Guitar Players: The Ultimate MIDI Connection ■ Champagne Sounds on a Beer Budget

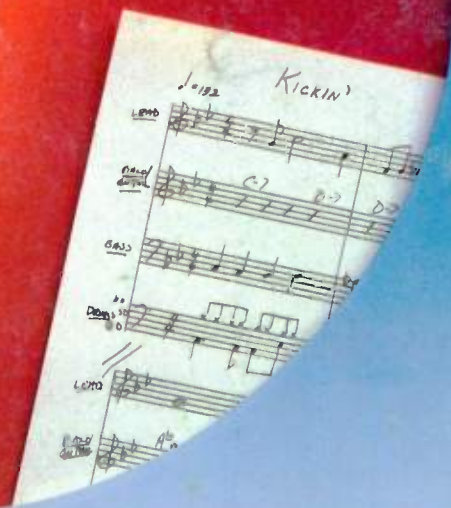
Electronic Musician

U.S. $2.95/Canada $3.95
October 1988

CREATE YOUR *OWN* MUSIC

Anyone can do it!

Part 1: Drum Patterns



REVIEWS: E-mu Emax SE HD • Beetle Quantar MIDI Guitar • Opcode Cue Film Scoring Software (Mac) • Shark Electronic Drum Pedal • HB Engraver Notation Software (Mac) • Lexicon LXP-1 Multi-effects Processor

Vision Becomes Reality. The M1 Digital Music Workstation

Every once in a while someone comes up with a better product. Less often, a company creates a better product that changes the entire nature of the music industry. The M1, a digital synthesizer/rhythm programmer/sequencer/multi-effects workstation, was conceived as a powerful tool that not only helps creative musicians express their ideas in the most complete form, but also becomes one of the most expressive and versatile performance instruments ever built.

Power To Perform

The M1 brings a new level of power to live performance with 2 megawords of ROM. Every one of the Programs and Combinations (up to 100 of each) is ready to play *instantly*. There's no loading time, because there's no loading. Nothing else gives you sounds this good, this fast.

The 61 note velocity and aftertouch-sensitive keyboard includes extensive parameter voicing that puts literally unlimited performance power in your hands with features like layers, splits and eight way zones across the keyboard.

Power To Produce

The heart of M1's power is 4 megabytes of 16 bit PCM ROM with multisamples of pianos, strings, brass, voices, guitars, attack transients, waveforms and much more.

M1's full-function drum machine has over 42 internal drum and percussion sounds that can be grouped into four user-defined drum kits.

Give extra dimension to your sounds with M1's 33 digital multi-effects including reverbs, stereo delays, panning chorusing, a digital exciter, distortion and more with a choice of four effects per program or combination independently routable to the four polyphonic outs.

Put an entire musical composition or arrangement together with M1's comprehensive 8-track sequencer with song position pointer, phrase and linear based recording, dynamic voice allocation, as well as single event editing.

And M1 power is designed to grow with you: RAM card memory stores extra sequences or programs. And there's an expanding sound library on ROM cards.

Let M1 power turn your ideas into realities. See your authorized Korg Dealer to find out more about the M1 Musical Workstation.

KORG®

MUSIC POWER

For a free catalog of Korg products, send your name and address, plus $1.00 for postage and handling to: Korg USA, 89 Frost St., Westbury, NY 11590, or to Korg USA West, 7886 Deering Ave., Canoga Park, CA 91304.

Exclusively distributed in Canada by: Erikson Music, 378 Isabey Street, St. Laurent, Quebec H4T 1W1

Why should a sampled piano respond like a grand?

Expressiveness.

"The piano is my main instrument for writing and arranging, so I need sound and a good action. I'm impressed with the Korg SG-1 sampling piano: the action and touch sensitivity is very good. The tone is sharp and clear and will carry a lot better than a conventional piano miked up."

Keith Emerson, Keyboardist/Composer

For years, musicians have been looking for an electronic piano which offered the same expressive capabilities and sounds as the classic acoustic grand piano. They needed the convenience of sonic versatility, portability and reliability, but the basic criteria for sound and expressiveness had to remain true to the original. The Korg SG-1 and SG-1D easily fulfill those criteria while offering a more versatile and practical alternative for the modern pianist.

