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MUSICIAN

JUNE 1986

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Interview:



**Thomas
Dolby**

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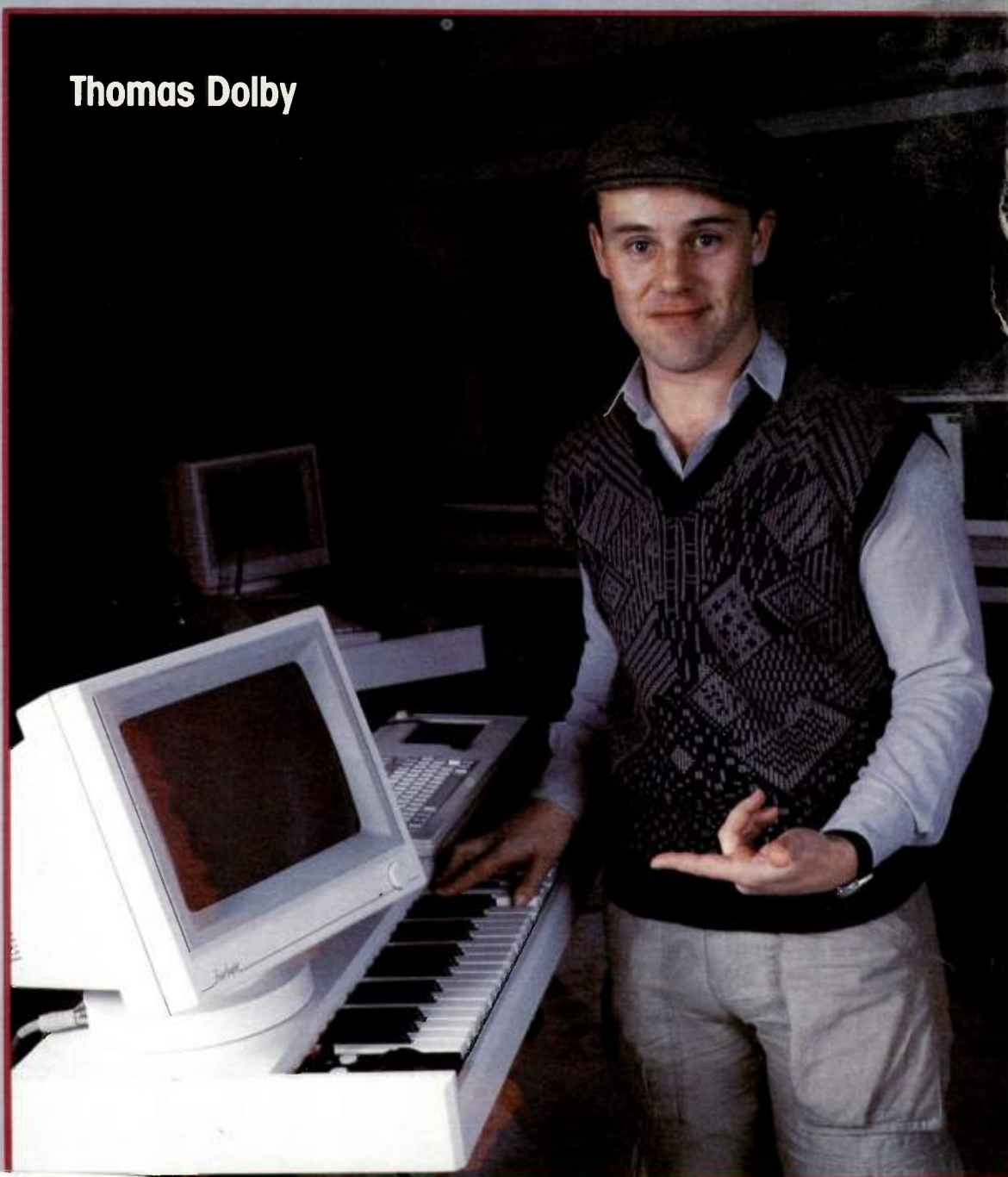
**via
MIDI**

Reviews:



**Fostex
4050,
DX Droid,
Mirage Sound**

**Dis
Int**



Thomas Dolby

***** 3-DIGIT
441 000244087 5705 ELM
JON, RICHARDSON

80 FRANKLIN ST
NAPA CA

3
94559

A MIX PUBLICATION

The digital effects.

COMPRESSOR RELEASE = 525ms	PARAMETRIC EQ. MID FRQ = 500 Hz	AUTO PAN DIRECTION= L↔R
TRIGGERED PAN PANNING = 525ms	FREEZE A REC MODE= AUTO	FREEZE B OVER DUB
PITCH CHANGE A BASE KEY = C 3	PITCH CHANGE B 1 FINE = + 8	PITCH CHANGE C L DLY = 0.1ms
PITCH CHANGE D F.B. GAIN= 10 %	ADR-NOISE GATE TRG. MSK= 5ms	SYMPHONIC MOD. DEPTH= 50 %
STEREO PHASING MOD. DLY= 3.0ms	CHORUS A DM DEPTH= 50 %	CHORUS B AM DEPTH= 10 %
REV 1 HALL REV TIME= 2.6s	REV 2 ROOM DELAY = 20.0ms	REV 3 VOCAL LPF = 8.0 kHz
REV 4 PLATE HIGH = 0.7	EARLY REF. 1 TYPE = RANDOM	EARLY REF. 2 ROOM SIZE = 2.0
STEREO FLANGE A MOD. DEPTH= 50 %	STEREO FLANGE B MOD. FRQ= 0.5 Hz	STEREO ECHO Rch F.B = +58 %
DELAY L,R Lch DLY =100.0ms	TREMOLO MOD. FRQ= 6.0 Hz	DELAY VIBRATO VIB RISE= 1400ms
GATE REVERB LIVENESS = 5	REVERSE GATE TYPE = REVERSE	REVERB & GATE TRG. LEVEL= 65

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COVER

Innovative synthesist, creator and all around fun guy, Thomas Dolby, visited Fairlight at last winter's NAMM show in California and modelled for EM's cover with the Fairlight Series III Computer Music Instrument. Photo by Sherry Rayn Barnett.

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Display advertising rates, specs and closing dates are available upon request.

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First of all, thanks to those of you who responded to my request in the March '86 *EM* for feedback concerning the magazine. I was very gratified that most of you like the current direction of the magazine, but even more gratified that those who had suggestions presented them in such a helpful, constructive manner. Many, if not most, of your ideas—and there were plenty of them—are being incorporated into plans for future issues. (See next month's Letters column for a distillation of specific comments from readers.)

The most commonly expressed opinion was the hope that we would not lose our technical orientation in order to expand our reader base. Never fear. The plan is to retain our technical slant, but as we pick up more advertising support and add more pages (which is already happening), we will use this additional space for more basics-oriented articles. This strategy also satisfies the second most commonly expressed opinion, which came from those who were just starting out in musical electronics and hoped that we would publish more articles on basics.

Some subjects were more controversial than others; interviews, in particular, seemed to garner polarized opinions. Many readers welcomed the fact that *EM* was including more information on the humans behind the technology, while others felt they could get similar information elsewhere so why should we bother. Covers were also a source of controversy. Often, a cover that one reader would single out as being his or her favorite would be singled out by other readers as being their least favorite. These comments mirror some of the internal discussions at *EM*; we're all trying to figure out what's best for the magazine, and sometimes it's hard to predict what works and what doesn't. We're still learning, but your feedback greatly speeds up the learning process.

One particular suggestion I liked was for a "system-of-the-month" feature, where a reader would describe his or her typical setup and include a photo. This could be a low-end or high-end MIDI studio, a particular live performance configuration, a video setup, a recording studio, and so on. The accompanying article would describe the equipment used, any particular problems involved in setting up or interfacing the system, and ways in which the system is used. The object would be to give people a "feel" for what equipment works well together, and what would be a typical way to get all this gear to work together harmoniously. If you'd like to submit your system for consideration as system-of-the-month, drop us a line. Actually, we've already started on the idea; David Karr's video article in this issue describes a setup he used to shoot a budget video, and next issue, Trevor Morais (Howard Jones' drummer) will describe his stage setup—and it's quite something!

Finally, we have often wondered how the "focus" concept of the magazine, where we highlight a particular topic each month, would go over. Generally, we have a major focus (for example, this month it's video; April was electronic guitar) and a sub-focus on a specific computer (this issue it's the Atari 520ST). We needn't have worried. It seems a lot of you are into knowledge for knowledge's sake, such as the keyboard player who loved the electronic guitar articles because "I didn't know much about that field until the April issue came along." We banked our hopes for this magazine on the premise that our readers had a wide range of interests, and wanted to be involved with as many aspects of musical electronics as possible. Your compliments indicate when we're going in the right direction, and your criticisms help make course corrections. With your help and feedback, the magazine will continue to progress in the years ahead. Thanks again for your assistance, and keep those comments coming.

Electronic MUSICIAN

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ALPHA JUNO 1 & 2

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Flashy sounds, flashy features and a flash to operate, the new Alpha JUNO 1 and 2 are two hot keyboards that are sure to move any musician's set-up into the fast lane of performance. Both Alpha JUNOs offer powerful sound synthesis (14 waveform DCO, 8 parameter envelopes) but at the same time offer incredible advances in user-friendly programming and editing features. The key is the JUNO's Alpha Dial. Just whirl it to edit any of the 64 preset patches or to create 64 new program patches—sound programming has never been so easy. Add an M-64 C Memory Cartridge and you have 192 patches at just a touch. The Alpha JUNO's innovative Tone Modify Function lets you quickly modify the many related parameters of Brilliance, Envelope Time, Modulation Rate and Depth—all at the same time, with just one touch of the Alpha Dial—a system called Biometrics. Or you can add the optional PG-300 Programmer to make programming even easier. You'll also find the Alpha JUNO's MIDI implementation to be the most sophisticated on the market. Most amazing is that all these features don't carry a flashy price. Which means they're going to move out fast, so you'd better do that too—only to your Roland dealer.

 Roland

Roland Corp. U.S. 7200 Devonian Circle, Los Angeles, CA 90046 (213) 885-5141

WPH

ARP Meets the 1980s...

I recently acquired an ARP 2600 for \$200. Is there any way to modify the 2600 to computer control, or MIDI? I'm sure this is the \$64 question everyone has been waiting for. I mean, if it was so easy to do this type of mod, why would everybody be dumping non-MIDI stuff?

I've been getting *EM* for six months now and really enjoy it; now how about a reader service card? Also, follow-up to electronic projects would be nice as a "feedback" segment. We all know who Murphy is and how easy it is to make typos and construction errors. Keep up the good work!

Dan Titus
Westminster, CA

Dan—It's easy (although not necessarily cheap) to convert any mono control-voltage based device to MIDI with J.L. Cooper's "MIDI CV Out" adapter. It listens to any one of the 16 MIDI channels and supplies appropriate control voltage and gate outputs. You may need to add an inverter or level-shifter for the gate, but this usually involves no more than a transistor and a couple of other parts. As to why everybody is dumping non-MIDI stuff, all I can say is that if you ever wanted a classy synth like a Memorymoog or OB-8, they are available for very little bucks and those particular synths can even be retrofitted for MIDI. There's still much that can be done with CV/gate technology; it's unfortunate many people think of MIDI as a replacement to what has come before, rather than as a supplement.

Regarding electronic projects, so far our luck has held and we've been able to keep technical typos and other problems to a near-zero level. Let's thank the authors and our Mac artist, Chuck Dahmer, for their vigilance about this. Of course, if we hear of any errors or problems we will publish them in the *Error Log* section of the *Letters* column.

We Aim to Please

My heartiest compliments on your having made the move to Mix Publications without losing one bit of the unique flavor that has always characterized *EM*, and Polyphony before it: A strong commitment to the independent producer, the do-it-yourselfer, and the home synthesist, who find within your pages the sort of valuable advice and clear information they need from a source they can trust... their fellow artists.

Michael P. Metlay
Pittsburgh, PA

Michael—We are constantly surprised and delighted by the quality and variety of manuscripts that the readers send in. We think that

having the readers write the magazine is the best way to go, and are glad you also enjoy that approach.

Does 15 ips Reign?

Is 15 ips half-track on 1/4-inch tape still the current format accepted by record pressing facilities for master tapes? Will Beta Hi-Fi or PCM tapes be accepted for stereo masters?

Dan Laskowsky
Windsor, Ontario, Canada

Dan—15 ips is still the most common format. However, some facilities offer more specialized formats such as half-inch 2-track, Sony PCM-F1 digital recorders, etc. If you are using a non-standard format, check that the mastering facility can accommodate it, or will agree to let you bring in your non-standard playback device.

Don't Forget Passport!

In "But How Do I Get Started" (March '86 *EM*), Mr. Albin makes note of a Sequential Model 64 MIDI Interface as a point of reference in helping the inexperienced to get started in setting up a MIDI studio. In actuality, that product no longer exists. Second, I was a bit surprised that no mention was made of Passport's line of MIDI interfaces, since we pioneered the MIDI software and interface marketplace. I sincerely hope that readers of your publication get better support from you in the future, especially since they are paying for it.

Jo Ann Thomas Vella, Marketing
Passport Designs, Inc.
Half Moon Bay, CA

Jo Ann—As noted in the article, the Sequential interface was mentioned in the context of second-hand gear, and also because it contains built-in software along with the interface, which cuts costs for beginners. Regarding support, I think most readers are aware that not all aspects of musical electronics will be covered in one article in one issue; readers who wanted to learn about Passport products had ample opportunity in the January '86 issue (see the article by Dave Kusek, president of Passport Designs, and Frank Serafine's review of Passport software).

The MIDI Coffee Machine?

I honestly feel that your magazine is too good to be true. The articles are unfailingly well-written and informative. The reviews are well thought out, and most important, *EM* never takes the supercilious tone that some of the other magazines use. Perhaps the most valuable feature is the DataBank column, as who among us doesn't know some techie who

would be willing to MIDI the coffee machine if he only had the schematic. The only improvement you could make would be to publish twice monthly.

Jonathan Helfand
New York, NY

Jonathan—Thanks much for the compliments, but moving on to the second part of your letter, the concept of a MIDI coffee machine may not be as far off as you might think; I have heard rumors that one computer company is toying with the idea of using the MIDI interface as a low-cost, simple way to control household appliances and security systems.

Delta Amiga

I would like to correct a mistaken impression which may be left by the sidebar on sampling basics (attributed to me and extracted from a longer, unpublished article) on page 42 of the April '86 issue. The sound output from the Amiga's digital sampling playback equipment is not, in my opinion, "toward the lower end of the professional spectrum." I have listened to the Amiga's sound output extensively and, while it is quite good for an entertainment machine, it is not comparable to a low-end professional machine like the Mirage.

My original article gave the Amiga the benefit of the doubt—I implied that possibly studio quality samples, amps, and speakers would give me a more favorable impression (although I was told that the samples I listened to were created on a Fairlight, and the playback equipment I used was more than adequate). Possibly my article, written in a rush, was unclear on this point, so I want to take this opportunity to be clear that the sound output of the Amiga is not, in my opinion, of sufficient quality to warrant its purchase with the expectation of using it in either performance or studio situations as a sampling machine.

The computer business suffers from enough over-praising of less than perfect equipment, and in particular, the Amiga has been hyped to the limit. As a programmer, I am often frustrated by the unreliability of printed reports on equipment, and as a writer I am disturbed when my efforts to present a realistic picture of a machine are edited to present a meaning opposite to the one I intended. I assume this was unintentional on your part; I will certainly make every effort in the future to be clear when I express an opinion.

Tom Jeffries
Oakland, CA

Tom—The original manuscript did, in fact,



Even if your music starts as a piece of junk, your sampling mic better not.

The new Shure SM94 Condenser Mic can make a big improvement in your digital sampling—at a surprisingly affordable price.

If you've made a major investment in a sampling keyboard or drum machine, don't overlook the importance of the microphone you're using. A vocal mic, for example, might "color" instruments you are sampling.

To capture your sample as accurately as possible, we suggest the new SM94. Unlike many popular mics, the SM94 has no high-frequency peaks, accentuated presence boost, or excessive low-end rolloff. This prevents overemphasis of high frequencies on instruments like strings and brass, while allowing you to retain the important low-frequency response essential to capturing the fullness and richness of many live sounds.

And its extremely low handling noise minimizes the introduction of extraneous handling sounds that might

otherwise creep into your sample. What's more, the SM94 offers exceptionally high SPL capability—up to 141 dB—all but eliminating distortion on transient peaks.

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In addition to offering a unique combination of features not normally found in condenser mics in its price range, the SM94 is built with Shure's legendary emphasis on ruggedness and reliability. Features like a protective steel case, machined grille and tri-point shock mount make it rugged enough to go wherever your inspiration takes you.

And for voice sampling, we suggest the new SM96 with its vocal contoured response and built-in three-stage pop filter. Both these fine microphones can bring a new dimension of realism to your digital sampling.

For more information, write or call: Shure Brothers Inc., 222 Hartrey Avenue, Evanston, IL 60202-3696, (312) 866-2553.



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state that the sampling specs for both the Amiga and Mirage "would be considered to be at the low end of the professional spectrum," which was assumed to be an accurate summary of your feelings. Nonetheless, we welcome the opportunity for you to clarify your opinions.

(And while we're at it, due to the rush to which Tom alludes, his biography was inadvertently left out. Tom spent 15 years as a professional trumpet player, including time as principal trumpet with the Saint Paul Chamber Orchestra and the San Jose Symphony. He also did recording work with Dave Brubeck and on the Charlie Brown TV specials. He currently writes music-related microcomputer software and soundtracks for computer games; his company, Singing Electrons, is based in Oakland, California.)

Telcom Info

I'm interested in your mention of PAN and IMC. Are these bulletin boards? If so, where can I get access numbers?

Paul Thomas
Ben Lomond, CA

Paul—These are two of the more popular computer telecommunications services for musicians. For more information, contact PAN at 215/489-4640, 9 AM to 5 PM Monday through Friday. Contact IMC at 213/937-0347 (Los Angeles), 212/757-0320 (New York), or 01/221-2749 (London). Both services have sign-up and connect time charges. For more information, watch for an upcoming article in EM on telecommunications for the musician.

Error Log:

April '86 issue, page 18: The proper address for Atmosphere (who released the Nightcrawlers' *Spacewalk* album) is 5623 Whitby Avenue, Philadelphia, PA 19143. Tel. 215/747-0741.

May '86 issue, page 78: There is a reference to a Personal Composer review in the same issue. Due to space problems, illness of the author doing the review, and the imminent release of a revised version of the product, that review has been postponed until a later issue. **EM**

Operation Help is dedicated to helping musicians help each other. If you need technical assistance, a schematic for some old piece of gear, or just want to connect with people having similar interests, send your name, address, phone number (optional), and nature of your request to Operation Help, Electronic Musician, 2608 Ninth St., Berkeley, CA 94710. There is no charge for this service, but we cannot guarantee that all requests will be published.

Jupiter 6/Jupiter 8 User's Group: I would like to form (or join if one is already in existence) a Jupiter 6 or Jupiter 8 user's group in order to trade patches and tips. Bruce A. Pelley, Box 444, So. Lancaster, MA 01561.

Schematic needed: I am looking for electrical schematics for a Teischord Model C keyboard. Any help in locating them would be sincerely appreciated. Dennis Williams, 1706F Porter Ave., Honolulu, HI 96818.

Suggestion Box

Here's your chance to make suggestions to the industry. Is there some feature you would particularly like to see on equipment? Something you particularly don't like? Something you like which you wish more manufacturers would implement? Send your complaints, compliments, and ideas to: Suggestion Box, Electronic Musician, 2608 Ninth St., Berkeley, CA 94710. We also welcome suggestions from manufacturers to end-users.

Using the SRV-2000 as a DDL:

Hidden in the service manual for the Roland SRV-2000 digital reverb is some interesting information about an alternate use for this unit. Namely, when powered-up while holding the "Reverb/Non-Linear," "Write," and "Room Simulate" buttons, the SRV-2000 becomes a digital delay. The display window will read "SRV-2000 Digital Delay," and the display numbers take on new meaning. Window two indicates the "Feedback Rate" in increments up to 120. Window four displays the delay time (up to 450 ms), and window six indicates the output level. To access these controls, the "Non-Linear" light must be on. By activating the "Equalizer" switch, the three band parametric equalizer can be accessed as well.

Note that unlike the SDE-2500 Digital Delay or the SRV-2000 in its normal operating mode, none of the delay parameters can be memorized. To return to the

SRV-2000's normal (reverb) mode, simply power-up the instrument. Nancy A. Kewin, Director of Communications and Education, RolandCorp US.

Patch Points, MIDI EQ:

Continuing Terry Fryer's idea of multiple audio/trigger inputs and outputs (Feb. 1986 Suggestion Box), it would be nice if you had access to the following points within a synthesizer: oscillator outs, filter inputs, filter outputs/VCA (voltage-controlled amplifier) inputs point, and VCA output points. This would let you use the VCAs (a MIDI controlled mixer?), route the oscillators of one synth through the filters of another, process external signals under program control, and so on.

Also, how about MIDI addressable, programmable graphic equalizers and analyzer/equalizers? For the latter, I would like to see a box with mic and built-in pink noise generator but no LEDs or sliders. Pushing a button would, as with other units, adjust the graphic equalizer filters to give you a flat response. But I would also like to see it store presets (useful for bands that do a circuit of particular clubs) and moreover, have a "reverse" button that would reverse the EQ settings. If you recorded this reverse setting on to tape, you would recreate the equalization characteristics of that room. Bill Murray, Quesnel, B.C., Canada. **EM**

dbx questions: I picked up an old dbx NX-40 noise reduction unit designed for the old dbx encoded disks and for making dbx encoded cassettes. It is supposed to be used in the standard home stereo configuration, but I would like to use it with my Fostex X-15. I also hoped to use cassette sub-mixes with my 4-track reel to reel. However, there is apparently some line imbalance problems when connecting the dbx between the mixer and tape deck. Any assistance would be appreciated on how to use this with my lil' 4-track synth setup. Nicholas C. Gorski, 39 Miramar Ave., San Francisco, CA 94112.

Revox redux: Where can I get the parts to convert my quarter-track, 3 $\frac{3}{4}$ and 7 $\frac{1}{2}$ ips Revox A77 to 15 ips half-track operation? Dan Laskowski, 10382 Shenandoah, Windsor, Ontario, Canada N8R 1B5.

MIDI Vocoder: I am interested in developing a computerized vocoder singing system using the General Instruments SPO-256-AL2 Allophone Speech Processor (available from Radio Shack), a UART, and a PaIA 6710 vocoder to convert MIDI data to vocoded song. (For further references see "MIDI Vocoder" in MIDI News Vol. 1, issue 4. Back issues are \$2.50 available from MIDI News, 3980 El Camino Real SP 21, Palo Alto, CA 94306.) All those interested in participating please contact me c/o MIDI News. Andrew J. Grotowski, Palo Alto, CA. **EM**

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BY JAMES E. FINCH

New Jersey Keyboard Whiz Bill Rhodes Writing Classical Symphony. Prolific recording artist, Bill Rhodes (Hazlet, NJ), is not only releasing two new albums, *Rupprechts Werk* and *Keyscan*, but is hard at work writing a classical symphony designed to musically describe the various colors of the spectrum. The piece, entitled "Symphony Of The Colors" will be recorded using the latest in digital technology, including the Kurzweil, DX7, and Emulator synthesizers. Rhodes, author of "Applied Synthesis" (a booklet and regular column in *Polyphony* magazine) is classically trained and is a degreed instructor of electronic music. His numerous progressive rock and jazz albums have been doing very well, averaging about 8,000 per release sold. All of his material comes out on his own label. Rhodes is also a clinician for IMC, which distributes Akai synthesizers.

Tangerine Dream Touring U.S. This Spring and Summer. Sponsored by Relativity Records (a division of Important Records), the "teutonic trio" will be touring major cities in America, according to a recent California radio interview with T.D.'s leader Edgar Froese. The Dream continue to do well both in album sales (in the 100,000s) and in garnering film score deals. At this writing, Relativity Records has licensed several albums from the Tangs' Jive Electro label (distributed by CBS), including a new boxed set of LPs that feature some rare early and unreleased material. Although T.D. is now known as a "space rock" band, back in the late '60s they were a heavy metal acid band going nowhere...until they were influenced by "spacers" such as Klaus Schulze (who studied under the likes of Gyorgy Ligeti) and Conrad Schnitzler.

JEM Records Signing Several Electronic Music Artists in 1986. Thanks to the efforts of longtime Passport Records recording artist Larry "Synergy" Fast, such "indie" notables as Emerald Web, Neil Nappe, Yanni, Barry Cleveland, Charlie Elgart and Don Slepian have been signed. With the advent of new audiophile progressive labels like Private Music and Relativity, JEM wants to provide a formidable product line to deal with this new competition for New Age and Progressive Music audiences.

California Composer Makes Use of Emulator II on MTV Program. Synthesist/

sound designer Michael Montelone, who lives in Pomona, California, scored the MTV program "The Cutting Edge," an IRS Records production. The score is all electronic featuring lots of Emulator II sound effects.

Accomplished NJ Author To Publish New Book On "Making Music." Thom Holmes, noted publisher of *Recordings* magazine and author of the book *Electronic and Experimental Music* (Scribner's, 1985), is finishing up a new book that "explores the creative process of making music and the many approaches used to transform musical ideas into something that can be shared with others." The book will be published by Harmony books. Holmes recently sent a survey to various musicians entitled "How do YOU Make Music?", the answers of which will be used for the book due out later this year.

San Francisco Music Fair Debuts in June. The San Francisco Music Fair, presented by the San Francisco chapter of NARAS (National Academy of Recording Arts and Sciences) and co-sponsored by *BAM* magazine, *Electronic Musician*, and *Mix* magazine (along with several other music-related companies), celebrates the recording and music industries. The event features over 100 music-oriented exhibits, continuous live music on two stages (from classical to rock), seminars, demonstrations, and much more. The Fair runs from June 27 to June 29 at the Concourse at Showplace Square, Eighth and Brannan, in San Francisco. For more information, call 415/383-9378.

New Age Synthesizer King Releases New Hour-Long Tape Album. Regarded by many as one of the first "New Agers" of the San Francisco Bay Area, IASOS has released a new audiophile cassette album of intricate electronic music called *Jeweled Space*. Part of what IASOS called the "Vibrational Environment" series, *Jeweled Space* features sustained bell tones and other meditational sounds. The album retails for \$10 and can be purchased from Inter-Dimensional Music, Box 594 Waldo Pt., Sausalito, CA 94965. IASOS' video *Crystal Vista*, which features a variety of complex and advanced graphics, recently won first prize in the Santa Cruz Video Festival and was hailed by the Consumer Electronics Show in Chicago for "outstanding original programming." The list price for this video has dropped from \$55 to \$50 and is available from the address above. **CM**

Next month in **Electronic Musician!**

Electronic percussion for drummers and other musicians!

- ▶ Percussive control of MIDI synthesizers
- ▶ Trevor Morais (drummer for Howard Jones) writes about his electronic percussion system and how he gets some of his unique effects.
- ▶ Mods on the SCI Drumtraks and MXR Drum computer

CZ-101: double the capacity of your memory cartridge with this simple modification!

Making Waves: a basic explanation of using visual editing programs for sound samples

In future issues:

August 1986

- ▶ Special issue on circuits and modifications to help you get the most out of your instruments.
- ▶ Feature on the Yamaha CX5 Music Computer.

September 1986

- ▶ Telecommunications and music—a guide to getting and exchanging music-related information with computers and modems.

October 1986

- ▶ Education in Electronic Music—where and how to learn more about musical electronics.

ELECTRONIC PERCUSSION

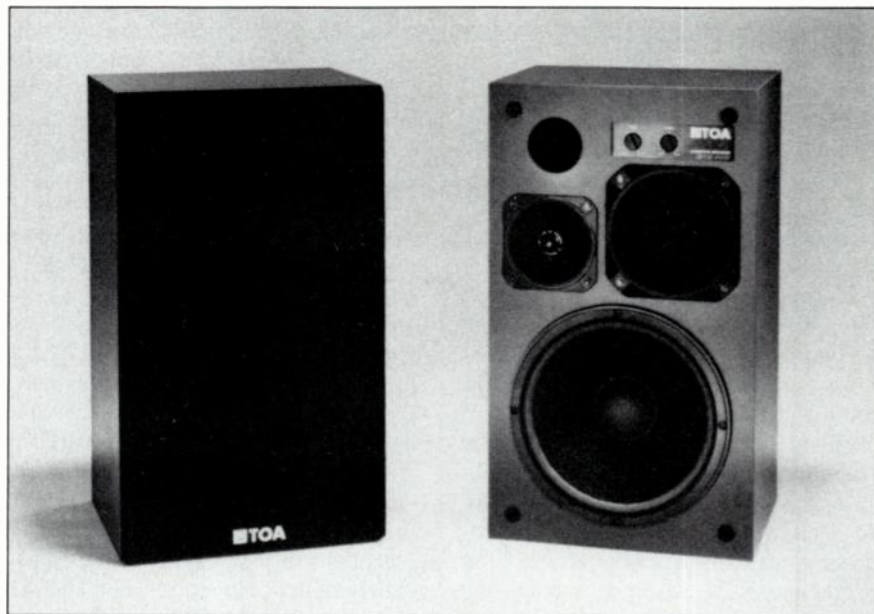
The **RZ-1** programmable PCM drum machine (\$599) includes 12 sounds and up to 0.8 seconds of sampling. One hundred patterns, 20 songs, individual outputs, MIDI In/Out/Thru. Casio, 15 Gardner Rd., Fairfield, NJ 07006. Tel. 201/575-7400.

The **LinnDrum MIDI Retrofit** (\$325) sends and receives note data (notes are mappable to different drums), song pointer data, and provides sync and sync offset (with 1/48th of a quarter note resolution). Installation is required by a qualified service center. J.L. Cooper Electronics, 1931 Pontius Avenue, West Los Angeles, CA 90025. Tel. 213/473-8771.

Replacement **Soundchips** are now available for the Oberheim DMX, DX, Stretch DX, LinnDrum, Linn 9000, JLC Soundchest II, SCI Drumtraks, and Simmons SDS-7 and SDS-1 drum computers. A demo tape is available for \$4 (refundable with purchase). Drumware, 12077 Wilshire Blvd., Suite 515, Los Angeles, CA 90025. Tel. 213/478-3956.

LOUDSPEAKERS

The **ME Series Studio Monitor Line** includes four different speakers that are magnetically shielded so they can be placed adjacent to RGB Video and TV screens without distorting the video sig-



Toa 312-ME 3-way speaker.

nal. The top-of-the-line **312-ME** is a three-way system with 11-inch woofer, 135 Watts RMS continuous program, and bass reflex design; the compact **22-ME** features a full-range five-inch speaker and 120 Watt rating. Toa Electronics, 480 Carlton Ct., So. San Francisco, CA 94080. Tel. 415/588-2538.

The **Studio Monitor Series** consists of the SM100 (10-inch woofer and tweeter, \$229); SM120 (12-inch woofer, midrange,

and tweeter, \$349); and SM150 (15-inch woofer, dual midrange, and tweeter, \$499). Infinity Systems, 9409 Owensworth Ave., Chatsworth, CA 91311. Tel. 818/709-9400.

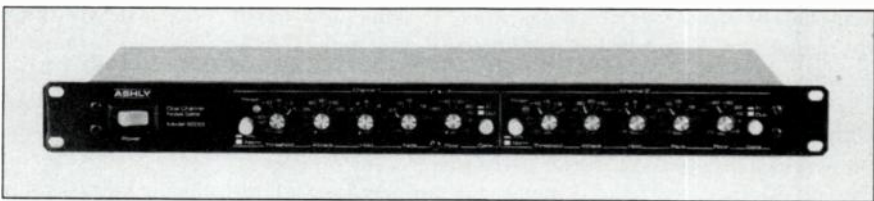
MICROPHONES

The **HY Series Professional Headset Microphones** feature fixed-charge condenser mics with cardioid pickup. A monitor system monitors the direct headset mic,

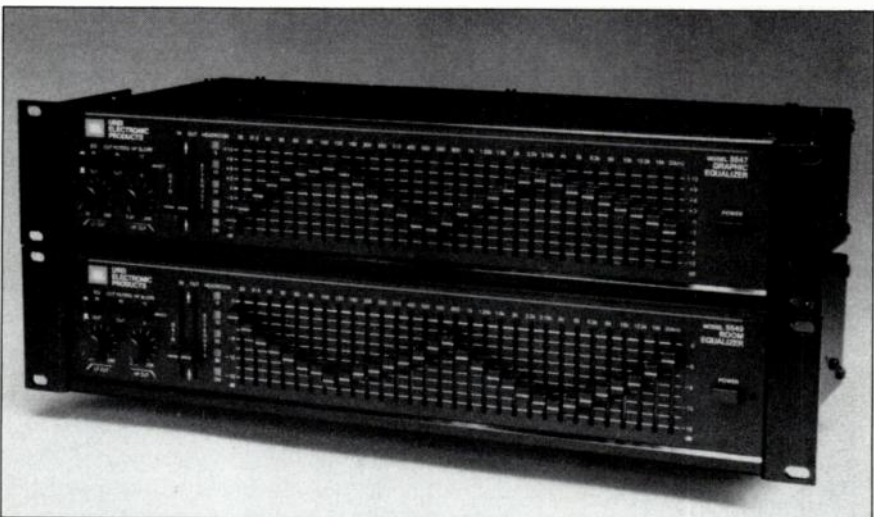
CALENDAR

Jul 6—Aug 3, Cal Poly, San Luis Obispo, CA: Allen Strange will direct a four-week intensive hands-on course dealing with production and applications of computer and electronic music in relation to film, video, dance, theater, poetry, and other arts. Students will have the opportunity to work in an intermedia environment with leading artists, choreographers, directors, etc. For audition and registration/tuition information call 213/590-5768 or write Summer Arts 86, 400 Golden Shore Dr., Long Beach, CA 90802-4275. For further course details, contact: Prof. Allen Strange or Prof. Dan Wyman, Electro-Acoustic Studio, Department of Music, San Jose State University, San Jose, CA 95192. Tel. 408/277-2905.

We invite all calendar items, from wherever they're happening, that would interest our readers but they must be received at least three months prior to the event.

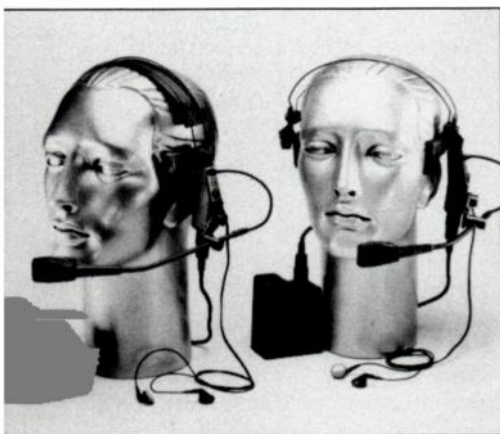


Ashly model SG-33 dual channel Noise Gate.



JBL model 5547 graphic EQ and model 5549 room EQ.

along with an external line-level signal, for individual monitor mixes. Three interchangeable mic capsules provide voicings for male vocal frequency response, female or tenor male vocals, and limited bandwidth intercom applications. A belt-pack provides power (two AA batteries), stereo amp, and monitoring functions; the pack may be isolated from the headset with a 15-foot cord. Toa Electronics, 480 Carlton Ct., So. San Francisco, CA 94080. Tel. 415/588-2538.



Toa HY series professional headset microphones.

PUBLICATIONS

Documenta Belgicae (\$8 international money order; includes postage) is an illustrated collection of essays by contemporary Belgian composers. Paul Adriaenssens, Vorstermanstraat 16, B-2000 Antwerp, Belgium.

The **Roland Drum Machine Rhythm Dictionary** (\$12.95) includes suggested drum patterns for various styles of music for several Roland drum machines. Alfred Publishing Co., P.O. Box 5964, Sherman Oaks, CA 91413.

SIGNAL PROCESSORS

The **5547 Graphic Equalizer** has 30 1/3 octave bands, with 12 dB boost or cut for each band. The **5549 Room Equalizer** provides corrective room equalization and a 0-15 dB cut-only range. Both include adjustable high and low frequency end-cut filters. JBL, 8500 Balboa Blvd., Northridge, CA 91329. Tel. 818/893-8411.

The **RDM 1000 Digital Reverb/Echo** includes eight programmable, MIDI-recallable memory locations. The simpler **RD 500** offers eight editable presets. Hohner (H.S.S.), P.O. Box 15035, Richmond, VA 23227. Tel. 804/798-4500.

The **SG-33 Stereo Noise Gate** features



Yamaha GAR-01 Graphic Artist display.

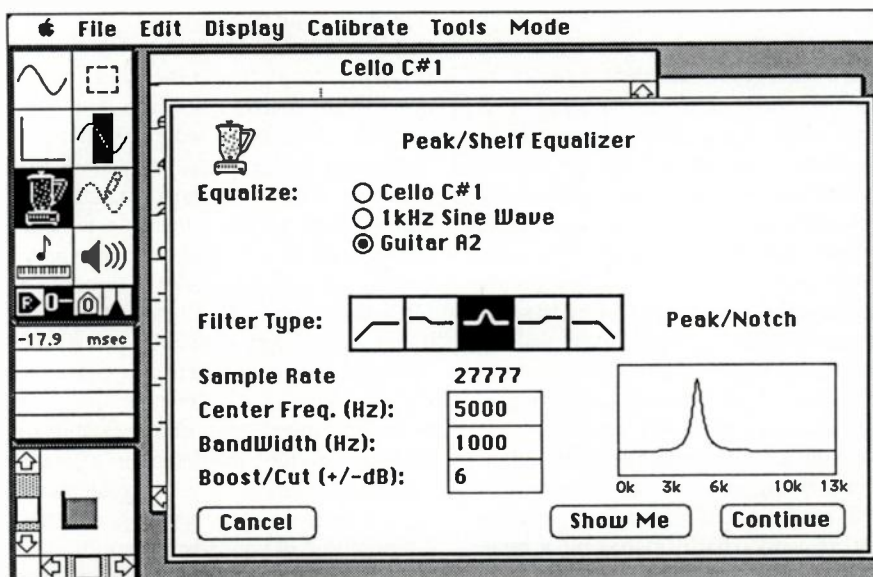
balanced/unbalanced inputs, fast attack time, and a wide range of controls. The **GQ215** features two channels of 15-band, 2/3 octave graphic equalization; the **GQ131** is a single channel 31 band model; and the **GQ231** features two channels of 1/3 octave equalization. Ashly Audio, 100 Fernwood Ave., Rochester, NY 14621. Tel. 716/544-5191.

