

▼ Norberg Monitors
c/o Audio Engineering Associates
129 North Allen Ave.
Pasadena, CA 91104
tel. (818) 798-9127
Models: BCS-16B, $695.

▼ Peavey/AMR
711 A St.
Meridian, MS 39301
tel. (601) 483-5365
Models: PRM 205A, $240; PRM 208S, $400; PRM 225, $438; PRM 308S, $600; PRM 310S, $740; PRM 312A, $860.

▼ Quested Monitoring Systems
c/o Audio Rentals
237 W. 54th St.
New York, NY 10019
tel. (212) 664-1000
Models: Quested Near-Field System, price on request.

▼ Tannoy
300 Gage Ave. #1
Kitchener, ON N2M 2C8 Canada
tel. (519) 745-2364
Models: PBM-6.5, $338; PBM-8, $478; AVM, $548; NFM-8/DMT, $998; SGM-10B, $1,798.

▼ Toa Electronics
601 Gateway
South San Francisco, CA 94080
tel. (415) 588-2538
Models: 265-ME/AV, $389; 280-ME/AV, $499; 312-ME/AV, $839.

▼ UREI
8500 Balboa Blvd.
Northridge, CA 91329
tel. (818) 893-8411
Models: 809, $1,590.

Digital Designs LS-161

▼ Westlake Audio
2696 Lavery Ct. #18
Newbury Park, CA 91320
tel. (805) 499-3686
Models: BBSM-4, $1,138; BBSM-5, $1,358; BBSM-6, $1,758; BBSM-8, $2,258.

▼ Yamaha Professional Audio
6600 Orangethorpe
Buena Park, CA 90622
tel. (714) 522-9312
Models: NS-10M Studio, $475; NS-40M Studio, $930.

tal passages with which you are familiar. A solo piano passage can also reveal much about the quality of the monitoring system. Remember, you're not looking for a speaker that makes the CD sound better than it is—you want a monitor that accurately reproduces what's on the disc.

Try to focus on midrange reproduction, because the most crucial decisions when mixing usually involve achieving a correct balance of vocals and lead instruments to the rhythm tracks. Consequently, a monitor's midrange performance is perhaps its most important attribute. While a mix with an imbalance in the extreme low and high frequencies can usually be fixed at the disc mastering stage, a mix with too much or not enough vocal/lead instrument level may be unsalvageable.

Another important feature of any good monitor is a sound characteristic that remains fairly constant at varying power levels. Confirm this by listening at different volumes. While most monitors sound good at high sound pressure levels, monitor performance at very low volumes offers a valid indication of a system's ability to provide consistent reproduction.

When evaluating near-field speakers, it is essential that you listen to the monitors in a near-field position, rather than the usual across-the-room, audio showroom setup. Perhaps this is an obvious point, but the only way to judge characteristics such as directivity (width of the sweet spot) and on-axis versus off-axis response is by getting close to the speakers. This will give you the best impression of how they will perform in *your* studio environment.

Offering accurate reproduction in a compact package, near-field monitors are an ideal solution for the electronic musician or small studio. Besides providing a critical reference when tracking or mixing, they are also an invaluable resource for synth programming or sample tweaking, where an accurate monitor is a crucial element in the creative process. Fortunately, there are a number of excellent near-field monitors available in a variety of styles and prices to suit anyone's taste or budget. Happy hunting!

George Peterson, *products editor for* Mix, *also occasionally finds time to write music and produce records.*

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THE MS 1 MIC STAGE accessory, available separately, allows you to use mic level programs with the SM 82, complete with phantom power and variable gain.

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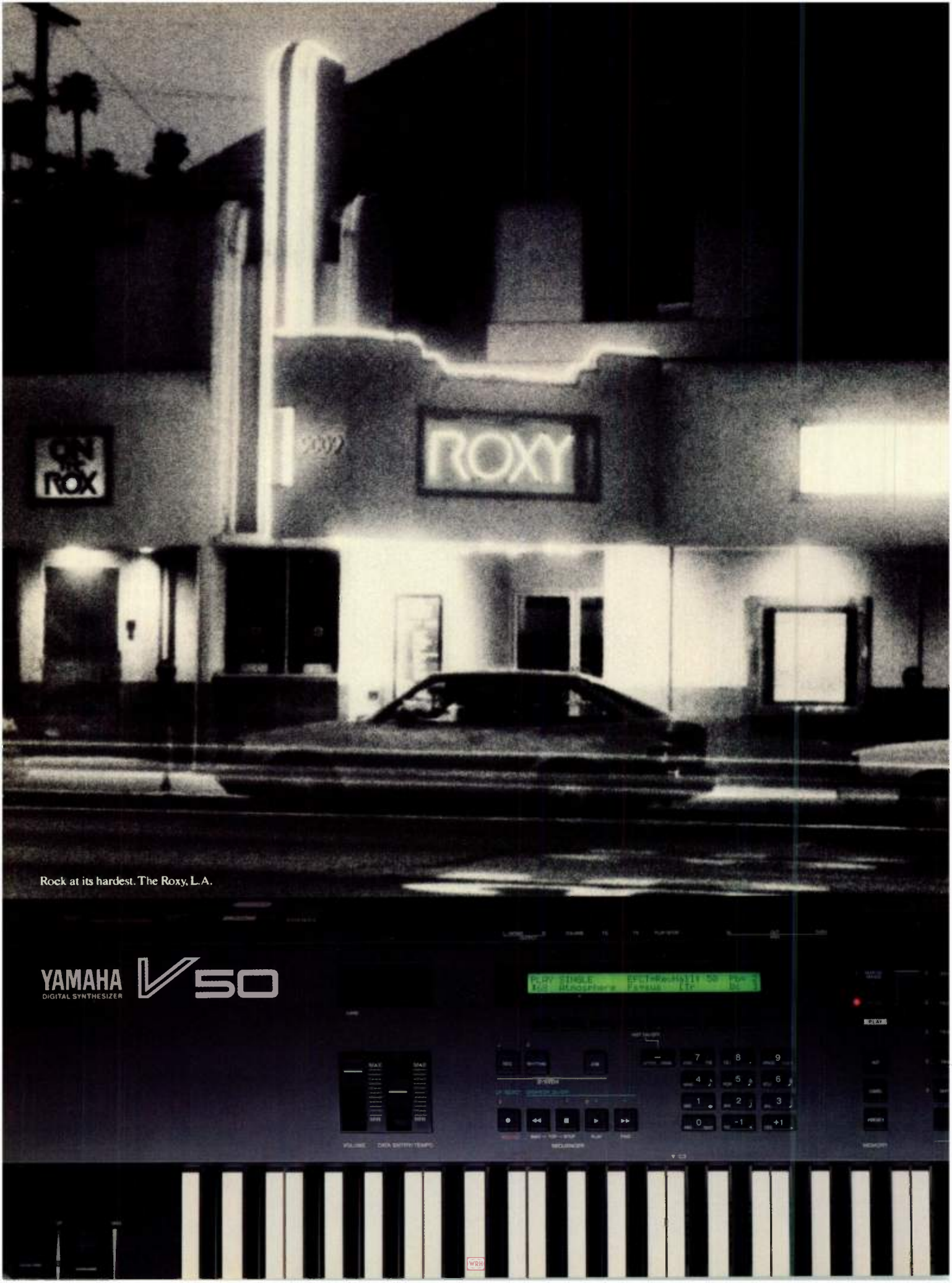
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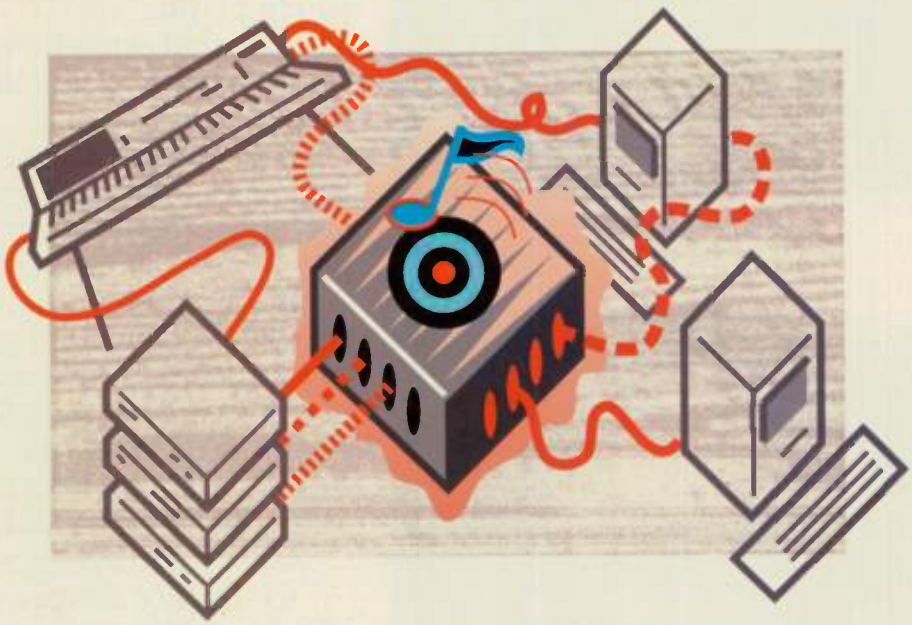
The Local Area Network



MIDI's Next Step?

As modern music devices demand more of MIDI, the protocol's restricted data-handling bandwidth has become a problem—but one with a very intriguing potential solution.

MIDI has served us very well over the past six years. It can accurately transmit just about anything you can play on a single keyboard controller, and it does admirably well when transmitting an entire performance recorded into a MIDI sequencer. However, with new MIDI applications such as mixing and lighting control, guitar interfaces, and complex gestural controllers, the amount of data now being sent over a single MIDI cable is much greater than what was originally envisioned by MIDI's designers. In fact, it is a tribute to those designers that MIDI has accommodated accelerating technology as well as it has.

As musicians working in the MIDI era, we are so accustomed to the power a MIDI system

STEVE LYONS

By Lachlan Westfall

provides that we become increasingly frustrated when we push MIDI to its limits. Like early pilots attempting to break the sound barrier, we run into a wall at 31.25 kilobaud. While some bandwidth-enhancing measures can be implemented with virtually no compromises—filtering unneeded controller data, addressing multiple MIDI ports from a single sequencer program (thus increasing the number of channels), and synching independent sequencers together—these solutions can only go so far.

For example, one MIDI-controlled mixer has its faders addressed by the MIDI volume controller, so each fader must be on an independent MIDI channel. This uses up MIDI channels like they're going out of style. Add to this various channels for controlling effects and lighting systems and you're hard-pressed to find enough for the instruments. So, what's the answer?

Obviously, none of us wants to trash all the instruments we have accumulated over the last six years. And the fact is, we won't have to. The solution to music system interfacing in the '90s will most likely not replace MIDI, but rather be a "superset" of the standard that also works with other forms of digital data.

A LAN-MARK SOLUTION

LANs (Local Area Networks) are used in computer systems and feature high-speed, bidirectional protocols that can share and distribute large amounts of information to a variety of devices. Apple's LocalTalk is one example of a popular LAN that connects computers, printers, and other peripherals, allowing them to talk to each other.

The idea of applying this type of solution to MIDI seems like a good one initially, and in fact, it's been suggested in the past. Unfortunately, there is a problem. LANs are very effective at distributing large amounts of information, but they do not do this in real time; LANs may put one task "on hold" while another, more important task is completed. For MIDI applications, this is not acceptable—I don't know of many musicians who would like their chords to wait until a hip bass line has finished playing.

What's needed is an entirely new LAN protocol that gives the highest priority to messages that need to be communicated in real time, yet doesn't sacrifice

the LAN benefits of bidirectionality and the ability to transport large amounts of information between a wide variety of devices. Luckily, such a protocol has recently been developed by a new company called Lone Wolf. This new LAN technology was born of the frustrations experienced by musician/engineers Mark Lacas and David Warman while working on a joint music project. Confronted by the numerous problems of exchanging sequences between different music systems and constantly having to reconfigure the system for each song, Lacas found it impossible to focus on the creative activity of making music.

What was needed was a way to reconstruct the state of the system without spending hours reconnecting MIDI cables. After investigating a number of existing protocols, Lacas and Warman came up with a new protocol called MediaLink that looks like it has everything needed to facilitate constructing very powerful music systems. Although MediaLink-based systems are not commercially available as of this writing, and this degree of sophistication carries a significant price tag, prototypes of the system are in use and have generated a tremendous deal of interest in the music community.

The MediaLink protocol carries all of the information necessary to both configure and carry performance information through a modern music system. The data communicated can include MIDI, SMPTE, digital audio, or any other type of digital information specified in the MediaLink protocol. MediaLink essentially acts as a "shell," transporting various forms of data at very high speeds to their destinations. It does not replace any existing protocol—your existing MIDI gear will not be obsolete—but simply facilitates the distribution of data in a large network.

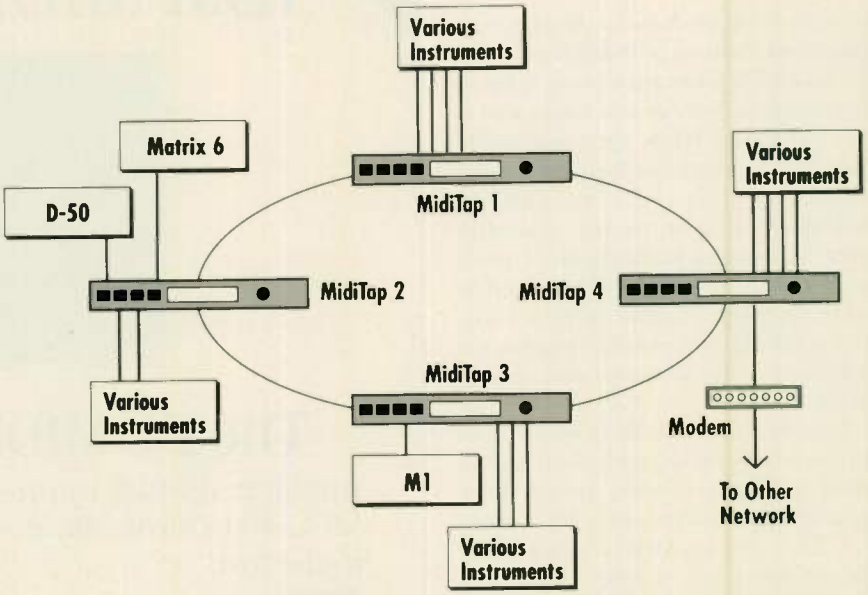


FIG. 1: A typical MediaLink setup with four MidiTaps. Each plugs into the LAN (indicated by the oval connecting the MidiTaps) and serves various instruments and peripherals.

MIDI A LA MODE: SETUP AND PERFORMANCE

MediaLink's ability to handle real-time data is accomplished by, among other techniques, using two different modes of operation: Setup and Performance. This differs from MIDI where setup information (i.e., system exclusive) can be intermingled with performance information (e.g., note on/off).

Setup mode is very similar to standard LAN operation, where all devices in the network have the same priority; that is, they are all active on the network. This mode is used when non-real-time information, such as system exclusive dumps, MIDI files, or other network configuration information is being sent. It gives more priority to the distribution of bulk information than to critical timing.

As all the devices are active, they can be "polled" to find out just who (or what) is on the network. This will allow software to configure itself to address specific devices. For example, if node 2 is an 8-voice sampler, future software will be able to know not to send more than eight notes to it at a time, and also that it may be capable of receiving a sample dump. This is a significant advantage over a unidirectional system, such as MIDI, that doesn't know (or care) what type of device is receiving information. Of course, getting standard configuration information from a MIDI device will take the definition of some new MIDI messages. The first steps toward that have already taken place with Inquiry messages, which are part of the current MIDI protocol.

Performance mode, on the other hand, is "built for speed" and achieves it by restricting the size of data packets being sent. It also eliminates unneeded overhead by essentially setting up a smaller internal network made up of the devices that are currently performing. All instruments on the network that are not being used are, in a sense, ignored. This allows time-critical information, such as MIDI note events, synchronization messages, etc., to be sent and received without unacceptable delays.

THE LAN ADVANTAGE

Unlike MIDI, this protocol is not limited to a single bandwidth. Speeds of 1, 2, 4, 10, and 100 megabits per second (Mb/s) are specified in the protocol (although 100 Mb/s systems may take some time to be realized). At its lowest bandwidth, MediaLink can transmit five full MIDI bandwidth (31.25 kbaud) data streams, distributing this data to up to 254 devices on the MediaLink network.

One of the most significant aspects of the networking concept is that a network device can be connected locally via fiber optic cabling, or remotely via a modem. While a modem won't let you play an instrument hundreds of miles away in real time, it can transfer sounds or other data to a MediaLink-compatible remote system, which appears to the system as just another part of the network. For example, you could load all the sounds from your pre-production studio into another studio when it's time for recording or mixing.

ABOUT MIDITAP

In order to better understand MediaLink, specifically with respect to real-time performance, let's look at Lone Wolf's *MidiTap*. The first device to im-

plement the MediaLink protocol, MidiTap acts as a link between MIDI devices and a MediaLink network (**Fig. 1**). This single rack unit features four MIDI inputs, four MIDI outputs, a pair of MediaLink fiber optic connectors, and an RS-422/232 computer port.

MidiTap individually addresses a particular instrument (or group of instruments) in a network as a user-defined "device." This is somewhat akin to the way a MIDI instrument is addressed via a MIDI channel. However, the parameters defining a device are much more flexible; the definition specifies a network, user, node, port, channel, and program number.

The network designation identifies one of many possible networks in a system. In our previous example, the mixdown studio would be one network addressed by another, the pre-production studio. Below the network is the user definition, which is a group of nodes within a network. This is followed by the actual node, which could be a single instrument or, as with the MidiTap device itself, could be broken down further into port (1 of 8 on the MidiTap) and finally channel and program number (if you have more than one instrument). In addition, you could have a multichannel instrument on a single port. However, a device is not limited just to this definition. In fact, a single device can be defined as a combination of several existing devices.

Once a device is defined and given a name, you don't have to think about it—everything is addressed by its device name. For example, to access a D-50 connected to MidiTap 2, port 1, channel 7, you simply define the device, name it "D-50," and dial it up on the MidiTap display; MediaLink takes care of getting the information to the D-50 via the pathways you have previously defined. To layer a number of synthesizers, define a single device that includes them. For example, a device called "Warm Pad" could be defined as program 2 on a Matrix-6 on port 4, channel 7, MidiTap 2—and program 7 on an M1 on port 1, channel 1 of MidiTap 3.

Once individual devices are defined, an entire system configuration (called a "LanScape") can then be set up by assigning source devices to destination devices. To play the "Warm Pad" from the D-50, you would define "D-50" as the source and "Warm Pad" as the destination. To play "Warm Pad" simultaneously from the keyboard of the D-50 and an M1, you could assign "Warm Pad" as the destination and a new device made up of the D-50 and the M1 as the source. Don't worry about merging—it's done automatically. In a sense, everything is merged, as this is a true bidirectional system.

The MidiTap can store 128 LanScapes onboard, any of which can be called up via a MIDI program change command on a specific port and MIDI channel. This allows the entire MIDI wiring and channel assignments for a studio to be reconfigured by a single MIDI program change message. A device definition can also feature MIDI data filtering and transposition in addition to routing information.

DID SOMEONE SAY "APPLICATIONS"?

It takes a little while for all the possible applications to sink in. Recently, someone asked if I knew about "that new 4-in, 4-out, fiber optic MIDI patch bay"; only later did I realize he was referring to MidiTap. On the surface, yes, it does present itself as something of a patch bay; but this is only one possible application, and MidiTap is only the first step in the development of other MediaLink-compatible peripherals. Lone Wolf already has plans for a SMPTETap as well as VideoTaps and AudioTaps. With the increasing availability of mass storage devices, it's easy to envision a digital sample distribution device that could send information over MediaLink, via MIDI or one of the many digital audio standards, to instruments in a large music system. MediaLink also has provisions for network-wide synchronization, which should allow audio, video, and other digital data to be networked in a single system.

Yes, MIDI has served us well, and I believe it will continue to do so for some time to come. Nonetheless, technological advances have made available more sophisticated communication protocols, and the devices to handle them. MediaLink seems to provide an excellent

continued on page 119

Two-Chip Project: The "Noisebuster" for Sequencer Metronomes

If you've ever cursed the noisy, unadjustable click output from your computer-based sequencer, this simple project is for you.