Realism To begin with, Korg's new SG-1 Sampling Grand uses the most refined 12 bit sampling technology to reproduce the sound of the legendary acoustic Concert Grand piano with uncanny realism. The SG-1's highly accurate acoustic and electronic piano ROM-based sounds are characterized by exceptional clarity, depth and textural richness. Sophisticated digital technology lets Korg eliminate the historical design compromises of electro-mechanical pianos. The SG-1 finally translates the acoustic essence of the Concert Grand into the realm of modern amplified music.

Response Equally important, the SG-1 responds to the touch exactly like a grand piano. Full-sized piano keys (76 for the SG-1, 88 for the SG-1D) combine with a true weighted action for the firm yet supple feel of the concert instrument. Differentiated touch-response adjustable in eight steps gives the modern pianist total expressive control over dynamics and the most subtle nuances of tone and timbre.

Range The sonic versatility of the SG-1 starts with four built-in sounds: acoustic grand, acoustic upright, classic "suitcase" Rhodes™ and electronic piano with a bright tine sound. Additional sounds including other acoustic and electric pianos, clavinet, harpsichords, marimbas, acoustic or electric guitars and more can be instantly loaded into the SG-1 with Korg's inexpensive and easily interchangeable ROM "credit" cards. Unlike other sampling instruments, the SG-1 doesn't limit your choices to factory presets.

The full expressive potential of MIDI can be exploited using the SG-1's responsive keyboard as system controller. It can send Velocity, Pitch Bend, Modulation and Sustain, receive MIDI data, select among 64 programs, send Aftertouch (SG-1D) and transpose within an octave (SG-1). A programmable split point with selectable Local Control On/Off offers the added flexibility of playing piano with one hand and controlling other synthesizers or expander modules via MIDI with the other.

Roadability Designed for today's stages, the SG-1 travels well and truly comes to life when amplified. Rugged and transportable, it eliminates longstanding touring piano problems like tuning instability, microphone feedback, fragility, excessive weight and size. And the SG-1 reduces the price of the acoustic grand to realistic proportions.

Combining all of the modern conveniences of an electronic piano, Korg's SG-1 and SG-1D benefit from the latest in sampling technology to express the true acoustic nature of the classic grand piano and more.

To find out more about the expressive possibilities of the Korg Sampling Grands, see your Authorized Korg Sampling Products Dealer.

KORG® Sampling Products Division

SAMPLING IS ONLY THE BEGINNING

For a free catalog of Korg products, send your name and address, plus $1.00 for postage and handling, to: Korg USA, 89 Frost St., Westbury, NY 11590.

THE RIGHT STUFF

Kawai's R-50 has the right sounds and the right features. Check it out:

POLYPHONY

Polyphonic note assignment lets a single instrument sound more than one note simultaneously. With polyphony, a crash cymbal can continue to ring even after the same cymbal is struck again—even at a different pitch. Or build a kit with 10 different sized toms or a scale of tuned Agogo Bells.

PITCH AND PAN FOR EACH NOTE

Every note in a pattern is stored with its own tuning and pan for ultimate control over your sounds.

ON-BOARD EFFECTS

Flange, Delay, and Gate effects are built in and also programmable for every note.

PAD PROGRAMMABILITY

12 Drum Pad programs allow assignment of any sound to any pad, each with its own settings for volume, accent, pitch, pan and effects. Each program can then be recalled with the touch of a button or footswitch.

MEGA-MIDI

The velocity-sensitive R-50 is the perfect slave for MIDI keyboards and sequencers. Each MIDI note can be assigned to any drum, with unique pitch, pan, and effects settings. MIDI Song Pointer enables synchronization with SMPTE controllers. And eight extra note triggers enable the R-50 to play external MIDI devices as well.

KAWAI ALTERNATE SOUND CHIPS KEEP YOUR OPTIONS OPEN

From ten snare drums, to bass guitars, orchestra hits and brushes, the wide range of sounds available keep the R-50 at the top of its class.

TAPE INTERFACE & MIDI DATA DUMP

Store patterns on computer or use the inexpensive tape interface.

Kawai's small R-50 with the big sound. Before you decide on a drum machine, give the R-50 a good listen at your authorized Kawai EMI Division dealer.