SOFTWARE

The **CX5M Computer** has come of age. The **YRM301 MIDI Sequencer** (\$55) provides 4-track real time and step time recording from a MIDI keyboard. The **YRM302 RX Editor** (\$55) gives computerized control of RX drum machines for Pattern and Song mode. An FM tone gen-

erator module, the **SFG-05**, plugs into any MSX computer and transforms it into a digital synth with 46 pre-programmed voices, 1,800 note sequencer, and four-voice capability when driven by a sequencer. For graphics, the **GAR-01** ROM cartridge (\$50) draws graphics in 15 colors; pictures can be saved to disk or cassette. New hardware for the **CX5M** includes the **PN-101** dot-matrix printer, **FD-05** double-sided 3.5 inch disk drive and **FD-03** single-sided 3.5 inch disk drive, **Teleword** modem with programs for telecommunications and word processing, and **MU-01** double-button mouse. Yamaha, P.O. Box 6600, Buena Park, CA 90622. Tel. 714/522-9011.

Magic 6000 and **Magic 8000** are



Sound Designer Digital Equalization Menu.

(respectively) Korg DW-6000 and DW-8000 patch libraries. Both feature five sets of patches on cassette and free parameter charts. Deep Magic Music, 1742 Second Ave., Suite 220, New York, NY 10128. Tel. 212/534-0728.

Version 1.1 of **Sound Designer** for the Emulator II adds digital equalization, crossfade looping, enhanced digital synthesis, and several new waveform editing tools. **Sound Designer 2000** (\$495) provides similar functions for the Prophet 2000. Sound Designer programs require an Apple Macintosh. Digidesign, 920 Commercial, Palo Alto, CA 94303. Tel. 415/494-8811.

Music MIDIworks educational software for the Apple II or Commodore-64 (with Passport interface) includes Keyboard Fingerings (\$79.95), Keyboard Arpeggios (\$79.95), Early Music Skills (\$39.95), and Keyboard Speed Reading drill (\$79.95). Electronic Courseware Systems, 1210 Lancaster Dr., Champaign, IL 61821. Tel. 217/359-7099.

SYNCHRONIZATION AND SMPTE

Polyphonic FX (\$16,000 and up) stores sound effects on hard disk and retrieves them according to SMPTE time code. The system stores an editable list of sound effects in order of occurrence, and auto-

matically loads each effect prior to the time code location where it is to be played. This 16-channel system allows each sound to be reproduced with up to six "voices" per effect. Shoreline Limited Teleproduction Systems, 3459 Cahuenga Blvd. West, Hollywood, CA 90068. Tel. 213/851-1236.

The **SV-1000 Mini-Loc** (\$440) retrofits existing tape machines for digital tape counter, auto punch-in and punch-out, return to zero, two other locate points, remote, looping, and other useful features. Sound and Vision, 8033 Sunset Blvd. #928, Los Angeles, CA 90046. Tel. 805/496-1518.

—page 18

Industry Trends

BY STEVE SAGMAN

One of the latest trends in the music business is an accent on education. The problem is that new musical tools are appearing at such a dizzying rate that it's very difficult to stay on top of the latest developments. You can't handle the overload alone, so maybe it's time to get your music store dealer into the act. But first, some background.

Just about this time, early June, music dealers from all over the country, and many from overseas, will descend on Chicago for the music industry's semi-annual trade show. They'll explore the halls of this enormous convention, speaking with exhibitor after exhibitor about nothing but music and musical instruments. And, believe me, that's no short day's work. Over 500 manufacturers display their latest products at each show and the convention itself occupies over 200,000 square feet. Then, after the point when someone from virtually any other industry would reach overload, they continue to discuss music and instruments with friends and acquaintances after the show, over dinner, after dinner, and on and on.

You see, the music business is more than just a vocation for most people. It's an avocation, too, an extension of their love for music and music-making. It's the way they've found to be involved in some aspect of music for nearly every waking hour. That's why your musical instrument store owner can be such a valuable resource. Wait, did I say "can be?" You mean my favorite music merchant might not be doing all he or she can for me? Well, maybe not. Oh, you can be certain that he works hard; managing a retail store is an extremely demanding task. But there are opportunities he just may

not have the time to pursue *without your help*. . . opportunities that will make his business more profitable and can greatly enhance your musical pursuits. Let me explain.

Back in the old days (just a few years ago), you'd walk out of your local music store with a synthesizer under your arm and it would be months, or even years, before you could squirrel away enough dollars to return for a new instrument. The advent of MIDI has changed all that. Now, rather than making one large purchase, you buy smaller, cheaper MIDI system components. As you can, you return to the store for another enhancement to your MIDI home multi-track studio—a keyboard controller one time, a MIDI patch bay another, then a MIDI-controlled signal processor. Slowly, piece by piece, you'll build your ultimate configuration.

The airlines recognize the value of repeat customers and reward loyal patrons with a slew of benefits. Encourage your music store to do the same. And I don't mean discounts; in the long run, you'll do much better with several other "frequent acquirer" plans. Ask your dealer to set up a free synthesizer patch/program library so you can trade favorite sounds with other musicians in your area. Even better, ask the dealer to sponsor a MIDI users group. He can put you in touch with others who have purchased the same instrument there and, perhaps, offer the store as an after-hours meeting place. You might even convince him to send out a club newsletter or, at least, post cards announcing your regular meetings. There's no better way to realize the full potential of your instrument than to learn from other musicians who are also using it.

Now, I can't promise that your local dealer will jump at the idea when you bring it up, but you have some powerfully convincing arguments to present. What better way to get you back into the store regularly than users group meetings, and just think how his burden of after-sale support will be lifted when you have a network of other musicians to help solve the problems you used to bring to him. And, after all, you're willing to do the organizational work necessary to set up the group meetings.

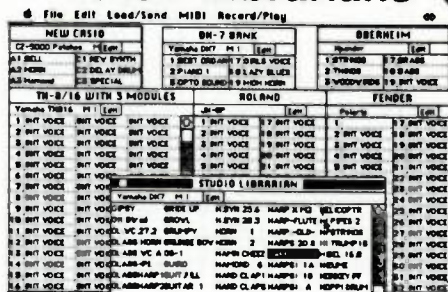
One caveat, though. At least to my eyes, you are entering into an unspoken agreement with your music dealer to support each other. By asking for his help, you are implying that you will patronize his store when the opportunity arises. Of course, that precludes making your purchases from discounters and then expecting support from your dealer. Mail-order discounters can still offer a useful service, though. They may sell a product your local dealer might not be able to stock.

I hate to admit it, but these ideas are not original. In fact, they have worked admirably for enterprising dealers and their customers in several areas around the country. If you are lucky enough to be part of a store-sponsored users group, you already know the advantages, but if you're not, wait no longer. Both you and your local music store owner will be delighted with how you will profit. **ES**

Steve Sagman is a New York-based keyboard player, marketing consultant, and editor of MIDI Marketer (an industry newsletter covering the electronic musical instrument business). When he's not entangled in MIDI cables, he leads an acoustic jazz quartet.

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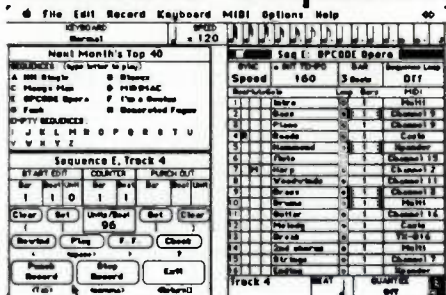
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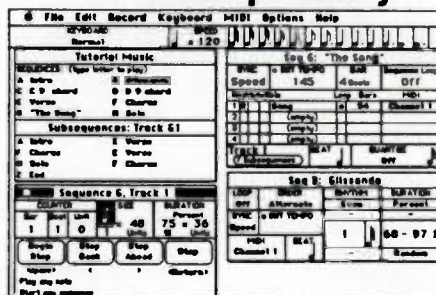
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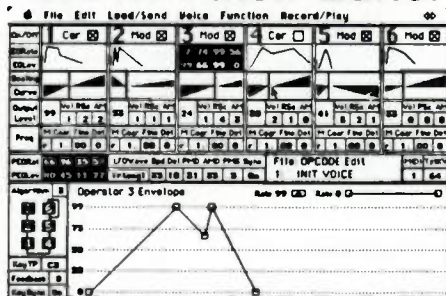
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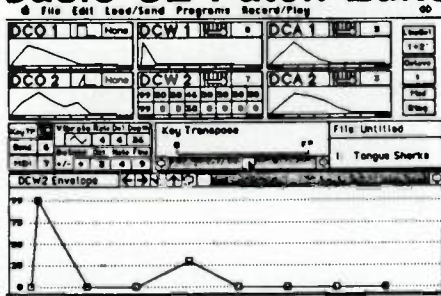
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SYNTHESIZERS AND MIDI

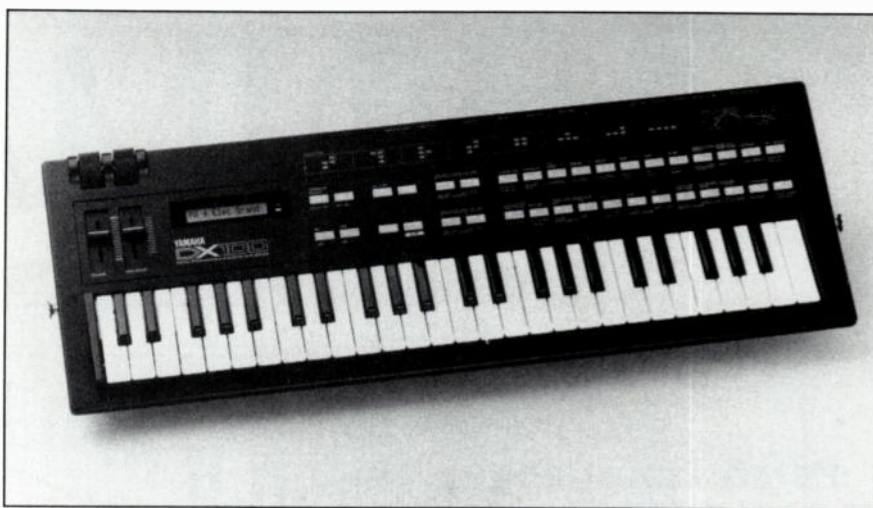
The **MIDI Blender** (\$199.95) mixes two MIDI signals into one output. Each input can filter aftertouch, pitch bend, note info, program change, controllers, real time commands, and system exclusive. J.L. Cooper Electronics, 1931 Pontius Avenue, West Los Angeles, CA 90025. Tel. 213/473-8771.

The **Mapper** allows for custom redefinitions of the MIDI code, which are stored as "Maps." Each map transmits patch change and allows keyboard splits and doubles; however, you can also use controllers (pitch bend etc.) to vary multiple MIDI parameters at once, redefine individual keys to play intervals or chords, and several other functions. One hundred and twenty-eight Maps can be arranged in up to 32 different sequences, and stepped through one at a time via footswitch. Axxess Unlimited, P.O. Box 8435, Fort Collins, CO 80525. Tel. 303/482-5656.



Hinton MIDIC MIDI data processor

MIDIC is an intelligent, Z80-based MIDI data processor for any computer



Yamaha DX-100 synthesizer.

with an RS-232 interface. In addition to data filtering, 16 different keyboard assignments can split or overlay a master MIDI keyboard into four registers, each with an independent output channel, transposition, and enables for pitch bend, aftertouch, and all notes off. All setups may be up- or down-loaded between MIDIC and a host computer. Hinton Instruments, 168 Abingdon Rd., Oxford, OX1 4RA, England. Tel. Oxford (0865) 721731.

The **SX-PX5** (76 key) and **SX-PX7** (88 key) MIDI electronic pianos play up to five Pulse Code Modulation samples per key at different velocity levels, thus preserving the effect of instrument dynamics. Sounds include acoustic piano, two electric pianos, harpsichord, and clav. An optional floppy disk drive turns either into a player piano. Technics, 1 Panasonic Way, Secaucus, NJ 07094. Tel.

201/348-7000.

The 41-key, MIDI-compatible **DX100** (\$445) "entry-level" DX FM synthesizer has a mini-keyboard, 192 preset ROM voices, and programmable FM tone generation. The **DX27** (\$645) is similar but has 61 full-size keys. Yamaha, P.O. Box 6600, Buena Park, CA 90622. Tel. 714/522-9011.

The 32-key **SK-1** battery or AC power sampler (\$99) allows 1.5 seconds of user sampling with polyphonic playback. Casio, 15 Gardner Rd., Fairfield, NJ 07006. Tel. 201/575-7400.

OTHER NEWS

Walking across a carpet and then touching a synth could discharge anywhere from 100 to 40,000 Volts. If static sometimes scrambles your synth's synapses, the **C&A** line of anti-static floor mats drain the body of static electricity within a fraction of a second of contact. For a free booklet on the subject, call 1-800/235-8817 or write Collins & Aikman, Static-Control Products, P.O. Box 1447, 1702 Kimberly Park Dr., Dalton, GA 30722.

Sumitomo Chemical Company has developed a new type of resin that eliminates double refraction, the main problem that has so far prevented the widespread manufacture of erasable optical disks. Expect products based on this new resin to appear within the next year.

EM author Craig O'Donnell is starting a regular column on budget home recording in *Output* magazine. *Output*, 220 Westbury Ave., Carle Place, NY 11514.



Polyphonic FX System directory with effects list and pop-up menu.

All prices are suggested retail prices, as supplied by the manufacturers. All prices and specifications are subject to change without notice.

The Thin Man becomes a Fat Boy

... or how a Mirage Digital Multi-Sampler can make your DX-7* Deluxe

The DX-7 is a marvelous machine, but quite a few of you think it could use a little fattening up. DX sounds are punchy and crisp, but a tad on the thin side. Not to worry. With a Mirage Digital Multi-Sampler and a MIDI cable, you can change all that.

While the DX uses operators, algorithms and sine waves to create its sonic personality, the Mirage uses multi-sampled waveforms of actual acoustic instruments for sounds with acoustic richness and character. Just connect the MIDI Out of the DX-7 to the MIDI In of the Mirage, power up your system, and turn yourself on to the hottest performance set-up going.

Partners in Crime

If killer sounds will help you steal the show, the DX and the Mirage are perfect partners in crime. There are over 100,000 sound combinations among the available DX and Mirage sounds. Rather than list them all, here are a few favorites.

Dualing pianos. DX and Mirage keyboard sounds complement each other perfectly. The electric piano sounds in particular combine the synth punch of the DX with the realistic timbre and dynamics of the Mirage. In fact, any synthesized sound takes on a new dimension when combined with the sampled acoustic counterpart. Strings, brass, mallets and fretted sounds take on a new personality when doubled on the Mirage.

The bells are stringing. The impressive bell sounds of the DX come alive with orchestral richness when combined with the Mirage string sounds from Ensoniq Sound Library Diskette 3. Depending on



Mirage sounds + DX sounds... over 100,000 combinations

how you balance the levels, the effect can be either subtle or startling. While you've got the strings loaded into the Mirage, try some of the DX synth bass sounds (especially percussive variations) and hear how well the strings support the bass.

Digital Doo-wop. The "Tah" and "Doo" vocal samples from diskette 17 add new life to many of the old standby DX sounds. Try the "Tah" and DX brass sounds together. Use the "Doo" with the caliope. The human voices add a jazzy sophistication to even clichéd patches.

The Special Effects Department

With pitch and mod wheels, velocity sensitivity, after touch, breath controller and pedals, the DX is among the most expressive synths. If the truth be known, the new Mirage operating system (version 3.0 and up) was developed specifically to take advantage of these DX features.

Through the magic of MIDI, the DX and the Mirage can be configured many different ways. For instance, you can modulate the Mirage LFO from either the DX mod wheel, breath controller, foot pedal controller, volume pedal, after touch or even the data entry slider. And all independently of how you are controlling your DX.

So you can use after touch to modulate a DX string sound while using the DX mod wheel to control vibrato of the Mirage sampled strings.

The Mirage has the ability to vary the mix between the two oscillators of each voice. The solo rock guitar sound on diskette 6, for instance, has a heavy guitar

sound on one oscillator and a harmonic feedback sound on the other. You can vary this mix with any of the DX control functions. A favorite of Mirage/DX players is to use the DX after touch to control the mix. Playing the

keyboard normally gives you that "wide-open-through-a-couple-of-stacks" sound, and pressing extra hard will bring in the feedback. A little practice with the pitch and mod wheels will earn you a convincing guitar technique.

Remote Territory

Changing sounds and programs on the Mirage is simply a matter of pressing a few buttons, but if you want to rack mount your Mirage you can just as easily change sounds and programs right from your DX



Just 11 pounds of Mirage can make your lean DX a fat boy

over MIDI. Pressing one button on the DX can change your entire set-up from a sweet string background to a sizzling solo sound on both the Mirage and DX.

A Marriage made in Malvern

The Mirage/DX partnership is a natural. Although the instruments are designed and built on opposite sides of the globe, they go together like hot dogs and mustard (or sushi and soy sauce). If you own a DX-7, bring it down to your authorized Ensoniq dealer and let it spend some time getting friendly with a Mirage Digital Multi-Sampler.

ENSONIQ Corp.: 263 Great Valley Parkway, Malvern, PA 19355 ■ Canada: 6969 Trans Canada Hwy., Suite 123, St. Laurent, Que. H4T 1V8 ■ ENSONIQ Europe: 65 Ave de Stalingrad, 1000 Brussels ■ Japan: Sakata Shokai, Ltd., Minami Morimachi, Chu-O Building • 6-2 Higashi-Tenma, 2-Chome • Kita-ku Osaka, 530

ensoniq®

Roger Eno, *Voices* (Editions EG 42). Brian's brother, who first surfaced on *Apollo* last year, plays in a similar style. Much of the disc is filled with heavily-echoed piano, with a few other instruments (or is it samples of other instruments?) thrown in. Brian is credited with treatments and Daniel Lanois produced.

Michele Musser, *Dreams Without Dreamers* (cassette). Six gentle and imaginative tunes several years matured from *A Cast of Shadows* (reviewed 10/84). Three of the pieces were commissions, so she won't be a secret much longer. World-class packaging (once again). \$7 from P.O. Box 14136, Harrisburg, PA 17104.

Richard Sorrentino, *Up, Down, Strange* (cassette). "Tapescares" he calls them, which indicates that like John Wiggins, you'll hear no "music" here. The range of noises goes from Eraserhead to Kluster, with enough variety and virility to keep all 20 minutes interesting. 637 Campbell Avenue, Long Branch, NJ 07740.

Sara Ayers, *Flourochrome*, (cassette). Literate and poetic lyrics, carefully sung. Straightforward accompaniment on synthesizers sing crystalline, organ-like voices. Ayers has a clear, distinguished voice which she accents with sliding-pitch flourishes to good effect. The glossy cover presents the lyrics (typeset) over Ayers' own abstract artwork. In all, it's a package that should open a lot of doors for her. \$6 postpaid from P.O. Box 1786, Albany, NY 12201.



David Sylvian *Brilliant Trees*, (Virgin 2290); ***Pulling Punches***, (Virgin 717-12; 12-inch single); ***Alchemy—An Index of***

Robert Carlberg is the national service manager for Audio Environments Inc., a nationwide supplier of original-artist music for restaurants and fashion stores.

Possibilities, (Virgin SYL 1; cassette). Sylvian was the impetus behind the English pop group Japan, who broke up in 1982 at the peak of their U.K. adulation. Assisted by Steve Nye (Penguin Cafe Orchestra), Holger Czukay (Can), Ryuichi Sakamoto (YMO), Richard Barbieri and Steve Jansen (Japan) and New Music trumpeters Jon Hassell and Mark Isham, *Brilliant Trees* (1984) and the 12-inch from it are more pop tunes backed by Enoesque treatments and rhythm tracks. Sylvian has a strong, masculine voice something like John Wetton's. The cassette (1985) is all-instrumental, featuring Hassell and Percy Jones (Brand X) prominently.

Control Voltage, *Apex* (cassette). Quiet oboe-like soloing over sequenced backing. It's minimalist background stuff, but unlike most in the genre, little touches here and there indicate that it comes from an understated sophistication. \$6 from D. Andrew Rath, 58 Marboro Lane, Willingboro, NJ 08046.

J. Greinke, *Cities in Fog* (Impetus 04). A few years ago, it was enough just to come up with new sounds; nowadays, one is expected to do something with them too. Greinke bucks the trend by laying out his low-register Prophet drones and slowed-way-down street noises without further organization. It's a bit like Basil Kirchin, the king of slowed-down nature recordings. Impetus Records, 612½ North 43rd, Seattle, WA 98103.

Daniel Emmanuel, *Rain Forest Music* (North Star 2001, cassette). Like Ariel Kalma's *Osmose* (if you remember that one), *Rain Forest Music* consists of lightweight organ extemporizations over the sound of falling rain (surf on side B). It's a perfect noise-masking background for reading or studying.

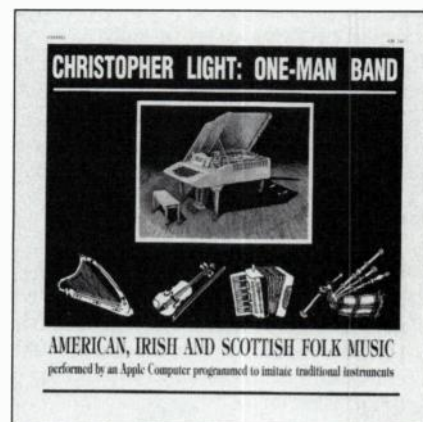
Daniel Emmanuel, *Wizards* (North Star 2003). The man with the mellifluous name also has an album of "research with music in relation to stress, meditation, altered states, and as a medium for counseling and physical therapy." It's not as repetitive as Terry Riley, but it's in the same ballpark musically. North Star Productions, 703 South Vernon, Dallas, TX 75208.

Eddie Jobson, *Theme of Secrets* (Private Music 1501). The name Eddie Jobson should be familiar to all. What is less obvious is that you'd never put that name with this music. It's full of delicate digital

textures and yes, beautiful tunes—almost like J. M. Jarre. Jobson just isn't known for these—yet.

Lucia Hwong, *House of Sleeping Beauties* (Private Music 1601). Hwong is one of those multi-talented people who make the rest of us feel inadequate. Dancer, painter, actress, model, scholar, composer, and performer of traditional Chinese music as well as modern electronics—all at world-class levels. Her debut album is something of a departure for Private, relying heavily on such non-electronic sources as violin, flute, Chinese wind and string instruments, and wordless vocals. It's a little less cohesive than their other releases, but that is perhaps only a reflection of the many worlds of Lucia Hwong.

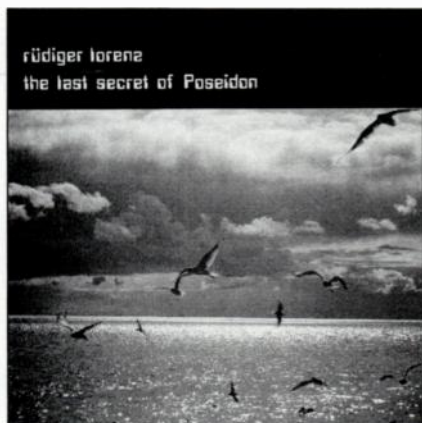
Joe Zawinul, *Dialects* (Columbia FC-40081). Zawinul's first solo album after 15 years of Weather Report shows just how much the group is him. There's not much here that couldn't have passed for recent Weather Report—furious rhythms, layered busy synthesizers and chanted indecipherable vocals. I would have liked to have seen some new directions.



Christopher Light, *One-Man Band* (Kicking Mule 242). Why is Kicking Mule, the renowned folk & bluegrass label, putting out an electronic music album? Well, what we've got here is "American, Irish and Scottish Folk Music Performed by an Apple Computer Programmed to Imitate Traditional Instruments." The voicing is sort of Casio-primitive, but the mechanical nature of these old pip-and-fiddle tunes fits in perfectly with the restrictions of being programmed into a computer. Oh this is a time we live in, isn't it?

Johnny Primitive, *Metal Mental Music* (cassette). Mr. Primitive was a founding member of Black Iron Prison (reviewed 2/86) and wants the world to know he's

alive and still kicking out the jams. This tape is frightening, noisy, experimental, humorous, cacophonous, clever, dirge-like, Dadaistic, and anything-else-but-primitive. The esteemed Mr. Primitive writes that he does "constantly changing real time tapes for \$7.50 or \$3.00 with a blank cassette," which probably means that no two clients receive the same selections. 3043-A Clement Avenue, San Francisco, CA 94121.

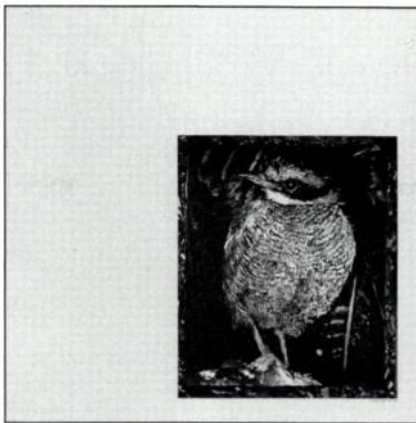


Rudiger Lorenz, *The Last Secret of Poseidon* (Syncord 004). The third solo album of this German pharmacist is his most experimental yet, still based around sequencers and drum boxes but including many sections with no rhythm at all. The variety and imagination of the synthesizer voices should revitalize other modular analog owners. \$11 postpaid from Eurock Distribution, P.O. Box 13718, Portland, OR 97213.

Ramon Kireilis, *New Music for Clarinet* (Owl 30). Avant-garde music for clarinet, some with tape accompaniment or "ghost electronics." The clarinet has never been the most cordial of instruments, and these pieces probably won't make any friends for it. Some of the tones are great, though.

Larkin & Friends, *Earth Light* (Narada 138). New Age music isn't always minimal. Here for instance flutist Larkin (no first/last name, just Larkin) combines with dulcimers, acoustic guitars, synthesizers and nature recordings for a very full, peaceful journey.

Aeolia, *Inner Sanctum* (Narada 108); ***The Light of Tao*** (Narada 126); ***Angel Love*** (Narada 133). Then there are travelers who are so blissed-out that they see angels and babble about The Third Ray, radiant Presence and crystal Rainbow Light. If you don't share his vision it is a little hard to swallow—or as a friend of mine put it, "he's a little dippy."



Allaudin Mathieu, *Listening to Evening* (Narada 137). Ever since George Winston, the music world has been awash in improvising solo pianists. Happily, sometimes a rare gem washes ashore such as Mathieu. No bandwagon jumper, Mathieu is 49 years old and worked as an arranger for Stan Kenton's big band, studied classical music for ten years, co-founded the Second City Theatre in Chicago and helped form the Sufi Choir of San Francisco. This broad background shows in his music, which incorporates jazz phrasing and note choices outside the usual pentatonic Winstonisms.

Riley Lee, *Oriental Sunrise* (Narada 112). Riley Lee is a teacher and grand master of the shakuhachi, one of the few non-Japanese to attain this rank. This album is largely shakuhachi solos (improvised), closing the circle around from New Age to Traditional Japanese technique.

Raphael Ornstein, MD, *Harmony* (video). For some people, light shows went out in the '60s. For others, they are a "breakthrough in the communications media, transmitting and conveying an inspirational message of Love, Beauty and Grace." Whatever your mindset, here's 26 minutes of kaleidoscope effects, some advanced video mandalas and prisms with different colored lights, accompanied by Pachelbel's Canon and another similarly-blissful synthesizer piece. \$31.70 postpaid from The Elysium Corporation, 49 Summitt St., San Anselmo, CA 94960.

Gabriel Lee, *Impressions* (Narada 1005). Although not apparent from the album cover, *Impressions* features Don Slepian's digital string synthesis almost as much as Gabriel (no relation to Riley) Lee's fast acoustic guitar. Lee lists his influences as Segovia, Bream and Boyd, and his pieces are certainly closer to this Baroque classical tradition than, say, Aeolia's spaced-out drones.

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Want to get your hands on thousands of dollars worth of video equipment—for free?

Video Access

BY JACK ORMAN

There may be no such thing as a free lunch, but you can have video equipment at your disposal for free. A dream come true? Well, if you live in a large city, chances are that there is a studio filled with equipment just waiting for you.

What makes this all possible is a little-known aspect of local cable TV operation. Cable companies are allowed to do business through the franchise granted them by the city in which they are located. Although no longer required by law, most cities still write a clause into their cable franchise contracts requiring the companies to provide a public access channel and the equipment to produce programs. Here in Memphis, Tennessee, we have more than one public access channel, a video production truck, two studios and a half million dollars worth of video equipment. We count ourselves lucky indeed!

What are the requirements for being allowed to use public access equipment? The rules may vary, but there are some fundamentals. Inexperienced or untrustworthy people are not allowed to use the facilities. However, if you're a beginner do not fear—introductory classes on video production techniques are generally provided (also free in most cases). These classes cover many aspects of video production, and sometimes an assortment

Jack Orman attended Memphis State University and has worked in electronics for ten years. He has written for Cinemagic, Modern Recording & Music, and Polyphony. At present, he has been working as a technical director in the Video Access department of his local cable channel. He is available on the Delphi electronic mail network via user name JAO.

“Most . . . cable franchise contracts (require) companies to provide a public access channel and the equipment to produce programs.”

of pre-recorded tapes on technical aspects of video production (such as lighting or computer graphics operation) will also be available. Production assistance and hands-on training is available nightly in the access studios.

After you complete training on the equipment and begin to produce programs, there is one stipulation. The cable company has the option of airing any programs or other material (such as music videos) produced with the access fa-



Author J. Orman with movie camera used to produce footage for transfer to videotape for music video.

PHOTO: LINDA M. BOSTICK



Video access volunteers producing a live show on the Memphis public access channel.

cilities. For a struggling band, this means there is a reachable audience of maybe 100,000 subscribers (and several times that many potential viewers). That's a stipulation I can live with.

The restrictions are few. Obscenity is prohibited, as is slanderous editorial con-

tent. Another restriction is that the production studio or equipment check-out has to be scheduled in advance since other people are often waiting to use the equipment. This can be a blessing in disguise, though; by working in public access you may meet many capable and

willing people who will volunteer their time and energy to work on your project.

Another benefit is that the cable company sometimes produces local programming for hire (such as sports events) and the public access members are given the *paid* job of filming these events. Furthermore, the experience and training to be gained through working in video access would cost much more than most of us could afford. My own time spent in this field has netted me hundreds of hours of invaluable hands-on experience in every aspect of video, and led to freelance work with a local production company.

There is even the possibility of getting nationwide distribution of your material through access channels in other cities via the Community Programming Network (CPN). Your municipal cable operator can provide more complete information on this.

The opportunity is there for you to grasp, and the only cost is a little time and as much effort as you are willing to expend. So ask around about your local cable facilities, and look into public access television as a means of entering the video field.

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That's the way you do it—you make home movies like the MTV.

Music Videos for the Rest of Us

BY DAVID KARR

The best (read: most expensive) way to shoot a production is with three or four cameras, camera operators, a technical director switching between the cameras, a director calling the shots to both the technical director and the camera operators through a sophisticated intercom system, a lighting director, an audio person or two, a stage manager, and a producer to tie the whole thing together.

So much for the best way to do things. And now, videos for the rest of us.

The following budget video methods allow one person with one camera and one video recorder (plus various combinations of audio, editing, and some other equipment that is usually rentable and/or otherwise accessible) to be the entire video crew. Yet your shoot can look like it was done by a crew of ten or more! This method emphasizes time, planning, and skill rather than equipment, people, and money. But you gain more than just monetary savings. Because you are doing all the work yourself, the end product will be entirely under your control—and there will never be any doubt as to who has the ultimate responsibility for your work.

First, we'll cover budget video taping basics (but note that some of these techniques are just as applicable to a \$50,000 video production). Then we'll cover some Sneaky Tricks and document (in a side-

bar) a shoot I did—equipment used, total time, and final cost. We'll also talk a bit about SMPTE (Society of Motion Picture and Television Engineers—expensive tricks) time code, and why it's useful. We won't cover aesthetics of a shoot (i.e. how to make your lead guitarist disappear in a shimmer of azure beams while soft-focus nubile prance in the background), but rather, deal with the equipment and techniques you will need to use during your shoot. Sure, the more equipment, people, money, and time you have will make a difference—but your *talent*, and how you use it, is always going to be the determining factor in whether people like what you do or not.

Here are the steps we'll be covering:

- Step 1: Planning and Storyboarding
- Step 2: Record Audio Tracks
- Step 3: Make a Reference Mix of Your Tracks
- Step 4: Set Up for the Shoot
- Step 5: The Shoot
- Step 6: Editing
- Step 7: Go Do It!

The approach we'll be covering gives a "live" look even if you are using pre-recorded music tracks; the key to this realism is to have the vocals sung live (if possible). Of course, a budget video can use lip-synching to a tape that already has vocals, but a live vocal looks live and is always preferable.



David Karr made his first full-length feature film (25 minutes of Super 8 with soundtrack) at age 13, and went on to be a professional photographer for The Velvet Underground and King Crimson. After growing tired of throwing things at the TV, he decided to put up or shut up and began his video career with a surplus machine in 1972. In addition to producing music videos, demos, and commercials, he is currently building Thunder Mill, slated to be one of the first High Definition TV post-production studios.



ILLUSTRATION: GARY L. WHITE

STEP 1: PLANNING AND STORYBOARDING

Begin by *planning*—making mistakes on paper beats making mistakes during your shoot. Sketch out your story line, note any solos or visual effects that must be caught and work them into your overall plan. *Plan with as much detail as possible.* There's an ancient saying that one step of planning saves two of execution, which just goes to show that ancient civilizations had budget video directors.

STEP 2: RECORD AUDIO TRACKS

After planning and storyboarding, record the audio on a multi-track recorder. For best results, record a track of SMPTE time code on one tape channel (Fostex makes an inexpensive SMPTE generator, or use something more upscale like the SMPL System). SMPTE code usually goes on the machine's highest-numbered track (i.e. track 8 for an 8-track); defeat any noise reduction for the SMPTE track if possible. I used a Tascam Model 388 (also called the Studio 8) for the shoot described in the sidebar. This machine is very SMPTE-oriented and includes a noise reduction defeat switch on track 8 (see David's review of the 388 in the January 1986 EM).

Finding the proper SMPTE recording level is somewhat tricky. It has to be low enough to not bleed over to adjacent tracks, yet high enough for the reader to accept and also high enough to withstand interference from signals on adjacent tracks. I recommend recording somewhere between -10 and -5 on the VU meters, but always do a few tests first. If you have tracks to spare, leave the track adjacent to SMPTE empty to create a

guard track that eliminates crosstalk problems.

Record continuous time code from the very beginning of a tape to the end (this is called *striping*). Consider the first minute as leader; use the other tracks during this leader portion to record test tones, A-440 tuning reference tones, or even patch data for sequencers, synths, and drum machines if you want to get "reel" fancy.

SMPTE is now being used quite a lot for musical applications, so take full advantage of that if you can. Multi-track parts used to all be synchronized with click tracks, but now anything that can sync to SMPTE can be locked right in sync (plus or minus a few milliseconds) and in the proper position in the song. In conjunction with MIDI instruments, SMPTE aids greatly in recording *virtual tracks* (see sidebar) during a final mix. Those with older pulse-based devices (e.g. LinnDrum, Drumulator, Oberheim System), would sync to SMPTE with a SMPTE-to-pulse converter (basic SMPL system) or SMPTE-to-MIDI box (Roland, Garfield Electronics, SMPL Lock, etc.) connected to a MIDI-to-pulse box (J.L. Cooper).

STEP 3: MAKE A REFERENCE MIX OF YOUR TRACKS

After completing basic tracks and overdubs (except for the final vocals if you are doing them live), make a reference mix with or without a scratch vocal. Use this tape for practicing and playing through the monitors during the shoot itself (more on this later). If you're the one doing the directing, use this tape to learn the music—you should be as familiar with the music as the band members. All of the timings and the solos should be rehearsed until the players have the exact arrangement committed to memory. Although the vocals will hopefully be recorded live, the hand motion of the players in the video should correspond to the music—if the sound is that of a bent string, the player had better be bending a string. If the final vocal is on the multi-track and will not be sung live, this tape should be used to practice lip-synching.