By Thomas Henry

GEORGE PETERSEN

You're ready to record some great sequence into some equally great sequencer software, with the computer all set to provide a handy metronome click. Except—the click coming out the computer's speaker is too soft, or it's a pulse that gives a confusing double-click sound, or it's a tone that (in strict accordance with Murphy's Law) is never in tune with the piece you're playing, or—worst of all—it includes so much digital noise, hash, and slime that you'd just as soon not listen to it.

Though the metronome sound is only a rhythmic reference and isn't recorded for playback, when you're trying to go with the flow, think creative thoughts, and play like a champ, all the problems mentioned above can really put a damper on things. Who you gonna call?

NOISEBUSTERS!

The Noisebuster connects between your computer and your monitoring system's audio input. This simple circuit processes the metronome click generated by your sequencer, producing a very pleasant, woody, and resonant "click-clack" that's free of background noise and other sonic goblins. I designed this circuit with the C-64 in mind (whose audio metronome output is very noisy), but it should work with almost any computer. It's a good beginner's project since it's easy to build and easy on your wallet.

HOW IT WORKS: THE GHOST IN THE MACHINE

Referring to **Fig. 1**, the metronome signal that needs a noise and garbage exorcism feeds RCA jack J1 (or whatever jack is appropriate for your application). The first two NOR gates are biased for linear operation (see Application Note AN-88 in the National Semiconductor *CMOS DataBook*) to amplify the (usually) low-level audio signal generated by the computer. The input signal couples into the first NOR gate/amplifier through C1 and R1; the ratio of R2 to R1 (about 20) sets the gain. C2 prevents spurious oscillations. IC1b operates similarly.

The audio then couples into Q1's base via C5 and R5, with diode D1 shunting the negative transitions to ground. When the computer's metronome "clicks" (noise and all), the amplified pulse causes Q1 to conduct, for the length of the click. But just how long is the click? We don't really know, since different computers/software will generate clicks—and therefore pulses—of different lengths.

So, 555 timer IC2 acts as a one-shot to provide a pulse of known duration for each click. The 555 circuit is non-retriggerable so that a sloppy click from the metronome won't generate a double pulse.

C6 and R7 differentiate the input

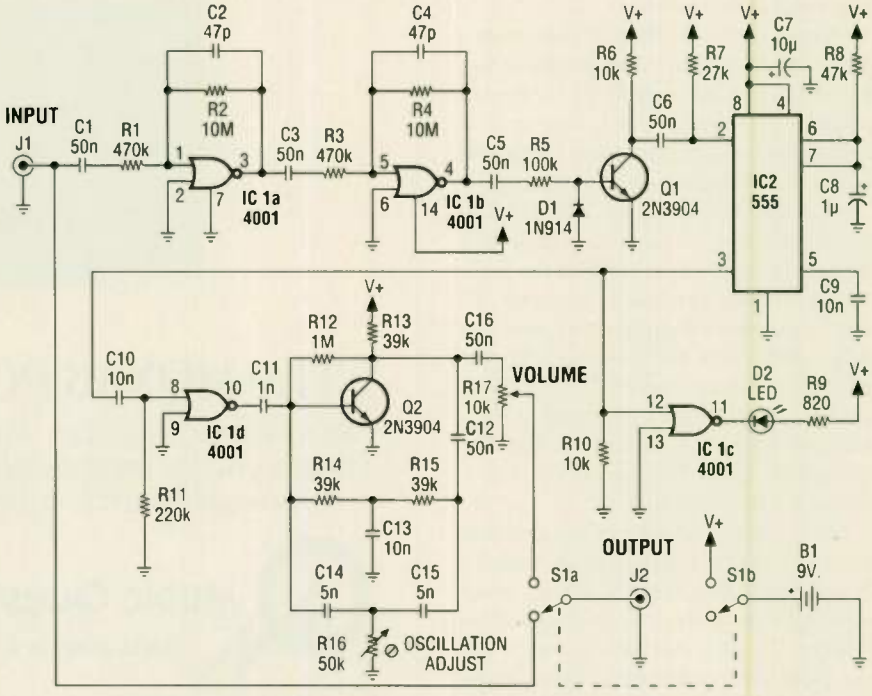


FIG. 1: Schematic, the "Noisebuster" for sequencer metronomes.

pulse, providing a sharp spike conducive to triggering the 555. R8 and C8 set the basic timing of the one-shot to about 50 milliseconds. C7 decouples the power supply, and C9 bypasses a sensitive, unused input on the chip. The 555 output (pin 3) feeds NOR gate IC1c; this drives LED D2, a visual indicator that flashes in time with the metronome beat.

The output pulse width is ideal for controlling the LED, but since it's a bit too wide to drive the final audio stage, the half-monostable configured around IC1d, C10, and R11 cuts the width. The pulse then feeds a tuned, high-Q filter, which acts as a tone generator. The sound is remarkably similar to the resonant "click-clack" of an old-fashioned mechanical unit.

This filter circuit is called a twin-T filter (see "Re-creating Classic Drum Machine Sounds" in the September 1989 issue for more information on this classic circuit). R14, R15, and C13 form the first "T," and C14, C15, and R16, the second. The filter is in the feedback loop of the amplifier created by Q2, R12, and R13. Trimmer R16 sets the amplifier gain just below the point of oscillation. Coupling a pulse to Q2's base causes the filter to ring, then decay over a brief period of time.

The audio output feeds volume control R17 via C16. S1 turns the Noisebuster off completely, disconnecting the battery and simultaneously bypassing the circuit.

PARTS LIST

RESISTORS (¼ watt, 5%; carbon film preferred)

R1, R3	470k
R2, R4	10M
R5	100k
R6, R10	10k
R7	27k
R8	47k
R9	820Ω
R11	220k
R12	1M
R13-R15	39k
R16	50k trimmer
R17	10k audio pot

CAPACITORS (16 working volts or greater)

C1, C3, C5, C6, C12, C16	0.05µ (50n) mylar
C2, C4	47p disk
C7	10µ electrolytic
C8	1µ electrolytic
C9, C10, C13	0.01µ (10n) mylar
C11	0.001µ (1n) mylar
C14, C15	0.005µ (5n) mylar

SEMICONDUCTORS

D1	1N9148 diode or equivalent
D2	Red LED
Q1, Q2	2N3904 NPN transistor
IC1	4001 CMOS quad NOR gate
IC2	555 timer

OTHER PARTS

J1, J2	RCA jacks (or whatever works with your system)
S1	DPDT switch
B1	9V battery
Misc.	IC sockets, circuit board, battery clip, LED holder, box, knob, hardware

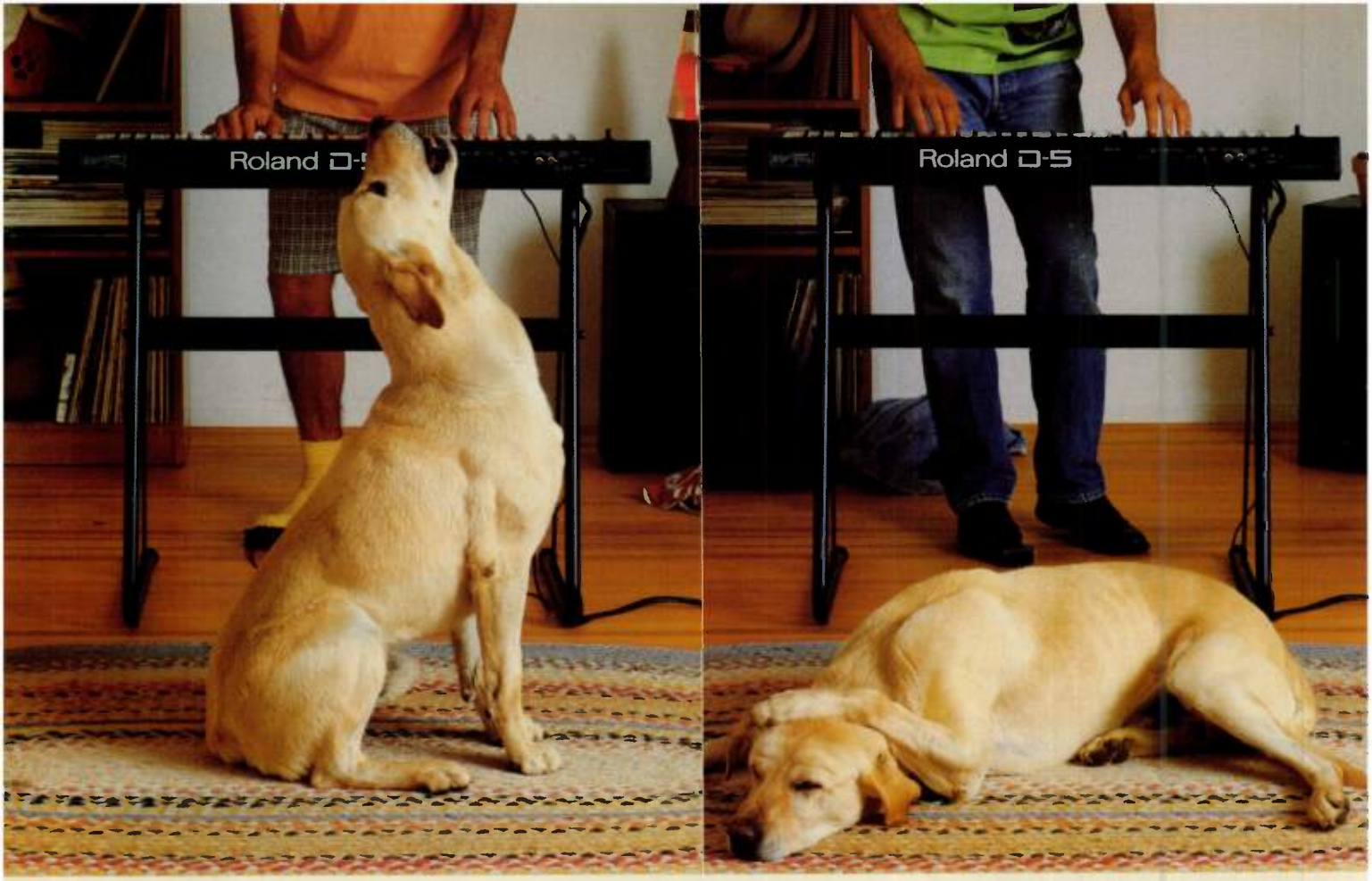
BUILDING IT

All the parts for this project are available from Radio Shack or just about any mail-order electronics house. I built the circuitry on a Radio Shack Experimenter's Board (part #276-154), which I cut down to fit inside a small plastic box. The jacks mount on one end of the box, and the LED on the other. The pot and switch mount on the top, and the whole thing goes together so that the battery is held firmly in place by the sides and the lid. I stuck on four rubber feet to keep the box from sliding around.

TWEAK BEFORE YOU TICK

Before you box the thing up, connect the Noisebuster between the computer and monitor (or amplifier). Install a 9V battery and turn the unit on. Boot up your sequencer and let it click. If the circuit is working properly, rotating trimpot R16 will change the tone's timbral quality from a woody "thock" to a ringing tone. Set it for the desired sound, and you're done—no longer need you suffer through noisy clicks, incorrectly tuned tones, or weak pulses!

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



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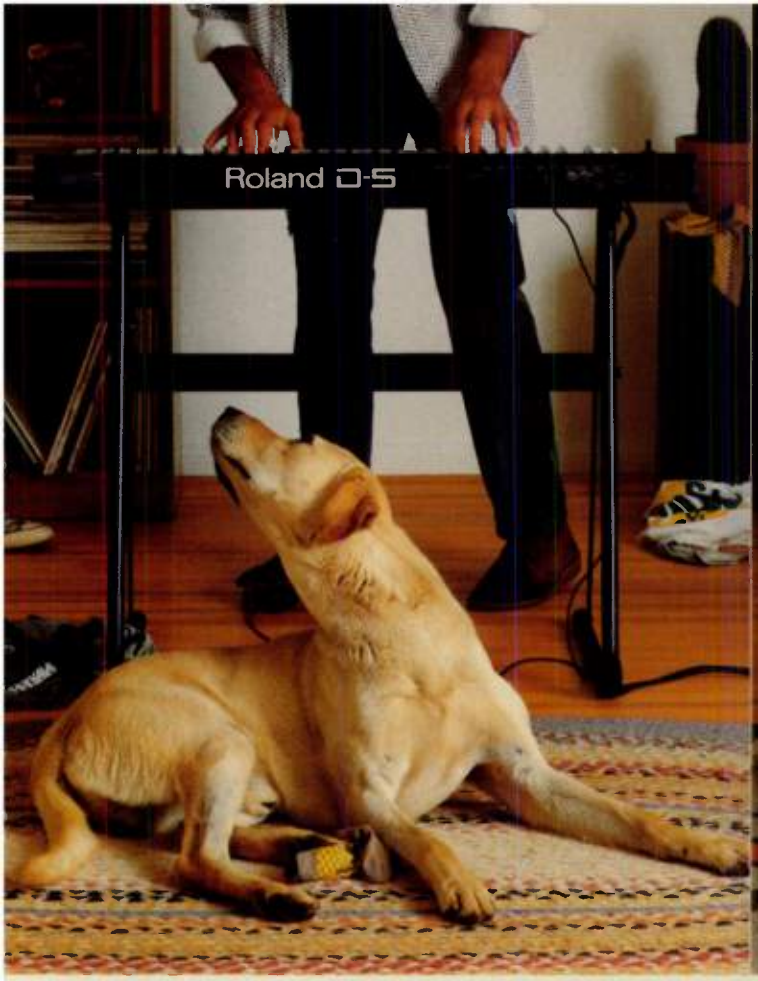

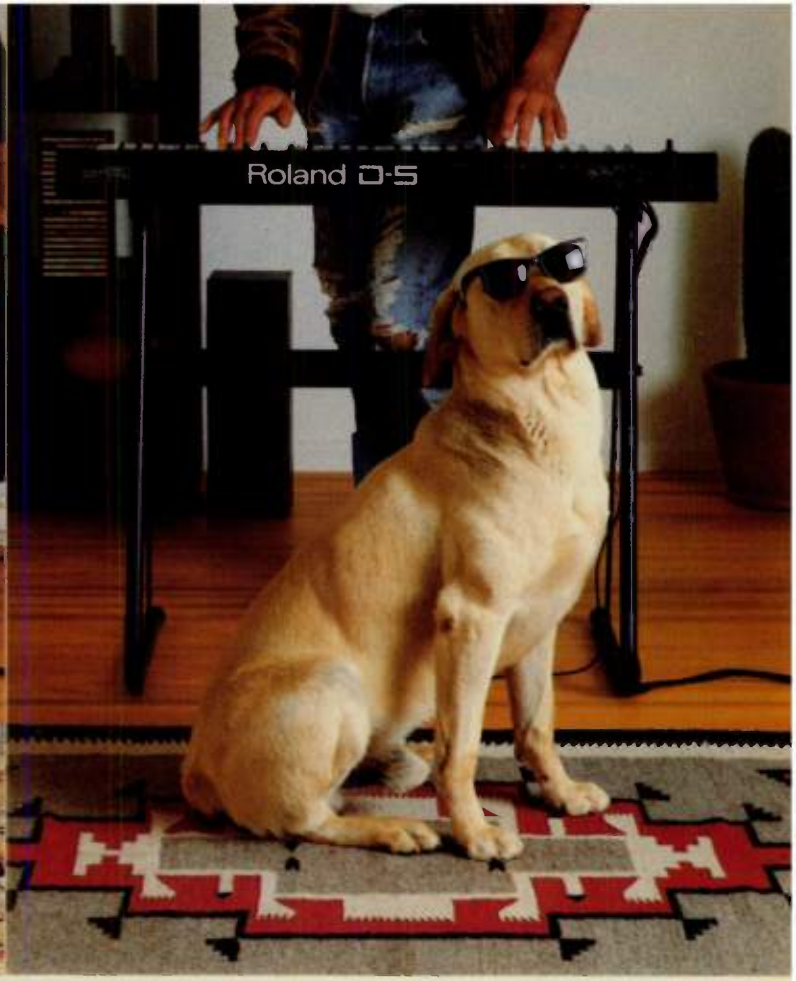

in our other D-series machines at a price you can actually afford. So no matter how good you get, it can keep up with you.

For starters, it's got 128 preset tones and 63 preset drum and percussion sounds—as well as the capacity to program in 64 additional tones. And if (oops, make that when) you get to the point where even that's just not enough, all you have to do is pop a memory card into the slot and you can instantly load 64 more tones. Or 128 performance patches.

It even has some performance features our other D-Series synthesizers don't. Chord Play, for instance, which lets you play chords with one finger. Chase, which lets you create all sorts of echo effects using any of your 192 sounds (255, if you count the drum and percussion sounds). Harmony, which harmonizes a melody according to the chords you play in the lower part of the keyboard. And Arpeggio. You know what that is.

All of which would be pretty hard to keep track of if the D-5 didn't have a 32-character, two-line LCD screen displaying settings for patches, performance and multi-timbral setups, or parameters.

Of course, the thing you'll grow to like best about the new Roland D-5 is that it has the same Linear Arithmetic sound source that you'll find in our D-10, D-20, and D-110 synthesizers. So it sounds particularly awesome when you're on stage. Underneath the lights. In front of hundreds—even thousands—of screaming fans.

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First Takes & Quick Picks

A multichannel mixer, a handy MIDI Remote Control and more are all on offer this month. Plus we introduce our latest twist on short reviews: Quick Picks.

Tascam MM-1 Mixer ($1,095)

By Daniel Kumin

There are certain incontrovertible truths in life. You can never be too rich or too thin. You can never—if you're a metal guitarist, anyway—play too many notes too fast. And you can never have too many mixer channels.

Clearly, Tascam agrees. Their new MM-1 keyboard mixer boasts twenty main inputs and a supply of auxiliary features to accommodate even the most elaborate setup of the performing keyboard artist or home studio. And it offers several unusual features expressly for the thoroughly modern musician, including some limited, but uncommonly useful, MIDI control features.

The compact, rack-mount MM-1 is somewhere between a full-sized mixer and a "mini" tabletop model. Five rack spaces (8¾ inches) deep, it can tilt out for easier rack access but works equally well on a tabletop (a removable palm rest is included). Sixteen main inputs are equipped with a trim control wide-ranging enough (40 dB!) to welcome anything from microphones to hot line levels (+4V). But the MM-1's claim to input fame is that its first four faders each control a *stereo* channel pair, thus the 20-input total.

Each channel (or stereo pair) includes tolerably useful high and low EQ controls, a choice of four effects (only two can be sent at once from each channel), and a stereo out balance control. Miniature but quite manageable faders control output to the system, while a green-yellow-red LED trio monitors post-EQ channel level.

An unusual effects loop scheme arranges four mono sends and four stereo returns with ¼-inch tip-ring-sleeve stereo jacks that can be normalled back to centered mono returns by shorting the tip and ring together. Combined with the MM-1's sixteen post-fader, direct channel outputs (the stereo-pair direct outs are summed to mono), and bus inputs to effects 1 and 3, this creates a great deal of expansion potential for additional effects, still larger setups, or recording patches.

A master panel holds left/right master faders (same small size) and send and return level pots. Sixteen Mute/Solo keys mute individual channels (or stereo pairs), unless the Solo mode key on the control panel is pressed, in which case they perform a solo function. The left and right master outs can be individually muted as well. Also on the con-

the EM rating system

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

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

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

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J.L Cooper FaderMaster

trol panel are stereo output LED bar meters (to +6 dB), a headphone jack and level knob (and a headphone amp with plenty of poop; well done, Tascam!), and the MIDI control keys.

The MM-1's MIDI functions are a potential godsend for the performer. Any arrangement of channel mutes can be stored in what Tascam terms a "Scene," then recalled so that different instrumental/mic setups are automatically recalled from song to song. Scenes can be called up manually via control panel keys, an up/down footpedal plugged into the MM-1, or external MIDI commands passing through the mixer's in/out/thru jacks. Ninety-nine scenes can be stored internally (or responded to), corresponding to MIDI program numbers 00 to 98, and a 2-digit LED numeric display reads out the MIDI channel, Scene number, and so on.

Scenes can also command synths and other MIDI devices to change programs, though again, the Tascam only sends program change numbers 00 to 98. Finally, individual channels can be muted without changing Scenes via full-velocity note messages from an external controller or sequence.

The MM-1 proved quiet, capable, and remarkably easy to use for such a dense package. Yes, the controls are rather small, and the round knobs are a bit tough to "read" at first. But once you learn your way around the panel, these problems disappear.