KAWAI

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EMI DIVISION
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Compton, California 90224-9045

Electronic Musician

A MIX PUBLICATION

OCTOBER 1988 VOL. 4, NO. 10

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Cover: Photo by David Bishop. Roland TR-626 Rhythm Composer courtesy of RolandCorp US.

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FOR YOUR INFORMATION

WHAT'S NEW THIS MONTH:

A new series, "Create Your Own Music," begins this issue and is designed to help you explore the process of using machines to make music. While the *operations* of any electronic device can be quickly mastered, using that same instrument to create *music* is indeed more complex. With that in mind, we kick off this series (subsequent installments not necessarily in successive issues) with Part 1: "The Soul of a Drummer," covering the basics of how to program truly musical rhythms.

ABOUT EM (*Electronic Musician*):

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

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Readers: Unless otherwise noted, EM reviews production versions of hardware/software (there are no "reviews" written from press releases). We ask reviewers to really work with gear, so sometimes reviews appear later than some other publications. Therefore, we encourage readers to scan "What's New" for new product announcements, and contact the manufacturer for more info. Note: Manufacturers constantly update products, and prices and specifications stated in EM are subject to change. EM does not make product recommendations. Educate yourself, and make your own decisions. Reviews represent only the opinion of the author.

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DO-IT-YOURSELF (DIY) PROJECTS:

We do not have space to explain electronic construction in each issue. Read *Electronic Projects for Musicians* (available from EM Bookshelf) for the necessary background. If you detect an error in a schematic or listing, *let us know*. If a project doesn't work for you, contact us to see if anyone has reported any errors (wait at least a month for EM to be in circulation).

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EM specifies parts values following international protocol, thus minimizing decimal points and zeroes. A nanofarad (nF) = 1,000 pF or 0.001 μF. Examples: 2.2k (U.S. nomenclature) = 2k2 (Intl. nomenclature); 4.7 μF (U.S.) = 4μ7 (Intl.); 0.0056 μF (U.S.) = 5n6 (Intl.).

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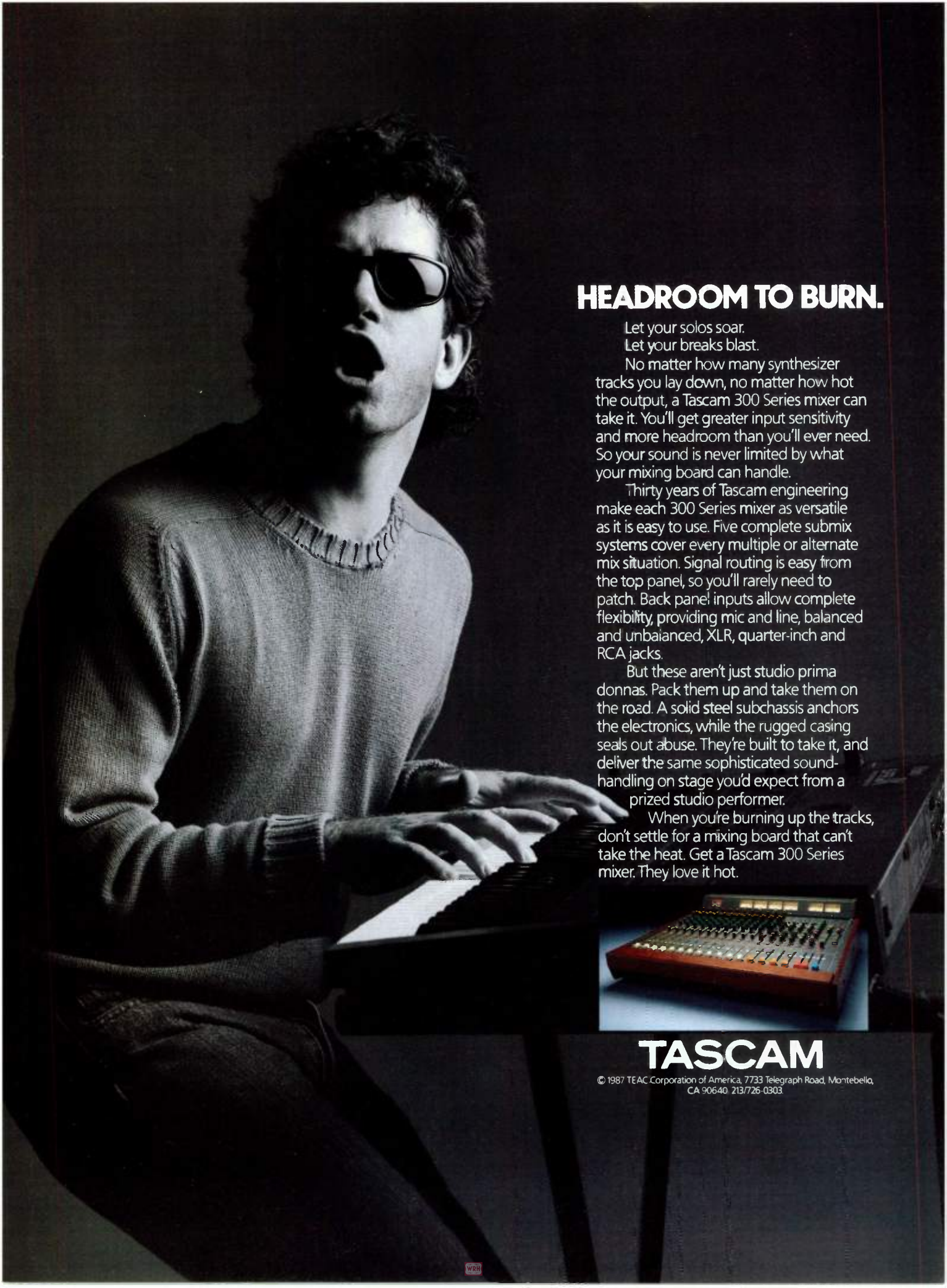