Remember, the whole point of this type of video is to *create the illusion that the band is actually playing live*, even if you're just playing along with pre-recorded tracks. Rehearsing in front of a mirror while listening to the tape can be a great help. Videotape band rehearsals and critique these carefully before the actual shoot. If the performers have their material down, they will look more comfortable

SMPTE Basics

Although there are several timing standards, for most professional videotape editing and multi-track synchronization applications, SMPTE time code is the sync standard of choice. Originally developed by NASA as a means of accurately logging data and later adopted by the Society of Motion Picture and Television Engineers (hence the name), SMPTE time code labels each frame of a videotape by recording a unique piece of digital data on that frame. For American (NTSC standard) television and video, each second of SMPTE time code is divided into 30 frames (the standard number of frames that pass by in one second of video; the standard frame rate for films is 24 frames per second, and for European television and video, 25

frames per second). Each frame is further divided into 80 subframes, with each subframe being 0.417 milliseconds long. A typical time code location might be 00:10:08:29:(76), which you would read as 00 hours, 10 minutes, 8 seconds, 29 frames, and 76 subframes into the tape.

The SMPTE time code emanating from a SMPTE generator can be recorded on tape and played back into a SMPTE time code reader, which precisely identifies where you are on the tape. This data not only helps synchronize audio to video, but can also synchronize two or more audio recorders together.

—Editor

Excerpt from "MIDI for Musicians" used by permission

on camera. If any singers play an instrument, make sure they concentrate on just singing so that the video has the best possible live vocal. I think it's usually better to have real vocals and faked instrument playing than the opposite.

STEP 4: SET UP FOR THE SHOOT

Decide on a location for the shoot (studio, club, or whatever). Shooting outside during daylight hours eliminates the need for fancy lighting which might be needed in low-lit clubs. If you use the club's light-

ing system, you will need to deal with lighting operators who will be lighting for the stage effect, not for your video. I've found the best approach is to set up a color video monitor for the lighting operator—just watch how this simple move makes your problems disappear.

Now it's time to set up your gear (Fig. 1). Feed a rough mix from the multi-track into some monitor speakers so that the musicians can hear the material to which they will be playing and singing (or lip synching). The vocals, if sung live, are

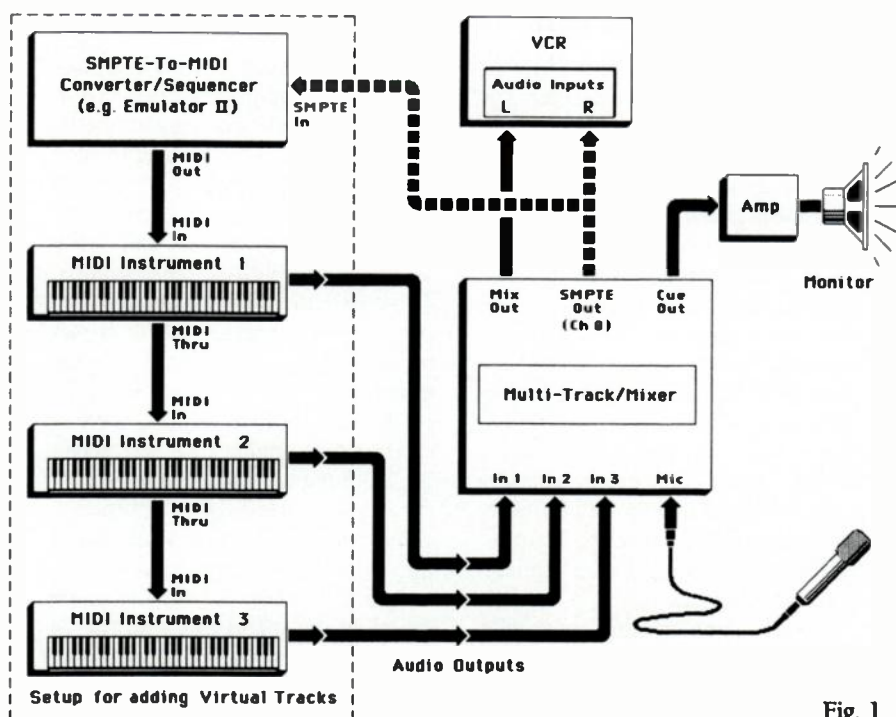


Fig. 1

mixed in with the existing audio tracks and then the whole mess gets recorded in one audio channel of the video recorder (this assumes you have a stereo recorder). The vocals also go to the empty vocal track (or it may contain a scratch vocal) on the multi-track recorder. Meanwhile, record the SMPTE from the multi-track recorder into the video recorder's other audio channel. You can often get away with bouncing the SMPTE time code directly, but may need a device to *re-shape* the time code so that the SMPTE recorded on the video recorder is nice and fresh.

STEP 5: THE SHOOT

Put the video recorder in record mode, then run through the song and record the mix of multi-track sounds and vocals onto the video recorder. Now rewind the multi-track and do another take. And another. And another. And another, until your patience wears out. When you think the vocalist is hitting his or her stride, save a vocal over to the multi-track as well as onto the video recorder. If you have a spare track on the multi-track, record two tracks of vocals. Save the "best" vocal track and record the current vocal over whichever vocal track is the weakest of the two.

Preserve continuity at all times during the shoot, since this makes it easy to edit the best parts of different takes and have them all fit together. (Remember the scene at the end of *E.T.*, where Elliot's mom is kneeling in one scene and then gets up

The Kitchen Sync

Synchronization is a fairly general term, and in this article alone we use three different meanings for the term: **Video sync** is obtained when each machine begins scanning a frame at the same time, i.e. the upper left pixel of each video signal is activated simultaneously.

Time code sync is usually SMPTE code. This can electronically lock separate machines together, such as video with audio or even multi-track audio decks with additional decks. Other forms of time code synchronization include clock tracks and MIDI.

Video-audio production sync refers to making sure the visuals correspond to what you're hearing.

twice in subsequent scenes?) If you are unsure whether the drummer had his sleeves rolled up in the last take or not, rewind the tape quickly and check—otherwise you won't be able to use some of your shots.

STEP 6: EDITING

This is where your ingenuity will really be taxed. No, not because editing is more difficult—but sometimes just finding suitable equipment at suitable prices is. Sometimes you can book off-hour time at a TV or cable station studio, or maybe you can work out a trade, like doing sound for a

jingle in return for time. Then there are public access studios (see Jack Orman's related article in this issue).

How editing works: Editing video is conceptually similar to making budget multi-track tapes where you bounce audio back and forth between cassette decks. You put your master video tape on one machine set to record and lay down the audio track. Then you set up the tape(s) containing your shoot on another machine(s) set to play. You play back one segment and record that on to the master in sync with the existing audio, then perhaps a segment from another tape, and so on until you've assembled the final tape. Unlike audio, however, these machines need to be locked together on a frame-by-frame basis so that the different segments of video flow smoothly from one segment to the next without any nasty cuts or rolls. This is what video sync is all about (see sidebar).

For *assemble* and *insert* editing (see below), the editing machine has the ability to lock its video frame sync (60 Hz) to the sync coming in the video input (or a separate sync input). If both machines can accept an external sync input, they can be fed sync from a common sync generator. This is called *house sync*, but we'll save talking about all the fun you can have with related gear—TBCs (time-base correctors), SEGs (special effects generators), and all that fancy stuff—for another time.

With *assemble* editing, you start out at the beginning of a tape and record Scene A from a tape. At the end of Scene A, you add Scene B. At the end of B, you add Scene C, and so on until you add the last scene. You assemble your piece in the order in which the shots will appear, one-at-a-time in a serial fashion. With *insert* editing, you insert a scene over an existing scene, or over transitions between scenes. For example, with a music video you could have a shot of the full band going at all times, and insert shots of individual band members, the crowd, etc. This article deals primarily with *insert* editing.

There is another form of editing, called *crash editing*, where you simply assemble or insert scenes without benefit of video sync. However, attempting to edit without video sync produces "tearing" and other video distortion due to gaps between transitions. While (thanks to the law of averages) some cuts will be fine, others will not line up and there will be an obvious, and ugly, transition between scenes.

SMPTE's role: Your best option is a video studio with SMPTE time code edit-

What's a Virtual Track?

For decades now, magnetic tape has been the primary recordable/eraseable medium for audio storage. Tape is well-suited to this application—it's not overly expensive and the fidelity is reasonably good.

Recently, there has been a trend towards recording not audio but *data* representing audio (typically, MIDI data) in a sequencer's computer memory. This approach offers several advantages, including excellent fidelity (data plays back into an instrument that directly provides the sound, which is inherently better than playing back a replica of that sound from tape) and lack of mechanical problems—there is no rewinding time, alignment, head cleaning, etc.

Synchronizing a sequencer with tape recorded tracks gives the best of both worlds: store acoustic sounds on

tape, and data for electronic instruments in the computer sequencer. On playback, the electronic instruments read data from the sequencer in sync with what's happening on the tape (if there is some time synchronization system), and therefore play back sounds in sync with the taped sounds. These synchronized, sequenced parts played in real time are called "virtual tracks" because they play along with taped tracks just as if they were recorded on tape. During mixdown, virtual track instrument parts go directly into your master tape, thus providing the best possible fidelity. Drum machines benefit greatly from virtual tracking, since second generation recordings of drums (i.e. recorded once on the multi-track, and again on the 2-track master during mixdown) can lack "punch."

—Editor

Merge Midi.

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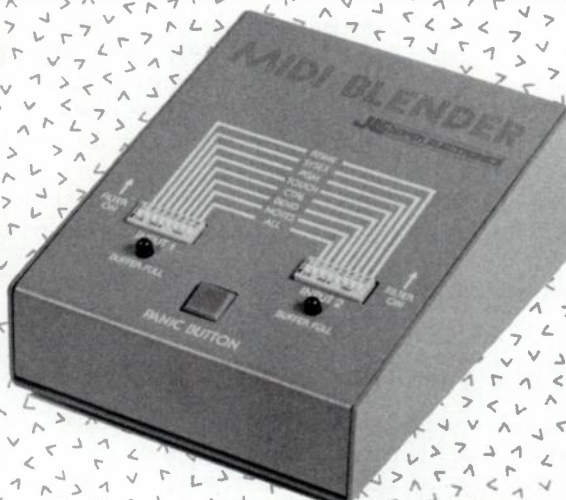
Filter Midi.

If the merged signal ever gets to be too much for your synth to handle, Midi Blender's "buffer full" lights up. You can then choose to filter out any of these commands, on either or both inputs: Note Commands • Pitch Bend Commands • Controller Commands (such as Modulation) • Program Change Commands • After Touch Commands • Real Time Commands (Midi Clock) • System Exclusive • All Midi Data

You can also use Midi Blender's filters for special tasks, such as filtering out unwanted pitch bends from an existing sequencer track.

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ing; this will make you glad you put time code on all of the video and audio tapes. Since all of the SMPTE was re-shaped or dubbed from the original multi-track, all of the takes will have the same time code at the same place in the performance and you won't have to deal with *offsets* to sync all the takes together. And since you don't have to deal with offsets, I don't have to deal with explaining what they are.

Even if you don't have equipment that will lock the video to the audio or

other video, don't despair—having recorded SMPTE can still save time and effort. If nothing else, you can read the SMPTE time coming off the two video machines in order to “park” them (using the pause control) at the same *pre-roll points* (typically five seconds before their edit points). If you release both pause buttons simultaneously, even though the machines aren't physically locked together, you at least have the advantage of having the two tapes start at the same

point and begin at approximately the same time. How long they remain in sync depends on the accuracy of the machines. If you can feed a common sync signal into both machines, the odds are much greater that the machines will stay in sync.

Editing a two recorder shoot: One way to edit is to edit live, as you go along, by using two cameras synched to a common source and a switcher to send the

The Reel Thing

For this shoot, time and money were the main concerns. The equipment I used was what I could get my hands on, for free, at the time and location I was producing this.

A reference mix was made on a Yamaha MT-44 4-track cassette and used for pre-production rehearsal the night before the shoot. We did the shoot outside the house in which there was a Tascam Model 388 8-track, SMPTE-compatible, 1/4-inch tape deck.

The main cue bus mix sent program material and the live vocal mic into the monitors (which were kept at a low level). The vocal signal's direct out fed one MT-44 channel; the mix of the music without vocals went into channels 1 and 2; and SMPTE from track 8 of the Model 388 went into channel 4.

A JVC GX-S9U video camera fed a JVC HR-2650U portable half-inch VHS recorder; one audio channel contained the monitor mix and the other contained SMPTE time code. First I did general shots, then lead vocal shots and shots of the other vocalist. For variety, I did some special shots from behind and the side to be used as needed.

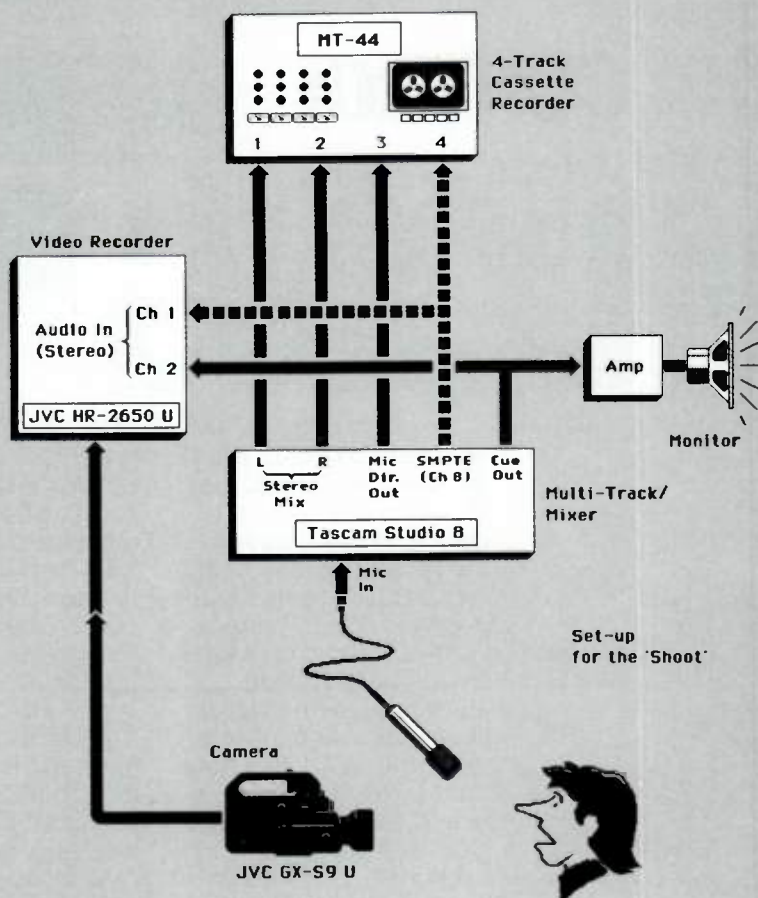
After the shoot, I had a VHS tape with lots of shots and a four-channel cassette of all the songs containing all the takes (each with a different vocal because all vocals were done live). Because I needed to do an edit as quickly as possible, (and could get free time), I worked in a studio without any SMPTE sync. I transferred the close-ups of the singer with the final vocal takes from the cassette onto a Sony VO-2850 3/4-inch editor first, laying down the reference mix audio from the VHS tape as well. Using the “hand-sync-via-audio-cue-track” method previously described, I inserted the other two sets of shots. At the same time that I added some ancillary non-sync shots (a collage of a few frames from some TV commercials and

news broadcasts), I “hand synched” the mix of the stereo tracks and the vocals from the 4-track cassette (played back on a Tascam Porta-One, a four track cassette deck with mixer). One song took four tries to get the sync right, but the rest synched on the first try. Hand synching is not for everyone, but if you don't have better equipment, it is better than nothing. The final copy was dubbed to the JVC VHS machine to create a copy with the songs in the proper order and black video and silence between the songs.

Total time for the project:

Planning	3 hrs.
Recording tracks	3 hrs.
Rehearsing	2 hrs.
Setup for shoot	1 hr.
Shoot eight songs	4 hrs.
Edit four songs	4 hrs.
Total	17 hrs.

Total cash outlay was \$7 for the VHS tape purchased at a supermarket. The equipment was either mine or borrowed.



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desired image to a single recorder. However, there's a way to edit if you don't have a switcher but have access to two recorders along with two cameras. Do simultaneous shoots with the two machines; you'll end up with two visually different tapes that contain common audio. Even if the audio is different (i.e. one machine has a direct feed from the console, while the other comes from a mic) the overall timing of the audio will be identical. By listening to both audio tracks and minimizing the delay between them, it's fairly easy to sync the two machines together. The most important aspect of this type of editing is to leave plenty of time before the piece actually starts, and have common sounds recorded during this time, so that you have time to sync things up before the piece begins.

For example, on the shoot described in the sidebar, I made sure that the audio tracks had five to ten seconds between songs. When shooting, say, song number three, I would start the video machines recording while the audio was playing the end of song number two. When editing, I could use this section of song two to check for sync so that everything would be locked together by the time song three started.

Hand Sync: Hand synchronizing two video machines for a simultaneous start requires a specific approach. First, I play the end of the previous song on machine 1 and pause it at a point that I can easily remember. Then I play machine 2 starting at a point *before* the point that machine 1 is parked. At the exact point that machine 2 plays the part at which machine 1 is paused, I release the pause on machine 1 and voila—with any skill and a little luck, both machines run together. The easy way to check for sync is to compare the two audio tracks and check for echo. If it doesn't sound like a DDL, success is yours.

Sometimes you may have to go over a part four or five times, but then again, sometimes it will work the first time around. Once you get good at this, if one machine is slightly leading the other you can hit the leading machine's pause to retard it a little bit, and sync the two machines even if they didn't start in sync. If things go out of sync, though, do it over—if you can notice a delay, other people will too, so take the time to do it right.

Cutting in the video: On an editor with insert editing (this should have a *flying erase head* which spins on the drum and erases old video just before recording new video, for best picture quality), shots of a specific duration are inserted over an existing shot. The reason for inserting

over a shot may be because the original shot is no good, or has been used before, or the video just needs some variety. When doing an insert edit, once the two machines are synched (but not necessarily locked), watch two monitors of the two tapes produced by either two different camera shots from a live event, or two different takes shot by the same camera. During the first run-through, watch one of the monitors for shots that are good/bad/or ugly; then watch the shots from tape two and take notes on the shots. While you are viewing these, if you see a bad shot on one tape, immediately check the other tape to see if you can cover the bad shot. After a while, you will be able to watch both monitors simultaneously (you have two eyes and two sides to your brain—exercise them!) and check which tape offers the best shot.

I like to start with the close-up shots so that the vocal close-ups will be the reference to which the other shots will sync. Anywhere the close-up loses interest, or if there is a technical problem, I check the other tapes. After combining scenes from two cameras onto your master, you can run through this again and cut in scenes from a third tape. The general rule is—if you find something better than what you had on tape, cut it in! This is just like multi-track recording where you punch out individual notes or phrases of a solo, but this time we're punching only video instead of audio. Meanwhile, throughout all this the audio is sitting there undisturbed on the master and providing some much-needed continuity.

Speaking of continuity, if someone changes positions between shots, here's a tip: edit in a second or two of a third shot, like a close-up of hands playing a keyboard, that doesn't show the person at all between the two conflicting shots. That one second of not seeing the person will allow the viewer's brain to accept the fact that maybe the person changed position in that second that we couldn't see them. Hey, video is all about illusion—fake it when possible.

Here's another example from a different shoot of how to use this two-recorder editing technique. I mounted one camera in the back of the hall to take a full stage shot and let it run continuously throughout the set. I then used a portable camera and recorder and walked through the crowd (with the tape still rolling and recording the audio through the mike on the camera) to the front of the stage, side stage, and even on the stage behind the drummer looking out at the crowd pushed against the front of the stage. With tape

still rolling, I put on a wide angle adapter and hoisted the camera over my head and over the keyboard player, looking down at the keys from above to look like a crane shot without the crane. Throughout the set, I let both recorders roll as I moved all over the hall. Whenever the moving shots were unuseable, I edited in the full stage shots from the camera in the back of the hall. This allowed me to cut out the other three or more people needed to do a two camera shoot.

The cassette assistant: Taking notes on edit points can be too much when you're trying to do everything at once, so I use a cassette recorder as an assistant. This is for the type of edit situation described previously (i.e. viewing two different tapes for simultaneous editing). To avoid confusion, always keep in mind which monitor shows the "master" tape (the one which you are going to add the inserts to) and which has the tape with the shots you are going to "insert."

On most editing machines, you have a Cut In button that starts the *insert edit*, and a Cut Out button that stops the insert. Normally if you are editing "on the fly," you will see the tape playing on the master editor until you hit the "Cut In" button, whereupon you see the shot you are inserting from the other machine. However, you can't see the video you are inserting over, and without viewing the tape enough to memorize it (or writing down the "cut out" point), you can easily insert over some material that you wanted to save. Also, if you are covering shots that have bad video (out of focus, etc.) you might cut out too soon, which is almost as big a problem.

The solution? As you view the two tapes, record an "audio edit guide track" on a cassette recorder where the video's audio track plays in the background as you talk into the mic. When you see a shot you want to insert (or one you want to cover), say "cut in" and keep on watching. When you want to stop the insert, say "cut out." Since you are not actually inserting, you can see what will be obliterated by the insert when you do the actual edit. When finished, rewind all tapes back to the beginning of the piece but set the cassette machine so that it is a couple of seconds *after* the beginning. Use the hand sync method described previously to start the two video machines at the end of the previous piece. As the two video machines reach the beginning of the piece you are editing, immediately start the audio cue track machine. If all is well, the two video machines will run together and the audio cue track will run

a few seconds *ahead* of the videos. Thus you will hear "cut in" on the audio cue track a few seconds *before* the actual cut-in point for the video machines. Remember, as you were viewing the videos, even if you said "cut in" as soon as you saw what you wanted, it was probably a few milliseconds after the point you saw. With the audio cue track running a few seconds before, you not only compensate for your reaction time, but also give yourself a warning of what is coming.

If you don't confuse easily, you can hear the audio (music from the video) in the background of the audio cue track, and edit to the audio you hear "live" from the video, and do cuts to the music with cues from the audio cue track. Using this method, I edited a two-camera, 20 minute symphony video in 50 minutes (not counting the time I spent learning how to do this).

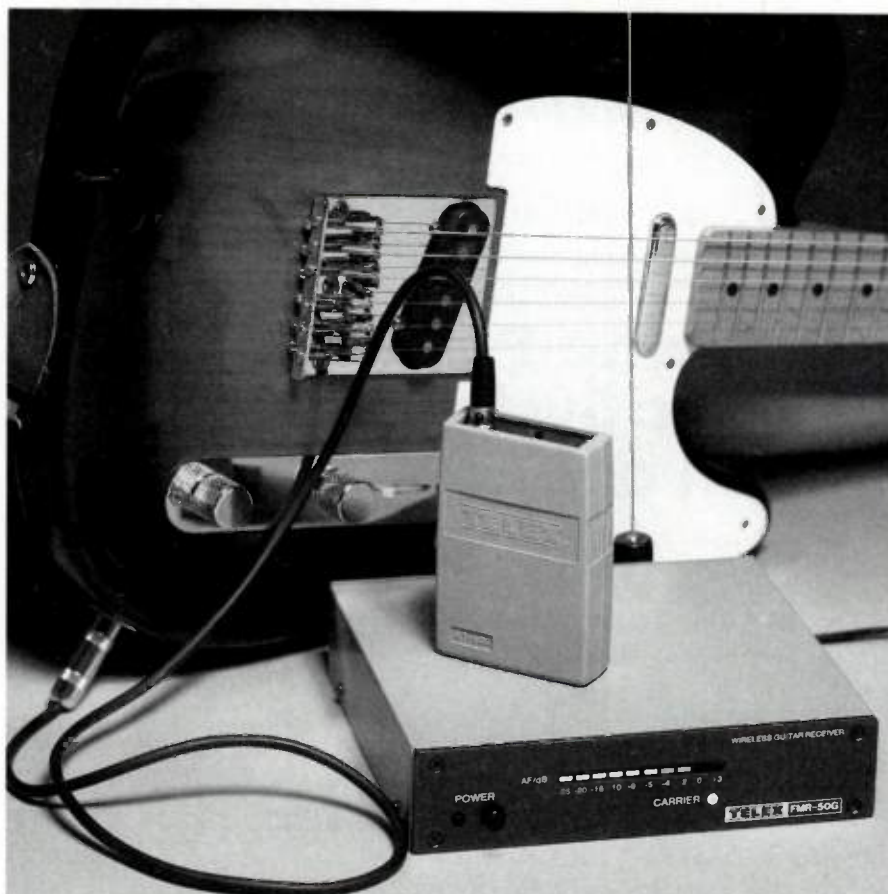
STEP 7: GO DO IT!

The preceding are relatively inexpensive video editing techniques, although they do demand time and patience. Of course, full-blown editing facilities and the extensive use of SMPTE is the easiest way to edit, but that's a story for another time. Meanwhile, put SMPTE on everything you do if you want to make life easier.

And let's not forget about post-production. You can add effects, cut in scenes from computer graphics (I use an Amiga with Genlock), or sweeten the audio. If you have MIDI equipment supplying the sounds, they can be played as virtual tracks and recorded on the edited video master tape as a first generation sound. When all is done, you do your final edit (like assembling an album) where pieces are transferred to another tape in the proper order and with the desired length of spacing in between.

Home video is at about the same stage home recording was just before inexpensive 4-track decks appeared. In other words, you can usually kluge together something out of equipment on hand and put together something satisfying with a minimum of bucks. If you have a VCR and a camera, you can get started doing tapes of rehearsals and so on to get more hip to the camera. Then you can borrow a friend and a deck, do a shoot together, and end up with enough material to put a bunch of scenes together. Beg or borrow some editing time, and you'll have a video to show for your efforts. It might not have the production values of a Steven Spielberg movie, but you'll be on your way... and that's the most important part.

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Welcome to the museum of lost continents, secrets of the ancients, and . . . analog video synthesis.

Alternative Paths to Video: Graphic Systems I've Known and Loved

BY DON SLEPIAN

Just as my friend and fellow synthesist Lauri Paisley¹ keeps a menagerie of ancient and antique but powerful analog synthesizers, I curate a museum of abandoned and discontinued graphic systems. These machines produce beautiful surreal and fantasy type images based on simple and inexpensive technologies that have fallen out of favor. Just as I cherish old ARPs and Moogs, I am a curator and advocate of these alternative paths to video.

Today's computer graphic systems create images by controlling anywhere from 65,000 to several million pixels or picture elements. One alternative method, called *vector graphics*, directly controls the position of the electron beam in the monitor as in an oscilloscope set for x-y display. Another method, *analog video synthesis*, involves using analog circuitry to directly generate video waveforms in a very close parallel to audio modular analog synthesizers. The pixel method of computer graphics won out for its superior ability to create the type of realistic images that are in commercial demand. Neither vector graphics nor analog video synthesis at their present stages of development are well suited to producing representational graphics. However, in both systems it is far easier to create beautiful imagery. The smooth and rapid animation capabilities of vector graphic and video synthesis rival that of digital video effects at one thousandth the cost. These strong innate advantages over pixel graphics could be enhanced even further

Don Slepian has been doing electronic music since 1970, and computer graphics and video since 1976; he has twice been sponsored by the French Ministry of Culture to perform live video synthesis in Paris and La Rochelle, and has given performances in New York and Philadelphia as well.

"The smooth and rapid animation capabilities of vector graphic and video synthesis rival that of digital video effects at one thousandth the cost"

by creating systems completely controlled by present-day microcomputers. In this age of music video, it is my sincere wish that some far-sighted companies take the opportunity to produce modern video tools based on the valid and potent ideas and technologies these abandoned machines possess.

AN ANALOG-CONTROLLED VECTOR GRAPHIC SYSTEM: THE NOVA MACHINE

The Nova Machine was built in a warehouse in Honolulu in the fall of '73 by my friend Charles Stevens, who was determined to express his vision of "Music of the Spheres" using the available technology of the time. I was working in an adjacent recording studio and living in a shipping crate on his roof, so I naturally got involved in building his dream.

At the heart of his machine were two ARP Odysseys mounted together in a single beautiful oak cabinet, making it like a four-voice synth with a six octave keyboard. This was built on top of the best Yamaha Electone Organ we could find. The ARP Odysseys were connected to a 25-inch television that was modified to be a large-screen oscilloscope². The Red, Green, and Blue guns inside the television had adjustable voltage offsets so that we could generate multiple copies of the same pattern in different colors displaced across the screen. One synthesizer cre-

ated patterns in the horizontal ("X") direction, the other worked on the vertical ("Y"). A pair of function generators driving an oscilloscope set for X/Y display would replicate this patch on a small scale without the colors.

The oscilloscope art became very interesting when I moved beyond simple Lissajous (sine wave) patterns. Setting the Odysseys for sample-and-hold patches with resonant filtering and harmonically related sample clocks would produce a series of graphics that would move from one complex stationary line drawing to another, with illusions of depth and 3-D rotation. After some practice, we could create complex wireframe sculptures that would pause, and then at the slightest nudge of a control melt into a new shape.

There were two disappointments with the system. One was that there was no apparent correlation between sounds and visuals. Set the two synthesizers playing beautiful contrapuntal melodies and the visuals would be a shapeless spinning mess. Create the most exquisite visual and the audio would flake the paint off the walls. The other was that there was no simple, direct way to record the visuals. We were creating vector graphics, and at that time were unaware of any available vector-to-raster scan converters that could have given us a true video output.

I'm sure there are some beautiful homemade analog vector graphic systems in the hands of individuals or groups of artists. I was sad to see the Nova system go, and I look forward to someday having an up-to-date incarnation of that system for myself. I imagine a small box that interprets MIDI commands to control all display parameters. It would output broadcast video, and have a MIDI-controlled keyer/colorizer and two modern digital synths built-in. Please write an article for *EM* if you have such a system!

Certainly every visual musician ("Vusician") with access to an X/Y oscilloscope should connect up a pair of synthesizers and explore this art form. Imagine the little green gem of a pattern on the oscilloscope displayed on a 25-inch monitor in full color!

A DIGITALLY-CONTROLLED VECTOR GRAPHICS MACHINE: THE VECTREX ARCADE SYSTEM

The Vectrex Graphic Computer System by GCE, a Milton Bradley company, had the misfortune of being introduced at the same time as the pixel-based home arcade systems produced by Atari, Coleco, and others. Since the Vectrex was a vector machine, it came with its own monitor as



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OR
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TRUTH: A lot of monitors "color" their sound. They don't deliver truly flat response. Their technology is full of compromises. Their components are from a variety of sources, and not designed to precisely integrate with each other.

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CONSEQUENCES: "Universal" monitors, those not specifically designed for a precise application or environment, invariably compromise technology, with inferior sound the result.

TRUTH: JBL's 4400 Series Studio Monitors achieve a new "truth" in sound with

an extended high frequency response that remains effortlessly smooth through the critical 3,000 to 20,000 Hz range. And even extends beyond audibility to 27 kHz, reducing phase shift within the audible band for a more open and natural sound. The 4400 Series' incomparable high end clarity is the result of JBL's use of pure titanium for its unique ribbed-dome tweeter and diamond surround, capable of withstanding forces surpassing a phenomenal 1000 G's.

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CONSEQUENCES: Conventional magnetic structures utilize non-symmetrical magnetic fields, which add significantly to distortion due to a nonlinear pull on the voice coil.

TRUTH: 4400 Series monitors also feature special low diffraction grill frame designs, which reduce time delay distortion. Extra-large voice coils and ultra-rigid cast frames result in both mechanical and thermal stability under heavy professional use.

CONSEQUENCES: For reasons of economics, monitors will often use stamped rather than cast frames, resulting in both mechanical distortion and power compression.

TRUTH: The JBL 4400 Studio Monitor Series captures the full dynamic range, extended high frequency, and precise character of your sound as no other monitors in the business. Experience the 4400 Series Studio Monitors at your JBL dealer's today.

CONSEQUENCES: You'll never know the "truth" until you do.



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a self-contained package. The pixel-based machines used the consumer's television for their display, so they were able to undercut the Vectrex's retail price by about 50 percent or more and quickly drove the product out of the market³. Even though the Vectrex was a monochrome, black and white system, if introduced at another time it could have been very successful based on its superior technology and software.

The Vectrex consisted of a small vertically-mounted monitor in a black plastic case, a four-button and one-joystick handheld control unit, a lightpen, and external programs on plug-in ROM cartridges. Inside was a 6809 micro that controlled a sound chip and generated the two analog control voltages for the vector display.

Where the Vectrex far outshines microcomputer graphics is in the smoothness and speed of its animation. The animation program allowed the user to use the light pen to either create shapes or choose from an existing library of art. You would then create frames, a collection of up to 28 still pictures that function as sequential "snapshots" of the desired animation, just like the "storyboards" used in film and video production. The computer animated the sequence by smoothly interpolating the positions of all objects from one frame to the next. Objects would twist, flip, spin, shrink, grow, appear, disappear, brighten, or dim in any complex combination of effects to create the transformations from frame to frame. I and many others have created powerful, surreal animations far faster and easier than on any pixel-based graphic system.

On a modern system, I would want a built-in scan-converter, a single tube that combines a vector display and a camera tube set up for optimum raster conversion of the vector image. Users would connect their own video monitor and VCR for recording. The NTSC video output would appear as a keyable overlay that could gen-lock to incoming video from a camera or videotape. Each of the 128 MIDI note commands would instantly call or remove a picture or animation frame. If played on a keyboard, the key velocities could control the instantaneous brightness or color of the images. Complex animation sequences could be created from the MIDI commands of a single channel of any standard MIDI sequencer.

AN ANALOG VIDEO SYSTEM: THE CHROMATON 14 VIDEO SYNTHESIZER

The Chromaton analog video synthesizer

was designed and marketed by Ralph Weinger, a test instrument designer, to be a compact and powerful source of broadcast quality video art, animation, and special effects. The product was introduced in 1975, and cost almost \$10,000 by the time it was discontinued at the end of the '70s. The Chromaton's complexity and lack of digital presets made it necessary to have an artist at the controls who had spent many hours mastering this video instrument. Thus the Chromaton never became a popular video production tool. I took mine in when it was both broken and affordable, and thus began a ten year love affair⁴. Imagine a control panel of 49 large silver lever switches that look like they came out of a 1950 car radio. Add to that 32 knobs and 24 other assorted switches, all on a box the size of a VCR.

The Chromaton consists of six pattern generators and two independent motion controllers, pattern modulators, colorizers, rectangle generators, and color keys. The pattern generators are like high speed VCOs creating video waveforms. Just like an audio synthesizer, there is a choice of waveshapes (patterns) and controls for pitch (color) and loudness (pattern size).

Mixing the patterns is handled a bit differently compared to mixing audio. Simple mixing of video signals is like a double-exposed photograph. This effect is beautiful and useful, but not very realistic. With vision, we establish perspective by creating a hierarchy of distance in the objects that surround us. Most of us like

there already.

The Chromaton is organized in a hierarchy of image planes like the Commodore Amiga or the sprite graphics in the Commodore C-64. Consider looking through four windows ("levels") onto a wall ("the background"). Objects in the first level obscure everything behind them. Objects in the second level are revealed when objects in the first level move out from in front of them. Objects in the second level themselves hide objects in the third and fourth levels, and objects at any level obscure the background. Objects at the fourth level can be set to obscure those at the first, creating the spiral or weave effect.

The colorizers take an external signal (usually from a camera) and divide it into four levels according to the amount of light (luminance) present. Each of the four levels can be assigned a color from a selection of 20 different colors.

The motion generators work on the same principle as the "Vertical Hold" controls on television sets. By turning the vertical control, you can make the picture roll on the TV set. With a control that does the same thing in the horizontal axis, you can send the picture anywhere at any rate of speed. On my instrument, the horizontal and vertical motion controls are tied together on a joystick whose shaft points the direction of movement.

A modern Chromaton would be a small, featureless, inexpensive box hidden under the table. It would sit happily in your MIDI net, and would connect to your choice of host micro.

AN ANALOG VIDEO KALEIDOSCOPE: THE CHROMASCOPE VIDEO SYNTHESIZER

There have been many analog video synthesizers, starting in 1970 with the Sandin Image Processor, a large modular system looking much like the old Moog synthesizers. In addition to the Chromaton, I have a more recent video synthesizer, created in England in 1980 by inventor Robin Palmer of CEL Electronics, called the Chromascope⁵. The Chromascope creates random still or moving graphics, and features an effective sound interface. With my instrument, I can play a fast piece of music (Presto, MM=150) on my keyboard and produce an entirely new image in real time on each quarter note by tapping my left foot in rhythm over a foot switch. This makes laughable the graphics generation power of present-day microcomputers. What existing system could create by itself, and display in exact sync to music, over two thousand

*"(The Chromascope)
makes laughable the
graphics generation
power of present-day
microcomputers"*

to have the objects close to us block out the things further away. That way we can tell what we're about to bump into, and establish where we are by perceiving where we're not. If you decided one day to mix sight the way you mix sound, you would place yourself in an enormous sphere of translucent people and objects on a translucent planet. Everyone and everything would be emitting differing amounts and qualities of light, and your vision would sum the multitudes of shades until it faded out into darkness and infrared. I know some of you are

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unique and non-repeating pictures in ten minutes? Since the beautiful pastel-shaded images the Chromascope produces would take a minimum of 512 x 512 pixels to approximate, the data rate using pixels would be very high. The Chromascope accepts an audio signal and divides it into four frequency regions, derives four control voltages based on the signal amplitudes in those regions, and applies them to both color and pattern-size parameters in the video circuitry. This provides an effective but mechanically rigid translation of sound into visuals⁶.

A modern video kaleidoscope would change patterns in sync with drum machines and sequencers all driven from the same MIDI clock. The MIDI program change commands would allow you to choose from dozens of different algorithms for translation of sound into video, changing algorithms every note if desired. This kind of control power would produce a display far more interesting and varied than the standard color organ. We will see significant advances in the visual staging of music performances made possible by MIDI-Controlled graphics systems.

FOOTNOTES

¹Lauri Paisley, Methylnunna Music, 812 Murray Street, #2E, Elizabeth, NJ 07202. Write for her catalog of cassette releases. I recommend her most recent, "Skywords."