The MM-1 provides exceptional utility and flexibility for both road-going and homebody MIDI musicians. It's not moving fader automation, but it's no bad thing. The technical performance is up to snuff, too. The absence of balanced ins and outs should not trouble the home studio user or live performer. And specs like -118 dB (A-weighted) equivalent noise, 77 dB S/N (A-weighted, 16 line-in-out), and 20 Hz to 20 kHz (+1/-2 dB) frequency response are excellent for the serious home studio or any performing venue. (A quick trip to the test bench—Audio Precision System One—more than confirmed Tascam's numbers.)

But perhaps the best Tascam MM-1 spec is this: $1,095 suggested retail. At this price, it is an accessible, wonderfully space-efficient, flexible product, with twenty high-performance inputs in the space of a good-sized drum machine.

With the MM-1 on hand, you can turn your attention back to counting calories and reading bank statements.

New Hampshire's **Daniel Kumin** *writes about consumer and musical electron-*

ics for several national magazines and is technical editor of CD Review.

Tascam/TEAC
Professional Division
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Montebello, CA 90640
tel. (213) 726-0303

J.L. Cooper FaderMaster ($299)

By Bob O'Donnell

Like my beloved Swiss army knife, the more time I spend with J.L. Cooper's new universal MIDI remote control, the more uses I've found for it and the handier I've found it to be. This is really a great little tool.

The FaderMaster consists of eight hardware faders that can be assigned to send just about any type of MIDI message: note ons, pitch bend, aftertouch, program changes, controllers, nonregistered controllers, and even system exclusive (sysex) messages. These are automatically merged with any incoming MIDI data. You can group any number of faders onto one fader, set the range of values any fader will send (including inverse), and even individually control how much data is spewed out per fader by adjusting the rate at which the microprocessor checks the fader's position. In another mode, FaderMaster can delay the onset of individual MIDI notes or MIDI clock messages by up to 15 milliseconds. (However, it cannot delay entire channels of MIDI data.) While very subtle, this is useful for changing the "feel" of drum parts.

Actually working with FaderMaster is a breeze, though programming it is not—primarily because of the meager 2-digit LED and the difficulty of dialing in precise values or checking existing values. Thankfully, the company has addressed the problem by offering an inexpensive ($29) editor/librarian for the Mac and Atari (both of which come in stand-alone and DA versions). Believe me, it's well worth the money and is required to create sysex messages for the FaderMaster to send.

The real beauty of the FaderMaster

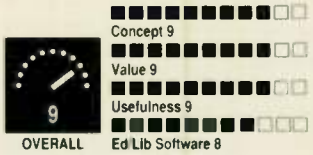
lies in all the various purposes it can serve. It excels at automated mixing, as it can send MIDI volume (controller 7) commands suitable for recording into a sequencer. Moving real faders is much nicer than trying to draw volume curves or using a mouse to drag around an onscreen fader (if your software sequencer even offers those features). I used the box in conjunction with Vision and controlled the program's software faders with the FaderMaster. *Très cool.*

FaderMaster can also cleanly punch in and out of any existing sequence of MIDI volume commands. It achieves this miraculous feat by checking incoming MIDI volume messages and letting you adjust your initial level to match the one coming from the sequencer before you "punch in" and start sending new values. The same technique applies to punch outs. The only problem is that FaderMaster merges everything it receives, so unless you filter out note messages coming from the sequencer before you get to FaderMaster, or only record MIDI volume commands on the new track, you'll instantly double the size of your sequence (because the entire sequence will be recorded on the new track). Plus, you run the risk of overloading the FaderMaster's microprocessor if you have a multichannel sequence with lots of controllers, aftertouch, etc. However, if you filter the incoming data through an external box (FaderMaster does not have any filtering of its own) and record only new MIDI volume commands, everything works fine.

The FaderMaster's merging functions come in handy if, for example, you want to add aftertouch messages to a MIDI stream coming from a non-aftertouch keyboard, or if (as suggested in the well-written and informative manual) you want to make real-time adjustments to eight different synth or signal processor parameters as you play. Thirty factory presets are dedicated to this purpose, but you can also create setups of your own. Included in the presets are banks for the Kawai K1, Korg M1, Yamaha 6-op DX/TX family, E-mu Proteus, Oberheim Matrix 6/1000, Roland D-10/20/110 and D-50, ART Multiverb and Ensoniq VFX. (You'll need software version 1.08 of FaderMaster and 1.7 or higher of VFX for these last two to communicate properly.) It's almost like having knobs again.

I really can't say enough good things about the FaderMaster in this limited space. It's certainly not perfect—I wish, for example, that each programming button could be used to send individual MIDI messages and that the accompanying ed/lib were a bit slicker—but it does a lot of things very well and at a good price. If you want a more controllable and powerful MIDI studio, check out the FaderMaster. Otherwise, as with a Swiss army knife, you may not know what you're missing.

Bob O'Donnell, *associate editor of* **EM**, *spends more time reading manuals and music and computer-related magazines than should be legally allowed.*



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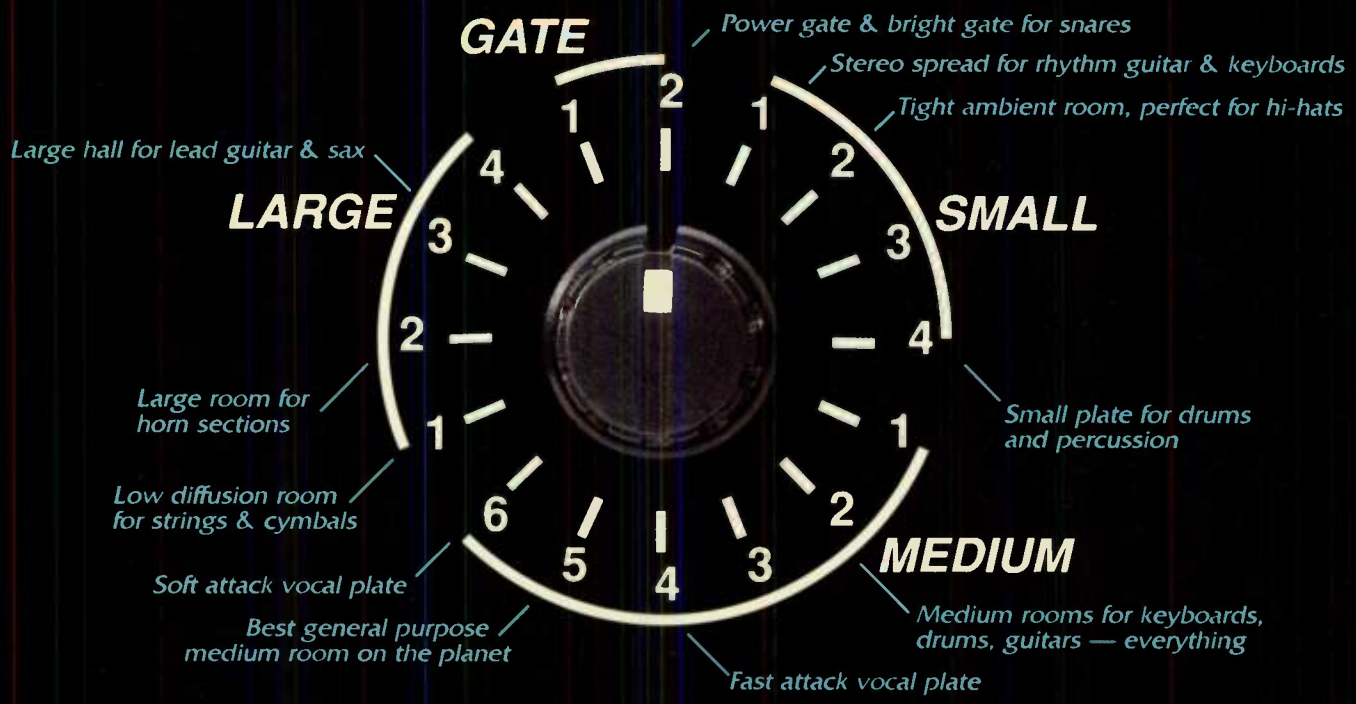

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Lexicon LXP-5 Effects Processing Module ($549)

By Steve Oppenheimer

Welcome to budget effects tweaker's heaven (almost). Lexicon, having started a new line of editable, programmable effects with the LXP-1 reverb/delay, has clearly advanced further down the same road with the LXP-5 stereo multi-effects processor. Included in its half-rack package are multiple delay lines (two or three, depending on the algorithm), reverb, EQ, and pitch-shifting, with a choice of two distinctly different signal-path algorithms—and enough quality presets to be sonically dangerous, even if you don't program. Most importantly, the LXP-5 retains the clean, crisp sound one expects from Lexicon.

Lexicon LXP-5 Effects Processing Module

Unlike the LXP-1, which only permits a few parameters to be edited from the front panel (other parameters are accessible through MIDI), the LXP-5 offers full access to 23 parameters through both the front panel and MIDI.

If you want to just plug in and play, Lexicon provides four banks with sixteen ROM-based presets each, and eight user banks. User banks 1 through 4 are duplicates of the ROM-based banks, provided for your editing pleasure, but user banks 5 through 8 contain additional and often unusual programs. On the whole, the presets are excellent, and their names (like "ambient detune" and "slow rise") give a good indication of what they do (don't take this lightly).

The front and back panels include the usual input, output, and mix pots with input and overload LEDs, and the MIDI ports include MIDI in and a switchable MIDI out/thru. Three other multifunction knobs round out the front panel.

I tried the LXP-5 on a gig, wired in mono, and it did a solid job. Because the module is small, it's a bit tough (though certainly practical) to adjust knobs on the fly if you want to make real-time adjustments. Performers will appreciate the ability to remotely adjust parameters in real time via MIDI continuous controllers, MIDI clock messages, or a footswitch. Other real-time modulation can be produced by the onboard LFO, which produces a frequency-adjustable sine wave.

Although it sounds good in mono, the LXP-5 blew me away when I used it in stereo. Many effects incorporate excellent panning, so you can really make the listener's head swim. Congratulations to the LXP-series design team, especially effects co-programmers Gary Hall and Michael Hathaway.

Lexicon was an innovator in pitch-shifting technology, but this is its first budget pro audio product to incorporate that effect. The pitch shifter sounds impressive—with none of those awful noises some pitch shifters produce—and can shift down two octaves and up an octave. Naturally, you can fine-tune the pitch for subtle detuning or more outrageous effects. A pitch shifter is really wonderful for adding polyphony to a sound, like adding high brass to a brass section, without sacrificing synth voices.

On the MIDI control side of things, the LXP-5 lets you create four "general purpose" patches that designate a modulation source (MIDI controller), a destination (parameter), the threshold above which the modulation is active, and a scale factor that defines the relationship between controller and parameter. In addition, you can assign the Adjust knob to as many as five parameters, and you can create global patches that assign controllers to parameters uniformly for all presets. This kind of controller flexibility makes it possible to create complex multiple-parameter editing algorithms that are relatively easy to use.

One feature I particularly appreciate is the red/green LED next to the Learn (edit) knob. In edit mode, the LED displays whether the preset value has been changed and whether the knob's setting reflects the actual value.

Although the LXP-5 has reverb, delay, and an LFO, it's a pain to program a decent flanging algorithm; the LXP-5 is not a substitute for the LXP-1, which is completely dedicated to reverb and delay-based effects. Lexicon anticipates you will combine the two LXP models as a system and simultaneously control them with a Lexicon MIDI Remote Controller (MRC) with Rev. 3.0 or later software. The MRC can transmit LXP-5 system exclusive data, allowing you to tweak parameters with even more flexibility and precision.

The manual is well-done (although the chart displaying the two signal-path algorithms is inconveniently located) and includes a thorough MIDI implementation section. If you are familiar with signal processing, you can learn (but not memorize) most LXP-5 functions in an evening.

A few problems do exist, however, and some are a drag. First off, the unit has no display, so you never know precise parameter values; an editor/librarian (expected soon) or MRC would solve this. The module also lacks mixing and level-control facilities for the individual effects. I'd like to have more choice of signal paths, but Lexicon would have to create yet another mode for the existing switches—there's no room for additional controls on the front panel. Finally, the various knobs don't have a stiff enough detent at each setting; sometimes it's hard to tell if a knob is fully snapped into a setting or is in between.

In spite of any minor gripes, with the LXP-5's sound quality, fine stereo presets, and powerful programming features, it is a tremendous value and should prove very competitive in a tough market.

Assistant editor **Steve Oppenheimer** *needs a vacation. He wants to travel, play (real) piano, and leave his electronic instruments at home.*

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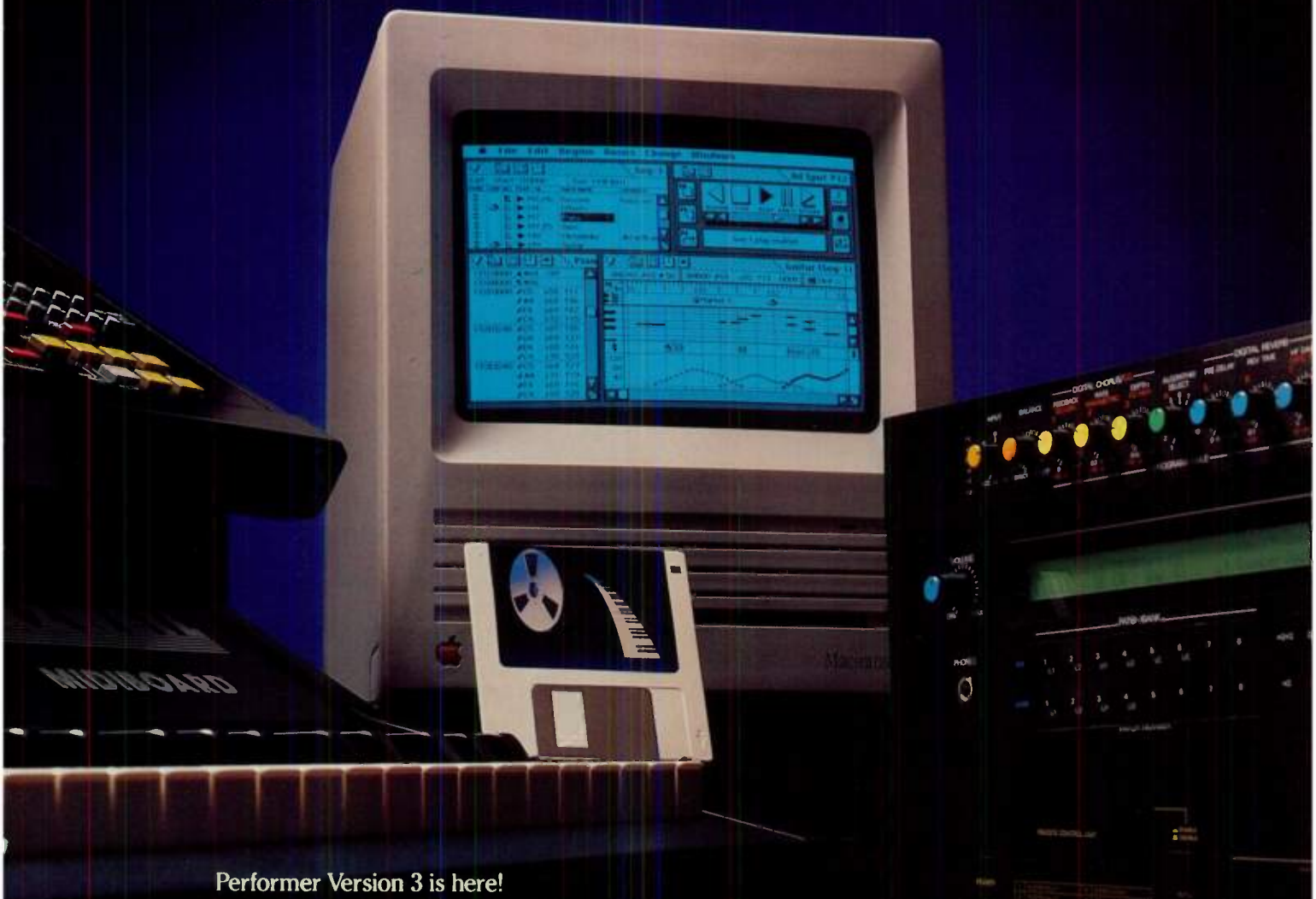

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The Ensoniq EPS Signature Sound Series

Ensoniq EPS Signature Series ($39.95 per three-disk volume)

By Kenn Lowy

When Ensoniq introduced the Ensoniq Performance Sampler (EPS), it received rave reviews. Now, Ensoniq has taken EPS samples from various well-known musicians and released them to the public under the "Signature Series" name.

Ensoniq has done a great job with the packaging and information. Each volume comes in a small package with four diskettes and a very useful manual that contains a section on how to edit some of the more pertinent EPS sound parameters, an artist bio, and some general sound tips. There are also some notes about the sampling session and a description of the sounds on the disks.

The quality of the samples is excellent throughout the series. David Hentschel's volume, of mostly synthesizer samples, is one of my favorites. "Metal Voices" is basically the famous Fairlight voice sound (heard on just about every European synth song in the past few years, but still a great sound). "Textured Pad" is an excellent synth sound that's great for big chords and features nice use of the EPS polyphonic aftertouch. If you're looking for synth sounds, this is a good choice.

Craig Anderton's volume is also all synths, but with a different slant. One disk contains OB-8 sounds, one FM synthesis sounds, and one Minimoog sounds. Memory is used very efficiently; there are 48 sounds among the three disks, so you certainly can't complain about value. (*Curiously, though, two sounds listed in the manual aren't on the disks, and the manual omits information on some of the FM sounds. Apparently these problems cropped up during the final disk and manual edits at Ensoniq.*—*CA*) The sounds are excellent; they sound like the instruments being sampled, but benefit from polyphonic aftertouch, layering, patch buttons, and other EPS features. If you still use analog sounds or were thinking of buying an FM synth, you should check out this volume. Anyone who does any Top 40 or synth pop work will probably find it very useful.

Claude Gaudette has given us some interesting voices, as well. I was unimpressed with them at first, but when I listened to them a few weeks later, I had the opposite reaction. Sounds like "Mega Bass," "Breathy Vox," and "String Pad" work very well. They don't really need any description here, as they pretty much sound like you'd think they would.

John Robinson's set has three different drum sample disks. "Rock Kit" is what you would expect. "Ambient Drums" has a *great* sound to it. The manual says these "are some kickin' sounds," and I have to agree—they really do jump out at you. Lastly, there's the "Jam Kit 1," which is nice and clean and

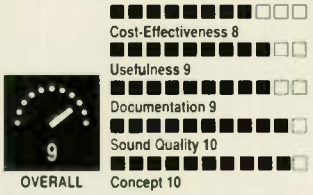
is applicable to quiet, jazzy music. *(An Ensoniq representative notes that these were the same drums John used on the Steve Winwood hit "Higher Love," so other applications are possible.—CA)* The notes mention using the EPS 12-note mode for better sound clarity; this does make a difference.

Paul Jackson Jr. has some useful guitar sounds. Being a guitarist, I don't need to play guitar sounds from a sampler, even if it is the EPS, but there are some very nice samples here. There are also a few special effect guitar sounds that can be used once or twice but are not the type you'd use every day.

Finally, there's the Nile Rodgers set. As with the other artists in this series, I was curious to hear his musical inclinations; he offers a bunch of guitar and drum sounds. The drum sounds are good, but the guitar sounds are, for the most part, effect sounds. While they're great sounds, I don't know how often you can use them. The feedback guitars are better than I thought would be possible on the EPS; the use of layers and patch select buttons is also impressive. These disks are a lot of fun to play with and would be great in a Top 40 act, where you can wow the audience with cool sounds. If you're playing your own music, they may not be quite as useful.

Considering the excellent sound quality and packaging, I don't find the $39.95 list price too high. I hope Ensoniq continues this approach to releasing samples, because there are a lot more musicians out there whose sounds I'd like to hear. However, samples are like ice cream: some people prefer vanilla and some chocolate; I recommend you listen to the samples before you buy.

Kenn Lowy *is a guitarist/E-Bowist and Chapman Stick player who abuses synthesizers and samplers (like the EPS). He has just finished recording his first album and is currently competing in triathlons in the Northeast.*



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Casio DA-2 Digital Audio Tape Deck ($1,499)

By Craig Anderton

As a portable or field deck, the DA-2 is both light (2.8 lbs. with battery pack) and small (9.5 x 5.8 x 1.75 inches). However, the rechargeable battery pack (which doubles as an AC power supply) only runs for two hours before requiring an eight-hour charge, so I expect many owners to pound on Casio's doors for additional battery packs.

Sound quality is what you would expect from DAT—almost razor-flat frequency response, with a combined record/playback dynamic range of 85 dB. This does not meet true 16-bit specs due to 15-bit record encoding, but it's excellent nonetheless.