HEADROOM TO BURN.

Let your solos soar.
Let your breaks blast.

No matter how many synthesizer tracks you lay down, no matter how hot the output, a Tascam 300 Series mixer can take it. You'll get greater input sensitivity and more headroom than you'll ever need. So your sound is never limited by what your mixing board can handle.

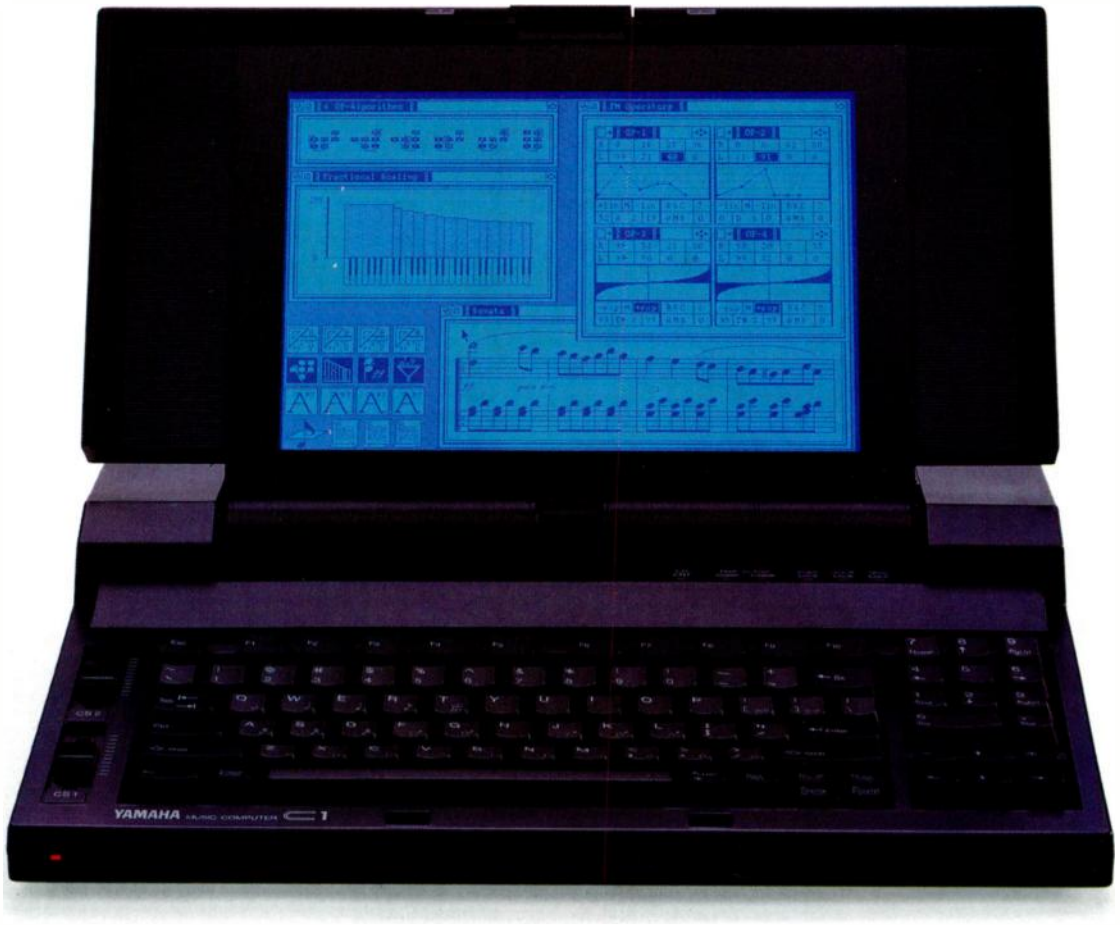
Thirty years of Tascam engineering make each 300 Series mixer as versatile as it is easy to use. Five complete submix systems cover every multiple or alternate mix situation. Signal routing is easy from the top panel, so you'll rarely need to patch. Back panel inputs allow complete flexibility, providing mic and line, balanced and unbalanced, XLR, quarter-inch and RCA jacks.