²In the classified ad sections in the back of electronics magazines, I have seen kits to convert television sets to X-Y displays. Warning: I have tremendous respect for the dangerous high voltages in TV sets, and rather than modifying one, I would look through surplus catalogs for X-Y color displays.

³I found my Vectrex in a surplus store for \$65. They're wonderful. . . happy hunting.

⁴Ralph Weinger has moved on to producing computerized Chromakey systems for colorizing old black-and-white movies. Chromatons are rare, and I would look for them in universities and used TV equipment brokers.

⁵The Chromascope was produced by CEL Electronics, Chroma House, Shire Hill, Saffron, Walden, Essex, England CB11 3AQ.

⁶I am presently experimenting with J.L. Cooper's MIDI CV Out, intended to interface old analog synths to MIDI. I am using MIDI to generate control voltages that change parameters in my video synths. I don't recommend this as cost-effective or optimum; I am just impatient for the new tools that I sense are so close to commercial reality.

EM



Meet the computer that already knows how to speak MIDI.

Atari 520ST: The MIDI PC

BY MALCOLM CECIL

At last, a major personal computer (PC) manufacturer has recognized that the age of MIDI is here—and for electronic musicians, the inclusion of a MIDI interface as a standard feature on the Atari 520ST hails the dawn of a new era. The MIDI port, for the first time, is now considered as an integral part of a computer's standard collection of hardware interfaces to the outside world; it joins such existing standard interfaces as the Centronics style parallel printer port and RS-232 serial port. If built-in MIDI was the only reason to choose the Atari 520ST as the "musician's computer" I feel it would be enough, but there are many more excellent reasons for "going ST."

WHAT'S UNDER THE HOOD?

First, consider the heart of the ST—the excellent, high speed (8 MHz) Motorola 68000 microprocessor chip. This is the same chip used by the Apple Macintosh and the Amiga. Its speed, combined with a prolific instruction set, allow for hardware design that is inexpensive, flexible, fast and powerful. Its internal architecture is actually 32 bit, which accounts for the lightning fast execution of instructions. The 68000 communicates to the rest of the computer via a 16 bit data bus and a 24 bit address bus.

What this all means is that over 16 megabytes of contiguous memory can be accessed directly (over the 24 bit address bus) with data values ranging from 0 to

Malcolm Cecil's involvement with musical electronics extends back over 15 years. During that time, he won a Grammy for his work on Stevie Wonder's Innervisions LP, produced artists such as the Isley Brothers and Gil Scott-Heron, and earned about 20 gold albums. His background as a systems engineer served him well in creating TONTO (The Original New Timbral Orchestra), an electronic music system that pre-dated the concept of MIDI systems by over a decade. Among many other projects, he is currently converting TONTO over to MIDI and designing software such as MIDIPLAY for the Atari ST.

65,535 (over the 16 bit data bus) at a clock speed of over 8 million times per second! For comparison, an 8 bit computer, e.g. the Commodore-64 and Apple II, access 64 Kilobytes of memory with data values from 0 to 255 at a clock speed of no more than 2 million times per second—several orders of magnitude less in speed, accuracy and memory capacity.

The memory: The ST provides a support environment for the 68000 that takes full advantage of its power. Memory capacity is 512 Kbytes of RAM (expandable to 1 Megabyte) and either two or six 8K ROM chips, depending on whether the Atari's operating system (TOS, for Tramiel Operating System) is stored on disk or in ROM internal to the computer. The former approach requires two ROM chips, while the latter requires six. Operationally, there are two advantages to the ROM-based operating system:

- ✓ It takes just five seconds to get to the Atari's "desktop" (the main user interface to the operating system), compared to 25 seconds for the disk-based system. This extra time is required to load the TOS from disk into the ST's RAM.

- ✓ Using TOS on internal ROM frees up



ST Facts at a Glance

Processor: Motorola 68000, 32 bit internal operation, 16 bit data bus, 8 MHz clock

Memory: 512 Kbytes RAM, 16K ROM (disk-based TOS)

Floppy Disk: 360 Kbytes (single sided, formatted) and 720 Kbytes (double sided, formatted)

Graphics: 640 by 400 pixels monochrome, 640 by 200 pixels in four color planes, 320 by 200 pixels in 16 color planes

Color: 512 colors

Interfaces: MIDI In, MIDI Out, monitor (RGB analog and audio), parallel

port (DB-25 female, Centronics signal), serial port (DB male, RS-232 modem), floppy disk port (Atari spec), hard disk port (SCSI/Sassie spec), ROM cartridge port (128 Kbyte capacity), mouse and joystick ports.

Sound Generator: Three square wave generators (30 Hz to 30,000+ Hz), noise generator (band frequency variable), envelope generator (single parameter), three VCAs (software programmable), 6-in-3-out mixer switch (software programmable).

Keyboard: 91 key intelligent keyboard (includes 6301 microprocessor)

Power Supply: +5 Volt at 2A, +12 Volt at 30 mA, and -12 Volt at 30 mA.

an extra 160 Kbytes of memory for programs and data.

There is also a ROM cartridge port with 128 Kbytes capacity. Disk storage is to 3.5-inch floppy disks, as used with many personal computers and musical instruments. Up to two disk drives can be used and there are two types available:

- ✓ Model 354—single-sided 80 track, 360 Kbytes capacity (formatted)
- ✓ Model 314—double-sided 80 track, 720 Kbytes capacity (formatted)

A hard disk drive can also be added, with a 20 Megabyte version currently available.

Atari has built its own custom LSI (large scale integration) chip for DMA (Direct Memory Access). This is used exclusively to communicate with both floppy drives and the hard disk. Blocks of 512 bytes of information at a time can be transferred to and from memory without the intervention of the main processor, accounting for a transfer rate to the hard disk of a staggering 10 Megabits per second! It also allows software programmers to write extremely fast floppy disk routines.

The graphics: Atari has also built its own graphics chip, thus enabling unique graphics capability. Three graphics modes are possible:

✓ High resolution, 640 by 400 pixels monochrome (black-and-white) in a single plane

✓ Medium resolution, 640 by 200 pixels in four color planes

✓ Low resolution, 320 by 200 pixels in 16 color planes

There is a palette of 512 colors for each color plane. Additionally, each plane can be resolved to 1024 different shades of that color, and the planes can be "mixed" to provide a virtually endless color array.

Both the Atari custom chips are artfully exploited in the disk based TOS system "sign on"—waves of colors flow diagonally across the screen in an awesome display of color power while the DMA simultaneously loads TOS into RAM. "Sprites" (small images which can be moved around the screen, automatically replacing the background and repainting it when moved) are also easily programmed. The "busy bee" that indicates disk waits and the mouse arrow pointer are examples of the ST's sprite ability. Sprites are one of the tricks used by programmers to create fast animation—they are often used extensively in "shoot 'em up" type video games, but there are interesting possibilities for utilizing sprites in

FirST Encounter

Hybrid Arts was so excited about their DX Droid program they shipped me an ST so I could check out their latest software. Atari had heard the magazine was focusing on the ST for the June issue and wanted to make sure I had one to evaluate... and that's how I recently found myself with two STs on loan.

The one from Atari was dead on arrival, but after reading Malcolm's article, I opened the case and took off the metal cover (which was not soldered in place but fastened by flanges bent over the cover). Sure enough, I pushed on one of the ICs, it gave a slight "scrnch" sound, and on the next power-up the ST was up and running. (The computer from Hybrid Arts survived the UPS torture test with no problems.)

As befits its extremely low price, the Atari does feel a little "cheap," and its mess of cables is not exactly a model of efficiency or mechanical reliability. No matter. When you first turn on the machine and check out the Mac-like graphics and operating system—only this time in color—you know you're definitely getting incredible value for the money spent.

I played around with a prototype paint program (lots of fun), and noticed that yes, the machine is *fast* but also, I particularly liked the feel of the mouse. The crisp color monitor was a treat too, with no mushiness to its resolution. The disk drives are quiet and fast, and if you want to immediately start doing something useful, BASIC and LOGO (along with a word processor) come bundled with the machine. The sound generator is nothing to get excited about, but since there's a MIDI port, the sound chip's importance is moot. (I've heard that Atari included MIDI because they couldn't get their AMY digital super-sound generator chip into production and wanted some way to access musically useful sounds.)

What we have here is, really and truly, the oft-promised but seldom delivered "computer for the rest of us." The low cost is significant, but the high performance achieved for that cost is even more significant. There are better computers out there, but when it comes to cost-effectiveness the Atari has little, if any, competition.

—Editor



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the creation of animated graphics linked to music.

PERIPHERALS & MODS

There are two monitors available, the SM124 (monochrome) and the SC1224 (color). The color monitor is capable of both medium and low resolution modes. Both monitors have built-in audio amplifiers and speakers, but unfortunately there is at present no way to feed the audio to an external amplifier or tape recorder. However, the audio signal does appear on two pins of the 13 pin DIN Monitor connector. Pin #4 has the direct sound generator chip signal via a capacitor (there is no isolation amp here so *be careful* if you make use of this connection). Pin #1 has the audio after an isolation amp, so if you can find a qualified technician, it is theoretically possible to make up a special monitor cable adapter with an added RCA jack or quarter-inch phone jack connector to carry the audio. The only hitch seems to be finding a source of 13 pin DIN plugs and connectors to make an adapter; the writer *strongly* discourages the alternative method of tampering with either the monitor cable or the monitor socket on the computer. The obvious solution is to add an audio out jack on the monitor itself, but this will undoubtedly void the warranty and is therefore also not recommended by this writer. If anyone locates a source of 13 pin DINs, we would all appreciate sharing the knowledge, so let *EM* know and that information will be published in a future issue.

SOUND CAPABILITIES

The ST's sound generator chip is an old friend—the General Instrument AY-3-8910 compatible PSG (Programmable Sound Generator). This chip has been around for years as an "effects" generator in video game machines. It has three square wave oscillators capable of frequencies from as low as 30 Hz to well beyond the highest audible pitch; a single, shared noise generator with center frequency control; a shared single envelope generator with an extremely simple, one parameter envelope which can be disabled or enabled for each voice independently; a built-in UART (Universal Asynchronous Receiver/Transmitter) and a twin parallel port (Input and Output).

In 8 bit computers the sound chip's capabilities are severely limited, but in the 16 bit 68000 environment, where the high processor speed and large memory capacity make software enveloping and software vibrato possible, it becomes

quite useable. By including the Motorola 68901 MFP chip (Multi-Function Peripheral) the ST provides for interrupt control by four counter/timers; therefore, it is feasible for a software programmer to create a real time, MIDI controlled synthesizer with no external hardware! Even a rudimentary form of velocity sensitivity can be programmed into the chip.

Atari ingeniously utilizes the UART section of the sound chip to talk to the floppy disk and for the twin parallel ports to talk to the printer port, so if you get into programming this chip, be careful not to change the values in the registers controlling these sections of the chip or your printer or floppy disk will mysteriously start to act up or just plain stop working! (The writer speaks from first-hand experience—'twas very strange until the cause was discovered!)

Access to the chip is via operating system calls. Atari provides access to these calls from LOGO and BASIC, two languages which both come free with the ST. For the more advanced programmers among us, there are quite good versions of FORTH and C available for the ST.

THE OPERATING SYSTEM

The TOS (Tramiel Operating System) is

named after Jack Tramiel, Atari's top executive, who used to run Commodore. TOS is a combined effort between Digital Research, Inc. and Atari engineers. DRI's GEM (Graphics Environment Manager) is a mouse-operated system and provides a "Macintosh-like" desktop appearance; this has earned the ST the nickname of the "Jackintosh." The "pull down" menus, "double clicking" and "dragging" mouse techniques, popularized by the Mac, have been incorporated into the ST. The ST utilizes a two button mouse and also has provision for a joystick.

THE KEYBOARD

The Atari's 91-key intelligent keyboard uses an independent 6301 microprocessor that communicates directly with the 68000. It has a Selectric style typewriter keyboard, a calculator pad, a full cursor control pad with Help, Undo (takes back your last command), Insert, Clear/Home and delete keys, as well as ten function keys.

AND NOW, THE BIG QUESTION...

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trade show last November, the Amiga, Mac, and 520ST were shown side-by-side running the famous Amiga "Bouncing Ball" program. As one would expect, since Atari was showing the comparison, the ST looked fastest. The Mac appeared painfully slow (and in monochrome, to boot!). Of course, the Amiga stereo sampled sound was not reproduced on the ST, but the ST was nonetheless impressive. In the case of the Amiga, I think that having the main processor hang around waiting for 90 percent of the time while expensive peripheral chips do the work does no good if you don't (or can't) utilize the processor to do something else that's useful with its freed-up time.

SOFTWARE OVERVIEW

A wide selection of software is available for the ST from more than 30 software developers. Packages range from the usual word processors, spreadsheets, data bases and telecommunications packages to games, painting, drawing and music programs. Many programs have been "ported" to the ST from other computers, particularly programs written in C, which is a well-supported language on the ST. There is even a program called Command (available from Rising Star Industries, Inc. of Torrance, CA) that converts the GEM desktop to an MS-DOS (IBM computer) style environment for those rodent-haters who prefer the more traditional keyboard-oriented computer interface.

Music software is currently under development by Activision, Electronic Music Publishing House, Hippopotamus, and Hybrid Arts. Activision and Hybrid Arts are developing new programs as well as porting their tried and tested Commodore-64 and Atari 8 bit programs to the ST; the word is that there will be a variety of music packages available by this fall. Electronic Music Publishing House (with which I am affiliated) is developing software specifically for the ST, and promises a multi-channel overdubbing professional recorder and an editing/scoring package by the fall.

Programs actually available at time of this writing are:

✓ **Activision "The Music Studio."** A ported version of their Commodore-64 and Atari 8 bit program that allows access to the internal chip and the MIDI port. Four monophonic voices can be entered and edited, one note at a time, on a music stave using the mouse. On playback, the score is displayed on a traditional music stave.

✓ **Electronic Music Publishing House "MIDIPLAY."** Developed specifically for the ST, this MIDI recorder/synthesizer

program runs two programs simultaneously. It turns the ST into the MIDI equivalent of a cassette recorder for all 16 MIDI channels (with piano keyboard graphic note display on record and playback), as well as a three-voice, velocity-responsive MIDI synth with vibrato, envelope control and 26 user definable sounds.

✓ **Hybrid Arts "DX Droid."** This novel approach to voice generation for the DX7 uses an automated random technique. The program has several interesting features; one is the ability to specify two sounds, then step through 16 intermediate sounds timbrally located between those two sounds. It also contains a voice librarian function for the DX.

PORTABILITY AND RELIABILITY

The ever-present question for the working electronic musician is "Will it let me down on the gig?" The ST is a modular system, comprising the main CPU/keyboard unit, separate disk drives (with their attendant power supplies) and a separate monitor. Concerning transportability, the ST is unwieldy in its normal state, however accessories are starting to appear that let you neaten your setup. For example, a compact metal case is available for about \$100 that houses all the power supplies internally with just a single power cord required to power the entire system (compared to four for a two floppy system). The floppy disk drives are also internally mounted in the unit and the whole system, when mounted in the case, becomes much more unified.

As to reliability, the author has had occasional hardware problems which in every case have proven to be chips working loose from their sockets. Since the case is held together with six small Phillips screws, it is easily removed, but the chips cannot be accessed without first removing the metal radio frequency shield—a job that requires a soldering iron. Once removed, it is expedient to leave the top shield off in case the procedure needs to be repeated again sometime in the future—especially on a gig! Note, however, that the radio frequencies generated by the computer may cause a little hash on the monitor screen if you put the monitor too close to the keyboard, and if you use wireless mics, check out the effect on them in your usual setup before you leave the shield off. Putting it back without soldering it is another alternative, but it tends to rattle around and may inadvertently short circuit something internally, so be careful! Vibration during transportation could cause the chips to work loose, so be ready with your small

Phillips screwdriver.

WHAT'S THE BOTTOM LINE?

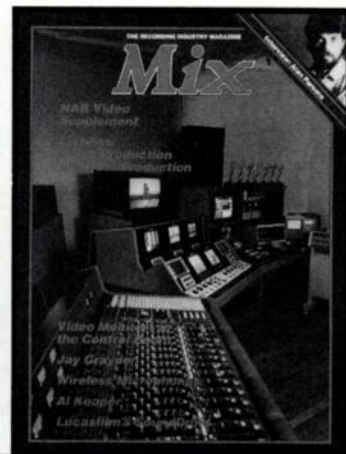
As more software developers become aware of electronic music in general and MIDI in particular, the ST promises to be fertile ground for the development of new music programs. One of the nicest surprises of all is the price of the ST. With one single-sided disk drive and monochrome monitor, it tips the \$ scale at \$799 list. Color is about another \$100 and an extra disk drive \$200. Even the 20 Megabyte hard disk is only about \$800. Most Atari dealers include a good range of software free with the hardware, but many software developers are pricing packages in the \$30 to \$80 range so even the software is inexpensive. For sheer economy, the ST has the field beaten, and I feel that for the electronic musician the ST is just about the best value for money in the industry. But economy aside, for performance and expandability, in my opinion there isn't a machine at any price that can come close.

A GAZE INTO THE CRYSTAL BALL...

The ST is currently expandable to 1 Megabyte of memory and a 4 Megabyte expansion is promised for the near future. The 1040ST, with its built-in disk drive, is following in the same tradition as the 520ST but includes 1 Megabyte of memory in a more compact package than the 520ST. We also hear through the grapevine that there will soon be a model of the ST that will function with a TV set for a monitor. As with all new computers, software will lag behind... that's only natural. But look at the Mac: it has been out there for a couple years now and only recently has music software started to become available (if you can afford the relatively steep prices!). Since the ST has built-in MIDI ports, MIDI software development is much easier and hopefully this will lead to a wide variety of music software packages at economical prices in the near future.

Atari has had the courage to be the first major computer company to give us built-in MIDI. This deserves the attention of electronic musicians everywhere. By showing Atari, they made the right decision in fulfilling our needs, maybe we can convince other manufacturers to follow suit. Let's congratulate, and support, everyone at Atari for being the first in the computer industry to recognize that the age of electronic music and MIDI is upon us, and that electronic musicians are an important and significant segment of the computer marketplace. **CM**

THE NEXT STEP



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The Atari ST really does make it easy to write MIDI programs—check out these two, for instance.

Why Buy A MIDI Sequencer When You Could Get an Atari ST Instead?

BY ERIC BARBOUR

Recently I was trying to develop digital synthesis software on a PC-compatible computer, using Pascal. I ended up having to get the IBM Macro Assembler, more memory, and lots of other stuff just to debug the Pascal main program. Playing back sounds would have required extensive assembler programming (and the 8088 is one of the most difficult microprocessors to program in assembler), plus another \$300 for a MIDI interface so a keyboard could control playback. I ended up selling all of it in disgust, with very little return for a seemingly endless expenditure.

I figured on giving up the whole idea—then I started looking at the new Atari 520ST. Despite its low cost, it had better graphics (black and white) than any IBM compatible, 512 Kbytes of memory built in, lots of peripheral ports, and MIDI In and Out at no extra charge. It occurred to me: why bother with a dedicated MIDI sequencer box, which only provides one specific function, when an ST will not just sequence but also figure your taxes, process your words, run paint programs, etc? I bought an ST, then began to see how easily I could implement a real time sequencer in BASIC. (First, I built a plywood box to organize the assorted parts—computer, disk drive, monitor and two power supplies. This hodge-podge of modules is the only major 520ST weak point. The 1040ST is much more integrated and includes its own disk drive, which makes for a tidier package.)

Eric Barbour has been working with synthesizers since high school. He has a BSEE as well as many years of professional experience in designing digital and microprocessor-based electronics. He helped found the avant-industrial group Black Iron Prison, and is currently working on digital synthesis software.

Note: the sequencer program will not fit into an ST that is running TOS (Tramiel Operating System) loaded from disk. Turn off Buffer Graphics and the GEM accessories to make space available (see the second page of the ST BASIC manual). Better still, install the TOS ROMs—this frees up the memory that would normally hold the operating system for other uses.

I have only one MIDI device right now, a Sequential Circuits Drumtraks drum machine, so I wrote the sequencer program specially for it. It should work with other MIDI drum boxes, since the output data produced by most of them is the same 5-byte string for each key strike—

```

10 DIM A(10,100,5)
20 PRINT"ENTER SEQ TO RECORD 1-10"
30 INPUT B
40 C=1
50 IF INP(-3)=0 THEN 100
60 FOR D=1 TO 5
70 A(B,C,D)=INP(3)
80 NEXT D
90 PRINT C
100 C=C+1
110 SOUND 1,15,5,5,1
120 SOUND 1,0,1,1,0
130 IF C=101 THEN 140 : GOTO 50
140 PRINT "1-10 TO PLAY SEQ, 0 TO REC,"
150 PRINT "NEG NUMBER TO QUIT";
160 INPUT B
170 IF B<0 THEN END
180 IF B=0 THEN 20
190 C=1
200 FOR D=1 TO 5
210 OUT 3,A(B,C,D)
220 NEXT D
230 C=C+1
240 SOUND 1,15,1,5,1
250 SOUND 1,0,1,1,0
260 IF C=101 THEN 140
270 GOTO 200

```

Listing 1: MIDI sequencer

List of FILTER.BAS

```

10 PRINT "ENTER CHANNEL TO FILTER OUT, 0-15"
20 INPUT A%
30 PRINT"ENTER CHANNEL TO CHANGE IT TO, 0-15"
40 INPUT B%
50 K%=(INP(3) AND &H00FF)
60 A%=(A% AND &H000F) OR &H0090
70 IF A% (>) K% THEN 90
80 K%=&H0090 OR (&H000F AND B%)
90 OUT 3,K%
100 GOTO 50

```

Listing 2: MIDI single-channel filter

3 bytes for key down, 2 more right after that for all keys up. I hooked DIN cables from MIDI Out of the ST to MIDI In on the drum box and vice versa, then pressed ENTER-4 on the drumbox to enable MIDI key outputs. Listing 1 shows the ST BASIC program; just type it in and run. To start recording, type in a number from 1 to 10 to record in that sequence slot, followed by Return. Then start hitting keys on the drum machine, and the key events will be recorded on each beep you hear from the ST speaker. (If you want the sequencer to run faster, remove the SOUND statements in the program—this will silence the computer.) When finished, you can enter 1 to 10 to hear that sequence, 0 to record another one, or any negative number to quit. The data in the sequence array A will be retained until you type CLEAR or quit BASIC, even if you terminate the sequencer program.

This program can be modified to record from a regular MIDI keyboard. You will have to read each byte as it is received with INP(3) to see if it is a key-down (it must record 3 bytes) or a key-up (2 or 3 bytes). See the user's manual for the keyboard—it should contain a section on the MIDI data sent out.

Listing 2 shows a simple MIDI filter program. It just watches for a 1001nnnn (key down) byte, and changes the channel number nnnn to the number you

"You don't need anything extra to run these programs, just your instruments and MIDI cables"

entered, from 0 to 15. All other bytes are sent on unchanged. (If you've wanted your DX7 to transmit on something other than channel 1, here's your answer.)

See how easy that is? You don't need anything extra to run these programs, just your instruments and MIDI cables. Even the BASIC interpreter is included, and you don't have to chase around after a MIDI expansion card or module. For those who hate to program, commercially available sequencers are becoming available (not only that, but the Hybrid Arts sequencer is slated to read SMPTE time code!) I'm not even thinking about buying any other brand of computers, because the ST is the most musical of all as well as one of the easiest to use.

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Looking for new Mirage sounds? Kirk has some recommendations you'll want to consider.

Pick of the Disks

BY KIRK AUSTIN

Sampling machines have really started to come of age in this last year. While I still don't think we have arrived at a truly mature state of technology, we at least have a variety of instruments from which we can choose. Everyone is getting into sampling machines (every manufacturer, that is), and most manufacturers seem to be aiming for a \$2,000 figure (plus or minus \$500). Sure, sampling keyboards have been around for quite a few years, but making them inexpensive has been the hard part. This new wave of economical samplers was initiated by Ensoniq, who shocked a lot of people (at least me, anyway) by bringing out the Mirage sampling keyboard for less than the magic \$2,000 figure. Well, the Mirage has been available for over a year now, so I think it's a good time to look at how well it has held up.

The newest Mirage keyboards are improved over the keyboards used in the original edition. Also, an upgrade is now available to owners of the older machines that I would *definitely* recommend to everyone with an older Mirage. The changes involve a ROM swap, new values for 11 resistors, and the addition of two 4n7 (0.0047 uF) capacitors. These changes result in lower noise and increased high end. The samples with substantial amounts of high frequency (like cymbals) come through much better. I used to have the treble control on my mixer turned up on the Mirage's channel, but since I got the upgrade I have been running the tone controls flat.

To a great extent, the factory sound libraries are probably the most overlooked "feature" of sampling machines. If you are

thinking of buying a sampling machine, you would be well advised to listen carefully to the library of sounds that the factory makes available. I have found that this can be much more important than whether an instrument uses, say, 8 bit or 12 bit technology. After all, the most important point is how good the sound is to your ears, not your eyes. After trying at length to make some samples of my own, I have really developed an appreciation for the people who make the factory samples for Ensoniq. Besides, I really don't know where I could go to try to get a sample of an acoustic piano since I don't have one myself. The 16 (so far) disks that Ensoniq has published are all excellent samples. But, like so many other things, some are more excellent than others. So, rather than try to point out the flaws that I perceive in some disks, I would rather talk about my favorite sounds that I use all the time. Here's my personal "Top 20" from the Ensoniq sound library:

E. Bass Disk 13 Lower 1—Bass sounds are some of the most useful sounds to me as they are needed for doing sequences and getting a full band sound. This sound is a sample of an electric bass played with a pick, and is

very authentic. Hitting the key harder accentuates the pick sound.

Synth Voices Disk 13 Upper 1, Program 4—Here we have a synthetic approximation of a human voice singing "Ahhhhh." It has an almost ethereal quality to it that I like, and in an ensemble situation it really sounds like a human singing.

Acoustic Drums Disk 3 Upper and Lower 1—This is a great drum set that is spread across the keyboard! I use this one quite a bit since I don't have a dedicated drum synthesizer. The hand claps and crash cymbals are outstanding. I particularly like the fact that there is more than one crash cymbal available at one time so I can do flams on the cymbals.

Acoustic Piano Disk 1 Upper and Lower 1—This sound is probably the single most important one to people buying a sampling keyboard. I use this one when playing solo piano, but I use the piano sample on Disk #5 when I want a brighter tone in an ensemble situation.

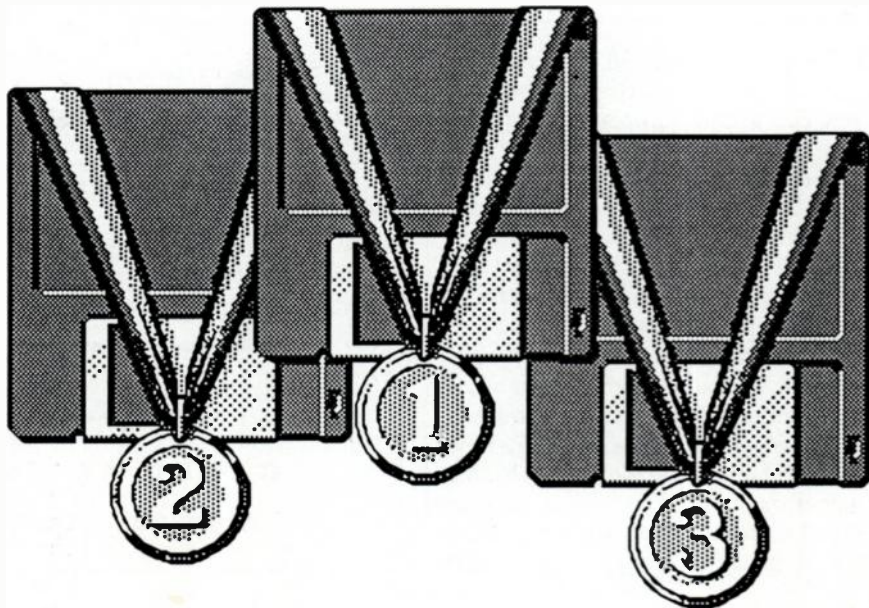
String Bass Disk 3 Lower 1—Boy, is this one ever authentic! When played with careful pitch wheel movement, it is very convincing. This sound is also available on Disk #13.

Cellos Disk 3 Lower 3—Probably the richest sound available on the Mirage. This is great for that "Big Low Note" so often heard in movie and TV soundtracks. It's also a great waveform to play around with when creating thick synthesizer sounds.

Sax Disk 3 Upper 1—This sound requires a lot of "wheel riding" to sound right, but I like it a lot. I combine this with the String Bass sound when I want to sound like John Coltrane and Ron Carter (ha ha).

—page 84

Kirk Austin designed one of the first stand-alone MIDI keyboard controllers. He is employed as a technical support manager for a computer peripherals firm and creates much software for the Macintosh. In addition to writing for EM, he also contributes to several Macintosh magazines.



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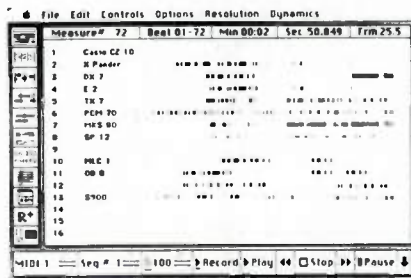
And record a MIDI jam session with four musicians with all tracks separated out for separate editing of individual MIDI events. Or recording all 16 channels from another sequencer in one pass.

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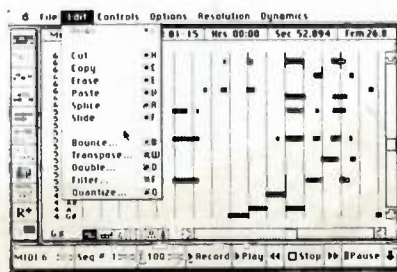
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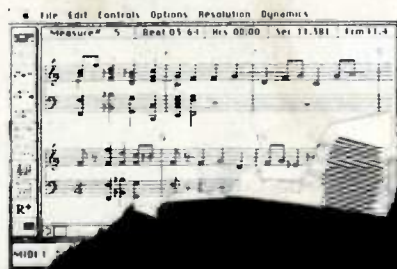
Total Music now also supports our new JamBox/4, the first MIDI interface for any computer to provide a SMPTE Time Code Generator and Reader for *direct* synchronization and cueing of sequences. Controlled slow rate of the generated SMPTE lets you lay down a SMPTE stripe even on less than studio quality tape decks. Drop-out detection circuitry lets you stay in sync even when your tape deck drops the ball. Not to neglect non-SMPTE use, we put in DIN sync, audio click sync, and MIDI sync.



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Put random numbers to work for you when creating new patches for parameter control synthesizers.

Have You Tried This?

BY HENRY SCHNEIDER

Since synthesizer programming can be both time-consuming and frustrating, I have developed a method for changing a synthesizer's parameter presets based on a random number algorithm. Using a computer, it is possible to compute an entire set of random synthesizer parameters. Theoretically, you could then feed that information to your synthesizer via MIDI System Exclusive data (if you have the software and programming capabilities). Otherwise, a simple print-out of the randomly generated parameters, and manual entry of the numbers into the synthesizer, will suffice. Since a uniform random number distribution is analogous to white noise, where all audio frequencies have an equal probability of occurring, you may wind up with some pretty strange patches...but you'll also probably get some that you would like to tweak to perfection. In any case, this procedure can often open up new areas of sound programming.

At first, I toyed with the idea of auditioning all possible patch combinations on my synth figuring this would give me an exact comprehension of its capabilities. That is, until I realized that there is virtually an infinite number of patches. For my Korg Poly 800, there would be approximately 4×10^{47} combinations. I wouldn't live long enough to hear them all.

There are two ways of generating random patches. Those without computers can hand-calculate parameter values using a random number table (such as one from the CRC Mathematics Tables), compute the transfer functions from random

number to meaningful parameter figures, program the calculated patch manually into your synthesizer, and try a new sound. Or, if you have a computer and synthesizer with MIDI capability, you can program your computer so that each time you depress a key on the keypad it calculates the random parameter figures from the following algorithm, immediately feeds the data through the MIDI interface (which you will have to figure out how to do based on your synthesizer's documentation of System Exclusive information)

"Next time you hit a creative block when doing synth programming, give this method a try"

and automatically changes the patch.

Want to try it? Okay. Computer generated uniform "random" numbers fall between 0 and 1, so you need to translate these numbers to meaningful parameter figures. The general equation for parameter values is:

Parameter value = INT(NPoss×Rand)

where

NPoss is total number of possible values, Rand is the random number, and INT means use only the integer portion of the product (NPoss×Rand).

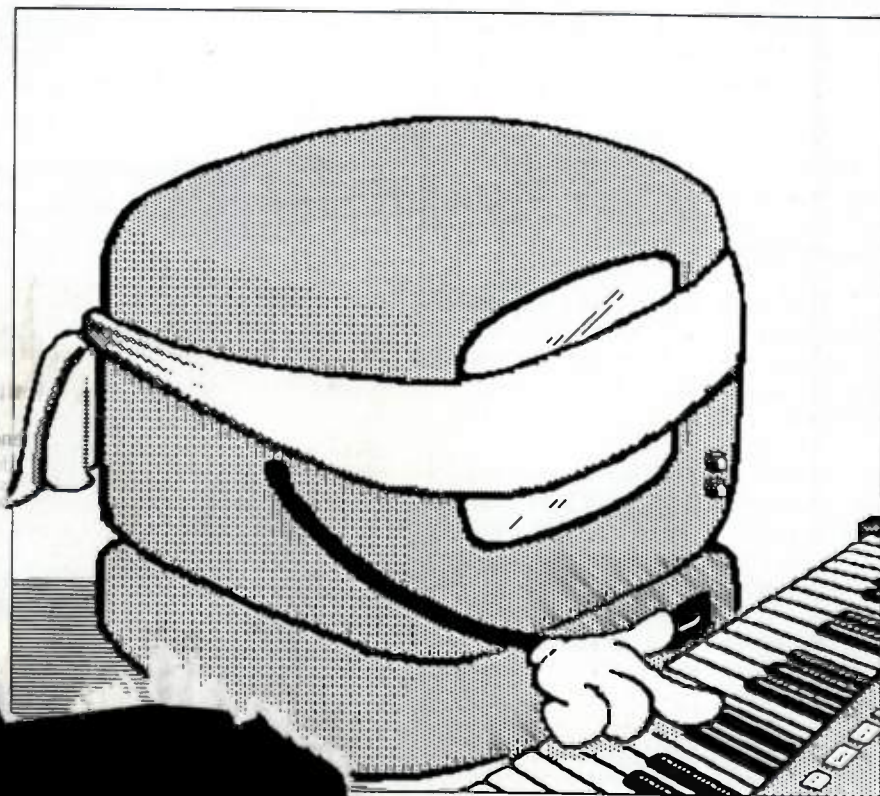
For example, suppose Parameter 1 can have the value 0, 1, or 2 for a total of 3 possibilities. If the generated number is between 0 and 1/3 (say 0.32) the result is 0; between 1/3 and 2/3 the result is 1; and between 2/3 and 1 the result is 2.

Note that if a parameter ranges from, say 1 to 15, (as opposed to 0 through 14) the equation requires an offset of 1 as follows:

Parameter = INT(15×Rand) + 1

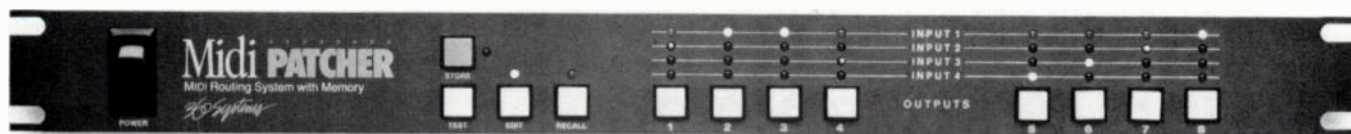
To simplify the calculation of several fixed parameter equations, I use the Lotus 1-2-3 spreadsheet. In this manner, I've been able to quickly create new patches for my programmable synthesizer, and come up with some new sounds in the process. Next time you hit a creative block when doing synth programming, give this method a try...you just might find some of those elusive sounds you've been seeking.

EM



Henry Schneider is a... has been interested in... several years. Presently... contractor and ha... with a computer... playing an... about a y

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EM is proud to present the first in a series of articles that tells how the music/record business really works.