As a pro mastering deck, the DA-2 lacks digital inputs and outputs and cannot record at 44.1 kHz (although it will play back tapes recorded at 44.1). If you're willing to undergo format conversion for CD mastering and, during album assembly, can play your masters back on a DAT with digital I/O, these are not serious limitations at all.

It seems the DA-2 is happiest as an all-purpose device—it's small enough for portability, has the track search and skip features useful in a hi-fi setup, and can serve as a mastering or archiving deck. So, if you need a DAT that performs a number of functions well, rather than just doing one or two things superbly, and sounds good, check out the DA-2.

Overall rating: 8. *Casio (Music Division), 570 Mt. Pleasant Ave., Dover, NJ 07801; tel. (201) 361-5400, ext. 407.*

Yamaha G10 ROM Update 1.2

By Craig Anderton

The latest ROM update to the Yamaha G10 guitar synthesizer has come close to turning it into a whole new instrument. Double-triggering has been reduced drastically, giving much more predictable results. The tracking, which was good to begin with, also seems more consistent and sensitive. Best of all, the ROMs are free to registered G10 owners, and installation can be handled easily by your local Yamaha dealer.

It's unfortunate for Yamaha that the G10 was not released with these ROMs—the improvement is that substantial compared to the original, which I felt was outperformed by the late, lamented Beetle Quantar. With the new ROMs, though, the G10 has taken over the #1 place in my MIDI guitar top five.

If you're a registered owner and don't immediately get Version 1.2 ROMs, check whether your brain is still functioning. If you tried the G10 and weren't too impressed, give it a second chance. There may never be a perfect MIDI guitar, but this one just got closer.

Overall: 9. *Yamaha, SGD Division, 6600 Orangethorpe, Buena Park, CA 90620; tel. (714) 522-9011.*

Alesis HR-16:B ($499)

By Bob O'Donnell

The sequel to the popular HR-16 drum machine is functionally identical to its elder sibling: it's got the same features, the same number of outputs (four), the same buttons (though with an improved feel over older HR-16s), everything. (For more on the HR-16, see the May 1988 **EM** review.) The big news here is the sounds, and they are big: 47 completely new, extremely clean drum sounds, most of which seem geared toward rap, house, and other forms of dance music. With names like Techno Kick, Techno Snare, Monster Kick, '90s Gated Snare and, more importantly, sounds that live up to those names, this machine is not for the squeamish or overly sensitive. A few of the sounds include a bit of reverb or ambience, but don't expect something for nothing. I still found myself adding a touch more reverb.

As with the HR-16, all the sampled sounds can be tuned over a range of about an octave and a half. Unfortunately, tuning the crash cymbal up and the booming, rap kick down led to some aliasing-type sonic ugliness in the machine, but the other sounds were impressively clean and tunable. The overall sound is comparable to the HR-16; in other words, excellent. Speaking of which, installing the plug-in chip that allows an HR-16 and an HR-16:B (or two of the same, if you prefer) to work together as a single machine is a breeze—it took me about five minutes, thanks to the included EPROM puller tool.

Overall rating: 9. *Alesis Corp., 3630 Holdrege Ave., Los Angeles, CA 90016; tel. (213) 467-8000.* ■

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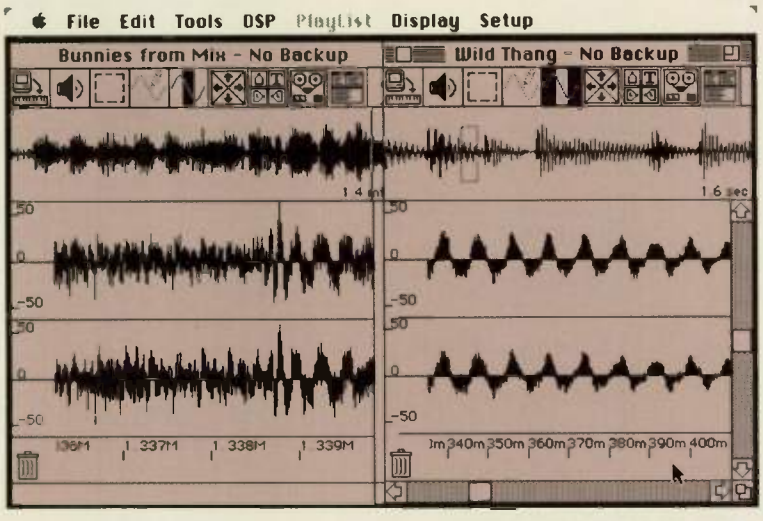
Digidesign Sound Tools

By Paul D. Lehrman

Two-track digital recording and editing is now as close as your Mac, with the help of a disk, a plug-in card, and an external hardware box.

For those of us who work in MIDI studios, the idea of manipulating real sounds as easily as we do synthesized sounds has always been a high-priced dream. Samplers, of course, have given us access to sounds on a limited, one-at-a-time basis, but the production process still revolves around sending individual MIDI commands to various devices and having them do their thing. The ability to have an entire audio track—music, effects, or dialog—in the computer and edit, mix, and play it with the ease of a MIDI sequence has been available only to those who have access to such saliva- and bankruptcy-inducing toys as the Synclavier, Fairlight, Opus, or AudioFrame.

Digidesign, who has built its reputation on software tools that enhance samplers far beyond what their manufacturers thought possible, has now, with Sound Tools, brought professional hard disk audio recording capability down to the level of the MIDI studio, both in terms of economics and ease of use. The company's engineers have used their knowledge and experience to create a system that puts all of the functionality of a hard disk audio system inside a Macintosh computer and given it a front end that's the essence of Macintosh user-friendliness.



Sound Tool's main editing window showing segments from two stereo soundfiles.

Sound Tools allows recording, editing, and playing back true 16-bit, stereo, PCM digital audio at a sampling rate of up to 48 kHz, which makes it appropriate for just about any audio application from film dialog editing to CD mastering. The system is in three components: AD IN, a stereo analog-to-digital converter in a stand-alone box; Sound Accelerator, a stereo D-to-A converter, and Motorola 56001 digital signal processor (DSP) on a card that fits inside the host computer; and *Sound Designer II*, the latest version of the company's well-known sample-editing software.

The fourth component necessary is a Macintosh SE or II, with a hard disk. (On an SE, sample rate is restricted to 32 kHz in stereo, however 48k is available in mono. A version for the SE/30, which will have the same capabilities as the Mac II version, may be available by the time you read this.) The package sells for $3,285; with the computer, the total system price is anywhere between $6,000 and $12,000, or more if you want an enormous hard disk. You will need a large hard disk for lengthy projects; about 10 megabytes of disk storage is required for each minute of stereo, recorded sound at a 44.1 kHz sampling rate. But because the system is designed to be used with off-the-shelf components, it is easy to increase the size of the system at any time, and it will become even easier as hard disks continue to grow in size and shrink in price.

Installation is simple. The Sound Accelerator card fits into a slot in the com-

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Chart shows results of blind, subjective listening tests conducted by *Keyboard* (© 1989). Ratings do not reflect scientific test results, price/performance ratio, or evaluation of instruments features.

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puter, and the AD IN then plugs into the Sound Accelerator card by means of a thick cable with DB-25 connectors at each end. Audio input to the AD IN is via two unbalanced, high-level (-10 to +8 dBm), ¼-inch jacks. The output of the Sound Accelerator card appears at a stereo (headphone-style), ¼-inch jack and provides a +4 dBm signal on each channel. Output trimpots are on the card for situations that require lower levels, and a splitter cable is included that provides unbalanced, ¼-inch jacks for each output channel. For recording and outputting sound completely in the digital domain, you can make use of the optional DAT I/O interface, which is housed in a box similar to the AD IN.

RECORDING SOUNDS

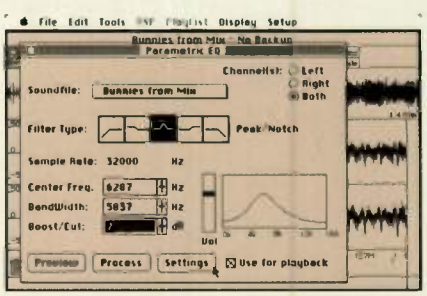
To record a signal, you send it to the AD IN box and adjust its level with two front panel knobs, keeping your eye on green "-20 db" and red "Clip" LEDs on each channel. Boot the Sound Designer software, then open up a "tape recorder" window, which contains transport-like controls and LED-like level meters. The window presents you with several options, such as whether you want the inputs of the AD IN to be echoed at the outputs of the Sound Accelerator card, and a selection of sample rates, which can be from 8 kHz to 48 kHz, with 44.1 kHz as the default.

Click on the Record button, and the system starts to record the sound coming into the AD IN directly to the Mac hard disk. A running display tells you how much time has elapsed and how many samples have been recorded. Click again, and the recording stops. Using other buttons for playback, rewind, fast forward, and return-to-zero, you can hear what you've recorded.

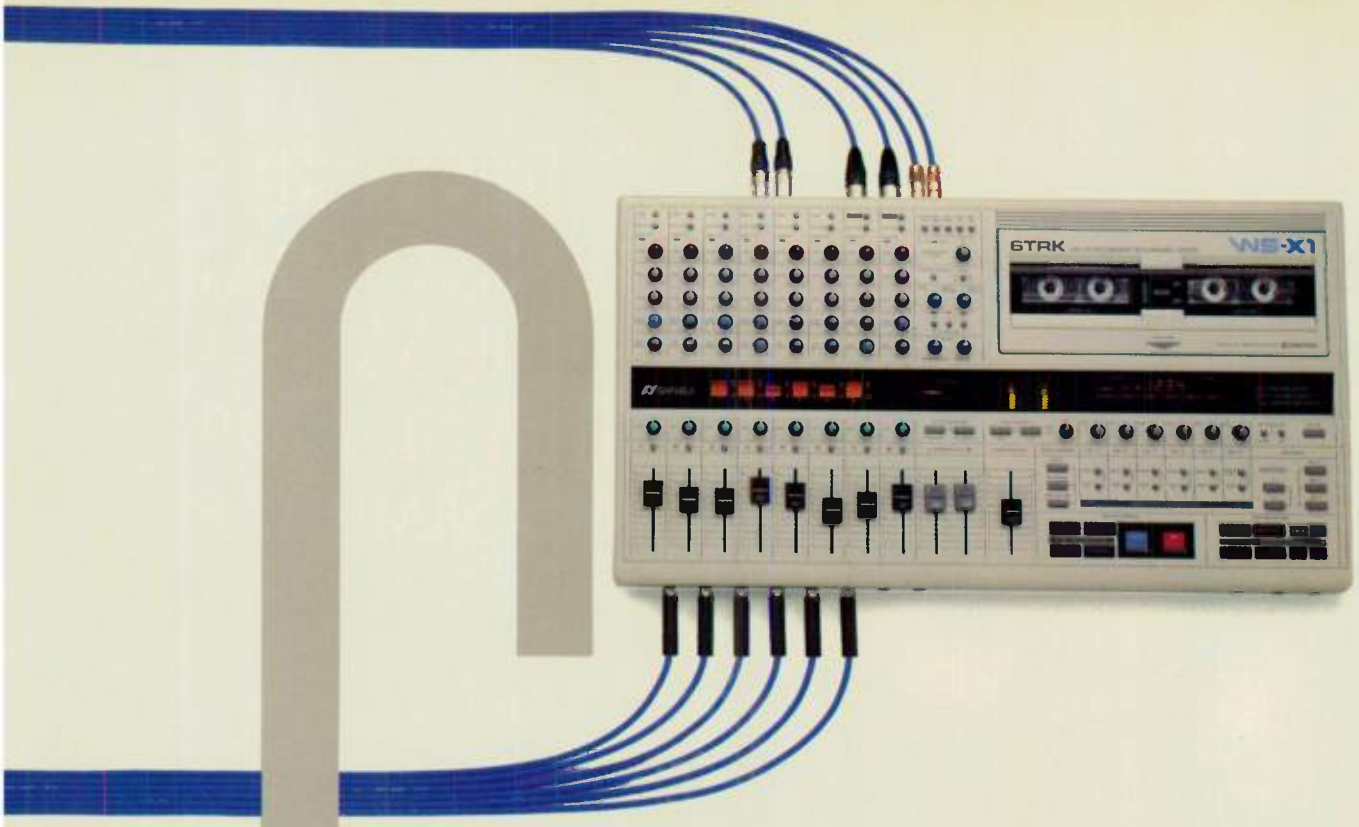
You can stop recording at any point and start again at the same point, go back and record over existing data, or even punch in and out on the fly. If you want to record sound coming off a tape that also has SMPTE time code on it (for example, a line of dialog from a videotape), and you have a SMPTE-to-MIDI time code converter hooked up to the Mac, you can instruct the software to start recording when it receives a specific SMPTE/MTC frame number and stop at another frame.

EDITING SOUNDS

Once you've recorded a piece of audio—now known as a "soundfile"—you can view it in a large graphic window, which will be familiar to users of most sample-editing software, showing the sound as amplitude versus time. If the file is stereo, there will be two panes (both within a single window), one for each channel. The horizontal (time) axis can be scaled from about three seconds full-screen (depending on the amount of Macintosh RAM) to about 500 microseconds, at which point individual samples become clearly visible. A smaller pane always shows the overall length of the file, with a marker to show



The Equalization Window allows you to preview or actually change a soundfile with one of five different EQ settings.



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you what part of the file is in the larger window.

Within the main window, you can select a region (including either or both channels) and perform various kinds of editing functions on it. To help you find the selection points, there is a "scrub-wheel" function in which moving the mouse over the screen causes the sound to play forwards or backwards at varying speed, similar to a jog wheel on a video or audio tape recorder.

The program provides two types of editing operations, destructive and nondestructive. Destructive editing actually changes the nature of the soundfile, while nondestructive functions change various parameters associated with the file, but leave the file itself intact.

Among the destructive functions are the standard Mac editing operations like cut, copy, paste (which moves old data aside to make room for new), replace (which writes over old data), and clear, as well as audio functions such as reverse, silence, trim (eliminates everything outside the region), fade in and fade out, change the gain up or down, normalize, and phase invert.

There are also a number of processing (DSP) functions, including a stereo parametric equalizer, which is configurable as a peaking, shelving, highpass, or lowpass filter and can cut or boost up to 24 dB over a bandwidth as small as 10 Hz. The window that opens when you select this function has a Preview button that lets you listen to the effect of the equalizer on the selected region, in real time, as you adjust it. Once you arrive at the setting you want, click on Process and the region is recalculated with the equalization. There is also a 7-band stereo graphic equalizer function, with adjustable center frequencies and bandwidths for each band.

If you design an EQ setting you particularly like, you can save it as part of the application or any soundfile and recall it at any time. In fact, an EQ setting can be saved along with the soundfile without actually having been used to process the file, and the setting can be imposed on the file the next time it is played back. This means you can equalize files nondestructively.

Other DSP functions include merging, which lets you splice two files together with a programmable crossfade time, and mixing, which lets you combine up to four soundfiles (mono or stereo) into one, with adjustable level, pan position, and starting delay (in milliseconds) for each of the original files. Both of these functions automatically create a new soundfile, thereby preserving the original components.

Finally, soundfiles can be stretched or shrunk in time without changing their apparent pitch. The software shows you the length of a chosen segment and lets you specify either a new length in seconds, or a compression or expansion ratio. Originally this function would only perform on mono files, but Digidesign recently provided a free update that permits stereo time compression.

PLAYING IT ALL BACK

Destructive editing of sound has one major drawback: if you want to keep your original version after it's been edited, you're going to use up twice as much disk space. Should you want to save several intermediate versions, you'd better have an enormous disk. Nondestructive editing, on the other hand, allows you to maintain just one copy of the soundfile, along with various sets of parameters for dealing with it, which takes up much less space, a couple of kilobytes at most. Nondestructive editing, because it involves moving far less data around, is also considerably faster.

One type of nondestructive editing is the equalizer function described earlier. Another is the Playlist function.

Say you had a soundfile, and you wanted to construct a dance piece out of it by extracting certain sections of various lengths and reassembling them in a rhythmic pattern. You could cut-and-paste the sections, but that's destructive, and if you repeat elements a lot, it would take up a lot of space. Sound Tools instead lets you select various sections of the soundfile just the way you would when editing them, give each selected region a unique name, and set up a Playlist for playing them back in any order you like. The soundfile is unchanged; the Playlist merely consists of a list of pointers for playing the various parts of the soundfile in the right order.

Playlist regions can overlap, and one region can even be a subset of another. After you've defined and named all of the regions you want (and there is no limit to how many you can have), you open a Playlist window, and all the names appear. You construct the playlist by dragging the name of each region down to a lower window in the order you want them to play. The software automatically calculates and displays the start time, length, and stop time of each region as you assemble the list. Reordering the list is simply a question of dragging the names around. You can hear your entire list by clicking on a Play icon, listen to the Playlist starting in the middle, or hear just a single region.

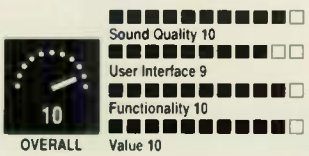
If the transition between two regions sounds too abrupt, you can impose a crossfade of any length from one millisecond up to several seconds. The crossfade can either be linear or "equal-power," which will sound smoother with some material. Each entry on the Playlist gets its own crossfade, so you can mix up long and short ones to your heart's desire and even put a nice, long fade on the end of the last region (if you have enough RAM).

The Playlist can be set to play back locked to incoming SMPTE (actually MIDI) time code. You can specify a SMPTE start time for the first region or assign a specific time to any region on the list.

Any number of Playlists, each with its own name, can be associated with a single soundfile. This means that with a given amount of raw material, you can create an enormous variety of music or sound, using only the amount of disk space it takes to store a few parameter lists.

Product Summary

PRODUCT:
Sound Tools
TYPE:
Hard disk, computer-based digital recording system and sample editor
HARDWARE REQUIREMENTS:
Macintosh SE with hard disk, Macintosh II or SE/30 recommended; SMPTE-to-MIDI time code interface recommended
RETAIL PRICE:
$3,285; $995 for DAT I/O
MANUFACTURER:
Digidesign
1360 Willow Rd., Suite 101
Menlo Park, CA 94025
tel. (415) 327-8811



PLAYING WITH SAMPLES

Like earlier versions of Sound Designer, the Sound Tools package is a very powerful sample editor and manipulator, and it supports files created with earlier software versions. Any sound recorded with the system can be transferred to a sampler (as long as it fits) via MIDI or, if the sampler supports it, the faster RS-422 or SCSI protocols. MIDI system exclusive dumps are supported for most major samplers, and the MIDI sample dump standard (in both 16- and 12-bit versions) is also available.

Of course, samples can also be loaded from these hardware samplers into Sound Tools for editing. With the Sound Accelerator card, any modifications you make to a sample can be auditioned immediately, without having to wait for it to be transferred back to the sampler. The AD IN box allows you to record new samples for samplers that have no recording capabilities of their own, such as the Oberheim DPX-1.

The excellent loop-editing facilities that made Sound Designer famous are still around, and the software handles sample rate conversions, so if you need to output a soundfile to a sampler with a fixed playback rate (for example, the AKG ADR-68K only plays samples at 32 kHz), you can do so easily. If you want to hear the sample polyphonically before you output it, you can turn on a MIDI Preview function that allows you to play up to eight voices of the sample (with velocity sensing!) from an external MIDI keyboard.

To combine different segments into a complete piece, you use the features of the Playlist Window.

OTHER GOODIES

Files can also be saved on disk as "snd" or "AIFF" files. Snd files are "resources" that allow 8- or 16-bit mono or stereo, digitized sounds to be inserted into various other Macintosh applications, such as games, and played back by those applications using the Mac's internal audio hardware and speaker. AIFF, which stands for Audio Interchange File Format, is a more complex (16-bit, multichannel) format designed by Apple for exchanging sounds among applications such as desktop presentation and multimedia programs. In addition, two utility programs are provided. One is for installing a "snth" resource into the Macintosh system software, which will allow playback of snd resources from within *HyperCard* (and probably other programs in the future), using either the Mac's electronics or the Sound Accelerator card. The second,

Sound Access, which is also intended for multimedia applications, permits Sound Designer II files to be played directly from a hard disk in HyperCard and *Director*, so you don't have to load them into RAM.

Also provided as part of the package is Digidesign's *Softsynth* software, a neat program that lets you design sounds from scratch using additive and FM synthesis, and either play them with the Sound Accelerator card or send them to an external sampler.

Finally, the software provides an impressive three-dimensional plotting function, showing the sound graphically as amplitude vs. frequency vs. time. A variety of scales, perspectives, densities, and directions are available.

IS IT REALLY THAT GOOD?