But these aren't just studio prima donnas. Pack them up and take them on the road. A solid steel subchassis anchors the electronics, while the rugged casing seals out abuse. They're built to take it, and deliver the same sophisticated sound-handling on stage you'd expect from a prized studio performer.

When you're burning up the tracks, don't settle for a mixing board that can't take the heat. Get a Tascam 300 Series mixer. They love it hot.

TASCAM

It will help you play your favorite tunes.



If you're determined to get ahead in music, we offer the following suggestion:

Mind your own business.

With the Yamaha® C1 Music Computer, you can put yourself in complete control. Whether you're building a sequence, organizing your voices, hyping the band or just making a valiant attempt to figure out your taxes.

The C1 gives you access to thousands of advanced MS-DOS programs, for music and business.

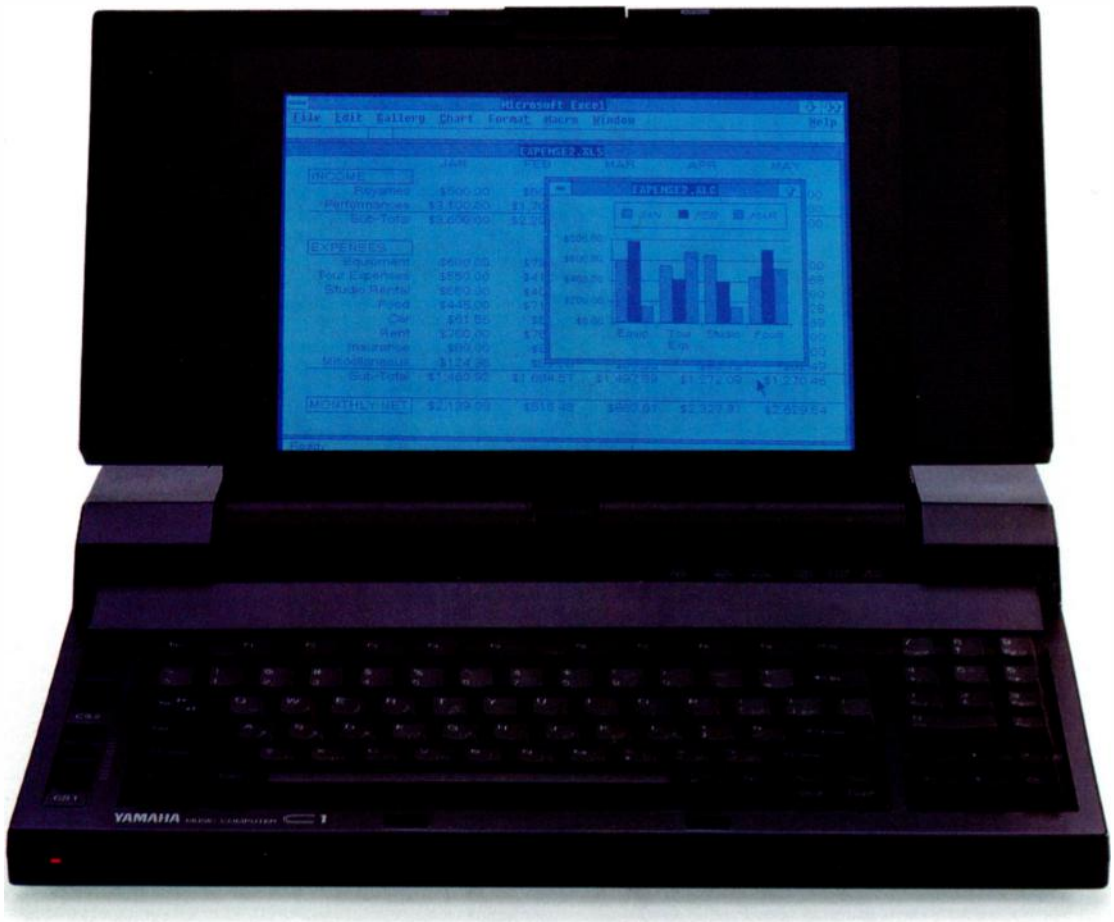
The C1 is IBM-compatible. So right from the start, you've got access to thousands of the most advanced programs.