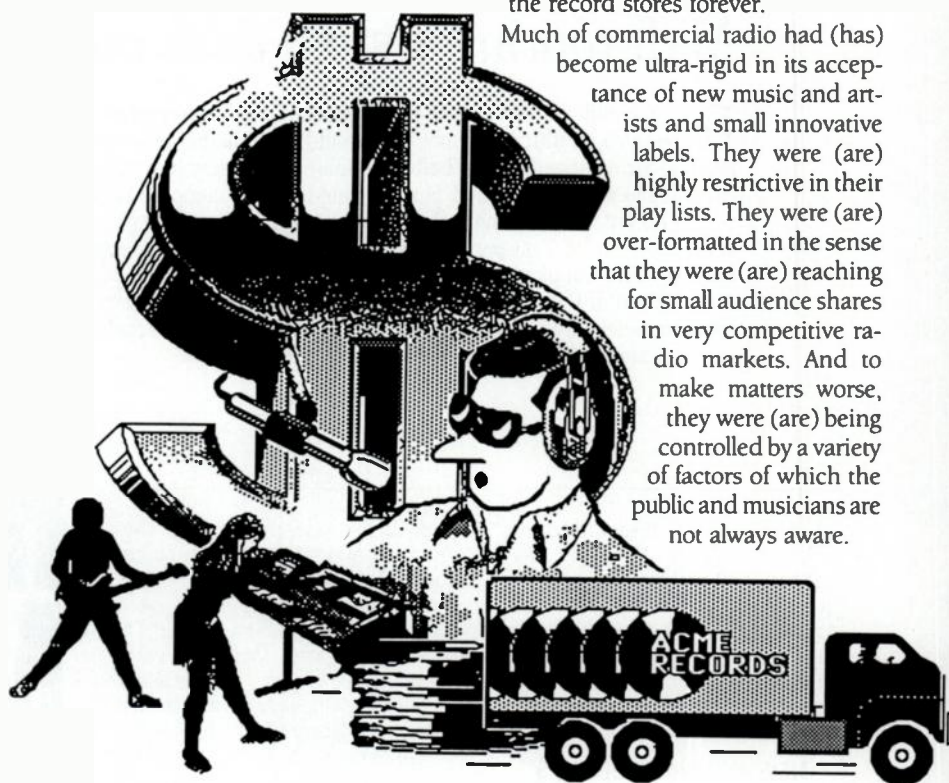
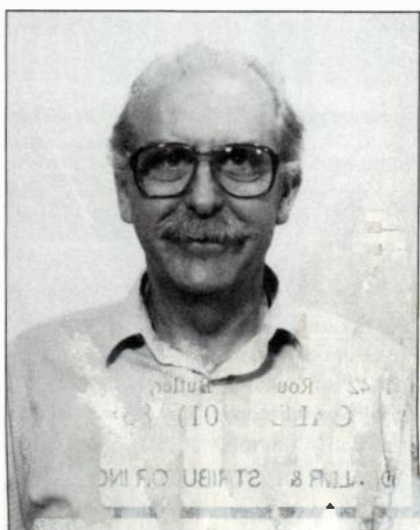
Inside the Record Business Part 1: Life in the Majors

BY AUGIE BLUME

If you're working in the music field, you're in business. The sooner you come to realize it, the better off you will be. There is an art side and a business side to the music business. If they're both working together, it all grows. If they don't, then everything slowly comes to a halt.

The prerecorded music business is Big Business. Each new development in the technology has caused a corresponding cycle in growth of numbers of releases and dollar volume. Beginning with cylinder recordings, then 78s, 45s, EPs,

Augie Blume is a widely-respected expert in the field of record promotion. In 1969, he was named "National Promotion Man of the Year" by the Gavin Report and in 1978, the readers of Billboard awarded him "Man of the Year Award for Independent Promotion." His company, Augie Blume & Associates, has helped gain airplay for Charlie Daniels, ELO, Jefferson Starship, Heart, Holly Near, Eddie Money, the Grateful Dead, and many others. He continues to work with his wife Nancy (herself a well-known personality in the field of record promotion) and maintains a national data base of record labels, producers, radio stations, publications, etc.



LPs, 8-track tapes, 4-track cassettes, and the newly emerging Compact Discs, each one has played its corresponding role in that growth. This would not have been possible without a considerable effort on the part of the industry to survive numerous hurdles past, present and future. Just when you think you're over one, the next one is already facing you.

Here it is, 1986, and the record business still finds itself barely exceeding the four billion dollar mark it topped back in 1978. At that time, the record business was about to come to grips with the "recession" and face the harsh realities of non-profitable releases. The industry is at the mercy of the market, and the record business is in a precarious position.

town, and the more than 100 labels they manufacture and distribute, had to cut back their over-specialized promotion and marketing staffs by more than 1,500 people within a year. They also cut back on their artist rosters and tour support, and dramatically reduced the number of records they released each year.

Almost simultaneously they became the unsuspecting victim of other forces. The music they were releasing wasn't accurately reflecting the changing tastes of the record buying public. People weren't buying as many records and tapes as they had in the past. Other customers had made a switch to becoming members of record clubs, which took them out of the record stores forever.

Much of commercial radio had (has) become ultra-rigid in its acceptance of new music and artists and small innovative labels. They were (are) highly restrictive in their play lists. They were (are) over-formatted in the sense that they were (are) reaching for small audience shares in very competitive radio markets. And to make matters worse, they were (are) being controlled by a variety of factors of which the public and musicians are not always aware.

In Ring Number One, we see a formidable host that includes the ever-present ratings services that keep radio in a constant state of paranoia, the radio advertisers who pay the bill, and a group of radio programming consultants that station owners hired to bring the latest version of "Super Format" to their fair city.

In Ring Number Two, we see another group of heavies, the six major record corporations and the more than 100 labels they distribute, with the collective promotional pressures they know how to apply, including the advertising dollars radio stations receive from the labels. And, oh yes, let's not forget the national trade "charts," without whose wisdom radio wouldn't know what to play or when.

Over in Ring Number Three there are more than 230 million people who tune into radio some of the time—the audience. Some of them like music and buy records and tapes, some buy products they hear advertised on the radio, and a very small number of them fill out “diaries” that form the ratings books issued every four months. These are the books that keep radio in a constant state of paranoia.

Look way up at the top to the tent on the high wire, and you’ll see music, an art form, and the thousands of musicians and singers trying to keep their art alive. It’s quite a balancing act.

All this was happening at a time when numerous other elements in the Big Top of Business would take shape and extract their toll on the fortunes of the music and record business. There was home taping. Radio was in the habit of playing entire albums and announcing when they would

“...six major corporations...account for 85 percent of the record and tape retail dollar”

play them. Cassettes were inexpensive, and almost every music fan had a tape deck—who could blame the consumers for trying to augment their record collections. The (RIAA) Recording Industry Association of America, the big corporations club, estimates home taping each year drains more than a billion dollars worth of income from the record industry.

And there were video games in the home and on the street, which were also taking a big bite of the entertainment pie. As prices for video cassette recorders began their descent, sales of video tapes started to take off. All of these combined factors have taken their toll on record labels sales and the way they do business.

Despite optimistic yearly statements by record industry moguls, it has been a struggle for them to stay in the range between 3.5 and 4.5 billion dollars in sales for the past eight years. As of this writing, the RIAA has just released its figures for 1985, and all indications are that the major labels barely topped last year’s figures.

When we speak of record companies, we’re actually speaking of close to 2,000 labels that exist in the U.S. They fall into different categories. The six major corporations mentioned earlier collectively account for 85 percent of the record and

tape retail dollar. CBS and WEA alone have 53 percent of that pie.

The major labels have now become “leisure time” profit centers of even larger corporations. It might be a good idea to explain how they are structured. At the top of the ladder are the presidents, some of whom still involve themselves in the day-to-day decisions concerning which acts to sign. There are staffs of lawyers in the business affairs departments to work out the fine points in contracts and other legal matters, and of course, “bottom line” accountants, who look over everyone’s shoulders and check periodically to see if each project is profitable or not. There are rather large A & R staffs who specialize in each musical genre and seek out new acts for possible consideration.

Most of the major labels have anywhere between 30 and 45 key executives in their total operation, not counting legal and accounting. The marketing managers are concentrated in the home offices, with sales offices scattered across the country in major markets. Each regional sales office has a branch manager, sales staff, promotion staff, and support personnel. All sales orders are forwarded either directly to record pressing plants or tape duplication facilities, or to central warehouse shipping points.

The national promotion staffs for each type of music are also concentrated in the home offices. They have 30 to 40 regional promotion representatives who work out of the branch offices, and are responsible for securing airplay in their regions. The national promotion office directs the mailing of promo records to radio stations. Quantities of DJ copies are sent to the regional promotion people as back up and radio contest giveaways. Specific individuals within each promotion department are responsible for trade magazine relations to keep their records moving up the charts. The national promotion people spend considerable sums of money each year to supplement the efforts of their regional promotion staffs by hiring outside “independent” record promotion people on selected projects in each genre of music. They are paid big bucks, and it gets passed around in one form or another.

The press and publicity departments are responsible for writing artist bio and press release material, and placing it in the appropriate print media. They also write the stories that relate to the acts and their key executives. They are responsible for

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The advertising departments work under the direction of the marketing and promotion departments to conceive album covers, advertising copy, sales and promotion pieces (such as posters, bumper stickers, and buttons), all of which is part of a coordinated plan to promote and market the final product.

With the emergence of music video, major labels have formed video departments that work closely with their acts and engage the services of independent video producers. They also have video promotion departments that work to secure exposure on MTV and other video outlets. A video piece like Billy Joel's "Allentown" cost well over 200 thousand dollars. Close to a quarter million dollars was spent on Michael Jackson's "Billie Jean" video.

The specialized nature of each one of these departments and their secretarial staffs creates a very large and costly overhead. All key executives in each department have their rather large salaries, with expense accounts to cover travel, lunches and dinners, and other incidentals. Many key executives have bonus plans, and receive bonuses that depend on their ability to meet planned goals. It all adds up to a lot of money, and they have to sell

very large numbers of records and tapes just to break even. It's called "tonnage," and the shipping companies make out coming and going.

Each department has its yearly budget that they try to make an effort to live within. But they often go over budget due to unforeseen expenses. Every one of these departments have regular meetings to determine the amount of money being allocated to each album, single, or video project.

Every promotion and marketing department also schedules weekly meetings and conference calls with their people in the field to report on the airplay and sales progress of their records. Each week, key executives from each department get together for listening sessions to hear the new releases being planned for the near future. They offer their value judgements on each record, and put forth ideas that form the nucleus for further discussion on promotional and marketing strategies for each project. There are also meetings with the artist managers, and sometimes with the artists themselves. And then there is a blizzard of memos to confirm topics discussed and set up further meetings.

These are pretty busy people. Most of them are married to their job, and it

becomes a hectic way of life. Divorce and substance abuse are not unknown. For everything there is a price to pay...but they are in show business.

There is considerable planning that must go into each release. When a major label decides to release an album, there is a dollar commitment in the neighborhood of 200 thousand dollars. Some projects are more expensive or less costly than others, depending on the various points negotiated in the contract. Keep in mind that the record label is acting much as a bank would in fronting the bulk of this money.

Depending on how closely in touch the major labels are with the ever-shifting musical tastes of the public, and what radio stations will or will not decide to play, these major labels are hard pressed to turn a profit. There are many factors that play a role in their profitability. Among these are the decisions on who they will sign and how much of an investment to make in new acts; they have to ask whether these new acts will stay together long enough, and sell enough records and tapes, to recoup the money invested by the company. They have to decide whether to sign other major acts whose contracts with other labels have expired yet may still be marketable. Much depends on the clear-headed value judgements of their A & R departments and key executives. They can't afford to be wrong too many times, or their future with the label can be in jeopardy. All you have to do is look at the "Executive Turntable" column in *Billboard* magazine each week to see the turnover in these executive positions.

The nature of the corporate structure at each major label creates a potential for a degree of political infighting. Some labels run more smoothly than others in this respect, some are not so fortunate. The personalities and egos of the individuals involved also play a role in these situations. The good old "Peter Principle" comes into play when some people prove to be incompetent and find themselves rising to positions they are not equipped to handle. These conditions exist in every business, including the record industry.

That pretty much concludes our tour of the majors. Next month, we'll cover smaller labels, the story behind the charts, and how record companies work with the print media to get their acts across to the public.

(The above is excerpted with permission from an upcoming book by Augie Blume on the music business.)

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Now that you have a MIDI Thru box, here's what to do with it. And if you don't have a Thru box, here's why you want one.

Getting the Most Out of MIDI Thru Boxes

BY WALTER K. DANIEL

Sooner or later, it happens: you just don't have enough instruments with MIDI Thru ports to distribute all that MIDI data to all your equipment. The answer, of course, is a "Thru Box" (see "Making MIDI Work for You" by Alan Campbell in the June 1985 *EM* and "I'm Thru with MIDI" by Kirk Austin in the April 1985 *EM*). But a Thru box can do more than give you more MIDI Outs, so this article examines some of the functions, uses, and applications of these small marvels.

INTRODUCTION

Simple MIDI Thru boxes take a single MIDI Out and split it into two, four, eight, or even more MIDI Outs. As MIDI signals are actually computer data, an active circuit is required to cleanly reproduce the data to several outputs. More advanced models are actually smart, software-patchable devices. These boxes can receive two or more signals and route them to one of several different outputs according to the panel switch selection.

SIGNAL INDICATORS

In addition to supplying those always-needed MIDI Outs, many boxes have an LED that lights to indicate incoming MIDI data. Use this indicator as a built-in troubleshooting device. If you suspect that your computer is not sending MIDI data, connect the computer output to a Thru box and check the LED. I write do-it-yourself MIDI software in which I send messages to instruments; having an indicator around helps track down errors in the routines that send (or all too often, don't send) those messages.

Walter Daniel may or may not still be a graduate student at Georgia Tech. Thanks to MIDI, computers, and modems, he'll probably never finish another song in his life. His Compuserve ID is 75066,164.

Signal indicators help illustrate certain characteristics of MIDI data streams. To see just how much data a keyboard sends, connect your favorite axe to a Thru box with a MIDI signal indicator. Sending basic note-on and note-off messages with velocity causes the LED to flicker every time you press or release a key. Now use other controllers such as wheels or sliders (make sure the instrument has these controllers enabled; see "Programming Synthesizer MIDI Parameters" by Craig Anderton in the May 1986 *EM*). Using a controller turns those once-sparse flickers into an almost constant light. If you can, try this experiment with a pressure-sensitive (aftertouch) instrument (make sure that pressure send is enabled). Now you know why most MIDI sequencers have aftertouch and controller filters! The instrument sends data almost constantly as your hand pressure on the keys varies ever so slightly. This is a source of MIDI data stream clogging and sequencer memory gobbling, so if your sequencer part can survive without aftertouch data, then by all means filter it out.

Using a Thru box to send the most note-intensive signals can free your instrument MIDI Thrus for other purposes. Some signal processing equipment is now equipped with MIDI (for example, a digi-

"...for the light load of sending patch change messages, using MIDI Thru ports presents no problem"

tal delay can respond to patch change information and switch from flanging to chorusing). Therefore, a sequencer can not only send note data and patch changes (also called program changes),

but automate effects settings as well. The trouble with using instrument MIDI Thrus for note-intensive work is that passing a signal through the MIDI Thru causes degradation that is cumulative. However, for the light load of sending patch change messages, using MIDI Thru ports presents no problem. Don't overdo it, though: some so-called "MIDI delays" are the result of instrument microprocessors being overloaded. One advantage of a Thru box is that it removes those burdens from microprocessors, so if you send really busy

"If you can sync your equipment by means other than the sequencer MIDI output, then you can really pare the number of bytes in the data stream"

sequences along with patch changes, it might be better to use a Thru box instead of running the risk of overloading an instrument.

Indicators can also show the huge amount of MIDI clock (timing) bytes woven into a sequence. Connect any sort of sequencer to a Thru box, then play a sequence with few or no notes. The clock bytes should cause the LED to glow constantly. If you can sync your equipment by means other than the sequencer MIDI output, then you can really pare the number of bytes in the data stream. For example, I use the clock out of my drum machine to drive a computer MIDI interface. The sequencer program allows me to turn off the sending of clock bytes, so all the sequencer has to send out is the note-on and note-off information. I could have slaved my drum machine to the MIDI clock, but why strain the sequencer? Another reason for using your drum machine as a master clock is that most models have a separate tempo control that is quite accurate. I can adjust the drum machine tempo by single beats per minute (BPM), but the sequencer can only be adjusted in steps of four BPM.

Speaking of sequencers, here's a tip for live performance: set up patch and effects changes as a short sequence that you would play between songs. (You might need a Thru box to distribute all those signals to all your modules.) Even if

you don't use a sequencer to play melodic passages, being able to change patches and effects is a most useful application. Small, on-board sequencers would be ideal for this use, although it may be tricky getting patch change messages loaded into them. One solution is to re-

cord the change messages for all modules on a stand-alone sequencer at home, then play that sequence into an instrument's on-board sequencer.

CONFIGURATIONS

In addition to its signal splitting duties, a

Thru box can function as a "MIDI patch bay" for your setup. Even a basic one-input, four-output model has streamlined my recording setup immensely. Fig. 1 shows a block diagram of my modest home studio. I have only one velocity-sensitive instrument, so I utilize it as my master keyboard. I program all sequencer parts from the master: it has the most keys, I prefer its touch, and I want to avoid playing the mini-keys of the other synthesizers. The master MIDI Out patches to the computer interface MIDI In and the computer MIDI Out patches to the Thru box input. The Thru box outputs drive all other inputs in a "star" network (so called because signals radiate out from a central point) which helps to minimize any potential delays. Incidentally, none of my instruments have a MIDI Thru port, so my MIDI Thru box is more of a necessity than a luxury.

When recording basic tracks to tape, I set all my MIDI-equipped instruments to listen to the MIDI sequencer information. The sequencer program has a convenient command that sends an "omni-mode off, poly-mode on" message to all the instruments on the network. When I power up, it only takes one keystroke to reconfigure the entire system! This mode change command also sends an "all notes off" message, which is quite handy when I occasionally get what we've all come to know and love, the stuck-on note. For overdubbing (I'm not using sync-to-tape with my sequencer), I re-patch the system as in Fig. 2. By routing the master MIDI Out to the Thru box input, I can control any or all of the instruments from my favorite keyboard. I can "tune out" unneeded synthesizers by changing MIDI channel numbers (note that all instruments must be in poly mode, where they respond only to data coming in over one particular channel, for this to be effective). When using patch librarians, I can use the configuration in Fig. 1 and simply move the connector from the master keyboard MIDI Out to the output for which-ever synthesizer I am programming.

CONCLUSIONS

One day you may regard your MIDI Thru box as an essential component of any MIDI system. From the basic one-by-four to the versatile smart patcher, these boxes can streamline your MIDI routing while helping you understand what signals you send. The useful yet simple patching configurations possible with even the most rudimentary Thru box can give a user great flexibility. Oh yes—and always use MIDI-specification cables!

EM

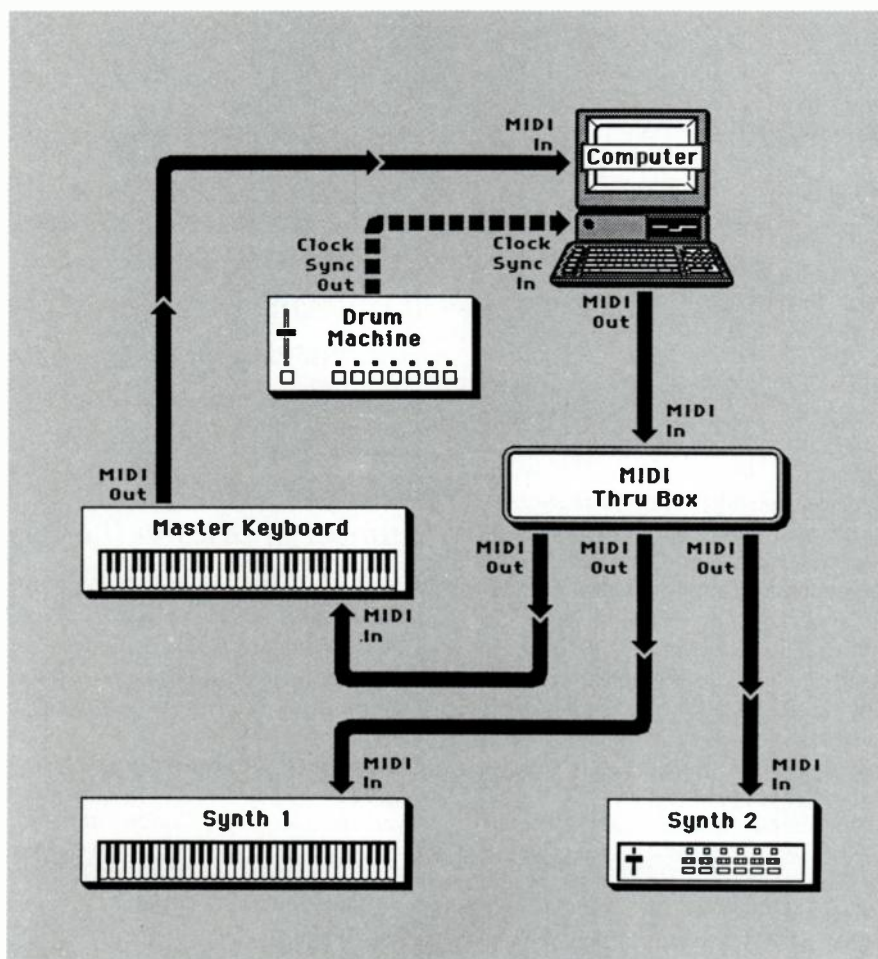


Fig. 1: Sequencer configuration

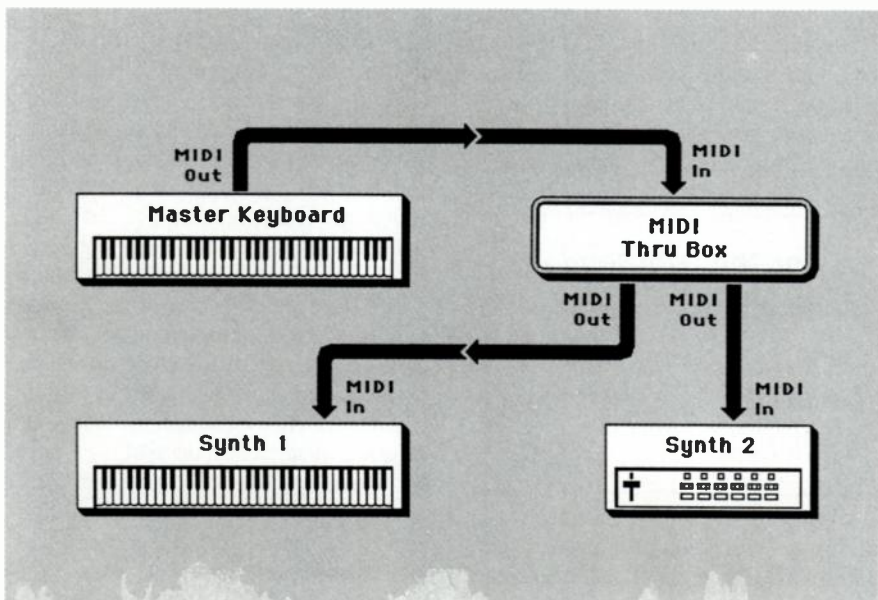
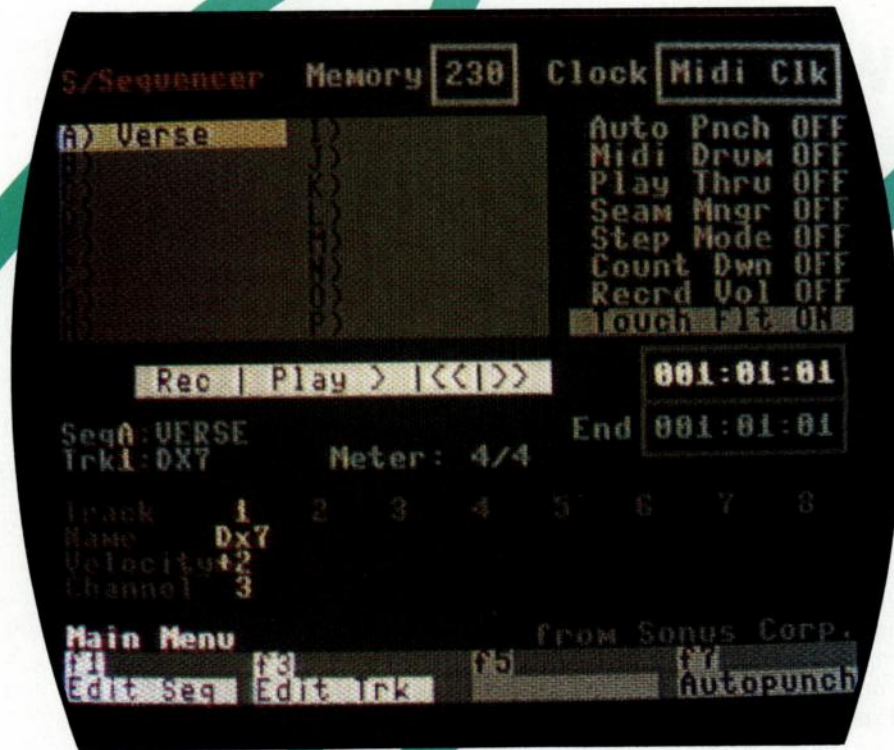


Fig. 2: Overdubbing configuration

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What happens when a dream comes true and you're hired to score a film? If you have little prior experience in film scoring, SMPTE, or MIDI, you learn—fast!

Seven Weeks in Heaven

BY ROBERT KRAFT

Sammy Cahn, the great songwriter, was once asked, "which comes first, the words or the music?" He replied, "The phone call." That is how my first movie score began, with a call from a close friend who wanted to introduce me to Fred Roos, Francis Ford Coppola's producer. After meetings with Roos and Coppola, I was on the next plane to New York City—it was time for the Big Audition.

For three straight days, I played Linda Feferman (the as-yet-untitled movie's director) every song I'd ever written. She seemed a bit concerned that I had absolutely no previous film scoring experience. Luckily, I had taken courses on the basics of film composing, and had watched a friend of mine score a movie in his home studio. I knew if I could find, rent, or create that same kind of "SMPTE" studio—where cues could be played on an instrument and magically locked to the video—in New York, I was home free.

As I investigated the audio-video lock-up during those three days, it didn't take me long to discover how difficult, expensive, and special that SMPTE system was. SMPTE, a complex time code, is the electronic "glue" that holds audio and video machines in sync; studios with SMPTE capabilities started at \$250 an hour. I was already aware of the music budget they had for the movie, so that approach was out of the question.

Then my wait was over. I was hired... and it was time to get started.

Prior to scoring *Seven Minutes in Heaven*, Robert Kraft released two solo albums on RSO Records and one on RCA. He has written songs for artists such as Bette Midler and the Manhattan Transfer. He is the co-author of the theme song for the ABC series *Who's the Boss*, and has just written the theme song for the new NBC series *All Is Forgiven*. His next project is producing Moonlighting star Bruce Willis' first album for Motown.

"She seemed a bit concerned that I had absolutely no previous film scoring experience"

THE SPOTTING SESSION

My first morning, Reel Number 5 (the first complete section of the movie) was threaded onto the moviola and the spotting session, a crucial aspect of film scoring, began. There, every aspect of the music's relationship to the film is discussed. Most specifically, timing notes are taken by the music editor, recording the exact footage of every cue's "in" and "out." Ideally, those points are a result of discussion and collaboration: the director hears the music starting at one point, the editor suggests a place that it could trail off, the composer suggests an internal "hit" for a dramatic shift, etc. Sometimes, the cues are obvious, as in transitions from one scene to another. Mostly, cues are shaped and discussed verbally, scene by scene. I took careful notes, recording

as much of the discussion as I could. I wanted to remember every suggestion later, when the composing began.

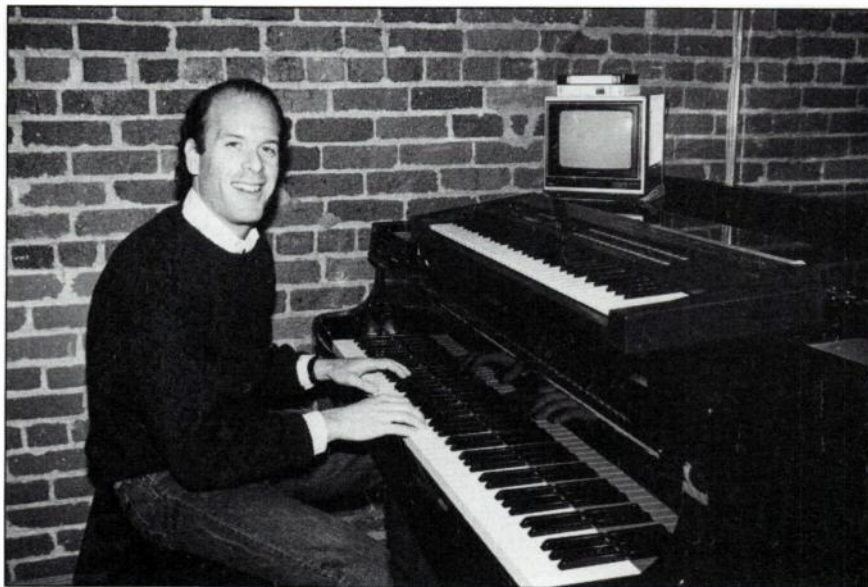
It was also during these initial sessions that I began shaping my concept of a film score. Composing a score seemed to be like creating a persona or a character in a film. Just the way an actor prepares for a role, I found myself starting to shape a particular personality for the score. I shared all these ideas with the filmmakers, seeking their opinions on my initial concepts. This was not my album, where I was free to create it my way. It was their movie.

By the end of that first session, we had spotted two reels, or about 20 minutes. It was clear that I would be seeing the film piece by piece, in the order the editors "locked" (completed) each reel. I

"This was not my album, where I was free to create it my way. It was their movie"

wound up scoring the picture "inside-out," receiving Reel Number 1 and Reel Number 10 during the final week of recording.

The director, editor, and music editor had allotted three days for recording the film score, and those three days were to occur five weeks hence. This was the traditional approach: the composer writes for a month, a copyist transcribes all the parts as the score is being completed, and a massive recording session ensues,



Robert Kraft at his Forte-MIDled piano

with the cues being laid down one by one, usually live (no overdubs). The music editor then takes the mixed film score and edits it into the picture, using the timing notes agreed to in the spotting session.

THE SMPTE CONNECTION

At this moment, it was clear that even the technical staff was unaware of the concept of using SMPTE to precisely synchronize a complete composition (often with MIDI acting as an interface between instruments) to the movie. My plan was to begin recording portions of the score shortly after I'd composed it, and long before they had achieved the final edit of the picture. With the miracle of SMPTE, I could sync my instruments to the film and they could all come to the studio and "hear their movie" as it developed, instead of enduring the usual nightmare of hearing cues for the first time during the monstrous scoring date mentioned earlier. Luckily, Pat Mullins, the music editor, had assisted on a picture that had been scored this way. Though he wasn't completely familiar with the process, he was eager to work with the new technique.

I would have to figure out, fast, how to score the picture with SMPTE, and without much money. Since I had recorded two albums in New York, I knew lots of people and was introduced to a musician and studio owner named Russ Landau. Russ owned a tiny 8-track studio in Greenwich Village, located in a basement, and called, appropriately, Rooftop Productions. That basement became my home for the month of July.

Our first step was to make his brand new Yamaha grand speak MIDI with a Forte MIDI-Mod. With his piano now able to transmit my performances to whatever MIDI synths we owned (or could borrow), I could record all the cues sitting at the piano. Even if we dumped keyboards later, the cues would be mapped out harmonically on tape. And that was the next challenge.

GEARING UP

For a weekly all-in-one price, Audio Force installed a BTX Shadow system with a JVC ¾-inch video deck to chase/lock our master (TASCAM 80-8 8-track deck). SMPTE time code was striped on track 8 of a half-inch Ampex 456 tape, without dbx. (We striped SMPTE corresponding to the pre-striped ¾-inch video tape cartridges, so that we wouldn't have to deal with offsets between reels.) We used an

—page 60



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Welcome to the audio/video world of a musician in transition.

Thomas Dolby

BY CRAIG ANDERTON

Thomas Dolby's Golden Age of Wireless album applied high technology to dance-floor sensibility, and produced a monster hit ("She Blinded Me with Science") in the process. His follow-up, *The Flat Earth*, showed a willingness to branch out in different directions and explore more than just the safe synth-pop turf.

Recently, Dolby has done the music for the LucasFilm Howard the Duck, collaborated with George Clinton, produced Joni Mitchell's latest album, and has generally kept active in a number of fields. He has the kind of schedule that makes him a tough person to pin down, but we finally caught up with him electronically—36,000 feet over Greenland.

EM: You describe yourself not as a musician, composer, or video specialist but rather as an "inventor." Do you, as do many of our readers, find terms like "keyboard player" or "musician" too limiting?

TD: Labelling is something you tend to tolerate rather than encourage. It's what journalists and A&R people and radio programmers—all my favorite people in the world!—do in order to neatly categorize music and file it away into pigeonholes. I've always tried to cut through those labels. Not because I wanted to go down in history as an "original" or an "innovator," but because my creative adrenalin only starts flowing when I sense I'm stretching myself. So I ended up calling myself "inventor." That's also down on my British passport as my profession.

EM: Are your inventions more conceptual or physical, and in what environment do you do your inventing?

TD: I've recently completed my studio in London, the ThinkTank. I love it—it's the perfect playpen for an artistic delinquent like myself. It was formerly a painter's

In addition to editing *EM*, Craig Anderton currently plays with the group Transmitter and is finishing up the electronic production on Spencer Brewer's new album for Narada records.



studio and is very light and airy, with wood beams and huge windows and its own cast iron staircase and front door. I chose to use the largest part of the space for the control room, in order to accommodate my video equipment (a small Sony 3/4-inch editing system, Fairlight CVI, and a large screen Barco projector over the mixing board) along with a large battery of electronic percussion (E-mu SP12, Linn 9000, and assorted Simmons and PPG modules) and my new Fairlight Series III and Emulator II. I've never sold a keyboard, even my first two—a Micro-moog and a Roland JP4 with which I recorded everything in "She Blinded Me With Science." Usually I can find the texture I'm looking for through a combination of the different components. But what's really great about the studio is that it's not an oppressive working environment, because it's very spacious and free of studio managers waving enormous bills in my face! And I don't think my record company even knows where it is.

Before the equipment went in there, I consulted an acoustician who said I would have to flatten the ceiling, raise the floor, narrow down the windows and drape the walls to achieve a flat sound. I'm really glad now that I didn't take his advice, because it's unquestionably the nicest and most sonically accurate recording studio I know. He also told me that

the kitchen off to the side was unsuitable for recording live sound—also wrong. So much of the theories surrounding studio sound are pure hokum; it's really a question of your approach. Which brings me around to your question—my "inventions" are really no more than imaginative explorations of the machines I already own, and new uses for them.

EM: It has been a long time since your last solo album, *The Flat Earth*. Since then, you have been involved in a number of collaborative projects. Why have you gone in this direction?

TD: I'm enjoying collaborating more and more—after a long spell of working very much on my own, with something to prove to the world I suppose, I've gotten a lot more gregarious as an artist, probably less egotistical. I'm always eager to impress whoever it is I'm working with, and that has the effect of bringing out a side of me that often I hadn't seen before. George Clinton got me harking back to a lot of my earliest influences, which unlike a lot of British musicians were not so much the Beatles and Stones as the American R&B I found late at night on European U.S. Armed Forces Radio stations. And that man is funny! I think he watched too much TV as a foetus. Ryuichi Sakamoto was amazing to work with; we had a hard time understanding each other on a language level, but no trouble communicating through our music and visual imagery. To work with Joni Mitchell was a teenage fantasy of mine—she's a sublime artist, set apart from almost anyone. I like the *Dog Eat Dog* album, but making it was a little like a series of dental appointments. Not my most treasured memory. What's important though is the end result, which stands up on its own. The Prefab Sprout album was probably my favorite production job: I really admire Paddy MacAlloon as a writer and singer, and I tried to step outside myself and do everything possible to complement his wonderful music with my experience as an arranger and the technology of the studio.

EM: How does a composition start for you?

TD: My songs usually start with a title, often a title that is memorable and suggestive enough that the music and the rest of the words follow on... "Airwaves," "One of our Submarines," "Mulu the Rain Forest," "Screen Kiss." Then there follows this strange exploration of the mystery that the title conjures up. For example on

"Mulu" I started with a rhythm made up of tsikada insects and trees falling down in a jungle, then blew over the top of a milk bottle to make a Fairlight pan pipe sound and found a melody. As I hummed along, words started to form which often tied in with the subject—"dreamtime/faultline," "warning/morning dew/Mulu," etc. It's all about atmosphere, really. I just try to climb inside my subject and squeeze

Mellotrons. Charles Darwin should be alive today, he'd have a lot to say about recording studios, and rock 'n roll in general for that matter.

EM: Could you describe your favorite musical equipment?

TD: Anything made by PPG. I discovered PPG in about 1981; it sounded very clean and bell-like—long before the Yamaha

a Marshall and an echoplexed, Fender-modified-by-AMS-signal-processor-through-Roland Chorus Echo. But nowadays Hendrix records and Cream records sound clumsy and distorted.

Actually, the first PPG I bought was a giant Wave computer the size of a deep-freeze that was the prototype for the Wave. It went wrong constantly, no one in England knew how they worked, and their designers were always too busy soldering to be of any assistance. But it was the one machine that I never learned inside out, because it is endlessly variable and unpredictable, and that meant that I could always count on it to give me a new sound if I got stuck. Like the bass sound on "Windpower," which had a built-in swing rhythm to it, and fitted so well into the feel of the song that I've performed



Dolby and Herbie Hancock jam at Fairlight's party at a recent NAB convention in Las Vegas. Dolby is improvising with a Voicetracker.

out every drop of detail that adds to it, until one night I can sit back and listen and know it's all there, and then I mix it. . . which I suppose is not much more than the art of making all those impressions onto a piece of half-inch tape.

EM: What is a typical Thomas Dolby recording session like?