Without a doubt, Sound Tools is brilliant. It makes great use of the Macintosh, both its interface and its computing power, to provide a system that is easy to use, eminently practical in a wide variety of situations, and sounds terrific. But I would be letting faithful EM readers down if I didn't make some criticisms.

To my way of thinking, the software is a little clumsy. The relationship between the various windows and how the tools behave in them is fuzzy and occasionally seems inconsistent. Finding and selecting editing points requires more mouse movements and a better visual memory than it should: when you've found an edit point with the scrub function, you have to remember where it is by eye, get the selection tool, and select it. Having a key combination to automatically invoke the selection cursor while you're using the scrub function would help a lot *(Digidesign has now implemented this feature—BO'D)*. Echo-loop editing is also a little slow, and the procedure for listening to loops could be streamlined.

Individual items on a Playlist cannot be adjusted slightly in time without going back to the editing screen and redefining the region's length, and then saving it under a new name and reinserting it into the Playlist.

Some operations can be quite slow, which in itself is understandable (there can be a lot of data to crunch), and the software is kind enough to give you a progress indicator so you know when it's time to go out for coffee, but it would be nice if it would warn you beforehand how long the operation is going to take

continued on page 129

SOUND DESIGNER II SK

Although most of the attention being paid to Digidesign these days centers around Sound Tools, the company has not forgotten *Sound Designer* users who are still working just with external samplers. There is a new version of the program called *Sound Designer II SK* (Sampling Keyboard) now available that includes all of the functions of the Sound Tools version of the software, except for the record window and Playlist editing. It can be used with just about every sampler on the market and can also access the Sound Accelerator card for real-time editing and analysis. The price is $595, and if you buy it now and decide to upgrade to Sound Tools later, Digidesign will give you full credit on your original purchase.

Microlllusions' Music-X for the Amiga

By Todd Souvignier

Finally—a serious sequencer for the Amiga that wasn't ported, but written from the ground up to take advantage of what the Amiga really can do.

The Amiga's color graphics, multitasking operating system, onboard sound (four low-fidelity, 8-bit voices), robot speech capability, and accessible price make it a potentially attractive computer for creative people. However, if music is your main interest, you may have been put off the Amiga by (among other things) the lack of professional sequencing software. Programs ported from other computers don't look or operate like "real" Amiga programs, and there have also been some less-than-sterling products released for this machine, which further confuses matters.

Microlllusions' prerelease campaign for *Music-X* began in early 1988, promising everything. Amiga users were hungry for a sequencer with color graphic editing, solid timing, and sexy goodies like decent SMPTE synchronization and system exclusive (sysex) storage. But then the long wait began—and cynical attitudes develop when anticipating software releases. Music-X became nothing more than a memory of some flashy ads when, suddenly, the program exited vaporland and started entering disk drives. Yes, it is real—and it is indeed a real Amiga program.

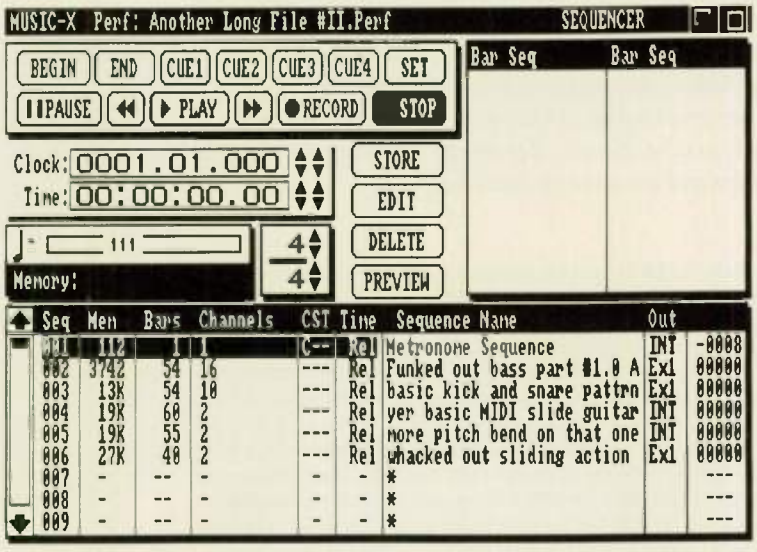


FIG. 1: The Sequencer page, which is devoted to real-time operations.

THE NICKEL TOUR

Music-X must be opened from the operating system that comes on the program disk (booting from Workbench 1.3 gives an error message). You can still do disk copies, formats, and the like, so that's not a real problem. One small but handy feature is that when opening the program, the program sends out a test message of note on and off events to each of the MIDI channels, providing audible confirmation that synths and sound system are functioning properly.

Our first stop, the Sequencer page (Fig. 1), uses the "tape deck" metaphor. Devoted to real-time operations, this page is the program's "home plate." The transport controls include record, play back, rewind, and fast forward; you can also set up to four cue points. Clicking on Begin sends you back to the head of the "tape." Sequences are clocked in measures, beats, and resolution increments in the Clock display, or in SMPTE time code (hour/minute/second/frame) in the Time display. The time signature is wildly adjustable, from 1 to 64 over 1 through 16.

Clicking on Record brings up the Record Sequence requester ("dialog box" to you Mac types), where you set Count-In Bars and number of bars to record, along with alternate recording options like Punch-In and Mixdown Mode. Sequences can be up to 4,096 measures long, but the program does not lend itself to building up little loops during consecutive real-time passes, as in drum box-style sequencers. When the Record Sequence requester is onscreen,

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playing any note from the master controller starts the count-in and begins the recording, so 90 percent of the time you won't mess with the requester.

During recording, the incoming MIDI events stop first at the Filter module (**Fig. 2**). All sixteen input channels can be remapped separately; pitch bend, channel aftertouch, and poly aftertouch can be filtered; and input can be echoed out to MIDI or the Amiga's internal voices. A Remap function can send each of six event types to a different channel, so you could keep the pitch bend and aftertouch separate from the notes in your big solo, then later merge that solo's controller event sequence with the note events from a second solo. This is one of those features where I'm not exactly going to change my playing style to take advantage of it, but it gives me a warm feeling to know it's there. There's also a Keymaps feature accessible through the Filter page; we'll get into that later.

The next stop is a "waiting room," the Record Buffer. Once you have a take, the contents of the record buffer can be stored to one of the 250 tracks (lower half of Fig. 1) and named (up to 27 characters). A stored sequence can be manipulated as a unit and copied, deleted, or merged with another sequence. An Extract function lets you pull apart sequences containing events on several different MIDI channels; it's a sort of "un-Merge" that assigns parts on different channels to discrete sequences, for easier editing and manipulation. This could be really useful to people trying to record parts from a hardware sequencer, and it also simplifies using a MIDI guitar controller in mono mode (where each string is on a different channel).

Music-X syncs to external MIDI clocks and MIDI time code, but at the time of this writing, the MIDI Song Position Pointer implementation does not work. While this program should be very

Product Summary

PRODUCT:
Music-X for Commodore Amiga 1000, 500, 2000, 2500 with 512K RAM (1 meg recommended)

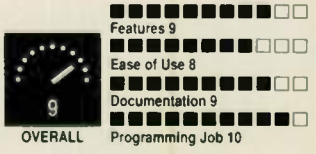
TYPE:
MIDI sequencing software

RETAIL PRICE:
$299

FEATURES:
"Tape deck" sequencer, graphic editing of MIDI data, versatile Filters and Keymaps, sysex librarian, conforms to standard Amiga user-interface

MAIN SPECIFICATIONS:
192 pulse-per-quarter note resolution, 250 tracks per "performance," slaves to MIDI time code, current version includes sysex protocols for Casio, Roland, Yamaha, and Oberheim synthesizers

MANUFACTURER:
MicroIllusions
17408 Chatsworth St.
Granada Hills, CA 91344
tel. (818) 360-3715



adaptable to video scoring applications, a few extra utility programs could really do the trick. Instead, we get gratuitous features like "video" sync to the Amiga's video display timing pulses, plus garden-variety internal sync to the computer timing chip, along with support for MicroIllusions' as-yet-unreleased SMPTE Reader.

A THOUSAND POINTS OF LIGHT

The Bar Editor screen (**Fig. 3**) shows a graphic representation of notes, velocities, pitch bend, aftertouch, and so much more, dancing down the pike as the display strobes through each refresh. Seven zoom levels make it easy to do delicate edits, then zoom back out for the overall picture. Five octaves of notes are visible on the left edge of the screen; scrolling takes you lower or higher. Measure and beat numbers run along the display's bottom horizontal edge.

The Bar Editor displays notes as bars on a "grid," like a player piano roll. This is a really precise and discrete way of representing note information, but be aware that the program doesn't deal with standard notation at all (sorry, you can't print out lead sheets). Music-X could be a deadly, integrated package if it included a good transcription and scoring utility.

Erasing, moving, and adding notes is simple. Notes in this screen will sound when they're clicked on and moved around, which helps you edit by ear. The Snap function locks notes to the grid setting so that notes land right on the beat. With Snap off, events can be placed anywhere within the 192 clocks-per-quarter-note resolution, with a display giving the exact location in measure, beat, and "ticks" (resolution increment). When moving notes or sections, the display also shows how far up or down the keyboard you've transposed from the point of origin.

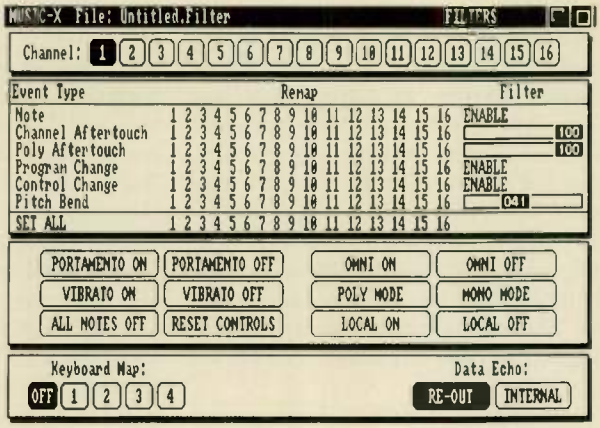


FIG. 2: The Filter module.

Although Music-X allows recording in Bar Edit mode (the events fly on the screen right after they're played), this page is all about manipulations outside of real time. You can also do step entry from the edit screens, but this is a painstaking, treacherous process. The Bar Editor, with its free and easy cut and paste of selected events or entire tracks, is the real heart of Music-X. This is also where loop points and repetitions are

defined for reiterating sequences.

Hitting the Add gadget over in the toolbox brings up a menu with fifteen choices of events, including tempo and time signature changes, Mute and Solo Sequence, Play (another) Sequence, plus old favorites like Program Change and Pitch Bend. Choose the event to add, exit the requester, plug the event into the matrix, then determine its value by moving one of the three virtual sliders. These change their function according to the type of event currently selected.

The display defaults to showing note on and off events, attack velocity, pitch bend, program changes, and system exclusive; this is adequate for most applications. Ensoniq EPS, SQ-80, and VFX owners please note: polyphonic aftertouch is extensively supported in this program.

The graphic interface's requirements have not compromised the program here or anywhere else in Music-X. The Bar Editor will scroll through dense sequences with a decent screen refresh cycle, and will keep perfect time, although scrolling to a point offscreen for a paste operation at a high magnification is a little slow. My main gripe about Bar Editing is that changing note velocity and adding pitch bend should be easier. You either have to scale velocities or else select a note then move to the virtual slider to boost or cut the velocity value. I'd much prefer to just draw a curve to which velocity values could conform, partially or entirely.

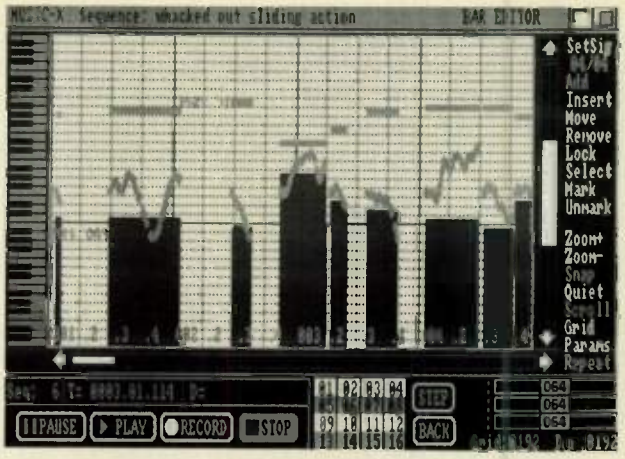


FIG. 3: The Bar Editor screen shows a graphic representation of notes, velocities, pitch bend, aftertouch, and more.

With pitch bend, I again just want to draw squiggly lines with the mouse. Music-X has you click at every point that a pitch bend message will occur, its vertical placement on the matrix determining bend depth. Smooth, graduated pitch bends require either a lot of clicking, or real-time playing. On the whole, though, the Bar Editor is great.

Before moving on, a quick look at the Bar Editor's ugly twin, the Event Editor page (**Fig. 4**). It shows whatever was in the edit buffer over on the Bar display, in black and white, as a simple list of (selectable) events, their times, types, channels, and values. This is mostly a reality check; serious editing functions are a little under-implemented over here.

The Keymaps module is accessed through the Filters page, and like the Filters, it's sort of a MIDI mailroom, where each incoming message is sorted according to its type and content, then rerouted to forwarding addresses. While Filters looks for event type and channel, Keymaps looks at MIDI note numbers coming in from the master controller. This module lets you pull off some pretty hip tricks, like starting and stopping songs, playing or muting tracks within a song, transposing sequences, or running "one finger" bass lines, just from playing single notes on the MIDI guitar or keyboard. You can do live mixing, or a dub version of your fresh dance tracks, letting the drums roll on while you run some changes on the bass line, or cut the keyboard figure in and out.

Keymaps can also translate attack velocity to another MIDI controller message, such as MIDI volume/controller 7. This is especially cool if you own a keyboard that does not implement velocity sensitivity. The Music-X examples disk even comes with a couple of sample "backwards" keymaps, in case you're ready for complete musical disorientation (or are Joe Zawinul of Weather Report).

A KINDER, GENTLER QUANTIZATION

Technically speaking, Keymaps is not part of the Sequencer, but a separate module, an auxiliary program that performs a special task and is loaded into the computer's memory separately from the Sequencer. The advantage to the modular approach is that you can boot up the Sequencer quickly, without the computer spending time loading all the code for these subprograms you may not be using, then you can access modules only as you need them. The most crucial Music-X modules are Quantize and Scaling.

Quantizing (also called "error correction," the practice of shoving notes around so they hit on the beat) is a two-step process in Music-X, and is always done after laying down a track, not while recording (as with Dr. T's *KCS*). The first step is to adjust the Grid setting by selecting note values (quarter, 32nd, etc.) where attacks should fall, as well as duration values. Second is to specify a minimum and maximum threshold value; this is like saying "quantize any note that is more

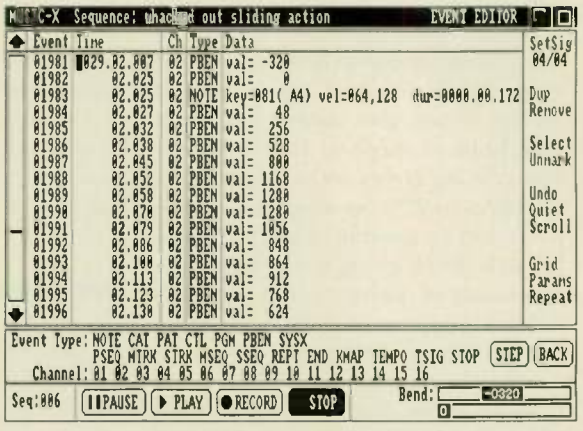


FIG 4: The Event Editor page provides list-type editing in black and white.

than a hair off the beat, but ignore all notes so far off the beat that they've gotta be deliberate." With Music-X's 192 ppqn (pulses per quarter note) resolution, any note that's more than three or four pulses off the beat will probably sound late and sloppy.

An Effect Percentage slider determines just how much quantizing you want of the start, stop, and/or duration of selected events, or entire tracks. On kick and snare drum tracks, I'll go ahead and mercilessly quantize 100% to sixteenth notes or eighth-note triplets, with zero threshold. Bass tracks need a lighter touch; give them a minimum threshold of three or four pulses so slight timing errors are preserved, then set Effect to 97%, so all quantized bass notes end up coming in a little behind the kick drum, giving a nice fat groove. The beauty of quantizing this way is that it doesn't happen by default: it's something you have to do each time, you're made to think about it twice, and you can add a little finesse to the process. The payoff is that you are less likely to suck all feeling out of parts that were basically all right to begin with.

The Velocity and Aftertouch Scaling modules also seem to assume that a track should need no more than a subtle tweak. You can specify positive- or negative-going "ramps" for attack, release, or aftertouch changes across two or more selected events, or for entire sequences. Two sliders control the ramp's Initial and Final Level, in terms of the percentage change from the values previously recorded. This allows for a smooth, calculated change in volume, while preserving the relative dynamics between the affected notes.

You can also use a "flat ramp" to just boost, say, the volume of the whole track, or mark off specific sections for scaling, leaving everything else untouched.

HEY, POWER USER

So you wanna store a different bank of sounds with each song? Or maybe you just need to save your custom patches to make some space for new sounds—no problem. Music-X includes a System Exclusive Librarian that accepts patch data dumps from most any synth. These can be saved as sound banks on disk, or right along with songs, in the same "Performance" file. The program includes handshaking protocols (i.e., MIDI messages that tell a specific synthesizer that it's all right to spill its guts, patchwise; each type of synth needs a different protocol) for the Casio CZ-1000, Oberheim Matrix-6, Roland D-50 and MT-32, and Yamaha DX7, DX100, and TX81Z. There's also a protocol editor screen, so you can write custom "handshake" protocols for each synth in your setup.

The Utilities disk includes a few potentially useful extras, like a D-50 and TX81Z patch editor (nothing fancy, but they're freebies and functional) and a Music-X to standard MIDI file conversion module, which worked flawlessly in Version 1.03 (unlike earlier versions). MIDI File Conversion is one of the only under-documented features in this package—it gets one page of vague lip service in the manual.

One thoughtful, but nearly pointless, feature is the Amiga Samples editor, which allows for customization of 8-bit

Internal File Format (IFF) sounds for playback by the Amiga's internal sound chip. This could be useful to someone who doesn't have a synthesizer yet (although this person's gonna have a tough time playing in parts!) but most EM readers wouldn't stand for the inherently cheesy sound quality of the old 2-inch computer speaker.

THE AMIGA'S DREAM DATE?

Music-X conforms well to the standard conventions of Amiga computing, using familiar mouse, menu, and window operations that are more or less common among Amiga programs—so it's easy to just dive in and start splashing around. The program includes logical keyboard commands as alternatives to most of the major mouse clicks. The program multitasks really smoothly with word processors or editor/librarians from other manufacturers. The program graciously gave over command of the serial port when I opened Dr. T's *4-Op Deluxe* (an FM synth editor/librarian) in the middle of playing back a sequence; I didn't even have to use the Suspend function to get back control of the serial port. The synth tracks just dropped out of the mix, waiting to be auditioned from the editor.

But the real joy of a multitasking home computer is starting a sequence in Music-X, then jumping to the word processor to write this review, and hearing that playback continue with no slowdown or hung notes. I haven't clocked it, just tapped along, but the timing feels rock solid, even when playing sequences during a window operation, disk save, disk copy, or format! The program doesn't hang notes when jumping between screens, and after a month of intensive use I still haven't crashed it. I just can't say that about other sequencers.

All in all, I'd say the Amiga finally has some software that can really make it sing. Now that Music-X is around, the Amiga just became a whole lot more attractive for musicians.

Acknowledgment: Thanks and a tip o' the S.F. Giants cap to Rob Griffith of Computer Showcase for his assistance in preparing the screen dumps that accompany this article.

Todd Souvignier *is a San Francisco bass player, MIDI guitarist and songwriter who also manages operations of the EM Bookshelf in his spare time. His handle on PAN is TrickBaby.*

Dynacord ADS Sampler

By Craig Anderton

The ADS has the "look and feel" of a German sports car—expensive, no-nonsense, high performance. But is it really worth $4,995?

Dynacord has made quite a name for itself in Europe as a manufacturer of fairly costly, high-quality gear. Their new rackmount, 16-bit, stereo sampler, which will also be made available in a keyboard version, fits right into that tradition. It offers the goods but requires a bit of work to get them. As with other selected Dynacord products, it's being distributed in the U.S. by Drum Workshop.