It has an 80286 processor, for speed. A megabyte of memory, for power (with room for 1.5MB more). And a Toshiba-style expansion port that allows you to add more options down the road.

But unlike other computers, the C1 is the product of a very musical family.

It's thoroughly wired for a professional MIDI setup, with two MIDI INs, one THRU and eight OUTs. It even under-

And a few other numbers.



stands SMPTE—no converter required.

Plus, it has two programmable sliders for better MIDI control. And keys marked with music symbols, to make data entry less of a mystery.

You can start with a pair of built-in 3.5″ disk drives. Or choose a model with one 3.5″ drive and a 20MB hard disk. Which can not only carry a tune, it can carry hundreds of voices—and all of your programs as well.

C1 for the road. Our computer even comes with its own carrying case.

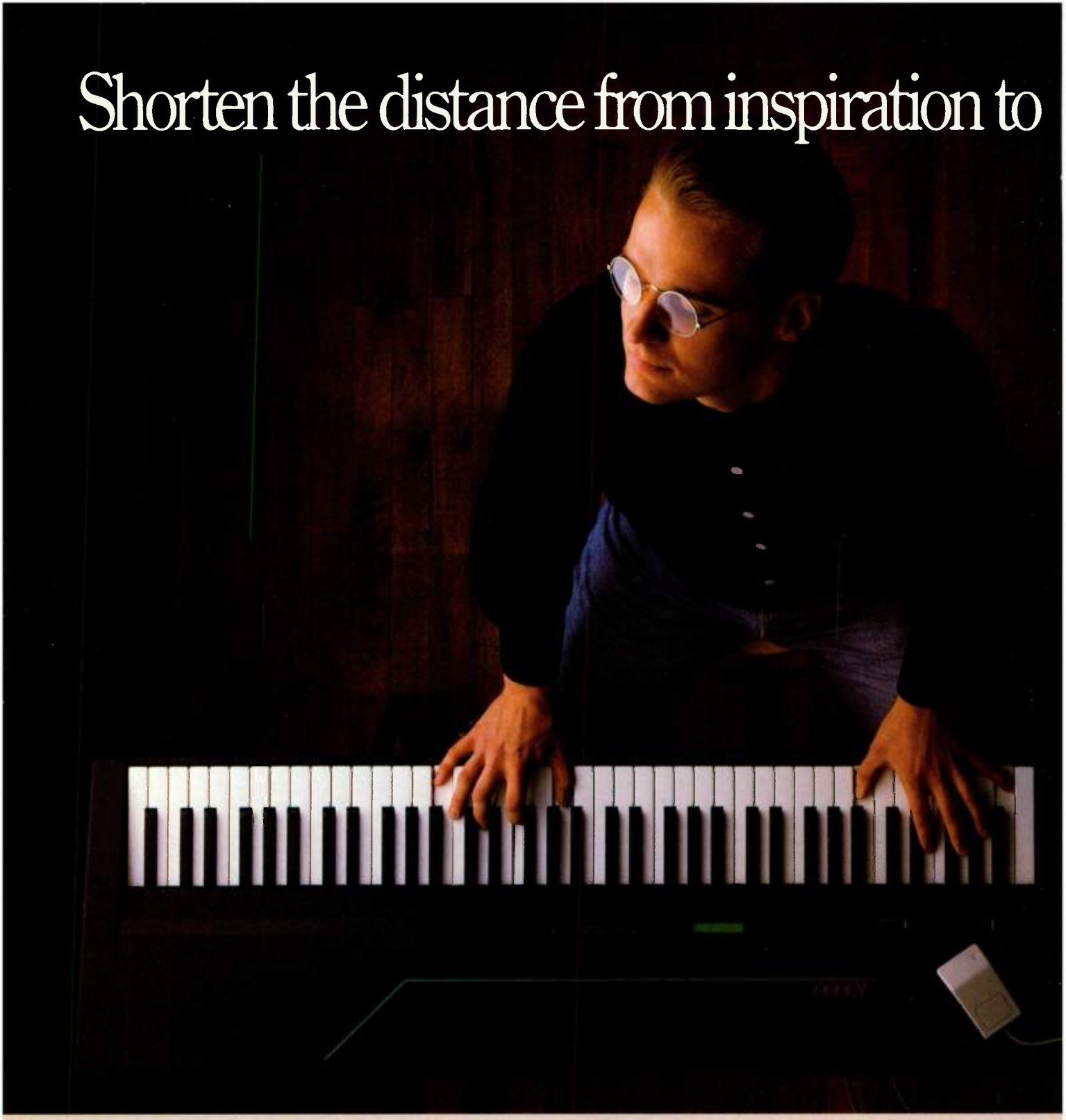
Of course, the C1 has connections for all your standard computer goodies, including monitor, modem, printer and mouse. And it's been designed for easy carrying from living room to studio and stage.