TD: I've always avoided using multi-track where possible. In the old days that was a lot more difficult to do—most sequencers would only run from the start of a song, which made mixing a nightmare, because the way I like to mix is to get a section at a time right and then find ways of blending the sections together. Nowadays with the use of SMPTE, most new machines will play from wherever you start the tape. So only vocals and acoustic instruments really have to be on multi-track, and will pretty soon be recorded digitally into powerful sampling devices in full anyway. Actually, I wouldn't give multi-track analog tape recorders more than a couple of years before they're junk, like the old

DX7 of course—and looked like it had been designed by a Frankfurt University professor, which was more or less the case. It also appealed to me because I sensed that clean, glassy digital sounds would one day replace the grittier analog synth timbres. I remember when Kraftwerk, whom I had always adored, came out with their *Computerworld* album after a long wait; I was disappointed. Compared to *Trans Europe Express* and *Man Machine*, perhaps the definitive electronic dance records, this seemed wimpy and insidious. After a couple of plays, it resided on my file-in-forget shelf for a good 18 months. Then one day I listened to it again, and it sounded utterly brilliant. The thought hit me that tastes develop in parallel with, but slightly behind, advances and innovations in musical technology. Like guitar sounds—if, in 1971, you'd heard a sample of the clean sustained chordal sounds later used by Andy Summers, you'd have probably considered it wimpy and insidious too. It was the difference between a Les Paul through

"I sensed that clean, glassy digital sounds would one day replace the grittier analog synth timbres"

the song live, on occasions, with only that bass sound and my voice.

Elsewhere, my favorite sequencer is the Fairlight Page R, and my favorite echo machines are the Roland 555 Chorus Echo and the Yamaha REV-1. The funkier drum machine ever is the E-mu SP12.

EM: Are you concerned that the price tag for getting involved with musical electronics is getting prohibitively high for those who, ten years ago, would have started garage bands?

TD: No, because overall music is now more accessible rather than less. It wasn't easy putting garage bands together either, especially with no money, but it had to happen, because people put up with whatever hardships faced them if they really wanted to get themselves heard.

EM: You have received as much attention for your videos as for your music. How active are you in the storyboarding, production, direction, etc.?

TD: That really varies according to how much time I have and how complicated my performing role is. "Science," "Dissidents" and "I Scare Myself" took around seven to eight weeks each as I conceived, wrote, directed and edited them myself. "Hyperactive" and "May the Cube be With You" were conceived by me but directed by others.

2870

A lot of people complain about videos, and you've heard all the arguments. I feel that if the world takes a particular turn, there's not a lot of point in bitching about it, you have to evolve with it as an artist or hop off. As long as releasing singles and making videos entertained and challenged me, I stuck with it; but one day I just thought, there's got to be a more dangerous way to make a living, and I looked around and found it, for a while at least, in films.

EM: Describe your recent project, working with LucasFilm on *Howard the Duck*...

TD: In the fall of 1985, I was approached by Quincy Jones' company Cinemascore to score a movie entitled *Fever Pitch*, directed by Richard Brooks and starring Ryan O'Neal. I was very pleased to get that opportunity and accepted. Unfortunately, the film turned out to be a damp squid, but it was worthwhile for me because it showed me what I could and couldn't do within the film medium, and introduced me into the very tight-knit

"(I'm) convinced...that making my own films is what I could and should be doing"

Hollywood music clique. Very soon after, I was asked to contribute one song to a Lucas movie called *Howard the Duck*, based on a '70s adult comic. I read the script and was frankly much more interested in doing the score—I've always enjoyed cartoon music and the concept of a large orchestra in a state of complete anarchy, and although this was not an animation, I saw the possibility of writing a ludicrous '80s cartoon score using the new Fairlight.

So Lucas said, "Okay, write four songs for the film and if we like them you can do the score too." There is a band in the movie, four gorgeous nubile girls who deserve much better than the hole of a club in Cleveland, Ohio where they perform. The band is played by actresses and led by Lea Thompson who was excellent as Michael J. Fox's mother in *Back to the Future*. The director, Willard Huyck, was keen that the girls themselves should sing the songs, and as it turned out they were actually excellent singers, though inexperienced. So in order to write songs within their limitations, and on account of their hectic shooting schedule, I decided to move to San Francisco for a while (where

the movie was being shot), bringing in musicians I knew from the U.K. to play the instruments. I also called up Allee Willis, a very brilliant songwriter from Los Angeles, to help me write the songs.

As it turned out, my presence on the set meant that the director and crew started to view me as a kind of resident rocker, and I started to get involved in everything from set design to choreography to suggesting camera angles. The toughest part though was teaching the girls to look and move like a rock band; we found that the only way was for them to plug in their instruments and learn to play for real. They worked incredibly hard to get it looking authentic, and in the process they got pretty good!

Lucas has the best sound and visual special effects facility in the world, and one of the interesting aspects of this was that I was able to incorporate sound effects into the score—for example, using the sound of trashbin lids as the basis for an alleyway sequence. Usually the music composer doesn't even meet the sound effects people until the final mix, and a lot of crucial cues end up being a tussle between the two. The best thing about it for me, though, was that I saw the making of a movie from start to finish, which convinced me that making my own films is what I could and should be doing.

EM: Some people are beginning to complain that the extensive use of instruments with the same factory presets, sampling instruments that use the same disks, and the wholesale sampling of other people's sounds is producing an objectionable similarity in current music. Do you feel this is a problem?

TD: I think it's like clothes, really. If you walk down a main street or around a shopping mall, most stores are selling the same ten or 12 items of clothing with different brand labels. You can kit yourself out in the latest fashions and be totally anonymous and boring and melt in with the crowd, or else you can use your ingenuity, go a little farther afield to second-hand shops and quirky designers, and set yourself apart, probably get noticed by much more interesting people. That's the way it is with music. You can work on the inside or on the outside, but the good stuff is usually well outside because it has that personality that sets it apart.

EM: How do you deal with the demands placed on the individual that "stardom" brings?

TD: I used to be very bad at knowing

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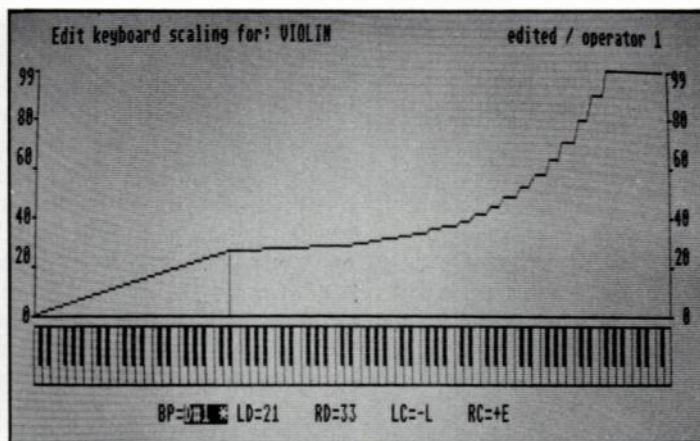
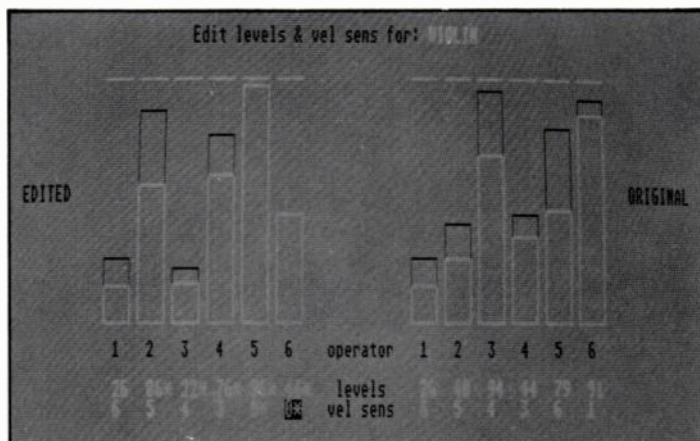
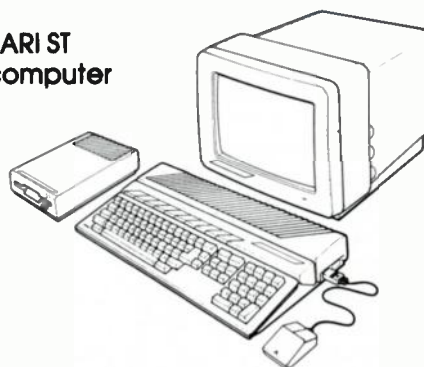
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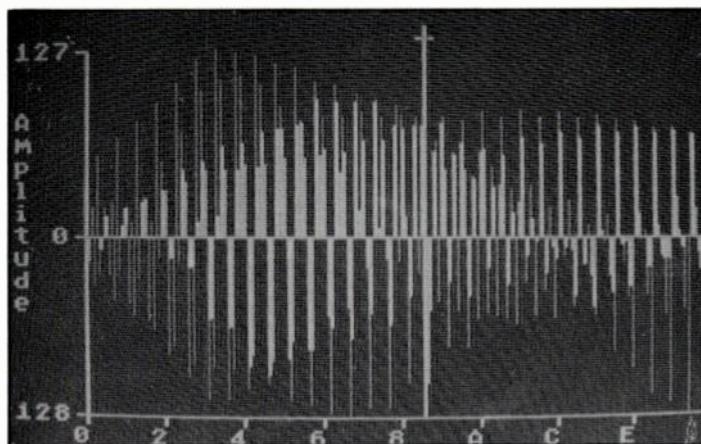
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when to stop working. There was always something to be done that seemed totally worth doing, either for my career or for my artistic satisfaction. Or for my bank account! I don't believe pop stardom is very good for anyone as a human being. It requires that you put your vanity, your arrogance, your self-importance to the fore, and it leads you to believe that just because you have a special gift, you have to use it 24 hours a day, which is not true. I'm a lot better now at being a normal Joe Schmoe, unless I really need to be Thomas Dolby as the world regards him, like in front of a giant live TV audience. Not that I doubt the integrity of the rock legends like Springsteen who just are what they are, but personally I don't feel that I'm a piece of public domain, and I don't intend to live like one. Having said that, I do live for my work, and I am very, very grateful to have been successful at a job that I love. A lot of people aren't that lucky.

EM: When can we expect another Thomas Dolby solo album?

TD: I'm dying to get back to that, but also dreading it: specifically, the nightmare of playing the whole record company game in order to get the thing heard. What's nice about a movie is that there are no

A&R people or radio programmers to decide what the public should or shouldn't hear.

EM: In what directions do you want to take your artistic impulses in the coming years?

TD: I think they'll decide that for themselves!

EM: Is your understanding of music mostly intuitive, or do you have a particular approach to making music?

TD: Everything I'm saying here is stuff that only crops up because you're asking me questions about it. Or else at dinner parties. I'm not an intellectual artist, I notice patterns and concepts in my work only in retrospect, as opposed to applying them in advance in a Brian Eno sort of way.

There's nothing wrong with that either, I mean I marvel constantly at the way he breaks the rules, but what I do is mainly intuitive and motivated by a puerile sense of mischief, and an incurable romance with this little planet and its occupants. There's no such thing as an "approach" or a "key" to art. Except maybe "approach with caution, it is armed and may be dangerous!" **EM**

—from page 55, **HEAVEN**

SBX-80 SMPTE generator/reader for this. The SMPTE stripe proved very useful for other applications besides sync-to-picture, such as entering accurate offsets in start points, and triggering the LinnDrum.

For three weeks, Russ and I cranked out film cues. I would divide my days and nights between spotting sessions, composing, and recording. In my tiny office in the legendary Brill Building, I installed an upright piano and a borrowed video player and monitor. I rented a LinnDrum, a Fender Princeton, bought a little cassette-to-cassette beat box, and happily created a film score cue-by-cue, pausing only on occasion to survey Times Square spread out below me.

THE FINAL SESSIONS

By the end of our first three weeks, we had recorded virtually every cue with piano, synths, and Linn. We then moved further downtown, to Sorcerer Sound. The first morning, we transferred all the material that had been recorded on half-inch 8-track over to 2-inch Ampex 456, undecoded at 30 ips for minimal generation loss. The SMPTE code was also transferred and checked. We were ready to bring in the band.

The piano score evolved rapidly. The first sessions were bass and drums, followed by guitar, woodwinds, strings, and vocals. After finishing off background vocals and some solo fiddle, it was time to mix.

Our engineer, Michael Golab, mixed to half-inch 4-track, 30 ips, with Dolby. Track 4 was SMPTE; tracks 1, 2, and 3 were various groupings of instruments and vocals, depending on the cues. This gave the director maximum flexibility in the final film mix of dialogue, sound effects, and music. The final mix was mono, at Coppola's request.

And then it was over. Seven weeks of non-stop creating, 20 hours a day of musical output, were all wrapped neatly around spools in a cardboard tape box and disappeared into an editing room for the final step of film scoring—dubbing the cues into the movie. By this time, I was through with my job. The music editor had all his notes, the director and producer had their opinions on how to incorporate each cue, so now it was my turn to fade. A month later, the film had a new title, *Seven Minutes in Heaven*. By early 1986, a release date of "late spring/early summer" was being anticipated. And, as they say in Hollywood, it will be "coming to a theater near you." Maybe I'll see you there. **EM**

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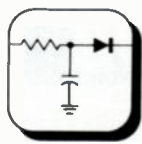
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Losing detail in your video? Here's a simple and inexpensive project to help you get it back.

Video Distribution Amp

BY JACK ORMAN

A video distribution amp is analogous to an audio buffer circuit. Both provide impedance matching, and possibly a little gain, to compensate for losses due to long cable runs or from feeding several video inputs from a single video output. In both

cases, loading down the output can cause high frequency loss, just as in audio. This high frequency rolloff translates into a loss of fine detail in the video picture. Using a video buffer (distribution amplifier) provides a single video output with the extra drive and proper output imped-

ance needed to drive multiple video inputs and long cables.

HOW IT WORKS

Fig. 1 shows a one-IC video buffer based on the LM359 Dual Current-Mode Amplifier chip. Each amplifier is similar to that

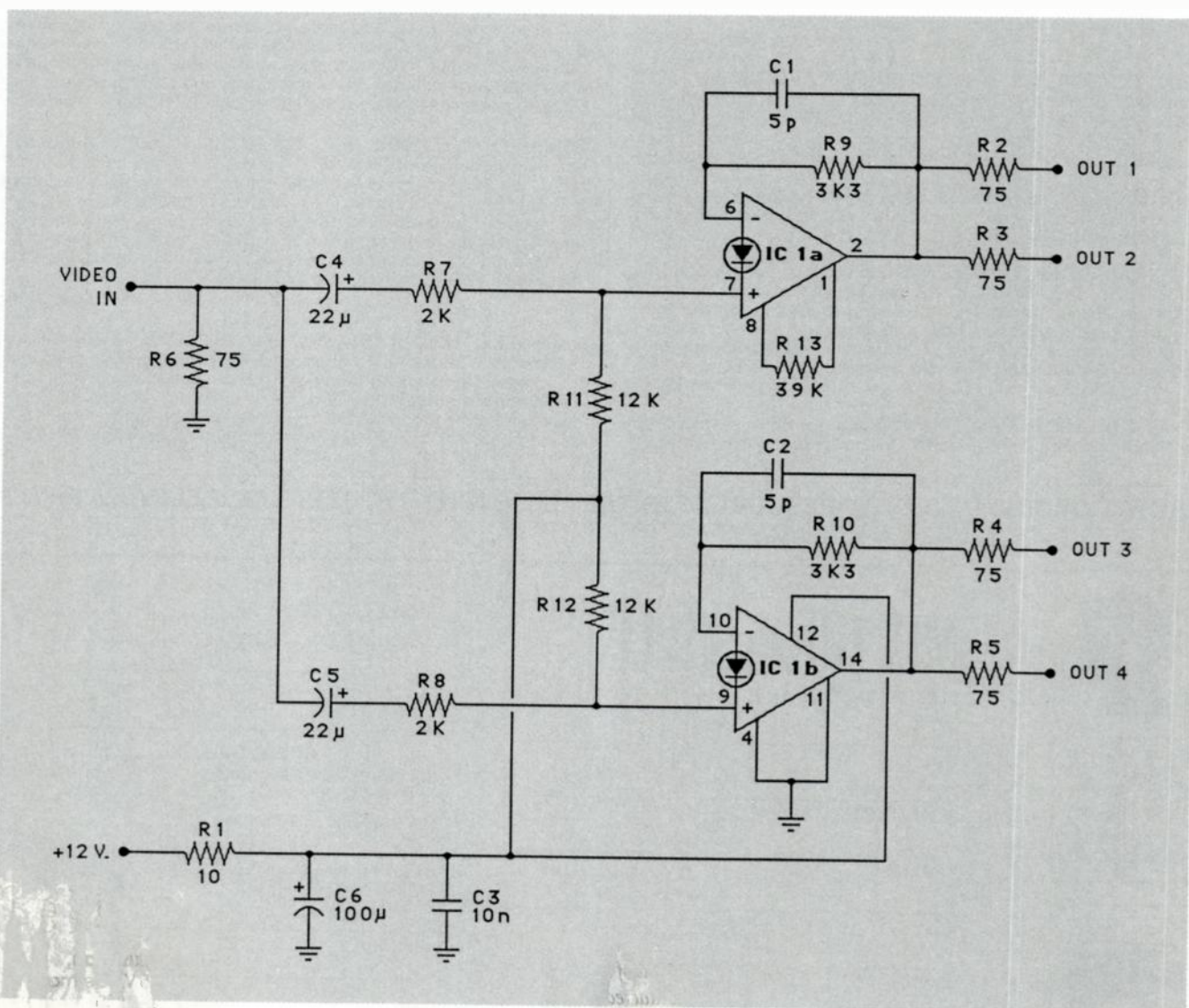
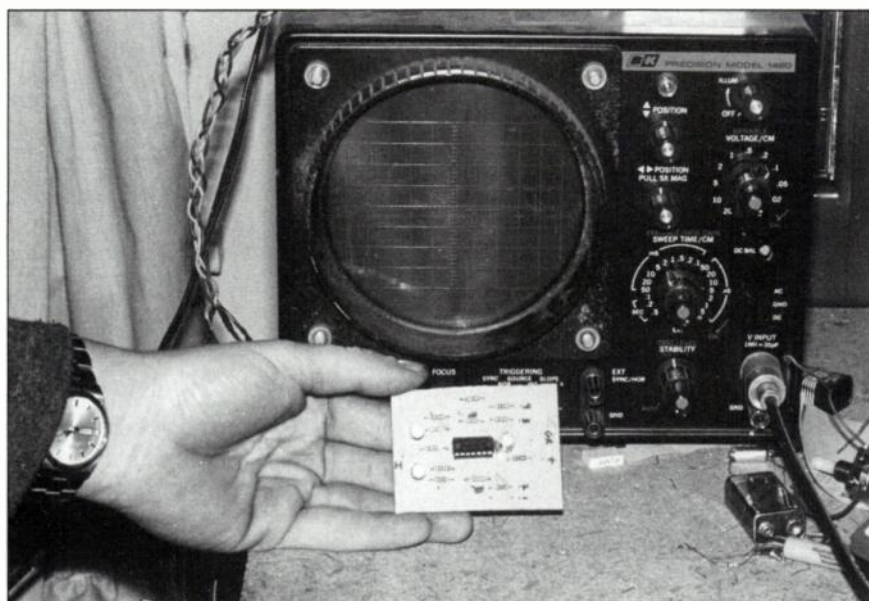


Fig. 1: Video Distribution Amp



Video distribution amplifier prototype

of the "old standby" LM3900, but has much higher bandwidth and better high frequency performance. Each half of the LM359 is set up as a non-inverting buffer. Resistor R13, the current programming resistor, sets the bandwidth, bias current and drive. The capacitors (C1, C2) that parallel the feedback resistors restrict the bandwidth to 10 MHz and promote amplifier stability at low gain. R11 and R12 set the output DC bias levels, C4 and C5 AC-couple the input signal to the amplifier inputs, and R6 provides a proper load for the typical video signal.

Since the most common video equipment voltage is 12 Volt, this circuit is designed to run from a +12 Volt supply. A

well-regulated and filtered voltage source is preferred, but as the current requirements are quite low (my prototype required only 25 mA of idle current) power supply requirements are fairly flexible.

CONSTRUCTION

Video circuits can be as simple and easy to build as audio designs if you follow a few rules. Use a single-point grounding method where all grounds return individually to a single ground, located as close as possible to the power supply ground. Keep all component leads short and close to the board. Inputs and outputs should use shielded cable and also be as short as possible. Be sure to wire the bypass capacitor (C3) right at the IC power and ground pins (pin 12 and pins 11/4, respectively). Any other good wiring practices you have picked up for audio work are equally applicable to video projects.

The LM359 is easy to find and affordable; its video-ready performance lets you get into video construction with a minimum of parts and expense. I hope to present other video circuits based on this chip in later issues. **CM**

Jack Orman attended Memphis State University and has worked in electronics for ten years. For about seven years, he played in a contemporary Christian band and he is now composing in his home studio. At present, he is working as a technical director in the Video Access department of his local cable channel, and may be contacted over the Delphi electronic mail network via user name JAO.

PARTS LIST

Resistors (1/4 Watt, 5% tolerance)

R1	10 Ohms
R2-R6	75 Ohms
R7, R8	2K
R9, R10	3.3K
R11, R12	12K
R13	39K

Capacitors (12 or more Volts DC)

C1, C2	5p ceramic disc
C3	10n ceramic disc
C4, C5	22μ electrolytic
C6	100μ electrolytic

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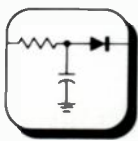
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Now guitarists, and other non-keyboardists, can harness the power of MIDI for their signal processing setups.

The MIDI Program Change Footswitch

BY TIM DOWTY

When MIDI-controllable audio effects began appearing on the market, no one was happier than I. For years, I had been trying (with limited success) to give stock digital delays and equalizers in my equipment rack the capability to perform the rapid-fire timbral changes my music demanded. Here, at last, was a solution: the MIDI program change mechanism provided an industry-wide, standard way to shift sonic gears (see sidebar). But after assembling a MIDI-controlled effects system, a glaring new problem emerged: except with a synthesizer, there was no way to generate MIDI program change commands!

The MIDI Program Change Footswitch (MPCF) is my solution to the problem. It's an inexpensive, self-contained unit that transmits MIDI program change requests in response to a set of floor-mounted switches. With each footswitch activation, the MPCF sends program change messages (consisting of two serial bytes) over the MIDI line, which can control any MIDI device that accepts program change: digital delay, digital reverb, effects loop, mixer, and, yes, even a synthesizer...

I designed the circuit with a guitar player's needs in mind, but I'm sure that musicians of all stripes can make use of the MPCF. As we'll see, the switch arrangement is somewhat flexible, so that it can fit into just about any MIDI system.

CIRCUIT OVERVIEW

Functionally speaking, the MPCF circuit divides pretty neatly into three separate fragments; therefore, I'll use the old "divide and conquer" scheme for describing

Tim Dowty has worked as a guitarist with the San Diego-based synth trio "Elemental P," as well as done software design for Inter-Ocean Systems. He is currently consulting to various musicians on MIDI and related topics, and readying a line of low-cost MIDI project kits for electronic musicians.

how the circuit works.

The first fragment is a souped-up "Small Tock" circuit (see the April 1985 issue of EM). This circuit provides a relatively simple way to send serial MIDI information, and doesn't require a fancy UART (Universal Asynchronous Receiver/Transmitter). Essentially, this part of the MPCF does the dirty work of formatting and transmitting MIDI data.

The second fragment precisely controls the data generated by the Small Tock section. Think of #1 as the musician of the circuit, who plays whatever is put in front of him, while #2 is the composer who decides what gets played.

Ah yes, fragment three. Number three is the "glory boy" of the whole affair: the display section. To carry the musical analogy a little further, the bright lights and numbers might be likened to a not-so-shy concert promoter. The promoter has lots of flash, and we don't know what's going on without him; then again, he's nowhere without the other two pieces of the circuit.

By the way, I tend to be a little sloppy about logic level names in what follows, so understand that "high," "1," and "5 volts" are meant to be equivalent expressions referring to one logic level, and that "low," "0," and "ground" are meant to refer to the other, opposite level.

HOW IT WORKS: FRAGMENT ONE

Circuit fragment one, the Small Tock section, appears in the top half of Fig. 1. IC1a and b, along with IC2 make up the 31.25 KHz bit rate clock, IC3 through IC6 are the shift registers, and IC7a and b drive the MIDI line. This part of the circuit is identical to the original Small Tock MIDI Clock, except that here we've strung two single-byte Small Tocks together, and several of the data pins are no longer hard-wired to set values. These changes are made to accommodate the different data format of the program change command.

The two eight-bit bytes we want to transmit get loaded into IC3 and IC5 when their Load inputs (pin 9) go high. Simultaneously, the four flip-flops making up IC4 and IC6 get either Set (to "1") or Reset (to "0") in response to the same signal. As soon as the Load signal returns low, each of the 20 pre-loaded bits is clocked rightward (one register at a time) and ultimately appear at IC6b's Q output (pin 13). Naturally, the motion to the right means that the bits loaded into IC5 will get there before the bits we put into IC3.

As each bit arrives, its particular logic level is instantly impressed on the MIDI line by IC7a and b. Thus, the two bytes we loaded earlier in parallel appear as a serial stream of bits over MIDI. The bits pre-loaded into IC6a and IC4b serve as the first byte's start and stop bits, respectively, and the bit we loaded into IC4a is the start bit for the second byte. The IC6b bit absorbs any phase difference between the Load pulse's trailing edge and the clock signal at IC2 pin 1, insuring that a full-width start bit precedes the first byte.

One other difference you may notice between fragment one and the original Small Tock is the presence of the R3/C3 network hanging on IC6a's S input (pin 6). When power is first applied, these components hold IC6a's Q output high until the rest of the circuit stabilizes. Without them, the circuit will put all sorts of random garbage on the MIDI line, with the possible (but unlikely) effect of putting your MIDI gear into unwanted modes of operation. If you built the original Small Tock, I suggest that you add these components there, as well.

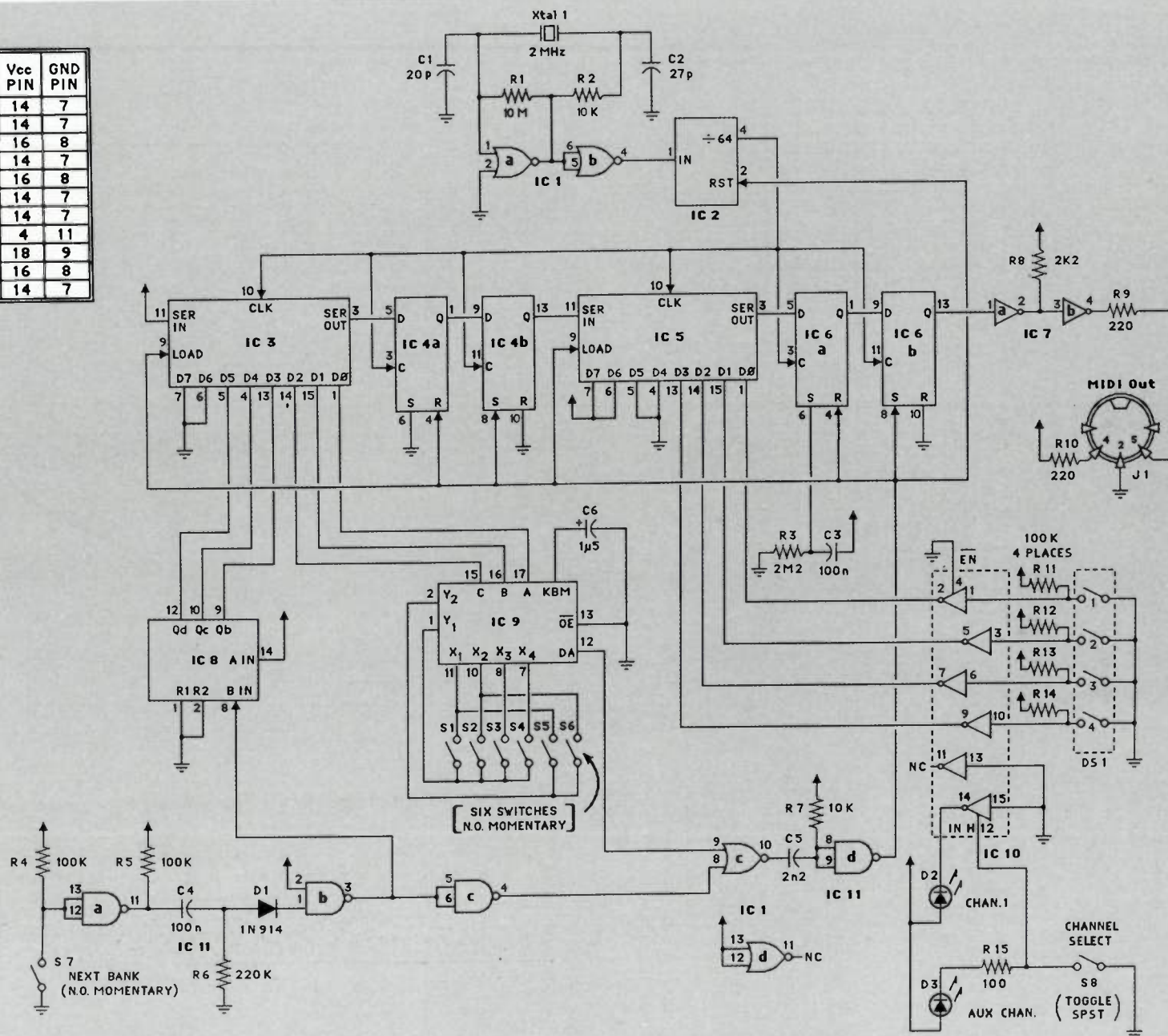
FRAGMENT TWO

Now let's take a look at the second circuit fragment, starting with IC10, a 4502. The 4502 would be your typical six-inverter package except for two special features. First, its outputs can be "tri-stated" or "floated," meaning that in addition to the logic high state and the logic low state, there is a third, high-impedance state in which the outputs are effectively disconnected from the lines they normally drive. Bringing the not-EN input (pin 4) high floats the outputs.

This is all academic, though, since we tie this line to ground in the circuit so that the outputs are always enabled. It's the second feature we want to exploit here. With the INH input (pin 12) low, the six inverters behave normally, with their outputs always reflecting the opposite state of their inputs. The trick is that

Fig. 1 MPCF-IC Specs

DESIG-NATION	TYPE	Vcc PIN	GND PIN
IC 1	4001B	14	7
IC 2	4024	14	7
IC 3	4021	16	8
IC 4	4013	14	7
IC 5	4021	16	8
IC 6	4013	14	7
IC 7	74 LS 05	14	7
IC 8	74 C 93	4	11
IC 9	74 C 922	18	9
IC 10	4502	16	8
IC 11	4093	14	7



it's possible to cause the outputs of all six inverters to go low, regardless of the state of their inputs, simply by taking the INH input (pin 12) high. When INH returns low, the inverters again behave normally.

The net effect of IC10 and all the stuff around it, then, is that with S8 open, the outputs of the top four inverters are determined by the settings of DS1. With the switch closed, the outputs are always low, no matter where the DS1 switches are set.

Why is this useful? For the answer, we need to look back along the fragment one/fragment two border. And in particular to the data pins of IC5, recalling that the byte pre-loaded here will be the first of the two bytes to be sent out.

THE MIDI PROGRAM CHANGE MESSAGE

MIDI specifies that a program change message will consist of two consecutive bytes, the first of the form \$Cx, and the second of the form \$nn (the \$ indicates that the number is in hexadecimal). The "x" in the first byte can be replaced by any hexadecimal digit from 0 to F (decimal equivalent: 0 to 15), and its value determines on which MIDI channel the program change will take place. A "0" gives us channel one, a "1" channel two, and so on up to "F," which specifies channel 16. The "C" is the particular hex digit that, paired with the channel digit,

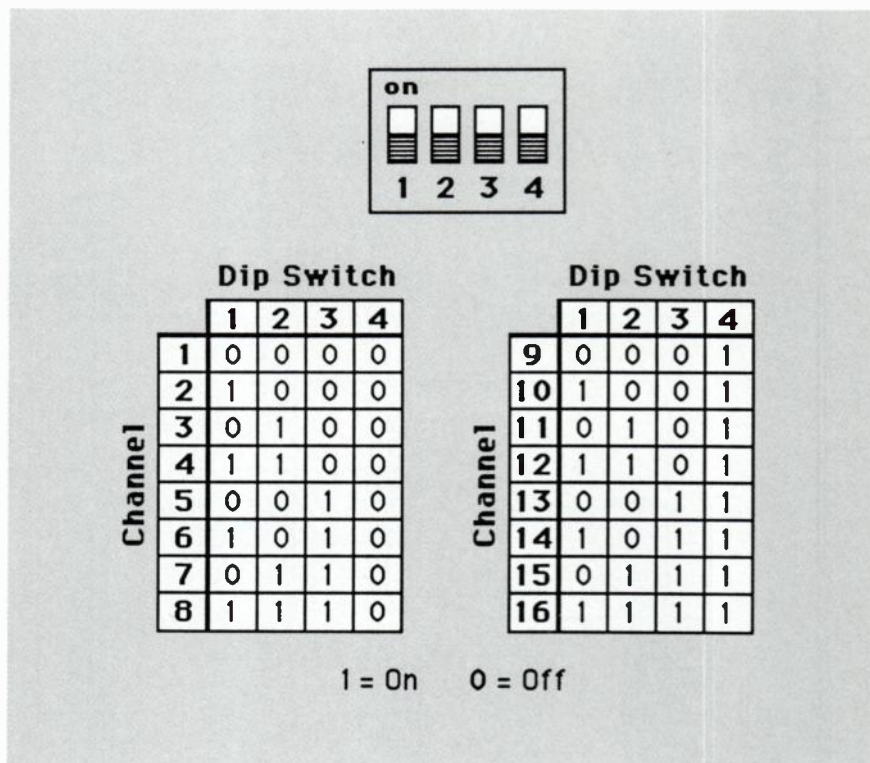


Fig. 2 Auxiliary MIDI Channel is selected by a DIP Switch on the MPCF Board

MIDI understands as a program change command.

The second byte specifies the new program number, but we're getting ahead of ourselves. Let's push that byte on the stack for a minute and get back to IC5

and our inverters.

If you look again at IC5's data pins, you'll see that D7, D6, D5, and D4 are hard-wired to the binary equivalent of hexadecimal "C" (that being "1100"), and the states of the lower four bits are determined by the outputs of the four IC10 inverters. Therefore, the inverter outputs will determine on which one of the 16 MIDI channels the program change will occur.

The circuit is designed so that you always have two channels over which you can readily send program changes. Toggle switch S8, when open, always gives you channel one; closing S8 enables an auxiliary channel that corresponds to the DIP switch settings shown in Fig. 2. D2 and D3 indicate which channel, "one" or "auxiliary," is currently selected.

Strictly speaking, flashy LEDs belong in circuit fragment three. But remember that we said fragment three was like a concert promoter? Well... have you ever known a promoter who didn't try to get a finger into everything?

CHOOSING PROGRAM NUMBERS

Now that channel selection is out of the way, let's pop that byte we saved earlier back off of the stack. As you remember, it was of the form \$nn, and represented the program number to which we wanted to change. MIDI says that this number can range from \$00 to \$7F, corresponding to

PARTS LIST

Resistors (1/4 Watt, 5% tolerance)

R1	10M
R2, R7	10K
R3	2.2M
R4, R5, R11-R14	100K
R6	220K
R8	2.2K
R9, R10	220 Ohms
R15-R22	100 Ohms

Capacitors

C1	20p ceramic disc
C2	27p ceramic disc
C3, C4	100n ceramic disc
C5	2n2 ceramic disc
C6	1μ5 electrolytic

Semiconductors

D1	1N914 or equivalent
D2, D3, D5-D10	LEDs
D4	Common cathode seven-segment display
IC1	4001B quad gate
IC2	4024 binary counter
IC3, IC5	4021 shift register

IC4, IC6	4013 dual-D flip-flop
IC7	74LS05 hex inverters
IC8	74C93 binary counter
IC9	74C922 keyboard encoder
IC10	4502 tri-state inverters
IC11	4093 quad Schmitt trigger
IC12	4511 seven segment driver
IC13	4028 BCD-to-decimal decoder
IC14	4049B hex inverter

Other Parts

X1	Crystal
J1	5 pin DIN female jack
DS1	Four-position DIP switch
S1-S7	Single pole, single throw momentary pushbutton footswitches
S8	Single pole, single throw toggle switch
Misc.	Wire, solder, IC sockets, case, power supply, etc.

decimal synth programs 0 to 128.

But wait. Before we blindly charge ahead, let's shift our thinking for a moment. Let's hang up our calculators and strap on our guitars so that we can answer the question: How can we organize the footpedal so that it's both straightforward and easy to use, yet makes a maximum number of programs available?

At one extreme, we could set out 128 individual footswitches in a long row or matrix arrangement. Sure, it would work—but the pedalboard would be huge, and running a 50-yard dash just to make a program change is absurd.

At the other extreme, we could use just one switch to do all of the program changes. Successive switch activations would count through each of the 128 programs one by one. However, this scheme isn't really any better than the first; changing from, say, program 10 to program 75 is going to be anything but instantaneous, and if you happen to step past 75, you're going to have to do a heck of a lot of switching before you're back to where you want to be.

The best solution, I think, sits somewhere between the two extremes. Precisely where depends on your personal pref-

Bank	Program Switch					
	1	2	3	4	5	6
0	1	2	3	4	5	6
1	9	10	11	12	13	14
2	17	18	19	20	21	22
3	25	26	27	28	29	30
4	33	34	35	36	37	38
5	41	42	43	44	45	46
6	49	50	51	52	53	54
7	57	58	59	60	61	62

Fig. 3 Available programs are shown in grid. A program is selected by choosing bank, then individual program switch.

erences, but after some head scratching, I came up with the following scheme that I intended as a more-or-less "one size fits

all" setup. The switch numbers in parentheses refer to callouts on the schematic.

✓ Programs are grouped in *eight* banks of six programs each.

✓ A single momentary switch (S7) does bank select; each switch activation selects the next bank in the sequence. The first push of the switch changes from bank "0" to bank "1," the second push gives you bank "2," and so on. A push of the switch in bank "7" rolls over back to bank "0."