Like any digital sampler, the ADS includes both a digital recorder and signal processors (although not *effects* processors). As a recorder, the 16-bit linear ADS offers two sampling rates, 44.1 and 22.05 kHz. Onboard memory is 2 megabytes (expandable to 8 megs in 2 meg, $1,295 increments), yielding almost 23 seconds of mono sampling at 44.1 kHz and half that for stereo. The disk drive uses HD (high-density) disks to store 1.64 megabytes of data, more than the average sampler. The drive can also read Akai S900 diskettes—a smart move that provides an instant sound library.

A high-speed SCSI (Small Computer System Interface) port transfers data to and from hard disks (check with the distributor for recommended types) and offers the potential for attaching CD-ROM drives, as well as fast data transfers to and from sample editing software—SCSI is essential with multimegabyte samplers. The ADS also implements the MIDI sample dump standard.

Sixteen dynamically allocated voices are supported, and the two-times oversampling D/A output converters are 20-bit. This provides the additional "headroom" (furthermore, the internal processing is 24-bit) to let all voices play back with 16-bit resolution.

So how does it sound? Unfortunately, the unit initially sent for review had a problem in the right channel that caused intermittent crackling noises. A second unit was sent amid profuse apologies, and it delivered what was expected: a clean, punchy sound with a good deal of dynamic range. In other words, well-designed, 16-bit linear sampling.

Unlike some samplers that seem to color the sound in some way, the ADS is very neutral—no zingy high end, no thin or boomy bottom. Some may find the "processing" introduced by other samplers to be more subjectively pleasing, but with the ADS, what you get out is, within the constraints of 16-bit sampling, what you put in. I noticed no "wandering" in the stereo field of mono signals recorded in stereo, which implies excellent phase-coherency between channels.

I do miss a choice of sample rates; using 32 kHz is almost like expanding the memory by 15%, since many sounds are not compromised by this sampling rate. The 22.05 kHz option is okay, but limits the number of sounds you can record with satisfactory fidelity.

Speaking of recording, the ADS boasts an unusual feature called "fusion" that resamples whatever appears at the output. For example, you could sample eight different snare drums, play them all at once, do the fusion shuffle, and end up with a monster snare sample. Or, you could use fusion to sample chords.

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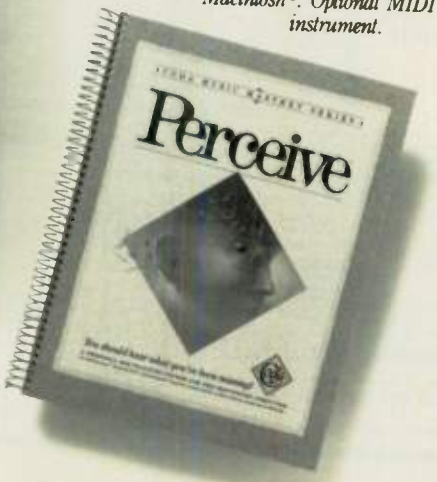

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• DYNACORD ADS

While not the feature to end all features, for percussive sounds it's welcome and valuable.

There's also a primitive additive synthesis function, where specifying levels for up to 64 harmonics creates a two-cycle loop. This is useful for generating harmonics, transients, and other special-purpose waveforms you can "fuse" with existing sounds. Need more of a snap on a snare hit? Create a snap sound with additive and combine it with the snare.

Looping is fairly standard: two loops (sustain and release) are available, with forward and bidirectional looping, as well as a non-undoable crossfade function (back up your sample first!). Not having undo is a bit of a pain, because if the loop doesn't work out, you'll need to reload the sample from disk. You can move loop points one, 100, or 10,000 samples at a time, or invoke an "auto" function that doesn't provide autolooping per se, but restricts sample movement to only those samples on zero-crossings.

ARCHITECTURE AND THE USER INTERFACE

Recording a sound into the ADS creates a *sample*—a raw recording without processing. Up to three samples (triggerable by soft, medium, and loud velocities if desired) can be combined to form a *sample group*. Spreading up to twenty sample groups across a keyboard and editing the combined groups in various ways creates a *sound*. Each sound is assigned to one of eight "mixer" *channels*, which when set for panning, level, amount of aux send, and so on creates a *mix*.

All of these are stored independently on disk, a time-saving and logical approach. Suppose you have a bunch of drum samples and various mixes of these samples. You needn't load a new set of samples from disk, just mixes. Although you can't load while playing—too bad—you can use the substantial amount of memory to hold all the samples you need and just pull different mixes from disk (a fairly fast process).

The user interface is a no-frills, 2-line, 16-character backlit LCD; don't expect graphic editing screens or other goodies. Parameters are selected by choosing a function (from one of ten front panel buttons), choosing a page, selecting a parameter, then adjusting the value of the parameter. Unfortunately, the buttons are packed together so tightly that it's easy to hit the wrong one. The ADS

uses a stepped "encoder" knob for parameter selection, but I found the alternate method of holding a button and typing in a number to be faster—scrolling from 00 to 99 takes many, many turns of the encoder.

There are a lot of pages with a huge number of parameters, but unfortunately, no "macros" that let you jump instantly to often-used pages (*a la* Ensoniq EPS or Roland W-30).

THE SIGNAL PROCESSING

The ADS doesn't have some things I've come to expect from samplers. For example, there is no analog or digital filtering, which is a disappointment—I really rely on filters. On the other hand, this is what accounts for the degree of freedom from phase problems, so you give up one thing to get another.

The ADS also doesn't respond to polyphonic aftertouch, nor is positional crossfading between sample groups easy to do. The highest note of one sample group is automatically the lowest note of the next-highest sample group; those who use positional crossfade to "fudge" multisample break points will need to layer sounds and use the tracking generator to create the desired crossfade curve.

As for what the ADS does have, like most modern samplers you can set (for each sample) upper/lower note limits, levels, names, forward/backward playback, tuning, and original pitch, as well as velocity thresholds for when you want to trigger different samples in a sample group at different velocities. The amplitude envelopes are ADSR-based (attack-decay-sustain-release), although the sustain can be set to decay over time. Most parameters are "modulatable," and you can set a gate time so the sample plays through even if you lift your finger off the key.

The really interesting portion of this instrument is its modulation system. This clearly takes a page from the venerable Oberheim Xpander, whose matrix modulation scheme set a standard back in 1984 that most other manufacturers are still trying to reach.

Let's start with the eight assignable modulation paths. For each sound (remember, this means up to twenty sample groups with three samples per group) you can modulate pitch, panning, volume, send 1 and send 2 volume (part of the mixer module), sample start point, or the attack/decay/sustain decay/release/amplitude parameters for each of three envelopes. You can also select between samples. Modulation sources are MIDI note number, velocity, release velocity, pressure, mod wheel, bend wheel, sustain pedal, any of the three envelopes, any of the two LFOs, four assignable MIDI controllers, note triggering rate, ramp generator, tracking generator, or random generator.

The really interesting portion of the ADS is its modulation system.

The ramp generator is simply an attack time generator—like the "A" in "ADSR." The tracking generator accepts any modulation source and lets you bias the shape or curve along five points. For example, you can shove a linear velocity function into the tracking generator and generate an exponential velocity curve, or one that's very sensitive to notes with soft velocity, and so on.

This is not all. There are also fixed modulation paths, such as pressure to LFO speed or amplitude, velocity to sound amplitude, and the like. Samples can be selected according to velocity; effect send 1 or 2 levels can be modulated by velocity or pressure; pitch responds to note number, pitch wheel, envelope 1, and/or LFO1; and panning to pressure, envelope 2, and/or LFO2. All in all, we're talking flexible, and powerful as well.

SAMPLING, DISKS, AND MIDI

Sampling works as you'd expect: play the signal, look at the meter, set the threshold, record, listen (you can monitor while hearing the results of the A/D-D/A conversion), and resample if necessary. Normalization, truncation, and other standard editing functions are supported.

Distributed mixing normally requires an outboard mixer, but the ADS has a programmable one built-in.

The disk functions are also standard: format, load, save, delete, name, etc. With an expanded ADS, you'll need to save sounds on multiple disks. The ADS generates a 16-bit random number and assigns it to each disk set so that the unit "knows" if disks are part of a set or not.

Regarding MIDI, there's a "chain" function (what the rest of the world calls "mapping") that lets program changes call up different mixes—handy. More importantly, each mixer channel can be assigned to its own MIDI channel and provide polyphonic information to the individual outputs. And speaking of polyphonic outputs, it's finally time to address...

THE MIXER

In some ways, this is the heart of the ADS, but I've left it for last because it ties together everything discussed so far. Imagine assigning each sound to a mixer input module (out of a total of eight) that includes two effects sends (with controls for amount, bus select, and pre/post fader), panning, volume, mute, pitch control (octave, transpose, detune), MIDI channel and note response limits, and two different key modes (polyphonic, where playing a new note doesn't cut off existing notes—within voice number limitations, of course—and mono, where new notes cut off old ones). Note, however, that this can be modified with an overlap function, which works with voice reassignment to allow such things as having

old notes decay faster when a new note is played. There's even a way to crossfade between channels. Up to 50 mixes can be defined, saved, named, and loaded.

Two master stereo outputs are located on the back, as are six auxiliary output jacks; any individual effect send can be assigned to any individual aux output. You could treat the six aux outs and stereo outs as eight individual, polyphonic, dynamically allocated outputs; or set up a complex mix on the stereo outputs, but also feed some signals to the aux outs for signal processing, or quad/hexaphonic playback systems. If you send this stuff through a stereo reverb or some other such digital wonder box, the ADS thoughtfully provides stereo return jacks and an effects return control.

So what does this mean to musicians? I've mentioned the concept of *distributed mixing* before in these pages, where satellite mixers accept groups of sounds (keyboards, drum machines, etc.). You would feed, say, a half-dozen keyboards into the keyboard mixer, set up a stereo mix (possibly with processing), then send just two lines containing the stereo premix to your main mixer. Level control is, naturally, handled by sequenced MIDI volume messages.

Normally, distributed mixing requires buying an outboard mixer, but the ADS already has one, and a digital/programmable/flexible one to boot. Because you can call up different mixes under MIDI control, you can do snapshot automation (as well as the automation that comes from feeding MIDI volume messages to control levels). It seems the mixer would be particularly handy "live," since the more stuff you can cram into a box, and the more you can program presets within that box, the better that box is to take on the road; and in terms of effects, well, having modulatable effects sends allows for extremely dense and interesting effects.

THE ADS CUSTOMER PROFILE

For drummers, the ADS seems close to ideal. The expandable sample memory has room for cymbals and such, and the self-contained mixer lets you call up different "kits" with ease. The phase coherency is crucial with splashy, high-frequency sounds like cymbals and also keeps kick drums centered, where they belong. Also, the triggering time is very fast, and the unit is compact enough to take on the road.

For studios, the digital recording aspects are the most important considerations. This is a good-sounding sampler with (even in the unexpanded version) enough memory to fly in vocals and do other tricks; a few extra megs let you do even more. Being able to read S900 disks is a big plus, because studios can trade up from an S900 without having to consign their sample library to the dustbin. The built-in mixer also takes some of the pressure off MIDI studios that never seem to have enough inputs. In terms of cost, the ADS costs less than the S1000 or Emulator III, its main competition in the true 16-bit sampler arena.

For live-oriented keyboard players, the ADS may not justify its expense. There are a lot of good samplers (albeit not 16-bit) at the $2,000 to $3,000 price point, and some folks might be happier with a CD-ROM-equipped E-mu Emax, fully loaded Ensoniq EPS, or second-

• DYNACORD ADS

hand Akai S900 with a Marion Systems 16-bit upgrade. The ADS also lacks some features that would be helpful to gigging musicians, like play-while-load. On the plus side, MIDI guitarists can take advantage of the multiple channels and retrigger modes, and the sound quality of properly implemented 16-bit linear sampling technology is a powerful lure to all musicians.

Sampling "tweakers" who enjoy the art of making samples may miss features like fade in/out, choice of sample rates, detailed supertwist display for sample editing, and envelopes that improve on the ADSR concept, but the modulation options are undeniably nifty, and there are enough parameters to have a field day bending sounds into different shapes.

But all is not totally rosy. The best thing I can say about the eight sound diskettes initially supplied with the ADS is that they can be erased and reused. Other disks sent by Drum Workshop were not much better. Some of the drum sounds are actually clipped, and few sounds do more than scratch the surface of the rich editing options. The synthesizer disk gives a hint of the power of the ADS, and there are a couple of

Product Summary

PRODUCT:
Dynacord ADS
TYPE:
Rack-mount sampling module
FEATURES:
16-bit resolution, 44.1 kHz sampling rate, 2 megabytes of RAM expandable to 8 megs, extensive modulation capabilities, built-in SCSI, eight polyphonic outputs, dynamic allocation, built-in mixer
PRICE:
$4,995 (extra memory $1,295 per 2 megs)
DISTRIBUTOR:
Drum Workshop, Inc.
2697 Lavery Ct., Unit 16
Newbury Park, CA 91320
tel. (805) 499-6863

nice electronic pianos, but by and large the factory disks don't make it. I've been told by Drum Workshop that an extensive library of new sounds should be available by the time you read this. Let's hope they're better. The documentation is also terse to a fault.

Another problem is that the ADS is very time-consuming to program if you want to take advantage of the many special features. If you play a note and want to edit it, just finding out which sample you're hearing out of the various sample groups and sounds is quite an effort; I often found myself going to the mixer to mute and unmute channels just to find out exactly what I was hearing. Of course, simpler sounds are easier to program, but if simple sounds are all you want, why bother with an ADS?

There are few parameter-selection shortcuts (e.g., macros, double-clicks, etc.), and the method of selecting parameters, while workable and clear, appears clumsy in light of other recent products. Had this sampler appeared a year ago, I probably would have considered the user interface as perfectly acceptable, but compared to some other devices on the market, it seems that Dynacord assigned the user interface a lower priority than sound quality.

It would also be very helpful if some software manufacturer developed editing software for samples *and* parameters, like the early *Sound Designer* did for the Emulator II. Even just being able to print out all parameters would be helpful so you could know what's going on.

Some people will need exactly what the ADS has to offer—sound quality and the ability to come up with some wild new sounds (even if it does take some work)—and fall in love with the unit, electing to pay the price required for uncolored 16-bit sound. Others will seek more cost-effective solutions to their sampling needs, or higher-end machines (such as the Emulator III) in order to get features like triggering samples via MIDI time code. Once again, we have a product that may not be the "ultimate" sampler, but one which addresses a specific niche—and does so in style.

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Interval Music Systems GenWave

By Craig Anderton

Simplicity of operation and gracefulness in function are the highlights of this package of 12- and 16-bit sample editors for the Atari ST.

Sample editing software, originally intended to help find good sample loop points, has evolved quite a bit over the past few years. Interval Music Systems (formerly Drumware) had one of the first Atari sample editors, and its latest effort, GenWave, shows the results of its own evolution.

GenWave (GW) includes medium-resolution color and high-res monochrome versions of two programs. *GenWave/12* (for Atari 1040ST and Mega machines) supports 12-bit samplers, while *GenWave/16* (2 megs RAM recommended, but not necessary) accommodates 16-bit samplers and stereo editing. See the product summary for a full list of supported samplers; sample rate conversion functions can swap samples between these units.

Some digital signal processing functions in GW/16 are not yet implemented in GW/12. However, GW/12 will supposedly be upgraded to GW/16 functionality, so this review evaluates the performance of these functions with GW/16.

Both versions of GW can read each other's sample dump standard (SDS) files from disk. Additionally, GW/12 can save files in a special, noncompatible format that saves about 25% of the memory required by an SDS file.

GW is blitter-compatible for ultra-fast screen redraws. Speaking of speed, GW does not support SCSI or RS-422, so all transfers take place at the standard, somewhat snail-like MIDI transfer rate. This slowness is not a limitation of the program but of MIDI.

The copy-protection method is a hardware key that plugs in the joystick port, but the program can also be installed on a hard disk.

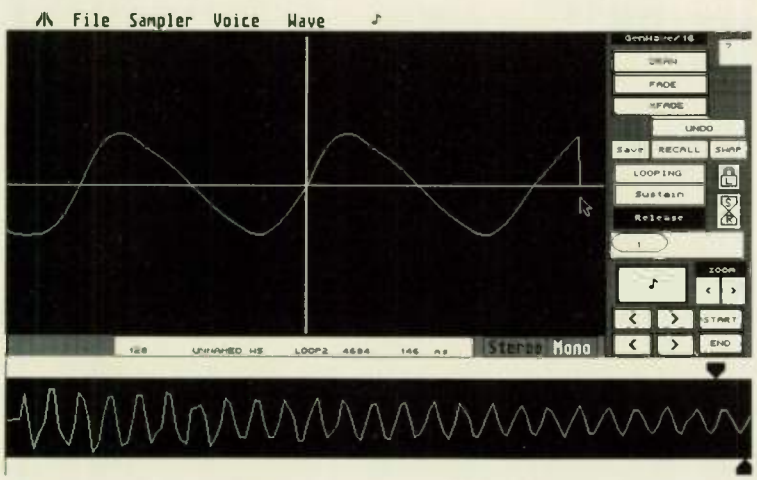

FIG. 1: A single cycle of a conga decay is being looped on the Loop page to create a sustained sound with a conga attack. The arrow points at where the sample end was truncated in the Envelope page.

GETTING SAMPLES

GW "looks" at the instrument and requests a list of samples. You can select up to seven of these samples and place them in individual buffers in Atari memory; an eighth buffer is reserved for the undo function (but you can store a sample there if necessary). Unfortunately, every time you get a sample GW goes through the "look at" routine. This is one of the few time-wasters in an otherwise fast and efficient program.

The program will automatically switch a MIDI patcher to optimize your connections for sample transfers or playing a rack-mount sampler from a MIDI keyboard. Otherwise, you can use a merger to combine keyboard and computer MIDI outs so that the rack device can get either sysex data from the computer, or MIDI data from a MIDI controller.

A "MIDI keyboard" window lets you send notes or chords, with variable velocity, modulation, and/or aftertouch, as determined by which mouse buttons you press and where and how you click

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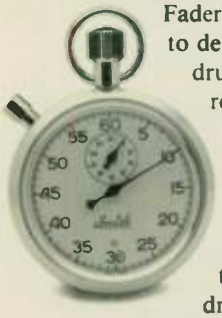

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• GENWAVE

on the keys. Nice. There's also a note button on each page for sending a quick MIDI note (the last note selected on the keyboard window) to your sampler.

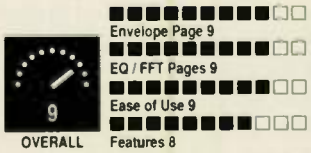
PAGING GENWAVE

There are five main "pages" of operations. Loop/Draw is where you set loops or draw freehand waveforms (**Fig. 1**). A sample overview runs along the bottom, with draggable start and end pointers. The left portion of the main waveform window shows the section prior to the end pointer, and the right portion, the section after the start pointer. This simplifies waveform editing by showing the most important parts of the waveform and the loop splice point simultaneously.

Start and end points can be changed

Product Summary

PRODUCT:
GenWave/12 and GenWave/16
TYPE:
Sample editing software
SAMPLERS SUPPORTED:
Akai S900/S950/S900 (or S950) with Marion Systems upgrade/S1000; E-mu Emax/SP-1200/E-III; Sequential Prophet-2000/2002/3000/Studio 440/Prophet-VS; Korg DSS/DSM; Roland S-50/S-550/S330; Yamaha TX16W; Oberheim Prommer/DPX; Dynacord ADD-one/ADD-two/ADS; Casio FZ-1/FZ-10M; Ensoniq EPS; Simmons SDX; and MMA sample dump standard (12- or 16-bit)
HARDWARE REQUIREMENTS:
Atari 1040 ST or Mega 2/4, color or monochrome
PRICE:
$349
MANUFACTURER:
Interval Music Systems
12077 Wilshire Blvd. #515
Los Angeles, CA 90025
tel. (213) 478-3956



in large amounts by dragging the overview pointers; for finer resolution, click on arrow buttons (the three possible combinations of mouse buttons—left, right, both—move the points by different amounts of samples, down to a single sample). There's also waveform zoom in/out (although this doesn't affect the overview). Once you get used to this system, it's fast and easy to navigate around the waveform, and there's a numeric readout spotting your location in the sample when precision is crucial. Up to eight loops, including release and sustain, are supported.

With most supported instruments, if you change the loop points while the AutoSend function is on, you'll hear the results when you play the sampler. However, the TX16W, Studio 440, FZ-1/10M, ADS, P-3000, and E-III accept loop points only when you dump the sample back into the sampler.