Call 800-333-4442 for the name of the authorized Yamaha C1 dealer nearest you, then stop in for a screen test.

See how well it performs when you play music. And when you play accountant. **YAMAHA**®

Yamaha Music Corporation, USA, Digital Musical Instrument Division, P.O. Box 6600, Buena Park, CA 90622.
In Canada: Yamaha Canada Music Ltd., 135 Milner Avenue, Scarborough, Ontario M1S3R1.

Shorten the distance from inspiration to



For centuries, musicians have had to use one instrument when writing music: the pencil.

Finale,™ however, is the first music software that efficiently eliminates the pencil from the composing and publishing process. All you need is the inspiration to write music. Finale will do the rest.

Finale software integrates MIDI keyboard, any 1 megabyte Macintosh, ImageWriter, LaserWriter, or any PostScript printer. IBM version available in Dec., 1988.

NO OTHER SOFTWARE HAS THE BRAINS TO WRITE MUSIC LIKE THIS.

As noted composer Christopher Yavelow so aptly put it, "If you asked a musician what the dream product would be,

publication.

you'd be hard pressed to come up with anything that outperformed Finale."

The secret lies in Finale's revolutionary cognitive abilities. It literally understands what you play into it.

With Finale, you just sit at your MIDI keyboard and improvise your score using expressive dynamics and rubato. Within seconds, your score will appear on the screen in standard music notation.

Finale even has the amazing ability to "explode" or expand a simple piano score into a full orchestration. Just a few clicks of the mouse will do it.

Then you add MIDI channels and patch assignments to hear your orchestration.

TURN YOUR HOME INTO A PUBLISHING HOUSE.

Now that your score has been entered, you can use Finale's unprecedented page layout and editing features.

Finale even has its own PostScript font called Petrucci.™

You can also customize and create symbols to fit any publisher's requirements.