✓ Six individual momentary switches (S1-S6) select the programs within each bank. There is no "stepping through" as with the bank switch, so each of the six programs within the selected bank is instantly accessible.

By-products of this layout compromise are: 1) a few gaps in the sequence of available program numbers, and 2) a reduced palette of program selections (only 48 of the possible 128 can be selected).

Fig. 3 illustrates the relationship between footswitch selections and program changes.

The missing programs notwithstanding, the above scheme still works well for me. During any given song, I rarely need more than six different program changes available instantaneously underfoot, but

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from song to song, I need several different sets of six instantly available program changes. What I do is set everything up so that bank "0" gives me my sounds for the first song of the set, bank "1" for the second, etc.

IC8, IC9, IC11, and IC1c implement all this selection stuff in hardware. Let's first look at how IC9, a 74C922, encodes S1-S6. The normal use for this chip is to encode 16-key keyboards, but it works beautifully in this application, too. What happens is that whenever a switch is closed (or a key pressed), the switch number (mapped here as 0 to 5), is put—in binary form—on the A, B, and C pins. At the same time, the DA (Data Available) output (pin 12) goes high, and stays high until the switch is released. Like IC10, this IC has tri-state capability, but, once again, we don't need it, so the not-OE input (pin 13) is set so that the output is always enabled.

The mnemonic on pin 6 stands for KeyBoard Mask. A capacitor between this pin and ground works with some circuitry inside the IC to debounce the switches so we get a single, glitchless DA transition per switch closure.

IC8, the 74C93, is a counter that increments the three-bit value on its Qb,

How MIDI Controls Signal Processors

While most people think "keyboards" and "computers" when they think of MIDI, signal processors are also benefiting from a MIDI message called *Program Change*.

The original intention of this command was to allow slave synthesizers to change programs in response to a single program change on a MIDI master keyboard. As you changed from, say, Program 1 to Program 2 on your master keyboard, it would send out a message telling the slave synths to also change from Program 1 to Program 2.

Since many signal processors started to organize different sounds as "programs" in memory, the next step

was to assign these programs MIDI program numbers. Thus, calling up a program on your MIDI master could also call up a particular program from a signal processor (i.e. chorusing for a string patch, echo for a sax sound, etc.).

Unfortunately, until recently electronic guitarists and other non-keyboard players have had limited access to the program change feature. However, devices such as Peavey's ten-program MIDI footswitch, Ibanez's line of effects for guitarists, and of course, Tim Dowty's project are sure to start a trend that will change all that.

—Editor

Qc, and Qd outputs in response to a pulse on the Bin input (pin 8). There's no built-in switch debouncing here, so the mess around IC11a and b is necessary. If the switch isn't debounced, then the mechanical bounce from a single switch activation will result in several IC8 counts.

The left-over gates, IC11c, IC11d, and IC1c, along with R7 and C5, produce a

narrow Load pulse whenever either a bank or a program change switch is activated. As you remember from fragment one, a Load pulse pre-loads the Small Tock registers with data, then starts the MIDI transmission. This means that any activation of S1-S6 or of S7 will not only put the new program number on IC3's data pins, but will also cause the trans-

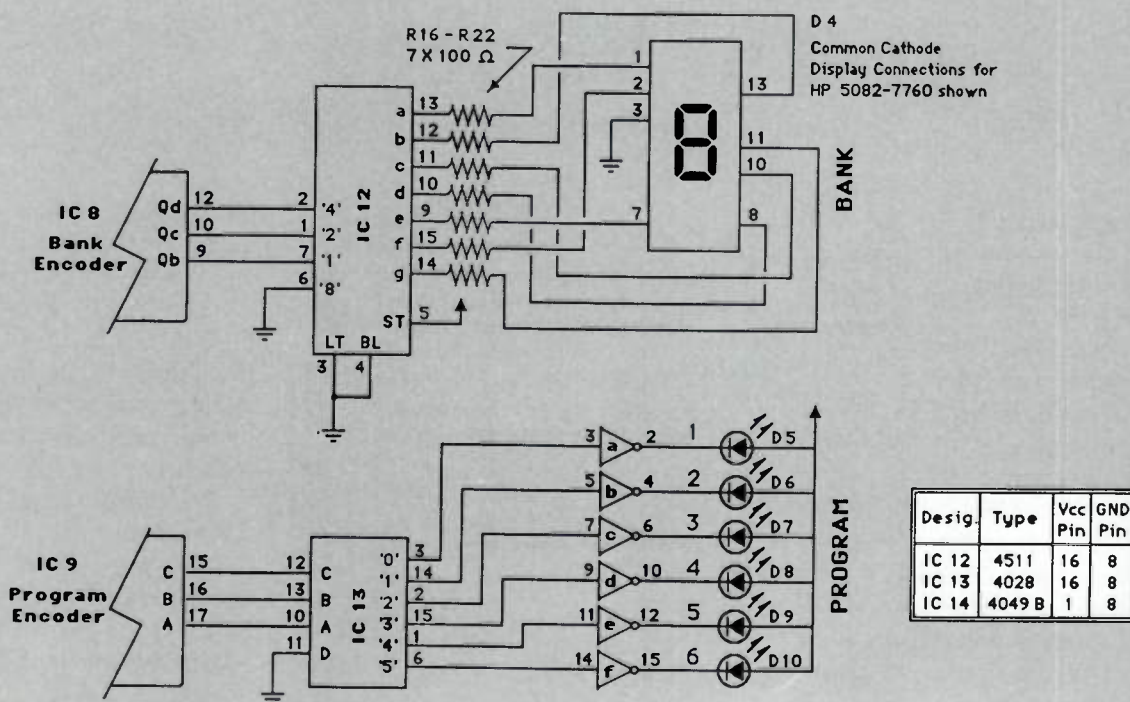


Fig. 4 MPCF Display Section—Fragment 3

mission of the new program change request over MIDI.

FRAGMENT THREE

The display section, shown in Fig. 4, accepts the binary-encoded versions of the currently selected bank number and program number and (what else?) displays them. IC12 and IC13 take their respective inputs from the fragment-two encoders we just discussed. For the sake of clarity, the connections from the indicated encoder pins that also go to IC3's data pins in Fig. 1 are left off of the figure, but are still there even though we can't see them.

The bank encoder, IC8, drives a 4511, which converts the input binary number into the appropriate lit and unlit segments of D4. Note that each of the lines "a" through "g" requires a 100 ohm current-limiting resistor between the encoder output and display terminals; these are not shown due to space limitations.

The individual program displays are controlled by IC13, which works by taking one of its outputs high according to the binary value on its input pins. If you'd rather have a numeric display for the program as well as the bank, just replace IC13, IC14 and the six LEDs with a sec-

ond 4511 and common-cathode display.

CONSTRUCTION

All of the required components are readily available from reputable mail order suppliers, with the possible exception of footswitches (S1-S7) which may be difficult to find. Garden variety "stomp box" switches are not the momentary type, and won't work here. I don't see why you couldn't use big, sturdy "front-panel" type push-button switches (such as Mouser Electronics #10PA349) in a floor box, or maybe switches from an old commercial pedalboard system could be salvaged. (Or try an auto parts supply store; many cars use momentary pushbuttons for a variety of functions.)

I haven't yet settled on a choice of footswitches. My wire-wrapped prototype uses regular finger-operated switches, but the switches and LEDs are connected off-board via 14-conductor ribbon cable for maximum flexibility. Once the circuit is built, I suggest you run a static wiring check (see "Build the EM MIDI Interface" in the May 1986 *EM*) before applying power. Static checks are a good idea for any newly built circuit—even power supplies. Speaking of power supplies, the MPCF requires a well-regulated 5 Volt,

175 mA supply for operation. Don't skimp on the power supply and expect reliable operation; on-stage 120 volt mains are notoriously funky and will drop kick you every chance they get!

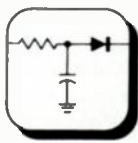
CIRCUIT MODS AND TIPS

If my "universal" footswitch scheme doesn't quite fit you, consider two circuit alterations. First, it's easy to double the number of available program changes. Just hook up another switch (alternate-action type) so that you can change the logic level on IC3's D6 input (pin 6). This gives you an additional "meta-bank" of eight banks.

Second, as hinted at above, IC9 will encode up to 16 switches. Maybe that's too many for a pedalboard, but why not mount a 16-key keypad on or near your instrument? This has the added benefit of filling in the "holes" in my six foot-switch scheme. Take a look at a 74C922 data sheet to see how to do it. You can add two more program select switches without changing the data connections to IC3, but any more than that and you'll have to move the bank select lines over one data pin to the left.

Happy building...and happy MIDI footswitching! **EM**

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Space is the place...to put these very practical circuits.

Panel Fillers

BY THOMAS HENRY

When completing the design of a front panel for a new synthesizer module, you often have a little room left over. Space is usually at a premium in most patch-jack systems, so it really pays to make good use of it. This time we're going to look at several small circuits that will fill that extra space and add more versatility to your synthesizer at the same time.

THE MULTIPLE

The first panel-filler that comes to mind is the *multiple*. Multiples are nothing more than several jacks wired together in parallel. While certainly not the most glamorous "circuit" in the world, multiples are needed in nearly every patch of at least medium complexity. For example, you may want an ADSR output to modulate a VCA, VCF, and LFO all at the same time. In this case, the ADSR control signal is routed to the multiple, where the signal splits off into the three desired paths.

Multiples take very little panel space. Typically, on a single-width rack panel, you will need one inch of width for each jack in the multiple. Of course, you can

arrange the multiples in any pattern you think right, and in my system this works out to groups of four. For example, the front panels on the power supplies in both my drum box and sequencer box each sport three quad multiples. (There's generally not very much happening on the front panels of power supplies, hence they are very good candidates for this filler).

THE CASE OF THE UNCOMMITTED CAPACITOR

Fig. 1 tells the story. You will recall that our standards adopted here in "Practical Circuitry" require all modules to be DC coupled so that we can process DC control signals as well as AC audio signals with equal ease. However, there are times when you may want to block any accumulated DC offset, which is when the uncommitted capacitor comes into play. Simply route the signal to jack J1, tap the output at J2, and away you go. This is especially useful at the end of a signal chain when you are passing an audio output to an amplifier. The uncommitted capacitor requires one to two inches of single-width rack panel space, and makes a fine addition to mixer circuits in particular.

THE UNCOMMITTED ATTENUATOR

This can help keep levels under control. Referring to Fig. 2, a signal that is too hot for some later circuit feeds J1. Potentiometer R1 attenuates the signal and passes

it to J2. I find the uncommitted attenuator to be most useful in taming the 10 Volt peak-to-peak synthesizer signal for use with a tape recorder. The width required by this circuit is on the order of three inches.

THE PULSE LIMITER

The next two panel-fillers apply particularly to drum and sequencer systems. Examine Fig. 3, which illustrates a "pulse limiter" circuit. IC1 is set up as a comparator that swings high when the input rises above one-half Volt. (The 39K and 1K5 resistors set this threshold.) The important thing to notice is that D1 in tandem with R2 and R3 restricts the output to a swing from 0V to +5V. Hence, the input pulse signal is limited. "What good is that?", you may ask. Well, some of the modules described in "Practical Circuitry", most notably Microdrums, operate on a 5V power supply; allowing any input voltage to rise above this level could cause damage to the remaining circuitry. So use the pulse limiter whenever you are driving TTL or computer-type projects that operate off this lower voltage.

PULSE EXTRACTOR

Fig. 4 shows a panel-filler that is worth its weight in gold! Although it has other uses, the "pulse extractor" was designed to recover timing pulses from a clock track on a tape recording. These pulses can then trigger a sequencer or drum box. This allows us to do multi-track sequencer and drum overdubs at any time (they don't have to be the first tracks), as long as a clock track was recorded on an unused channel first. Unfortunately, clocks have a nasty habit of bleeding energy over into adjacent tracks, so it is important to record them as softly as possible. The tradeoff here, of course, is that soft clocks are more difficult to recover, but the pulse extractor circuit is sensi-

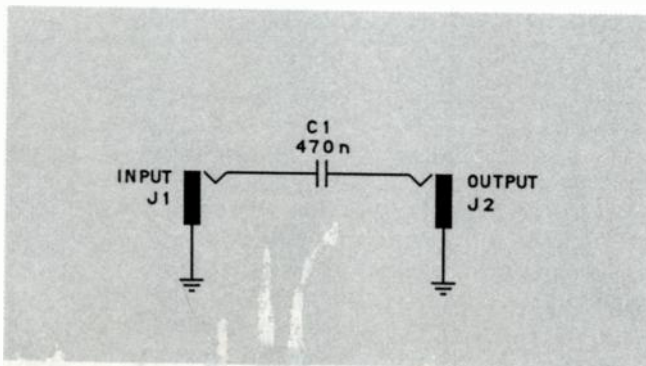


Fig. 1 Uncommitted Capacitor

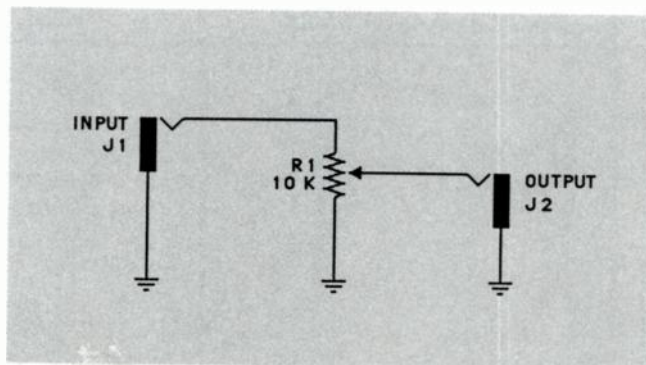


Fig. 2 Uncommitted Attenuator

tive enough to handle the most demanding situation. Let's see how it works.

The clock channel (from a tape recorder, for example) feeds jack J1. C1 and R7 differentiate this signal, which transforms the sickly input pulse into a sharp spike. IC1 is configured as a comparator, and this will square up the spike into a nice trigger signal. Divider chain R1-R5-R6 sets the sensitivity for this stage. R5, which is a front panel control, allows you to accommodate signals from just about any source (not just tape recorders).

D1 limits the pulse extractor output to positive excursions; R2-R4 provide attenuation. This insures that the swing falls in the desired range of 0V to +5V.

Finally, an LED indicator allows visual feedback of how the circuit is doing. When the comparator goes high, C2 charges up, thanks to the path provided by D2. The voltage on C2 is enough to turn on Q1, which itself turns on LED D3. Diode D2 blocks the reverse current so that C2 can discharge only through R8, and this takes a fair amount of time. Taken together, C2 and R8 act as a pulse stretcher, which allows the LED to stay turned on long enough for it to be seen. (Otherwise, the LED would flicker too

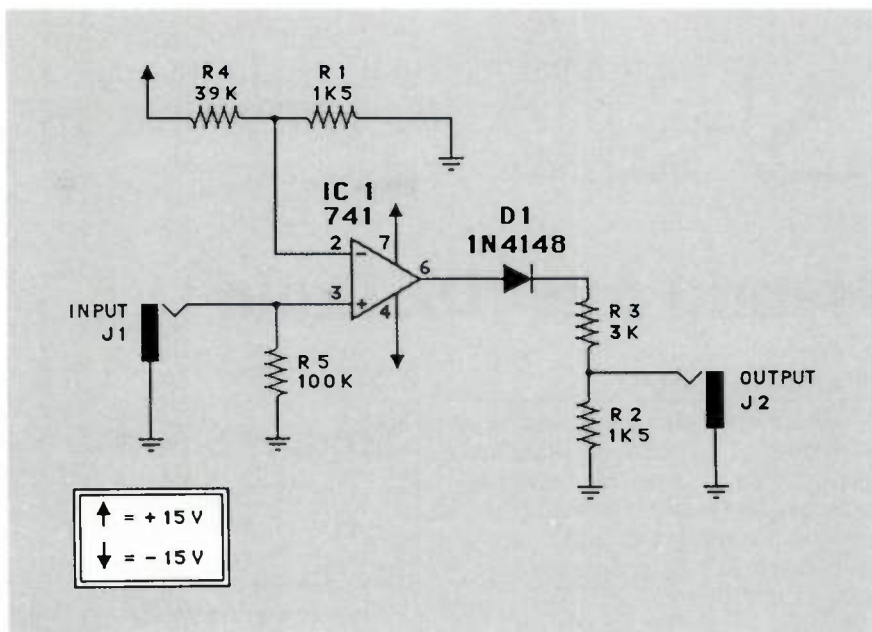


Fig. 3 Pulse Limiter

rapidly for the human eye.)

In terms of front panel space, the pulse extractor consists of two jacks, a pot, and an LED, and consumes a mere three inches. Despite the small size, this circuit is essential to any multi-track drum or sequencer system, and clearly makes a great panel filler. I built mine right next to the RS-232 Drummer (described previ-

ously in "Practical Circuitry"), since the two really go together well.

So next time you're designing a front panel for a new module, don't let any space go to waste! With the price of rack panels being what it is, it makes a lot of sense to throw in a panel-filler. Get your money's worth and add versatility to your system at the same time!

EM

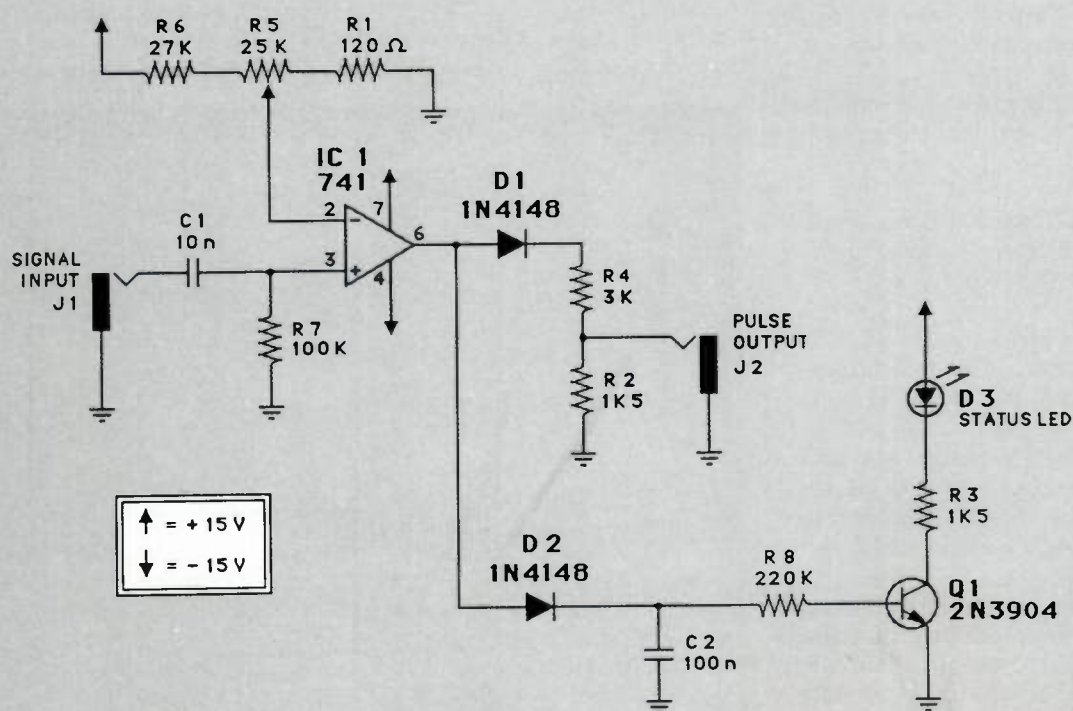


Fig. 4 Pulse Extractor



What happens when you throw a 520ST, a DX7, innovative software, and some artificial intelligence together?

Hybrid Arts "DX Droid"

BY CRAIG ANDERTON

(The following is not a review, but a preview. The program I had for testing was a not-quite-ready-for-release version that was still undergoing final tweaking. Even so, the program was fascinating and close enough to completion to warrant an evaluation.)

DX Droid, for the Yamaha DX7 and TX series modules, offers voice editing (graphic and numeric) and sophisticated patch librarian functions, but more importantly, includes a Droid function. I'm tempted to skip right to that part immediately, but let's spend some time looking at the more ordinary aspects of the program.

MAIN FUNCTIONS

When you first boot the program, you are presented with a nifty title page and then a fairly spartan main menu that presents a list of the function key options:

F1, File: This is where file management takes place. Send files to and from the DX7, lock (protect) files, erase, name, etc.

F2, Edit: This is where all your editing options reside and is the heart of the program.

F3, Index: Essentially acts as a notepad for keeping track of what's happening with files.

F4, Catalog: Lets you catalog files by suffix, prefix, only locked files, only unlocked files, all indexed files, etc.

F5, Bank: Use this function to send an entire bank of files to or from the DX7, name banks, erase a bank, send function parameters only for a bank, and the like.

F6, Utility: These functions let you change data disks, set the MIDI channel, erase all files, erase all banks, catalog the synth voices, and other useful but not particularly glamorous options.

F7, Edit Bank: This is basically the patch librarian section of the program.

Product Summary

Product: DX Droid

Type: DX7/TX voice editor/generator, librarian

Price: \$244.44

Hardware requirements: Atari 520ST (with disk or ROM TOS), disk drive, monitor, or Atari 1040ST

Manufacturer: Hybrid Arts, 11920 W. Olympic Blvd., Los Angeles, CA 90064. Tel. 213/826-3777 (computer bulletin board: 213/826-4288).

F8, Droid: Herein resides the most radical departure from existing software; we'll cover it in detail later on.

F10, Quit: Beam me back to the computer's operating system, Scotty.

Of these functions, Edit and Droid are the most interesting, so let's talk editing.

EDIT MODE

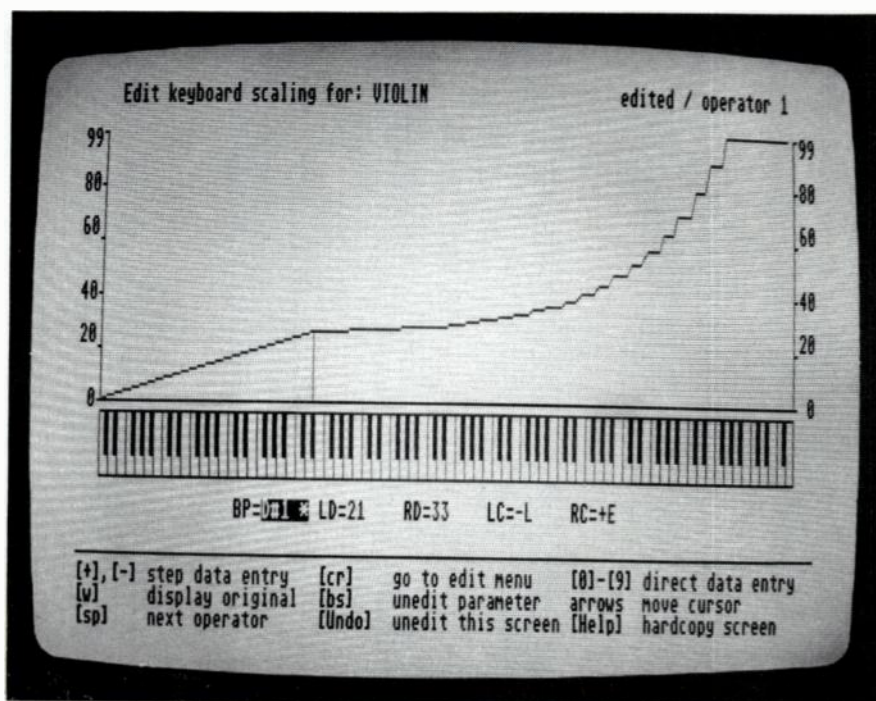
There are several edit screens. The principal option, *Numerical Edit*, displays every DX7 parameter on two screens. Screen 1 shows parameters for individual operators; screen 2 shows parameters that all operators have in common (algorithm, LFO, feedback, portamento, function parameters, etc.).

Parameters can be edited with the mouse or keyboard, or some combination thereof. I tend to use the mouse for positioning the cursor over the value to be changed, then adjust values with the keyboard since it's hard to keep the mouse centered on a particular parameter and click the mouse (which changes the value) at the same time.

Changed parameters are flagged with an asterisk; the original value can be recalled at any time, not just immediately after entry, with the backspace key. You can also undo all editing with a single keystroke. I might add that at first, the choice of keys to implement certain functions may seem arbitrary—but after even a short period of familiarity, the choices make sense and are easy to remember. For example, you can almost always go back to the main menu at any time by hitting carriage return.

At no point do you need to refer to the DX7 while editing—all info is available on screen, including the algorithm block diagram (in purple, no less).

Next up is the *Operator EGs Edit* (envelope generators edit) screen, and here is where we get an inkling of the power behind this program. Those who have



The DX Droid Keyboard Scaling Edit Screen

THE INTERFACE

Volume 1, Number 4

PASSPORT DESIGNS, INC.

June, 1986

Hello from Passport. As usual, we've received a lot of calls and letters from you asking for more information and offering feedback on how you're doing with your particular applications. We can't emphasize the importance of your communications with us, and we urge you to keep the calls and letters coming in.

In, Out & Thru

By Jay Lee

Many of you have asked about your back-up disks. Good News! They're now on their way to you and have some new features that need to be addressed. For Apple owners, MIDI 8+ and 4+ now have independent track looping. This allows each track to loop by itself, regardless of track length. Also included is a channel selectable MIDI Out/Thru which allows you to echo any MIDI information received by the interface to MIDI Out. Specifically, you can control an instrument connected to the MIDI Out from the instrument connected to the MIDI In while you are playing or recording a track. Thru is active only in the main menu screen (Disk/Edit/Form/Util) and in Play or Record. Selecting Thru+0 will bypass this function, while selecting Thru+ 1-16 will let you choose which channel you want to "echo." Also, note that active sensing now defaults "off."

Commodore owners, MIDI 8+ and 4+ now have the benefit of tape sync. This allows you to synchronize your Commodore with a Multi-Track tape recorder. To use this valuable feature, you must have the Passport MIDI Interface with tape sync. You can update your old card for a minimal cost. If you're interested in doing so, just give us a call.

That about does it for *In, Out & Thru*. Next issue we'll be taking a closer look at Passport's Polywriter Program. So, if you have any questions on Polywriter, let's hear from you.

MASTERTRICKS

By Denis Labrecque

I'd like to take this opportunity to answer your questions about the MIDI controller numbers that you can enter into a Quickstep file with MASTER TRACKS. Specific information regarding MIDI controller numbers and valid controller values should be listed in your synthesizer owner's manual and can also be found in the International MIDI Association (IMA) MIDI Spec. 1.0. The following partial listing contains some of the confirmed controller numbers you can use.

Controller numbers 0 through 63 are continuous controllers with a valid range of 0 through 127, while numbers 64 through 121 are defined as continuous switches with most having a value of 0 for OFF and 127 for ON. All other controller numbers are either undefined or in the process of being defined. Please contact IMA at 818/505-8964 for up-to-date information.

CONTROLLER #	FUNCTION
1	Modulation Wheel or Lever
2	Breath Controller (Yamaha)/VCF Mod. (Korg)
4	Foot Controller
5	Portamento Time
6	Data Entry
7	Main Volume
64	Damper Pedal
65	Portamento
66	Sustenuto
67	Soft Pedal
96	Data Increment
97	Data Decrement

More information on the uses of these controllers in the next issue.

Other News

By Perry Devine

Good news for third party software developers and computer hobbyists. Passport is now delivering both the MIDI PRO Interface and the MIDI PRO Toolkit for the Apple IIc. Software developers can now make their existing Apple II MIDI software and their new MIDI software run on the IIc with the MIDI PRO interface. To support this effort, we've developed the Toolkit to help get MIDI software up and running quickly and efficiently.

The interface requires no hardware modification of the computer. It connects easily to the IIc's

built-in serial port. The toolkit contains a disk with assembly language driver routines that establish interrupt driven bi-directional communications between the Apple IIc and the MIDI PRO interface. Object code and fully documented source code are included so that you can either use the routines "as is" or modify them to fit your needs.

For more information, call or write Passport Designs, Inc., 625 Miramontes Street, Half Moon Bay, CA 94019, 415/726-0280.

tried to program DX7 EGs know the frustration of not only trying to correlate numbers to time, but trying to compensate for shifts in the envelope's total time when a parameter is changed. DX Droid makes life much easier. Entering a new rate or level parameter instantly redraws the selected operator envelope. A status line below the display indicates the total envelope time of both the edited and original versions. By the way, DX Droid creates a "workspace" where the voice is edited while the original remains preserved in a different memory space. The advantage is that throughout the program it is easy to shift between the two, thus allowing for instant comparisons of edited and unedited sounds. Parameter entry for the EG page is similar to the numeric edit page—select a parameter and change it, undo it, or whatever.

Operator EG Edit lets you view and edit one envelope at a time. For the big picture, select the *View Operator EG* page. This displays all EGs, one at a time or any combination thereof, for a quick comparison of EG characteristics. As with most other screens and pages, you can print out the screen information if you want a hardcopy record of what you see.

The *Operator EG Edit* screen shows

level values for each operator (in bar graph and numeric display) and velocity sensitivity (numeric only). Both the original parameters and the edited parameters are shown simultaneously.

The *Keyboard Scaling Edit* screen (Fig. 1) lets you do just that. Better yet, the

"...the manual claims that even if you spent every minute of your entire life generating Droid sounds, you would still probably never generate two identical sounds. I believe it"

medium-resolution graphics (as used throughout the entire program) create a superb keyboard display that correlates keyboard scaling to all 128 MIDI notes (not just the range of the DX7 keyboard). Finally, there is a *Set Test Tones* function. This lets you create a chord of up to 16 notes for sending to the synth (toggled on and off by pressing the T key). I wish

this feature would arpeggiate through the notes you select rather than play a chord; that way, you could listen to individual notes from various ranges of the keyboard. Maybe next revision... then again, only the terminally lazy would not be willing to reach over to the DX7 itself and bang a few keys to hear the results of their edits.

Those are the edit section highlights. The librarian (bank) functions do pretty much what you would expect them to do (efficiently load and save banks of patch data), albeit with more variety and sophistication than most... so without further ado, let's skip ahead to the part we've all been waiting for, Droid-land.

THE DROID FUNCTIONS

At the most obvious level, the Droid function is a random patch generator. In other words, if you select one of the Droid options, every click of the mouse will send a new, randomly generated patch (or bank of patches) to the DX7. Now you might think this isn't so great an idea—can a program come up with better patches than a human?—but hold on. First off, there is some intelligence built into the Droid function. For example, if one of the operator levels is turned off, Droid will not go through all the possible permu-

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tations and combinations for that operator's envelopes. For those purists who don't want the computer to make any decisions for them, the same Droid function to generate voices and banks can be applied with virtually none of the "intelligence." Playing with the two options does reveal a fundamental difference between them, with the intelligent version coming up with more "musically useful" settings. On the other hand, the dumb Droid setting is good for coming up with some truly "out there" combinations.

As I see it, the point of random patch generation is not to create cello, piano, horn, and other imitative patches (although out of the first 20 or so random patches Droid generated, there were some good percussion sounds and even a pretty life-like guitar). Rather, a Droid patch gives a very convenient point of departure. As you sit there clicking the mouse through the umpteen zillion possible combinations, occasionally one will sound like an *almost* really good patch... which means it's time to zip over to the edit page and sculpt it to your liking. One time Droid came up with a great percussive patch except for some lame LFO settings and an envelope with a long attack that didn't sound good at all. I edited the envelope for a more percussive effect, turned off the LFO, and had just what I wanted. Sure, you can run into some real random clinkers, but a new patch is just a mouse click away, and it doesn't take too long before something interesting shows up. As one comparison, the odds for a Droid "cool sound" payoff seem vastly greater than the frequency with which, say, a slot machine pays off. Random patch generation is not a gimmick; it's a tool.

By the way, the manual claims that even if you spent every minute of your entire life generating Droid sounds, you would still probably never generate two identical sounds. I believe it.

If the random patch feature was all that Droid did, that would be a significant step forward. But there's more. A *distort* function alters a random number of parameters by a random amount; however, the "main" parameters (algorithm, transposition, and a few others) are not affected. This is very useful for taking an existing patch and coming up with variations on a theme—you'd be surprised how distorting a patch can make it more or less suited to different parts of a song.

An *average* function lets you specify two patches, whereupon Droid creates a sound at the midpoint of the two chosen sounds. The resulting sound may or may

not be what you would expect, depending primarily on whether the two sounds have similar algorithms. *Glide* actually transforms one sound into another in 16 increments. This process is not fast enough to be used while playing, but it's something you haven't heard before and is most impressive.

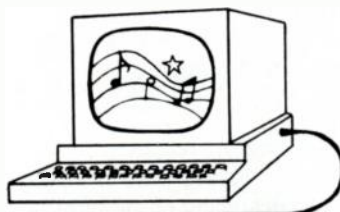
Finally, a quick load feature (which I did not get to test) is claimed to load multiple synths very quickly. The manual states that two TX racks plus two DX7s (a total of 18 synthesizers) can be loaded in 90 seconds.

CONCLUSION

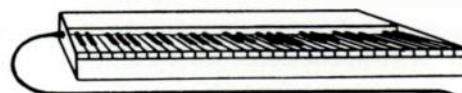
DX Droid is in the vanguard of a new generation of software—a generation that takes advantage of better computers (520ST, Amiga, Mac) and progress in software development (particularly primitive forms of artificial intelligence). Profes-

sional sound programmers will find this type of program a great aid in creating new and original sounds, but working musicians who just want to play around with their synth and possibly use the distort or glide features from time to time will find much to like as well. Educationally speaking, this program will give you a crash course on FM synthesis and the DX7's *modus operandi*—I never felt as familiar with the machine as I did after playing with DX Droid for a few days.

Space prohibits me from describing every feature (for example, the scaling curve is accurate enough to show the DX7's limitations when trying to create true exponential curves) but by now you should have a pretty good idea of what this program does. This is anything but a "me-too" program; those responsible for its creation have every reason to be proud of their work. **CM**



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NAMM 631



Can a book written by the editor of a periodical get an unbiased review in that same periodical? For the answer to this and other exciting questions, read on.

The Digital Delay Handbook

BY DAVID DOTY

(Editor's note: I feel a bit uneasy running a review of one of my books in the magazine, but enough people convinced me that the magazine is here to provide information, my book is aimed at the type of people who read the magazine, and any other editor would run it...so here we are. The review was accepted on the basis that it would be published regardless of whether it was favorable or unfavorable.)

The *Digital Delay Handbook* is a collection of 69 applications for this most popular of effects devices. It is divided into nine chapters, the first being a summary of basic delay line features, while the remaining eight are collections of patches, organized according to the features of the delay line that they use. The applications presented range from commonplace effects like flanging, chorusing, doubling, and slap-echo, to the likes of bathtub reverb, a warped-record simulator, and something called "Haas In Hell."

The first chapter, as stated above, explains the basic features common to most current digital delays, and the more advanced options characteristic of higher-priced units. It does so on a purely non-technical level, referring the various functions to a detailed block diagram of a representative device. It concludes with diagrams of five basic patches, upon which all of the following applications are based. All of the applications are presented in a common format, describing the effect to be achieved, specifying which of the five basic patches is to be used, detailing the positions of all of the relevant controls, and indicating what

David Doty is a composer, performer, instrument builder and theorist, and a founding member of the experimental ensemble Other Music. His compositions can be heard on Other Music's two LPs, Prime Numbers and Incidents Out of Context. He is currently editor of 1/1, the quarterly journal of the Just Intonation Network.

Product Summary

Product: The Delay Line Handbook (by Craig Anderton)

Type: Instructional book

Price: \$9.95

Contents: Introductory chapter on digital delays, followed by 69 different applications.

Publisher: AMSCO (Division of Music Sales), 24 E. 22nd St., New York, NY 10010. Tel. 212/254-2100.

accessories, if any, are required.

Chapter Two, "Short Delay Line Applications," includes many of the most familiar delay-line effects: manual and automatic flanging, rotating speaker simulation, chorusing, doubling, and vibrato. Also included here is "bathtub reverb," (#10) an admittedly gimmicky effect based on a delay time of around 30 ms and 75 percent positive feedback. Chapter Three, "Echo Applications," also covers mostly familiar ground, with a variety of echo-type effects, both long and short, including the by-now-mandatory "Frip-ertronics" (gag) simulation. (Terry Riley used long tape delays extensively for many years, beginning in the late '60s, but had better taste than to call this generic process "Rileytronics.") Some more novel delay-line uses are also to be found here: "Synchro-Sonic Echo Effects" (#16) gives you a formula to match the tempo of the tune (in beats per minute) to a delay-line readout in milliseconds. "Selectively Added Echo" (#18) splits the signal to feed two channels of a mixer, one with the direct signal, the other passing through a volume pedal and the delay line, allowing a player to do what the title indicates.

Chapter Four, "Special Effects," contains a number of technically unrelated applications, ranging from the ultra-mundane use of a long delay to catch obscenities on call-in radio shows (#28), to the

above-mentioned "Warped Record Simulator" (#27), with precise delay times suggested for 33, 45, and 78 rpm operation. Chapter Five is devoted to the uses of delay lines that give the user access to the feedback loop, wherein almost any out-board signal-processing device can be inserted. This is one of my favorite chapters, as it presents a principle that can be used in infinitely varied ways, depending on what you choose to insert in the loop, and how much feedback, positive or negative, is selected. A pitch transposer, for instance, can be used to produce chromatic glissandi (#35) or a preamp can be inserted in the loop to generate '50s Sci-Fi movie-style runaway echo (#37). Chapter Six, "Drum Delay Line Applications" is aimed primarily at drum machines rather than real drums; most of the applications here are intended to compensate for the lack of complexity and variety characteristic of digital percussion.