Digital editing functions (all undoable) include fade in and out, crossfade (your choice of two linear types, equal power and bidirectional, both with variable width), and waveform drawing (mono samples only). Keyboard commands are available to accommodate nonstandard features, such as the FZ-1's eight loops or the Akai S1000's "play to end" and "loop to release" functions.

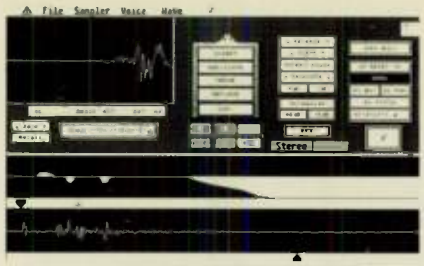


FIG. 2: A handclap sample on the Envelope page. The markers set where the claps will be truncated. The envelope (center line equals unity gain) shows a boost of a low-level section, two dips to limit some peaks, and a fadeout.

To round out the major features on this page, Looplock forces the loop end point to track any changes in loop start point, thus maintaining a constant loop period.

THE ENVELOPE, PLEASE

The Envelope page (Fig. 2) includes an overview and a separate window with start and end points, which mark regions where editing is to occur. Functions include waveform reverse, clear data, truncate, phase reverse, gain change (increase or decrease) in 1 dB increments, normalization, and two gain change functions that increase or decrease the overall level by 6 dB. The latter three affect the entire sample. There are also the usual "clipboard" functions for merging, copying, replacing, or inserting samples, as well as a replicate function that takes whatever is on the clipboard and copies it until the voice buffer is filled (this is good for creating "wavetable" samples).

Note that when merging samples, the reduce-gain-by-6-dB function comes in very handy: reduce both samples, then merge, and you won't get distortion.

As useful as the above functions are, the extremely well-implemented envelope draw function is the real scene-stealer on this page. You can draw in envelopes for gain or pitch, or panning

for stereo samples. Changing gain is great—I use it to "compress" and "limit" sounds for more punch, as well as draw in unusual fades. You can even do weird sample modulations by drawing little blips. And, anything you can do to gain, you can do to pitch (although this is not yet available in GW/12). The best part is that all this is very easy to use.

EQUALIZATION

Oddly, when you select an item on this page, its box turns from black to white; on the other pages, boxes turn from white to black. This confused me for a while until I realized what was going on.

EQ operations affect the entire sound, so while there is an overview, there are no start/end pointers (**Fig. 3**). Options include 12 dB per octave low- and high-frequency shelving, bandpass, notch (the latter two have Q controls but no boost/cut), and peak (same as bandpass and notch, but with boost/cut). Why these seemingly very similar options? Because peak takes more calculation time. If you're in a hurry and only need a Q adjustment, go for the bandpass or notch. Of course, all modes let you adjust the frequency. A useful "leveling" option scales the sample to prevent distortion regardless of how much of an absurd boost you add.

All digital processing (EQ, cut-and-paste, etc.) takes place within the computer, so samples must be transferred to the sampler or played back through the Atari speaker or an external (and optional, at extra cost) D/A converter to hear the results of your edits.

This window is a highlight of GW because it is so easy to use; in particular, leveling is very handy. But EQ truly comes into its own when used with the...

FFT PAGE

Accessed from either the envelope or EQ page, FFT does a Fast Fourier Transform of the signal located between the start and end markers. It shows 128 harmonics with 128 "time slices" (**Fig. 4**), from which you can select five different bandwidths if you want to zero in on a portion of the sound. Far from being a gimmick, this is not only educational (and impressive to clients!), but works very well with the EQ page to show where peaks and dips occur that you might want to equalize. It also shows you the results of EQ operations.

SAMPLE RATE CONVERSION

Resampling is easy: type in a new sample rate, click, and wait a while (this is a fairly time-consuming process). You can also do pitch transposition, i.e., change pitch without a sample rate change. To make life easier, an Autofilter option runs the sample through a digital EQ when converting to a lower sample rate to prevent aliasing—yet another handy, convenience-oriented feature, although sometimes it doesn't go far enough and you'll need to add more filtering.

FIG. 3: Limited and truncated handclaps about to be boosted at 2600 Hz. Leveling is enabled.

THE FINAL CUT (AND PASTE)

GenWave is an unpretentious program, yet it is stable, functional, easy to use, and still includes enough gee-whiz features to be considered a bona fide upper-echelon sample editing program. Its apparent simplicity is deceptive; it has quite a few tricks up its sleeve.

It's not perfect, however. I'd like to see SCSI implemented, and I wish the Envelope page splice-point display was as detailed as that of the Loop/Draw page (there's no zero-crossing marked on the smaller Envelope page display). Also, switching between the pages is more inconvenient than having all functions on one page, but in its favor, this does allow each page—and you—to concentrate on a particular task.

The documentation is as unpretentious as the program and is probably a little on the sparse side if you're new to all this. Veteran samplists, however, will appreciate that the manual trades off "user-friendliness" for increased speed of learning.

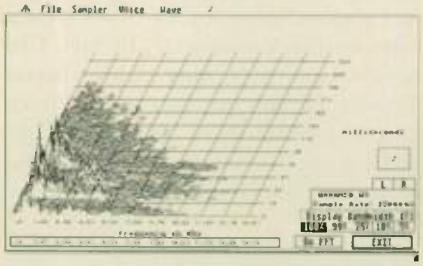


FIG. 4: FFT of entire clap sample, which is 228 ms long. Note the peaks and fadeout.

After working extensively with *Alchemy 2.0* I expected GenWave to be a bit of a letdown, especially considering the price difference. But GenWave need make no apologies. It's ideal for the musician who has a job to do and wants to get it done with a minimum of fuss. In fact, when working with short samples, GenWave has become my program of choice because I can get things done so quickly, even with the slow MIDI transfer rate. Tweaking a set of drum samples with GenWave was an experience; using a Mega 4 with the blitter chip enabled, I was able to turn a batch of so-so percussive sounds into a superb drum kit in a few hours of virtually painless work. GenWave may not be the sample editor to end all sample editors, but it performs about as effortlessly and easily as the current state of the art permits. ■

Texture 3.5 for the IBM PC

By K.K. Proffitt

Having evolved from one of the original IBM-compatible sequencers into a family of products, the latest version of Texture offers solid, quick operation.

My mother's favorite soliloquy concerns Coco Chanel and the continuing value of excellent design. "A good Chanel suit," she says, "will never go out of fashion because it has classic styling. Only the accessories will change."

I was amused to find that Magnetic Music now calls my favorite version of their MS-DOS sequencer "*Texture Classic.*" There are several varieties of Texture, and each comes with different accessories. Novice users will appreciate the mouse-oriented graphic interface of *Prism,* a stripped-down, 16-track version (with a *Kill the Smileys* game to aid in venting creative frustration) that's reviewed in the accompanying sidebar.

Fans of *Microsoft Windows* can await *Texture for Windows,* which is due out in October and sports 32 tracks. There are even two Amiga versions of Texture, available for $165 and $250, U.S., from Sound Quest (5 Glenaden Ave. East, Toronto, M8Y 2L2 Canada; tel. [416] 234-0347). Magnetic Music used to support the Amiga but now concentrates entirely on IBM-compatibles and the Yamaha C1. Files can be shuttled among all formats. To move files from an IBM to an Amiga, you'll need to convert MS-DOS files to Amiga-DOS files with a file conversion utility such as Central Coast Software's *DOS-2-DOS.*

Perhaps it's due to my upbringing, but I prefer the 24-track Texture Classic. It simply screams on my IBM PC/AT, and it's also fast on my XT clone. It even runs on the Yamaha C1. In fact, I've been considering buying a C1 just to run Texture, because you can assign a track or group of tracks to any of the eight MIDI ports. Texture on the C1 also features the ability to read and write true SMPTE.

I'll probably stick with Texture Classic on the AT for a while, though, because the most recent upgrade (V. 3.5) keeps its vintage format while adding lots of fresh accessories. Bundled with the program are four utilities: *Texture Live!, TX2PC2, TX-VIEW,* and *Zone Ranger Keyboard Enhancer.* They're combined into a Support Tools Package, which is also available separately.

The newest version of Texture reads and writes standard MIDI files according to the MIDI File Specification (Format 0 for one multichannel track and Format 1 for data separated into different tracks). Texture Classic runs on IBM PCs and compatibles with the Roland MPU-401 and compatibles, or the Music Quest MQX32. If you choose to run it with Music Quest's MQX32, you can take advantage of some of its "enhanced hardware" functions. The MQX32 has two independent MIDI outputs (32-channel support) and can read and write SMPTE in 30 frame drop and non-drop formats. Unless you really want a laptop, the combination of a PC with the

Fig.1: The main Texture screen, with track display.

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MQX32 and Texture Classic (3.5) gives more MIDI bang per buck.

If you use an MPU-401 or compatible interface, you may need to use the /I option to restrap the interface from IRQ#2 to another interrupt request line.

Texture Classic also supports the IBM Music Feature and permits you to install up to four Music Feature cards in your computer. Each card supports eight voices, so if you load your IBM with Music Feature cards, you could create an FM workstation with 32 monophonic instruments.

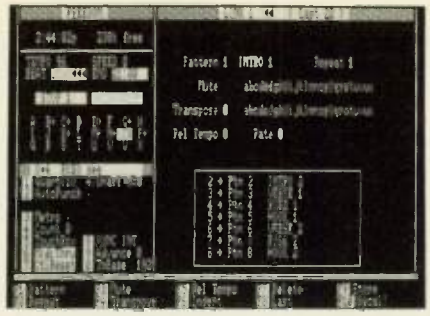


FIG. 2: In Link mode, Texture displays track mutes, transpositions, and looping, as well as pattern order.

RUNNING THE PROGRAM

The concept behind Texture is akin to that of modular programming: you create patterns (or sections) and link them into songs. The main screen consists of two windows (see **Fig. 1**). In pattern mode, the right window contains the multitrack display, which toggles with the MIDI data display. In link mode, the right window displays the name and number of links, the number of repeats, relative tempo offsets, track mutes, and transpositions (see **Fig. 2**). The file directory display also comes up in this window. In the lower part of the right window, there is a scrolling data display that graphically represents where the data lies within a track. This function should be locked out using the backslash (\) key if you run Texture on a slow computer. If you have a lot of dense tracks, this display will bog down the CPU.

The left window has three panels. Panel one (work status) shows the amount of free memory and a timer/

Product Summary

PRODUCT:
Texture Classic

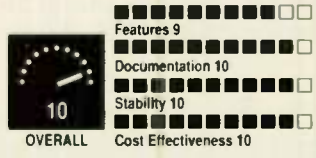
TYPE:
Sequencing software

PRICE:
$199 for Texture Classic (w/Support Tools);
$59 for Support Tools alone;
$299 for Windows version;
$99 for Prism

FEATURES:
Supports true SMPTE time code w/MQX-32 interface and Yamaha C1; good filtering; intuitive commands; compatibility w/TSRs; support for standard MIDI files

HARDWARE REQUIREMENTS:
IBM PC XT/AT; MQX-32 or MPU-401 or compatible; 256K RAM

MANUFACTURER:
Magnetic Music
6 Twin Rocks Rd.
Brookfield, CT 06804
tel. (203) 775-7832



clock display. The second panel shows song and track status and includes the master tempo (and its temporary offset), current beat, loop status, track mutes, and a playback/record/stop indicator. Panel three contains number commands that set up the Texture environment. They include quantize, autopunch, metronome, count, MIDI thru, sync status, advance, timebase, aftertouch on/off switch, and on/off switch for controller reset.

Ninety-six pattern locations are available; each may contain up to 2,730 beats and may include fractional beats to a maximum resolution of 1/192nd of a beat (192 is the maximum number of pulses per quarter note available in Texture). There are 24 tracks per pattern, yielding a total of 2,304 individual phrases. Choice of timebase does not affect the maximum pattern length.

Although the "drum machine" or "pattern" approach to programming is suitable for pop tunes and other forms of music that rely on short, repeated sections, Texture does not impose such limitations on composers. Even at its maximum tempo of 240 bpm (beats per minute), a single pattern can be almost eleven minutes in length. Patterns can also be "linearized" into a song, bypassing link mode.

Texture does not impose the pop tune-biased limitations that many pattern-oriented sequencers do.

PLAYING WITH PATTERNS

Tracks can be blended (merged) together to the limits of the MIDI spec (sixteen notes per MIDI channel) and they can be unmerged by filtering per MIDI channel or by using the Undo command, provided no other record or editing changes have been made to the blended track. You can also filter tracks by note range or event status.

One of Texture's most appealing features is the intelligent implementation of "alpha commands." For example, striking an "H" calls up the help menu, "P" and "R" enable play and record, and "C" copies a pattern, track, or link. Once you have learned these 26 commands and a few other character keys and control keys, Texture becomes second nature, especially if you can touch type.

Texture also features a step-time function, which includes auto advance, that allows you to begin at any point of the track or pattern. For a quick repair, it's easy to slip into step time and blot out a bad section, especially if you're working with percussive sounds whose end points remain relatively fixed. Finer tuning requires opening the edit window.

EDITING TIPS

If you're a tweak freak, you'll be happy to know that Texture runs well with Borland's *Superkey*. Many of the sequencers I've tried have crashed when I attempted to run them with this TSR

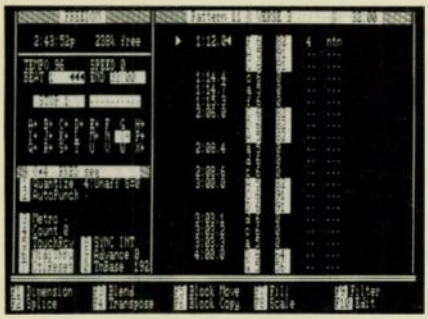


FIG. 3: The edit screen shows MIDI note on, note off, and controller values.

(Terminate and Stay Resident program), but Texture and Superkey can coexist peacefully. In critical situations, running Superkey really speeds up editing across links.

Here's a recent example. I had writtten snare flams for a rock "torch" ballad, but when I set up in a 48-track studio, the producers decided that the tempo was too slow and the snare samples should be altered. My meticulously written snare flams disappeared. I had to go through the edit window (see Fig. 3) and tweak each flam by moving the second hit forward a few timebase units and extending the note off of the previous hit. Since the tempo and snare samples were changed several times until the tune "worked," having access to an editing macro reduced stress and the studio bill.

Ostinato aficionados and groove programmers will appreciate the fill function. You can set up a few notes, hit "Fill," and the seed riff will spread to the end of the pattern. If swing is your bag, you can automate it with the swing function. There's also a cut-and-paste function and a block edit function that can operate on sections as small as a timebase unit (1/192nd of a beat).

GETTING IN SYNC

Texture 3.5 supports true SMPTE time code via the Music Quest MQX32 MIDI interface and the Yamaha C1. If you're running the program with a plain-vanilla MPU-401 or compatible interface, you'll need a SMPTE-to-MIDI converter. Although MIDI time code support is not yet implemented, Texture supports MIDI song position pointer. I've used an SBX-80 with Texture for three years, and it only failed to sync a couple of times. Both times, I was able to lock flawlessly to tape on my second try. Texture also supports FSK sync-to-tape via the MPU-401.

ACCESSORIES

Although the program used to be a mid-priced sequencer, Magnetic Music has dropped the price to $199 and added a Support Tools Package, which is free when bundled with Texture and is available separately for $59.

Of the four Support Tools, the most useful and fully developed is Texture Live! I used to swear I would never attempt playing with a software sequencer on stage because my band plays in the Boston area, where bands are stacked four deep and sound checks are

THROUGH THE PRISM

Prism is a version of *Texture* for the MIDI beginner, offering a graphic user interface and mouse control. Although it has only 16 tracks, 32 patterns, and 50 links, it implements most of the important features found in *Texture Classic* and planned for *Texture for Windows*. Maximum pattern length is 1,000 beats, and you can have multiple MIDI channels per track. Like its more advanced siblings, Prism has recording with manual or auto punch-in and loop-record for multiple takes. It supports tape or MIDI sync with song position pointer.

The mouse implementation is fast and accurate, although it's a bit unusual in that to select an option, you click the right mouse button instead of double-clicking the left.

Icons and windows are well-designed and reminiscent of Amiga graphics. I ran Prism on an AT with a VGA graphics card and was pleased to find that speed had not been sacrificed for graphic beauty.

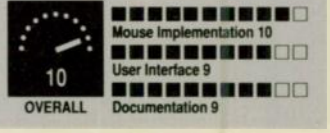
The manual is written with the novice in mind and comprises a series of lessons. Useful tips abound, such as, "When you record a difficult passage, it is helpful to slow the tempo way down (perhaps using the half-tempo button)." This insight into the problems of neophyte musicians underscores most of the information in the Prism manual.

Prism also has a couple of options that would be a welcome addition to the other versions of Texture. Because it has graphs available for data, you can draw curves for controller data and pitch bend. That's much more intuitive and fun than dealing with an event list. You can also squeeze or stretch phrases and implement time reversal (playing a track backwards) by selecting the Mapper graph. Another really useful graphing function shifts the relative timing of tracks. You can make a snare be "on top of" the bass early in a pattern, then make it "lay back" later.

The program, which, like Texture Classic, is not copy-protected, now supports standard MIDI file formats 0 and 1 (an addition that was made to the most recent version, 1.2). All Prism files can be converted to Texture files with a utility that comes with the program.

Prism runs on IBM PC/XT/AT and non-MCGA PS/2, compatibles, and Yamaha C1 computers with at least 384K RAM and one floppy drive (512K RAM recommended). It will work with CGA, EGA, VGA, and Hercules graphics cards and requires a Roland MPU-401, MIF-IPC, Music Quest, Voyetra, or equivalent MIDI interface, and a Microsoft-compatible mouse.

A *Kill the Smileys* game is provided to help break the tension of a creative block. It's not hard to beat in VGA, and it's quite easy if you're running CGA, so it's a very efficient confidence booster. In a similar vein, instead of warning you to make frequent backups as you exit the program, Prism signs you off with a flippant "outta here..." Fun stuff for experts and novices alike.



short. When I purchased Texture Live!, however, I immediately started checking out rack-mounted IBM PCs.

Texture Live! can have 50 songs per set, and you can change the order of songs without stopping playback. (Live! is not currently available on the C1.) You can program a pause between each song, in one second intervals. If the audience doesn't clap, hit F1, and the next song jumps into playback. You can GOTO a link during playback, and you can loop links within a song. If the audience proves more (or less) lively than usual, you can offset the basic tempo accordingly. Track muting, soloing, and subgrouping are also available.

The second tool, TX2PC, is a file-conversion utility that converts song and pattern files to Jim Miller's *Personal Composer* format for music notation printout. The Texture III manual has an excellently detailed file specification section for programmers who want to write their own programs to massage the data in Texture song and pattern files. Since Texture supports MIDI file specs 0 and 1, access is available to other notation programs.

TX-VIEW displays and prints out information about Texture song files. This is a handy utility because Print Screen doesn't capture the text-mode interface well.

Finally, the Support Tools package contains Zone Ranger Keyboard Enhancer. I love the honesty of its documentation: "In short, this version of the program is not particularly 'user-friendly' and probably contains bugs (program errors)." That's an accurate caveat, but the program is fun for anyone who has a smidgen of hacker spirit. Several different algorithms are included that assign notes to different MIDI channels depending on their velocity, pitch, or order of play. It's not a perfect program, but it's amusing.

CONCLUSION

Texture is not copy-protected, but unless you own the manual, it's almost impossible to learn. It's not an introductory sequencer, but it's a powerful, elegant, professional tool that is flexible enough to suit the needs of composers from the beat box to the orchestra pit. Magnetic Music and Steve Rossi have been unfailingly cooperative in their commitment to making Texture an increasingly refined sequencer. (I remember calling them with a bug fix years before I started writing reviews. It was refreshing to chat with someone who listened to the problem without first considering my lack of credentials.)

Don't copy it; buy Texture and read the manual. It's a compendium of helpful MIDI hints as well as a reference. Mother was right; classic styling never goes out of fashion.

K.K. Proffitt *works as a MIDI consultant and programmer in the New England area. She has produced several records for independent labels and is recording her second album. Her two favorite formats are 48-track and the Mommy track.*

• THE MIDI LAN *from page 67*

method of moving into the future without sacrificing the past. Already a number of instrument and computer manufacturers have shown interest in the protocol; as MidiTap features a standard computer port, software that can address MediaLink directly is probably not too far away.

After years of hearing "MIDIphobes" bemoan the limitations of an interface that has changed the music industry, it's very heartening to see a device that removes those limitations and adds many more desirable characteristics, without making existing gear obsolete. Now *that's* progress.