Chapter Seven is concerned with effects available with DeltaLab's *Echotron*, particularly its long delay times and its ability to synchronize other devices, such as drum machines and arpeggiators. Most of these applications should be usable on any machine with similar features. The concept expressed in Chapter Eight, "Using the Control Voltage Input," might come as something of a surprise to newcomers to electronic music, in this age of hardwired-digital-programmable devices. Those who cut their teeth on modular synthesizers, however, should certainly feel at home here. The final chapter consists of applications that require two delay lines, preferably of the same make and model. I won't attempt to describe these complex effects here—you will have to get the book and read about them, or if you have the proper equipment, try them for yourself.

In conclusion, I would strongly recommend this book to anyone who has just bought their first digital delay, or is about to do so. Some clever manufacturer might think about bundling this Handbook with their delay lines—I could not imagine better user documentation. While more experienced users, given sufficient time and motivation, might eventually be able to invent most of these patches for themselves, I think most will find that having this collection on hand will save much re-inventing of the wheel. The more advanced applications, in particular, can serve as starting points for almost endless experimentation. This, I think, is where the real pleasure in electronic music is to be found.

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OP-4001 IBM PC MIDI Interface

BY PAUL GRUPP

Until recently, if you wanted an IBM PC MIDI interface that would be compatible with most MIDI software, you had only one choice—the Roland MPU-401. While other manufacturers have introduced their own interfaces, these have failed to win the support of the general marketplace to the same extent as the MPU-401. Most IBM PC software manufacturers write exclusively for the MPU-401, thereby giving Roland a virtual monopoly in the PC-to-MIDI interface business. But now Octave-Plateau has introduced an alternative interface: the OP-4001. The OP-4001 claims to be nearly 100 percent compatible with the MPU-401 (I'll explain what they mean by "nearly" in a moment). It is considerably more compact than the MPU-401, and at \$295, is significantly less expensive.

The OP-4001 includes two parts. The first part, the main card, plugs into any free expansion slot inside a PC. This card is about an inch longer than Roland's, but it still fits easily into the short slots in computers such as the Tandy 1000. The second part is a small connector box that plugs directly into the main card via a DB25 connector, and protrudes about 1.5 inches from the rear of the PC chassis. The advantages of this system are simplicity and compactness. Unlike the MPU-401, there is no need for a separate interface box tethered to the PC via a heavy cable.

The OP-4001 connector box contains one MIDI In jack and one MIDI Out jack, Sync In and Sync Out Jacks, and two toggle switches to choose between tape (FSK, or Frequency Shift Keying) sync and standard TTL (Transistor-Transistor-Logic; 5V pulse) clock sync. The switches for Sync In and Sync Out are independent, so it is possible to receive tape sync at the same time you are sending clock sync, and vice versa. Finally, there is a

Product Summary

Product: OP-4001 Intelligent MIDI Interface

Type: IBM PC (and compatibles) to MIDI interface

Suggested retail price: \$295

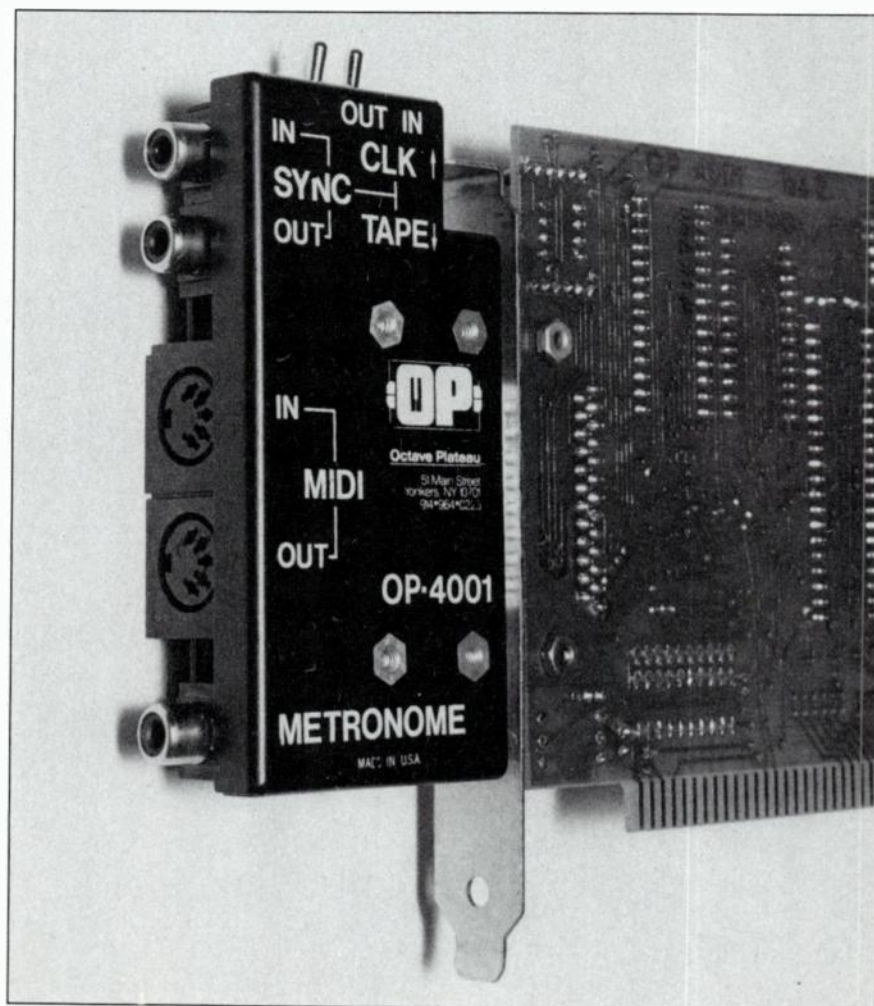
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separate metronome output jack. The metronome output is unpitched with an accent on the downbeat.

You may be concerned that I said the

OP-4001 is "nearly 100 percent compatible" with the Roland MPU-401, but relax. The only functional difference is that the OP-4001 cannot transmit Roland Sync Out. Unless you are planning to use your system to drive old Roland sequencers or arpeggiators that accept neither MIDI nor TTL sync, you'll never miss this feature.

I tested the OP-4001 on an IBM PC and a Tandy 1000, and encountered no operational problems with either computer. Installing the OP-4001 in the Tandy 1000 does require a little effort. Because the 1000's card slots are not exactly like the slots on an IBM PC, you must remove the metal support bracket on the OP-4001 main card before installing it. Also, the deep overhang on the back of the 1000 makes plugging in the connector box a tight fit. Strangely enough, this tight fit is something of an advantage, since it helps insure that the main card stays firmly in place. Octave-Plateau suggests that you screw the connector box to the main card. While this is possible, the construction of the connector box makes it a difficult task that you wouldn't want



Paul Grupp is a musician and writer living in Concord, MA. He is also Manager of Technical Publications for Lexicon Inc.

to repeat very often.

Once installed, the OP-4001 performed exactly as promised. I connected it to an Oberheim DX, Roland JX8P, Yamaha TX7, Korg DW6000, and Lexicon PCM70, using a Roland MPU-104 Thru box and a MPU-105 input selector. When tested with a variety of MIDI software packages, including Roland's MPS, Octave-Plateau's Sequencer Plus 2.0 and Patchmaster, all the software functioned exactly as it does on my MPU-401. Obviously, it is impossible to predict whether or not it will work with future software for the MPU-401, but in view of its performance with existing software, it seems like a safe bet.

The manual supplied with the OP-4001 is very complete from an operational point of view. A variety of problems that might come up during first-time installation (like hardware conflicts with COM ports and interrupts) are treated in detail. The manual contains a particularly good discussion of synching to other devices, and there are examples using the Oberheim DMX drum machine and Roland

"...it is impossible to predict whether (the OP-4001) will work with future software for the MPU-401, but...it seems like a safe bet"

SBX-80 sync box. However, if you plan to write your own MIDI software, you might be disappointed to discover that the manual does not contain any information about the protocol used for communications between the OP-4001 and the PC. If you need this information, you'll have to obtain a Roland MPU-401 manual.

CONCLUSIONS

If you haul a PC to studio dates or gigs, you'll appreciate the OP-4001's compact configuration. Certainly everyone can appreciate its attractive price and full compatibility. But the best thing about the OP-4001 is that it serves as a strong indication that the MPU-401 interface protocol has been accepted by the industry as a de facto standard for the IBM PC and compatibles. This will surely result in more competition and lower prices for MIDI software and hardware in the coming months. And that, my friends, is good news!

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Fostex 4050 Synchronizer

BY PATRICK HUBBARD

When the first MIDI sequencers and rhythm machines became available, I began to envision a studio wherein I could record and play back MIDI tracks just as I did tracks on tape, where one set of controls would allow me to start and stop the drums anywhere, and everything would mix down in perfect sync. Today, at least for users of the new generation of Fostex multi-track recorders, that vision has drawn a bit nearer. SMPTE (Society of Motion Picture and Television Engineers) time code is the foundation of such a system, along with the ability to synchronize SMPTE code to MIDI clock and real time command messages (stop, start, etc.). The Fostex 4050 synchronizer provides all these functions, as well as remote control transport features found only in high-end systems.

THE SMPTE CONNECTION

Briefly, the 4050 generates and reads SMPTE code, operates the Fostex 80 (8-track) and B-16 (16-track), locates specific points on tape, and operates as a master for MIDI devices. This means that the touch of a button will send your recorder and sequencer to any point in a composition and start them together (assuming your sequencer supports Song Pointer—more on this later). Forget about starting at the top for every overdub (or when fine-tuning a mix), generation loss for electronic instruments, and the need to fill analog tape tracks with program material that can live in your sequencer until mixdown.

The process begins by *striping* one track on a reel of tape with SMPTE code;

Patrick Hubbard is a keyboardist and writer living in Venice, California. After four years "on the road" and in the studio with country-rock artist Lacy J. Dalton, he decided to stay home and put together a small studio of his own, which has since grown to 16 tracks. He also plays in bars, plays sessions, and spends his spare time learning computers and pondering the vast world of electronic music yet uncharted.

Product Summary

Product: 4050 Synchronizer
Type: SMPTE/MIDI synchronizer, SMPTE generator/reader, autolocator, automated transport controller
Price: \$1,300
Manufacturer: Fostex, 15431 Blackburn Avenue, Norwalk, CA 90650. Tel. 213/921-1112

the 4050 includes a level pot and LCD (liquid crystal display) to read generator time as you record it. Code is available in the four most common SMPTE formats—24, 25 and 30 fps (frames per second) as well as drop-frame. You can set the beginning code time to any value.

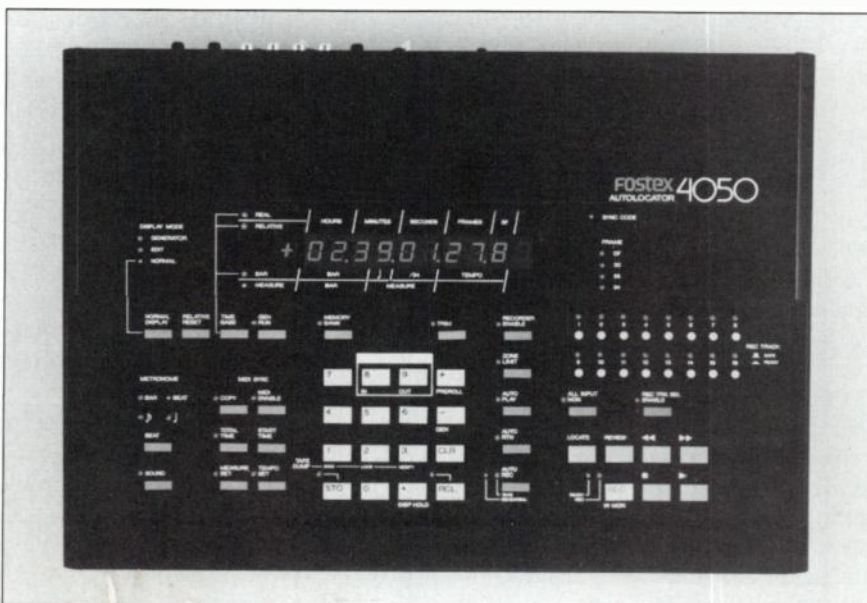
THE MIDI SYNCHRONIZER

The 4050 control panel divides functions into color-coded sections of "soft keys" (i.e. software-definable keys). Generally, the first parameter to enter is *start time*, sometimes called *offset*, which tells the synchronizer at what code time to send a start signal. Data is entered in hours, minutes, seconds, and frames (1/30th of a second), with an additional subdivision of 1/10 frame.

A *measure set* button sets the composition's length and time signature. Touching this key shifts the display from real time to "measure" format, and shows bar number and time numerator and denominator. Default time is 4/4 but may be changed. The last bar number is assigned a time of 0/0, which sends the *stop* signal. If you are composing as-you-go, just set the last bar as high as you want (anything to 999) and edit later.

PROGRAMMABLE TEMPO CHANGES

Pressing the "tempo" key shifts the display to "bar" mode, which reads out bar number, beat number, a division of the 1/24 beat, and tempo (when first called up, the display shows 1.1.00.100). The default tempo of 100 may be set anywhere from 20 to 250 BPM (beats per minute), but you can also step to any bar-and-beat in the tune and make tempo adjustments which your MIDI slaves will follow. With a little practice you can program great ritards, or even de-mechanize your electronic drummer with subtle imperfections (the 4050 memory will hold up to 340 change points). Or if your bassist hit a downbeat just far enough behind the kick to be irritating, and now has gone home and can't add a punch-in part, just drop



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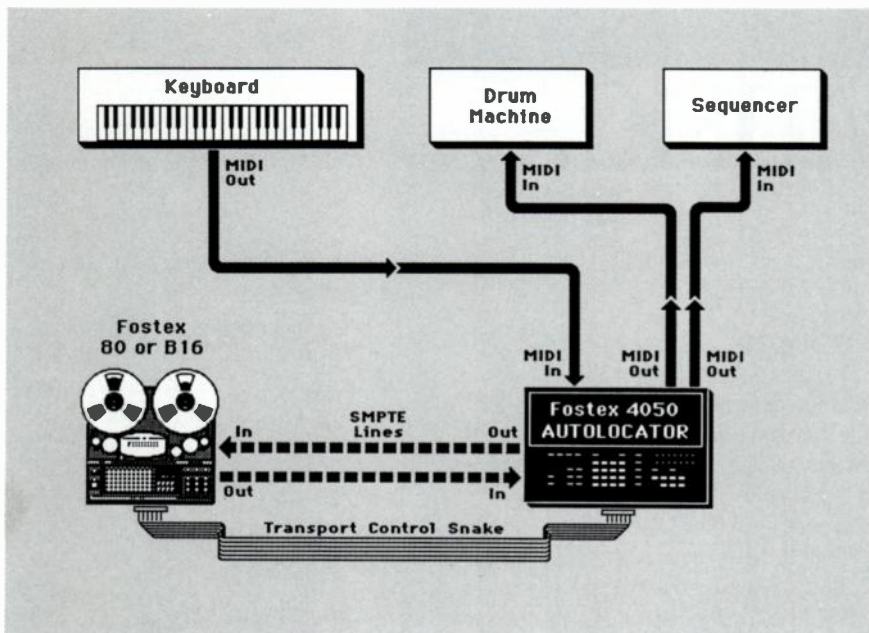


Fig. 1 Typical set-up for the 4050

the synchronizer tempo for a beat or two until the kick falls in with the bass, then make up the lost time in the next bar (yes, the drums *can* follow the band after all). Changes in time signature throughout the tune can be programmed similarly. Yet another parameter called "total time" displays just that (once you have determined length in measures) and tempo(s). Edit this value, and tempos adjust correspondingly so that the piece fits the specified time! Jingle producers and film-scoring artists will love this feature, and it's also handy for a demo aimed at top-40 that needs to come in "just under three minutes."

One word of warning: the 4050 is fussy about the order and manner in which data is entered, and you will frequently hear the annoying "error" beep while you are learning what it likes. Each error signal is accompanied by a code number in the display, but as the manual offers no explanation of the code, you'll have no idea what you're doing wrong. Too bad it's midnight and you can't call Fostex...patience and intuition come in handy here.

SEQUENCER LOADING

After making these adjustments, you can now slave your sequencer and lay down a track or two; run your drum machine for a time reference or use the internal metronome (there's a rear-panel audio beep level control, along with an auxiliary out jack for the metronome signal).

The back panel includes RCA jacks for SMPTE (and associated level control), a serial port for computer interfacing,

and the MIDI port (one "In" and two "Out" jacks). The 4050 won't run as a slave except to the SMPTE track; the In jack provides a limited merge function by mixing incoming data (key number, velocity, etc.) with outgoing data. One benefit of merging is to use a MIDI keyboard to load your sequencer while it is slaved to the synchronizer (Fig. 1 shows a typical setup). The ease of loading in this manner depends on your sequencer—hopefully it won't require too many gymnastics. You can alternately load sequences independently and sync them up later. Transport control keys start and stop MIDI gear, and also "fast-forward and rewind" if Song Pointer is supported.

OPERATING THE TRANSPORT

When it's time to lay tracks on tape, since MIDI events are all assigned to precise moments in SMPTE time, they will always be in perfect sync with recorded material—no jitters. Transport track select is available as an option on the 4050 panel, and when you touch "recorder enable" the transport keys will operate the recorder as well as MIDI equipment. A "sync" LED and audible beep tell you that the synchronizer has locked to the SMPTE track. The controls—which include "review" and "edit"—function as expected with one exception: you can't punch in by selecting a track, then holding "play" and stroking "record" with the tape running. Nothing happens. You have to start the transport in record mode with all tracks safe, then hit the appropriate track button. This still annoys me, partly because I've used the other method for years, but

mainly because it's too easy in the heat of the moment to hit the wrong button, and too hard to hit more than one at a time. I'm hoping for an update on this one.

On the bright side, though, you *can* punch in with a footswitch (and go into play mode or initiate autolocate with another), and the "auto-record" feature is great. Cue points are entered either by keypad, or on-the-fly. Cues can be edited in either real time or bar display mode. I always use the latter; since beats are divided into 24, you can cue a couple of 24ths before a downbeat to neatly punch-in just in time for the downbeat. Once the punch sounds right in "rehearse," commit to tape by entering record and watching it happen. I know this is nothing new, but it is for those of us who are budget-conscious.

AUTOLOCATING

There are eight locate points. I set them to various sections of a tune and keep written notes handy so I can instantly find the second verse, chorus, and so on. All cue settings, as well as MIDI parameters, are stored in one of ten memory banks with battery backup. If you have seven or eight tunes on a reel, each has its own bank, and all banks may be dumped to tape through the SMPTE interface. I store this data on the code track at the end of the reel so it's right there ready to load. (All-memory-clear is available, but there's no way to clear a single bank and start over—a minor inconvenience.) You can locate *any* position on tape; move to a different tune by calling up the appropriate bank, recalling "start time," and doing a locate. After years of listening to high-pitched clock pulse or FSK (frequency-shift keying) garble and trying to figure out where you are, this is really a pleasure! And a readout in bar numbers while working is immeasurably helpful. Yet another display option, "relative time," can be reset to zero at the start of the tune.

Another neat transport feature is *pre-roll*. If you set your cues to downbeats, you can tell the transport to locate to a point a designated number of seconds before each cue. Other features are *auto-play*, which kicks the recorder into play after locating, and *auto-return*, which in conjunction with auto-play repeats a section between any two cues indefinitely—good for rehearsing overdubs.

YES, THERE ARE SOME PROBLEMS

If all this sounds too good to be true in a package listing for \$1,300, there are a few sobering realities. My 4050 works fine

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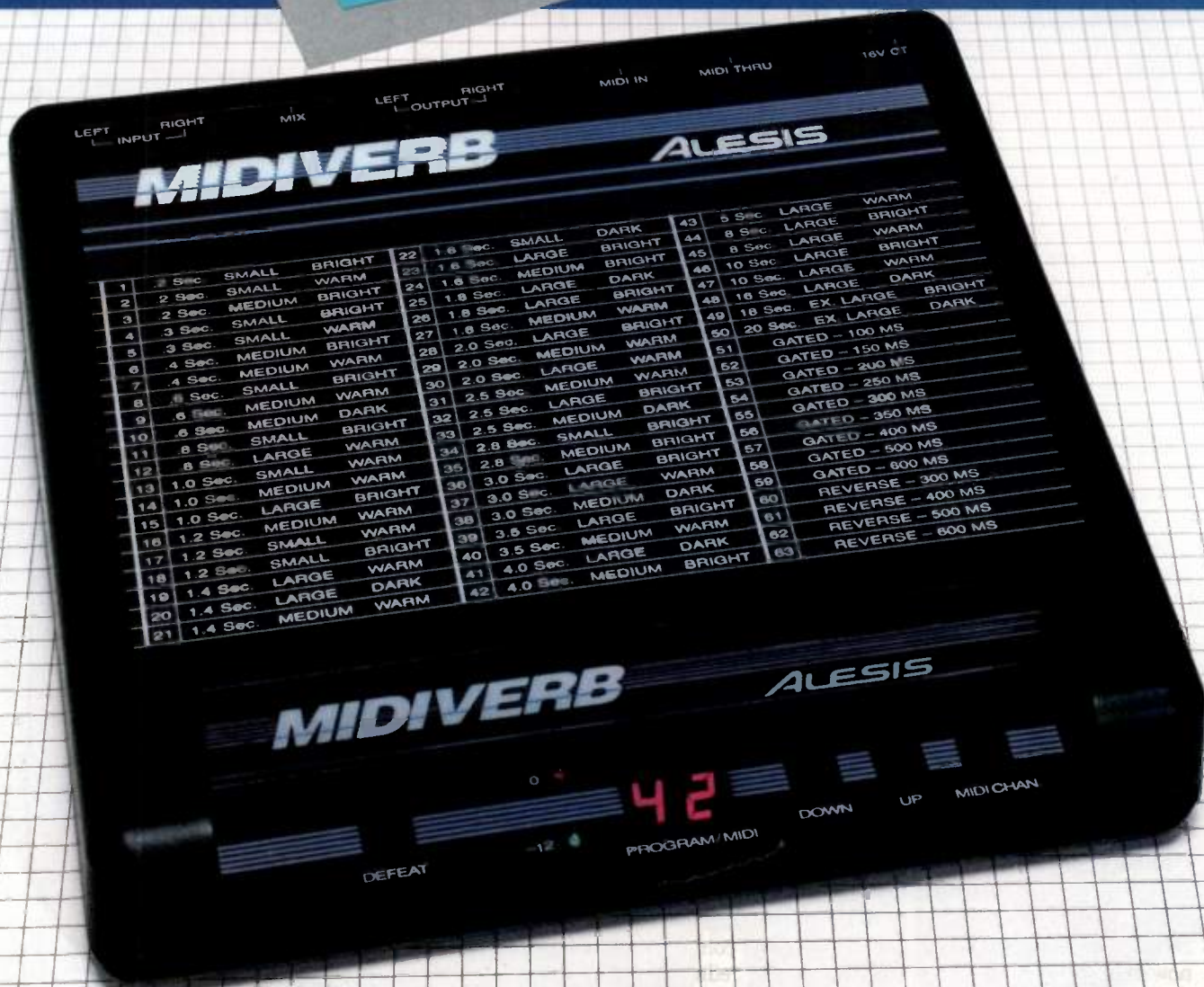
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about 95 percent of the time, but I would be remiss in not mentioning the other five percent. First, this guy sometimes gets lost while locating, or in fast-forward or reverse. SMPTE code is read only in play and record modes, and is read flawlessly; the rest of the time the on-board computer is sensing tach pulses and extrapolating real time values from those readings, which it does quite accurately when it works. But occasionally, enter the autolocator from hell: the display leaps to some arbitrary number bearing no relation to actual tape location, and you have a runaway transport. You then must re-enter play to remind it where it is.

Another problem I've had is somewhere in the SMPTE-MIDI interface. I use the 4050 with the Roland TR-707 and -727 rhythm composers (other dedicated devices that autolocate to the 4050, according to the manual, are the Roland MSQ-100 and TR-909, Yamaha QX-7 and RX-21, and Korg SQD-1). Again, this is a perfect system most of the time, but then without warning the TRs will "kick out" of slave mode and grind to a halt. At first I thought bleed from an adjacent track might be disrupting the SMPTE signal, but bleed on the Fostex B-16 is negligible, and it has since happened with *all* tracks

empty. This seems to baffle the techs both at Fostex and Roland, but since both TRs kick out simultaneously, my suspicions lie with the 4050.

Finally, the Song Pointer is a mysterious and much-neglected MIDI spec so far. Only about half of the dedicated sequencers support it, and almost none of the available software; one exception I am aware of is the new Miditrack III from Hybrid Arts (I'm waiting for the 520ST version). Even working systems like mine are limited. As near as I can tell, the Song

"...Song Pointer is a mysterious and much-neglected MIDI spec so far..."

Pointer sends a message in "number of MIDI beats (sixteenth notes) from the top," and the TRs simply divide by an appropriate number to set bar number: not a smart interface. Forget 3/4 time, or 12/8 (swing time), or anything with odd bars—they will sync up, but only when starting from the top. So there is still much to do.

VIDEO OPTION

One last note for video engineers: the 4050 works in conjunction with the Fostex 4030, a rack-mountable synchronizer that lists for \$1,500 and locks audio-to-video or audio-to-audio to within 1/100th frame. All time codes are available, and many 4050 features seem ideally suited for video work.

CONCLUSIONS

In spite of occasional frustration when the locator gets lost (I expect updates may solve this), the inconvenience of manual punch-in, and the continuing technical gap between the ideals and realities of MIDI synchronization, I am quite pleased with the 4050. It allows me to work in most applications without constantly returning to the beginning of the song, affords more flexible electronic composing than I have known before, and brings engineering features I have coveted in state-of-the-art studios down to my somewhat more humble domain. In terms of power-per-dollar, the 4050 has undeniable value. And I am a few steps closer to my goal of the ultimate MIDI studio, a goal which will continue to redefine itself as I approach it...or where would the fun be? **CM**

—from page 44, **DISKS**

Slap Bass Disk 1 Lower 2—A great funky bass sound. This sample rounds out my bass library so I can handle any acoustic/electric bass situation.

Percussive Bottle Disk 9 Upper 2—This sounds like blowing over the top of a bottle. There's lots of breath in this one—like a Fairlight sound. This type of effect seems to show up a lot in current TV soundtracks (*Miami Vice*, etc.).

Synth Bass Disk 15 Lower 1, Program 1—This is actually two distinctively different sounds that can be mixed using the mod wheel. One is a plucked type sound, and the other is a bright synthesizer buzz. Careful mixing results in a sound that has the best of both.

Rock Guitar 5ths Disk 6 Lower 1—I can't believe it...one finger power chords! Close your eyes and you would swear Angus Young was in the room.

Nylon String Guitar Disk 6 Upper and Lower 3—Another real authentic sample. This one has to be played like a guitar player would play to make it sound convincing; "strum" the keys from left to right.

Wooden Flutes Disk 1 Upper 3—Lots of breath in this one which makes it sound very human.

How Mirage Disks Are Organized

Each disk contains three "Banks" of sounds, and only one bank at a time can be active on the keyboard. Each Bank is divided into two sections, Upper and Lower. Each section can contain up to eight different wave samples (i.e. eight completely different sounds) but only four "Programs." Each Program is a setting that combines one or more wave samples with particularly programmed parameters (such as envelope, filter cut-off, etc.).

Draw Bar Organ Disk 8 Upper and Lower 2—A good B3 sound.

Chainsaw Bass Disk 9 Lower 3—I don't know who came up with the name for this sound but it's a pretty dramatic bass tone with a metallic attack. Limited usefulness, but a great sound nonetheless.

Full Pipe Organ Disk 12 Upper and Lower 1—This is a big sound! The left hand has pedals as well.

Cup Gongs/Che Cymbal Disk 14 Lower 3—The Cup Gongs are a set of tuned bells that have a beautiful ring to

them. The sound is unlike any bell sound I have been able to get out of my DX7.

Flute Disk 14 Upper 1—I've always been fond of silver flutes, and this is a good silver flute sample.

Solo Cello Disk 14 Lower 1—This sound lacks the ensemble richness of the Cellos on Disk 3, but still has a great deal of character.

Orch. Brass Section Disk 14 Lower 2—I use this one for fanfares and the like. Great for playing the theme from *2001*.

Well, folks that's the lineup. It has a good beat and is easy to dance to...I'd give it an 85. No, really, these sounds are just about impossible to get on an analog or digital FM synth, so the Mirage has earned a lasting place in my home studio. The greatest thing that the Mirage does for me is to make acoustic instrument sounds available under MIDI control. Most of my recording work consists of MIDI sequencing on a Macintosh computer, then I edit the sequences and finally transfer them to tape when they are finished to my satisfaction. With a combination of analog, FM digital, and sampling keyboards, I am able to put together sequences with a very wide variety of sounds. **CM**

AC coupling: An interconnection technique between stages in an electronic circuit that blocks direct current (i.e. a constant current flow) but allows alternating current (AC, such as an audio signal) to pass. A series capacitor, which blocks DC but not AC, is ideal for interconnecting stages in this manner and essentially acts like a high pass filter.

bit: An abbreviation for "binary digit," a single piece of data, usually represented by a comparatively high voltage (binary number 1) or low voltage (binary number 0). This is the most fundamental unit of information that a computer can accept.

byte: A digital "word" consisting of eight bits of digital data.

chase lock: A device that implements chase lock monitors the timing signals emitted by two devices to be synchronized (locked) together (e.g. audio tape recorder and video tape recorder), and provides the necessary correction signals for the slave to follow (chase) the master (i.e. slave speeds up when lagging the master and slows down when leading the master).

DC coupling: In audio circuitry, direct coupling avoids the use of capacitors to couple a signal from

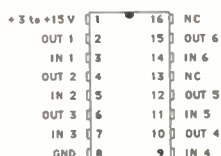
one stage to the next. This allows for the greatest possible low frequency response, all the way down to 0 Hz (DC).

nibble: Half of a byte (four bits of digital data). Alternate spelling: nybble.

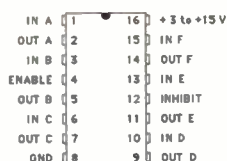
quantization: The division of a continuous (analog) event (such as a pot rotation or audio signal) into a finite number of steps. For example, a mercury thermometer displays a continuous process of temperature variation, yet the markings that indicate temperature are usually quantized into one-degree steps. Computers, which can only handle a finite set of numbers, quantize analog inputs into a specific number of steps (up to 256 for an eight bit machine, up to 65,536 for a 16 bit machine). A sound sampler measures signal amplitude thousands of times a second, and reconstructs the sound from that quantized data.

tach pulse: A signal, emitted by some tape recorders, that correlates to transport motor movement and therefore, the amount of tape that has shuttled from one reel to another. Devices that remain synchronized to tape during fast forward or rewind read these tach pulses to accurately calculate the current tape position.

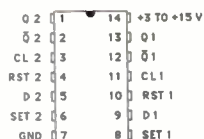
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Hex Inverter



4052
Tri-State
Hex Inverter

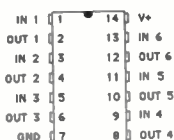


4013
CMOS
Dual D Flip-Flop



74LS 05

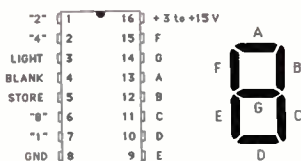
TTL Hex Inverter with
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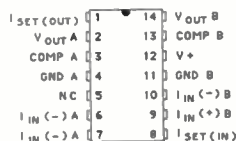


4511
7-segment Decoder / Driver



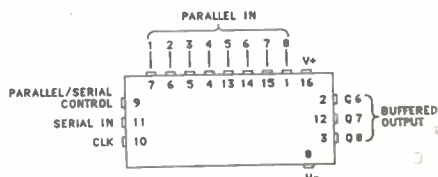
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4021

CMOS 8-Stage
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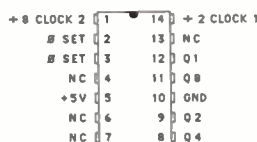
4028

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(1 of 10) Decoder



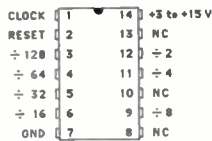
74C 93

Binary (+16)
Ripple Counter



4024

7-Stage (+128)
Binary Ripple Counter

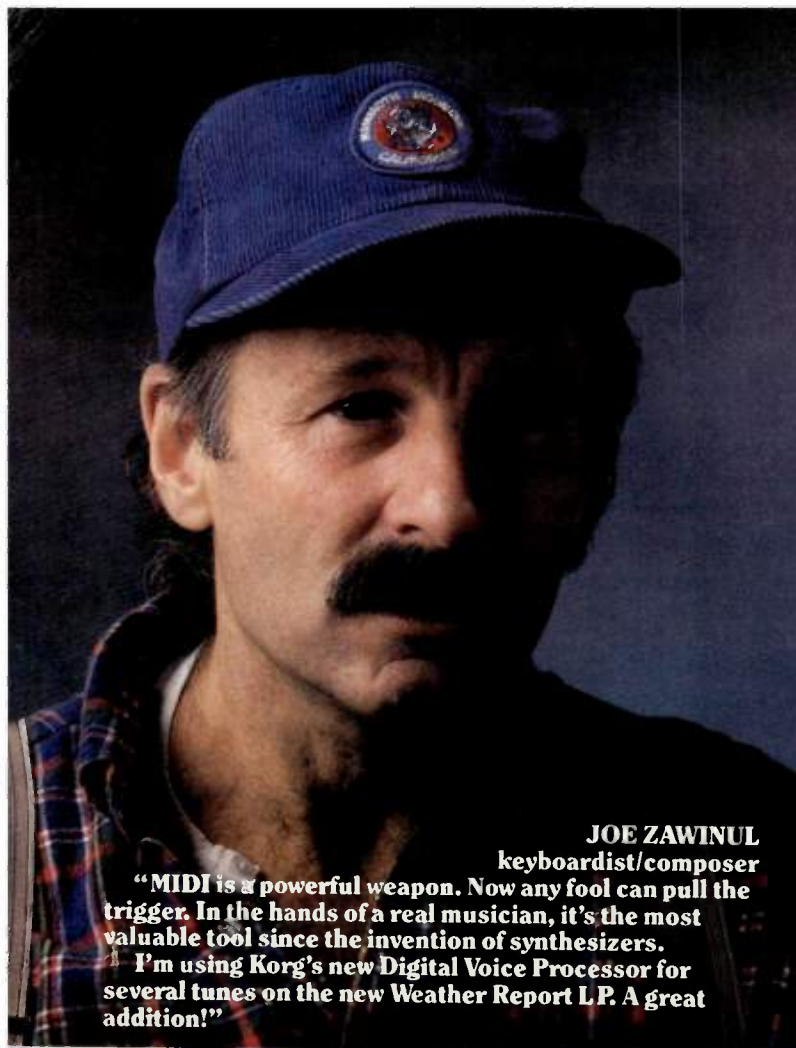


4093

Quad 2-Input
NAND Schmitt Trigger



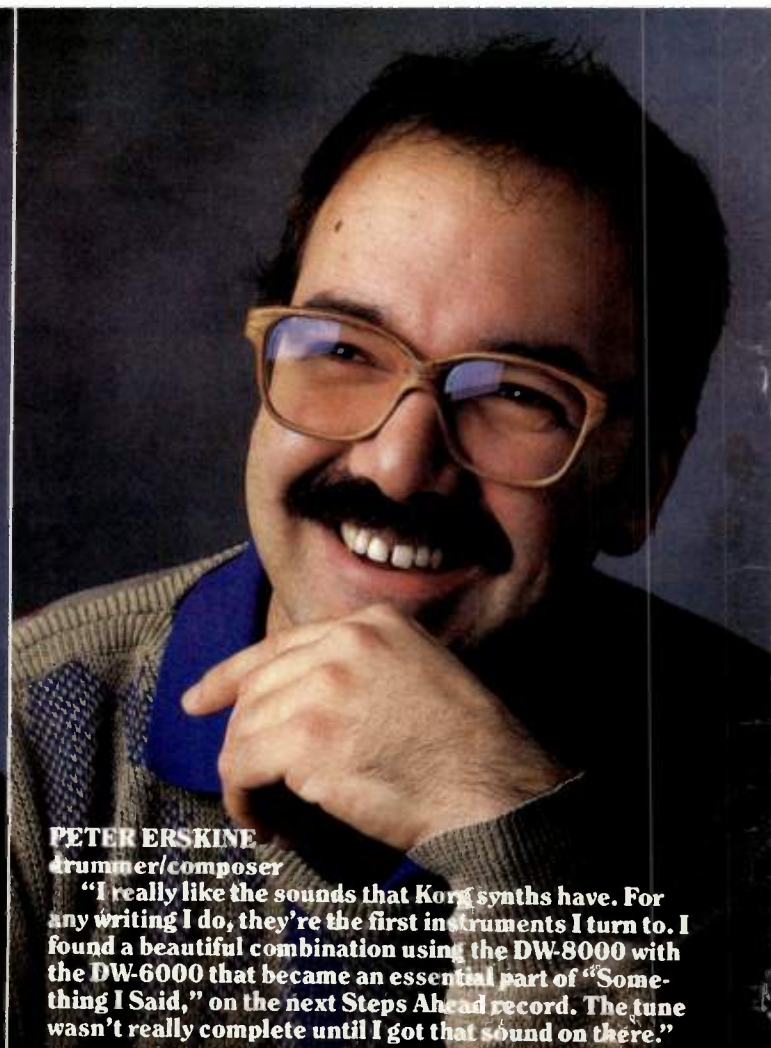
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