For more information on MediaLink and MidiTap, contact Lone Wolf at 1505 Aviation Blvd., Redondo Beach, CA 90278; tel. (213) 379-2036. (MediaLink, MidiTap and LanScape are all trademarks of Lone Wolf.)

Lachlan Westfall *is a Los Angeles-based musician, freelance writer, and Macintosh fanatic. He is president of the International MIDI Association and is on the executive board of the MIDI Manufacturers Association.*

Music: One Flight Up

By Robert Carlberg

Some music is on a whole different plane from the usual level. But what is it, exactly, that distinguishes it from the majority?

Blue Note, the famous jazz label, has begun re-releasing a number of their albums in CD format. Each is stamped with this notice:

"The classic Blue Note albums which span the mid-1950s to late 1960s were recorded directly onto 2-track analog tape. No multitrack recording was used and consequently no mixing was required. Therefore, this CD was made by transferring the one-step analog master to digital."

Now, whether or not you agree that a 2-track master requires "no mixing" (I think what they meant is "mixdown"), the fact remains that these sessions were recorded live in the studio, everyone playing together, just as if performing in a club. Today it's difficult to imagine any group of musicians coming together without rehearsal and performing complex and improvised music, unless they're "jazz traditionalists" playing standards. The Blue Note musicians, while certainly practiced in their chops from an active club scene, were probably no more technically proficient than their present-day counterparts. Why is it, then, that so many of the Blue Note sessions seem inspired, especially when compared to current-release jazz? I don't think it's just nostalgia.

One reason may be that the "liveness" on these old sessions feels fundamentally different from the way things are done today, with the music meticulously assembled track-by-track (or even note-by-note) in the control room. The Blue Note musicians play off of each other, feeding each other ideas, and sound genuinely excited to be hearing themselves in the process of creation. Even the technical recording sounds more natural, with believable three-dimensional imaging. It's different in today's jazz, where the players are recorded in isolation for independent tracking, artificial reverb is used to create a recording space, "errors" are corrected, timing is quantized, and the balance and overlap (if any) of the instruments is added at the final mixdown of the multitrack master. This jazz sounds like an assembly-line product instead of music—at least that's my reaction to most of the stuff on the GRP label, for instance, or even the new productions from Blue Note. They're just too calculated to be "musical."

For years, **Dexter Gordon**'s 1964 release, *One Flight Up* (Blue Note 84176), has been my album of choice for testing speakers. The cymbals have a palpable presence, you can hear the spit in Donald Byrd's trumpet and the buzz in Gordon's sax reed, and the bass has a bowel-shaking resonance. Even when other albums were out on CD, I found myself returning to the old black vinyl LP for final evaluation. "Hard bop" jazz may not be to everyone's liking, but nobody can deny it sounds like real instruments.

Now that this album is finally out on CD, the whole Blue Note philosophy seems to have a lesson embedded: Michael Cuscuna and the other Blue Note engineers had no way of anticipating the introduction of digital two decades later. They were simply making the best recordings they knew how, using the equipment available at the time. It turned out that the simplest approach was the best. They kept the technological interference to a minimum and let the musicians play music.

Technological advances come and go, but good music has a timeless quality. When faced with a choice between doing something simply or making a

show of your technology, consider the lesson of Blue Note. This may sound like sacrilege in a magazine devoted to exploring (and some might even say promoting) new technology, but there it is. Once the technology becomes visible, you've dated yourself.

This month we've got a couple of productions that are "timeless." The composers have written music that I think would stand up under any presentation, whether played by a bagpipe orchestra, ten fiddlers fiddling, or the latest electronic technology. In other words, the composers use the instruments to get their ideas across, rather than following where the instruments lead. Perhaps the reason so much electronic music sounds alike these days is that the popular instruments have very strong personalities. A couple of years ago, everything was sparkly DX7 voices, and a few years before that it was fat Prophet drones. Back in the early 1970s, you heard Mellotrons everywhere. You can almost guess the exact age of any song on the radio by the instruments used. I'm guessing most of today's music will always sound like 1989 (if, indeed, it's ever *heard* in the future). However, these two productions are different.

Both do use the "latest in digital electronic technology." Both are almost entirely keyboard-based, with very little electronic percussion or other instrumentation. Yet both don't allow the synthesizers to direct the music, and both sound very unlike the majority of recent releases. Both are, to my way of thinking, truly "one flight up."

Both artists coincidentally have also been reviewed in this column before. **Conrad Praetzel** sent in a demo tape two years ago, which appeared in the December 1987 issue. In the short review, I wished for "a CD of CP," and said, "Somebody should sign this guy up!"

Well, somebody finally did, and now the new CD of CP is here. It's called *Between Present and Past* (Scarlet SR 25703-2; 605 Ridgefield, Wilton, CT 06897), and as Praetzel says in his letter, "It's been a long wait, but everything came out so well it was worth it." Indeed! Scarlet is a small concern out of Connecticut (formed by the co-founder and former partner of Celestial Harmonies, Ruby McFarland Rahn), but the production is first-rate. At this writing, they have only four releases out, but I think you can expect more.

All four tracks on Praetzel's demo made it to the CD (although one mysteriously changed titles), joined by eight more tracks of similarly outstanding quality. Five are uptempo, using sampled plucked bass and rhythmic percussive noises (not really drumkit sounds), but the seven others are slower, moody Ishamesque "tone poems." Praetzel does not belabor his music, knowing when to fade out—most of the tracks are short (one to three minutes). His synthesizer(s) are not identified, but the samples and digital voicing indicate that my two-year-old guess of Kurzweil or Emulator is probably not far off.

What is it about Praetzel's music that makes it so unusual? I've asked myself that question often in the last couple of weeks, and it is what motivated the rambling at the beginning of this column. I'm not sure I have the answer. It isn't the sounds—lots of people have used the same types of sounds recently.

I can only guess that it's Praetzel's composing. He gives off little indications that a lot more is going on than meets the eye (to mix metaphors). Each track has at least one distinguishing feature, something unusual in the world of electronic music, as if he's intentionally pushing the limits of what is expected. The opening track, "Mistress and Men," uses a sliding pitch bend in the melody, which is at once both startling and feels completely right. You don't hear much integral pitch-bending outside of country music.

TEN BEST SO FAR

1. **Kit Watkins**
   Azure (November)
2. **Conrad Praetzel**
   Between Present and Past (November)
3. **Mark Isham**
   The Beast (June)
4. **Najma Akhtar**
   Qareeb (June)
5. **Bill Nelson**
   Optimism (June)
6. **The Janus Ensemble**
   The Janus Ensemble (April)
7. **Gene Rabbai Jr.**
   Yosemite Soundscapes (June)
8. **Either/Orchestra**
   Radium (April)
9. **Trilok Gurtu**
   Usfret (June)
10. **Arcane Device**
    Engines of Myth (August)

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Or take the second track, "Fish That Walk on Land" (I love his titles, too). He's got a sort of walking bass line going, but every once in a while it sort of hiccups, the way Ron Carter is famous for doing on real bass. It's a simple thing, but oh so effective.

The track that changed names, now called "Forest of Dreams," is followed a couple of tracks later by one entitled "In the Same Forest." They use the same construction and the same sort of sampled bass line. Coincidence? Think again. The track called "Prayer Flags" uses a lovely popping reverb sound—again, simple but unusual and very memorable.

Most of all, *Between Present and Past* is a mature, fully developed work. It has such strong composing that I think it actually could be played by bagpipes or fiddlers. The music does not depend on technology—and as such, anybody could do this themselves at home—and good music outlasts the latest "neat sounds" every time. Although this is his "debut album," Praetzel has wrestled his machines and come out on top.

The other release is *Azure* by **Kit Watkins** (East Side Digital 80242; 200 N. 3rd Ave., Minneapolis, MN 55401). Like Praetzel, Watkins shows many years of composing experience. His father's a piano teacher, so you know "little Kit" grew up sitting on telephone books on a piano bench, and it shows. Watkins was the keyboardist for Happy The Man, a late 1970s progressive rock outfit from Maryland, and then did a stint as the keyboardist for Camel. Since then, he's done a trio of home-recorded solo albums, which were reviewed in *Polyphony* and **EM** in September 1982, June 1983, and February 1986.

All of his earlier music was written and recorded in Arlington, a suburb of Washington, D.C. Prior to the new album, he "moved to the country," Linden, Virginia, on the banks of Goose Creek, 60 miles from D.C. Watkins says this had a definite effect on his music, although I don't know how much of it was the move and how much was just the tenor of the times. The album is less progressive rock oriented and more new age, although he'll hate to see it put that way. Labels are generally shunned by artists who have more to offer than following a formula, which Watkins has.

Azure is also a mature work. The primary feature that distinguishes it from the majority is the construction, I believe. Watkins does not use an A-B-A-B-A-B development; in fact, there's very little repetition at all (A-B-C-D-E-F?). He doesn't seem to write in 8-bar sections either—a trait that puts him more in the realm of classicists than rock and rollers. Many tracks on *Azure* would sound perfectly natural played by a string orchestra. Again, the actual technology Watkins uses to get his music across is relatively unimportant because his music is paramount.

In the extensive and very helpful liner notes, Watkins details which instruments are responsible for which sounds: Yamaha "X"-series (DX7, TX7, TX81Z, and RX5), Roland D-50 and MT-32, Korg Poly-61 and Kurzweil K1000, all controlled by *Cakewalk* software on a Leading Edge Model D (IBM-compatible) computer. He also gives time signatures for each track: three of them are "none" or "freeform," and then there are 11/8, 7/4, 15/8, 8/4, 3/8, and a couple of 4/4s and 2/4s. Not your usual hack keyboard work. The chord changes are very sophisticated as well, unpredictably moving between minor modes in surprising ways.

He's always been known for odd time signatures and nonstandard progressions, the hallmark of the "Canterbury sound," but *Azure* somehow manages to combine this philosophy with a Bartokian or Stravinskian classicism. The result, at least for this listener, is an album that can be put on auto-repeat without getting tired of it, which I've done for most of the week getting ready for this review.

So what is it that distinguishes Watkins and Praetzel from the majority? It has to be the strength and sophistication of their composing. They don't have to be recorded "live in the studio," they don't have to sound like "real instruments," they don't even need nostalgia on their side, as long as they present great music. Without that at the heart of a project, no amount of fashion or technology will put it "one flight up."

Robert Carlberg *likes to listen to music. If the price of hearing all this great music is that he has to try to find something to say about it, then he's willing to make a fool of himself in public. He knows that nobody reads this anyway. Items for review should be sent to PO Box 16211, Seattle, WA 98116.*

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THE STORAGE DILEMMA

One of the biggest problems facing the Sound Tools user is what to do with files once you're finished working on them. Maybe you can fit the score and effects for an entire film on a 500-megabyte hard disk, but when the film is in the can, and you want to use the hard disk for something else, where do you put the original audio tracks?

In the analog world, the answer is simple: save all your original masters. Analog tape is an excellent medium for both short- and long-term storage, and once you're done with a tape, just put it in the vault, and it will (hopefully) still be there three years later when you want to use the tracks for another project. In the world of hard disk recording, however, there is no such easy solution.

Floppy disks won't work unless you always deal with very short files. Remember, we're talking megabytes per minute here. Digital tape, although offering potentially perfect reproduction (especially with Digidesign's promised DAT I/O interface for Sound Tools, which was not finished at the time of this review) can only go so far: you can record the soundfiles from your hard disk onto a DAT cassette, but there is no way to store playlists, EQ files, and loop points, and so those would have to be reconstructed from scratch every time you used the soundfile.

Once they become available, recordable optical disks might be an answer, assuming the cost of the medium itself is low enough, although read-once disks only would be appropriate for archival storage. Removable disk cartridges are very attractive, in that data transfer takes no time at all—the cartridge is the hard disk—but they are very expensive, especially compared on a cost-per-minute basis with tape, and are likely to remain so.

A good compromise solution, used by at least one studio, is a tape backup system made by Crate Technologies and designed for archival data storage. The files are stored on ordinary data cassettes like the kind you used to buy computer games on. Each tape holds 60 megabytes of data (six minutes of stereo sound) and costs about twenty dollars. It takes about ten minutes to transfer all the data on a tape to a hard disk, and vice versa. If a soundfile is larger than 60 megabytes, the backup system software will automatically break it up over two tapes. It's still a more expensive way to go than audio tape, but it shouldn't inflate anyone's production budget unduly.

and/or give you a chance to change your mind.

The hardware is solid, but the unbalanced inputs and outputs give it a less-than-professional look and feel. If the system is part of a complex studio setup and you're not careful about signal routing, the AD IN-to-Sound Accelerator echoing function can cause the system to go into instant digital feedback. The tape-recorder window in the software initially defaults with this function turned on, which is probably not wise, but you can set the default to turn this function off.

One important difference between Sound Tools and some high-end digital workstations is that it can only handle two tracks at a time. Although it is theoretically possible to put multiple Sound Accelerator cards in a Mac II, the Mac's CPU itself is not fast enough to access more than one card, so true multitrack recording is out for the time being (although that may change with the next generation of faster Macs).

IS IT FOR YOU?

So big deal, I found some things wrong. They're all trivial, and Digidesign has promised to take care of at least some of them. The fact of the matter is that Sound Tools will handle many of the functions of systems that cost up to 50 times as much, and will do so in a very friendly, nonintimidating way. It's also easily upgradable and will happily coexist—thanks to Apple's forthcoming *MIDI Manager* system software—with other music applications.

Sound Tools is not a sampler, and it will not replace a good sampler in a MIDI studio, although it can enhance that sampler's capabilities considerably. Nor is it really a master recorder, unless you have access to huge amounts of storage (see sidebar). It is very much what its name says: a bunch of highly useful and innovative tools that will prove invaluable in many applications. If you work extensively with samplers, with sound effects, with dialog, with music for film, or even with straight music recording, you will find new uses for it constantly and will soon be calling on it to solve many otherwise unsolvable problems. If you're serious about music production, you should have Sound Tools.

Paul D. Lehrman *wonders if he will get as many phone calls following publication of a review of something he likes as he has in the past after he's reviewed something he hates.*

How to Double the Size of the Music Business

Many companies complain about shrinking markets, yet one segment is starting to expand—and now is the time to help that market along by acknowledging its existence.

By Marsha Vdovin

JON WINET

(We don't run guest editorials often, but in light of companies complaining that the music industry is in a slump, it seems appropriate to print a potential solution—so take it away, Marsha.—C.A.)

Women don't buy high-tech music devices. At least, music marketing people consider this a fact; the music industry, from manufacturer to music store, treats it as law. But is this simply the nature of things, or is it a self-fulfilling prophecy? Perhaps it's time to take a good, hard look at this question.

Consider the numbers. The percentage of female music software users ranges from 0.5% for high-end programs to 5% for more educational or accessible programs. There are certainly many reasons that these numbers are so small, yet in other computer-related fields, such as office automation or computer graphics, women seem to be much more equally represented. Why is music different?

Perhaps compared to men, women identify themselves as different kinds of musicians. In pop music, women are traditionally vocalists, not instrumentalists. Of course, there are exceptions, but when I asked a marketing expert recently about the lack of women buyers in the music software industry, I was offered this analysis: if we take the body of people who are musicians, we will see most women identify themselves as vocalists. If we draw the subgroup who play an instrument, and then from that group draw another subgroup of those who play a MIDI instrument, and from that group extract those who own a computer, we can't expect more than 0.5% of those people to be women. Hmmm!

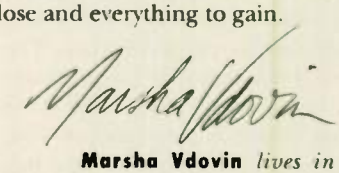
Society has assumed that women have lower math and science aptitudes, and thus it has been theorized that women do not "naturally grasp" technology as easily as men. However, many women are aware that often they have been actively discouraged from technological paths. The times are changing, though, and more and more women are buying high-tech musical devices and software, and they represent an untapped market with amazing potential. This is 1989, and believe me, Laurie Anderson and Suzanne Ciani are not the only women buying music software.

Between 1980 and 1987, only four songs written entirely by women made it to Number One on the pop charts. But in 1988, five songs written entirely by women climbed to the Number One spot. This was not accomplished solely with pencil and paper.

Debbie Gibson is a perfect example of what this untapped market could represent. As I type this editorial, she has the top-selling album in the country. The album started in her MIDI studio, housed in her parent's spare bedroom, while she was still in high school. Debbie Gibson fears neither software nor computers and seems comfortable pushing technology to the limits she requires. She is part of a new generation of women who have been exposed to computers since elementary school, and she is rapidly becoming a role model for another generation destined to be more than vocalists.

Marketing people should remember that promotional tools such as advertising both *create* and tap into markets. As to how to tap this market, L.A. studio keyboard player Diane Louie suggests, "Maybe one way to get women to buy more software would be for the software companies to keep in respectful touch with the women who are using software, and if they feel so inclined, use those women as part of promoting their package. We need to dispel the myth that technology/software is scary." As to how to create this market, advertisements that use women as role models and don't use sexist language is a good start.

This is an era of barrier-breaking, and women will not remain an invisible market for long. I do not think that music hardware and software manufacturers are trying to dissuade women from buying their products, but I feel it is obvious we all need to rethink our position on women and music marketing. Perhaps as business people, developers, distributors, and dealers, we should spend less time explaining why women don't buy music technology and more time including women in the dream. Music marketeers should be on the vanguard of "stereotype bashing." We have nothing to lose and everything to gain.



Marsha Vdovin *lives in San Francisco where she is the marketing director at Blank Software. Although not a musician, she has a background in performance art and filmmaking, for which she has made extensive use of audio.*

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If you're making music with MIDI and computers and are looking for a better way than ever to put it all together, look to Opcode. Our fully integrated system supports every aspect of music production from composing, recording and film scoring, to notation, and voice editing and organization. We understand what your needs are, because at Opcode we're musicians too.

Vision is the professionals' choice for sequencing. Grammy award winning composer and producer Jan Hammer says "If you compare all the really good sequencers on the Mac, Vision is more than the sum total of those sequencers." With the power of Vision, pros who haven't already, now have more reason than ever to switch from whatever program they've been using.

Keyboard Magazine called Opcode "the undisputed leader in **Editor/Librarian** technologies." Our programs support hundreds of synthesizers with innovative features and graphics. And with our new Desk Accessory Librarian, included free with every package, you can audition voices while Vision is playing! We've got programs for the E-mu Proteus, Korg M-1, and Kurzweil K1000 series, so you won't miss a beat while using today's hottest synths.

Many composers rely on **CUE—The Film Music System** for all the paperwork and calculation tasks involved in scoring to picture. Tom Scott, who says he's "thoroughly committed to CUE," even has his music editors use CUE to streamline the process.

With the **Studio 3** rack-mount SMPTE and MIDI interface, you can stripe SMPTE or configure the MIDI outputs using our custom software. Or start with a **Studio Plus Two** or **Professional Plus** MIDI interface and add SMPTE to your system later with the **Timecode Machine**.

Every system needs integration, and since we're the company who created MIDI Files, all our programs use the Standard MIDI File format, from Editor/Librarians and CUE, to Vision. And Vision also easily exchanges files directly with most popular notation programs, so you can print out your music or play back your written scores. We've even got our own notation program in the works.

So whether you're a Pro, or just setting up your first MIDI studio, Opcode has a system to help make *your* music better. We have over forty great music products designed specifically for the Macintosh, that's more than any other music software company. It means we can offer you a more flexible, customized, fully integrated system. If you're serious about putting it all together, call the musicians at Opcode now.

Contact us for a free brochure. Demo disks of Vision or CUE are available for $10 each. 415 321-8977.

Opcode systems

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Foreign Distributors: France-Numera; Germany-Multimedia; England-MCM; Japan-Naniwa Gakki; Australia-Music Technology; BeNeLux-Synton; Italy-Midiware; Switzerland-Musikengros Gutter; Norway-Applied Computer Science; Sweden-MidiMusic AB. Opcode Systems FAX 415 321-9034.

Vision™

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The UREI 813 solved the "time smear" problem with Time Alignment™, unifying sound into a single point source. This dramatic breakthrough, along with other major technical advances, soon established the 813 as the industry standard.

Now UREI introduces less of a good thing: the 809 Time Align® Studio Monitor. The 809 delivers all the engineering depth of its big brother, but at a compact size and price that's ideal for small control rooms and near-field applications.

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The 809 has exceptional power handling capabilities, high sound sensitivity, and low distortion. It accomplishes precise acoustic impedance matching and smooth out-of-band response with UREI's patented high-frequency horn with diffraction buffer. And its ferrite magnet structures assure the system's high sensitivity drivers will not degrade with time and use.

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