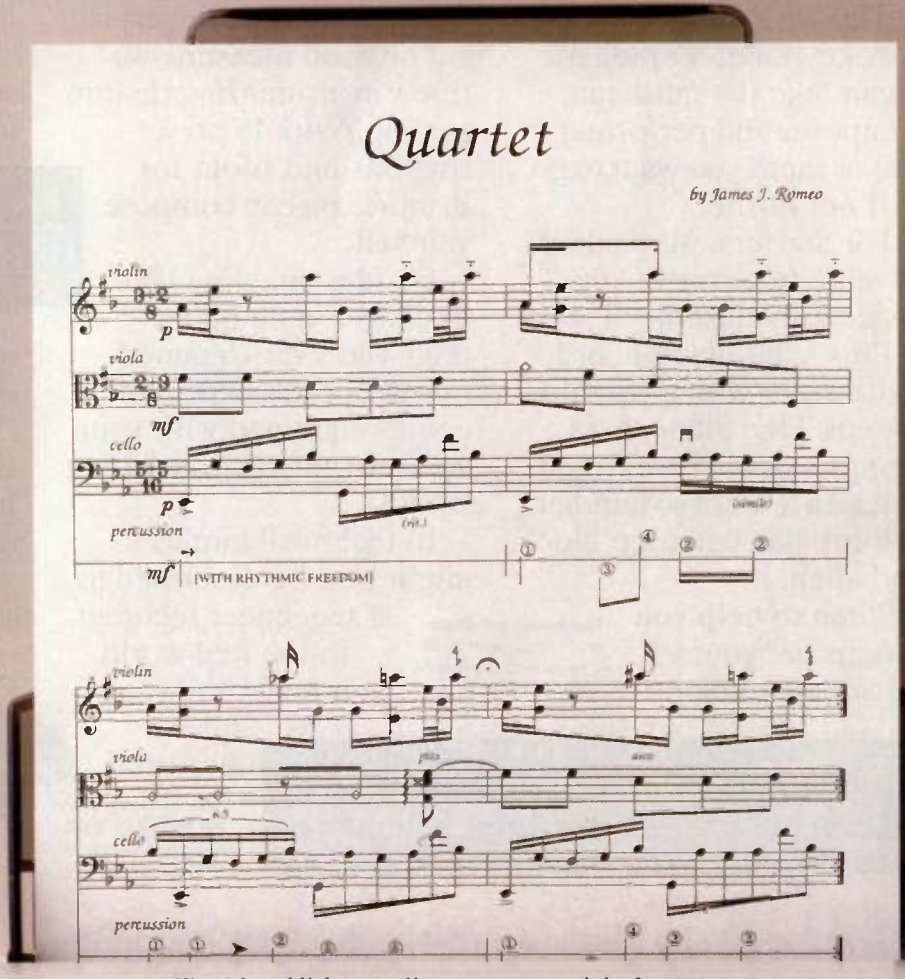
No wonder *MacWeek* exults, "Finale blows away everything else currently available."

THE GRAND FINALE.

For only $1000, Finale is a true investment for the professional composer. It's been designed to be the last music composing and publishing software you will ever need.

Just call toll-free 1-800-843-1337. Or collect 612-854-9554 for the dealer nearest you or for more information.

Finale™ Coda™



Finale's publisher-quality scores are a sight for sore eyes.

YOU WON'T BELIEVE HOW BAD YOU CAN SOUND.

You're looking at one bad electronic keyboard.

The DSR-2000.

A keyboard so radical, it can take the musician, composer and performer in you as far as you want to go.

If not farther.

For starters, we packed 61 velocity-sensitive keys inside its handsome 41" case.

Plus a handy on-board synthesizer with 60 familiar sounds. Like piano, bass, strings, sax and blues organ.

And a few not so familiar, like tubular bells, ice block and alien.

Then to help you "compose" yourself, we added a Voice Data Controller. A remarkable feature that makes editing your own voices mere fingerplay.

Your portable studio. The five-track digital recorder that lets you cut a demo whenever you like.

For good measure, we threw in an amazing rhythm section. With 16 preset rhythms and room for 16 more you can compose yourself.

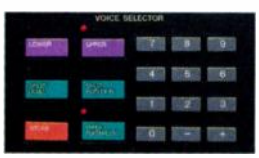
Besides enabling you to carry a tune better than you ever dreamed possible, each DSR-2000 comes equipped with your very own personal recording studio.

In technical circles it might best be described as a sequencer recorder.

In the real world, you might say you have a five-track recorder that lets you lay down tracks whenever and wherever the mood strikes.

There's also MIDI in. MIDI out. MIDI thru. Stereo input. Stereo output.

Even a headphone jack, so you can jam, compose and record all night without disturbing anyone who'd actually prefer to sleep.

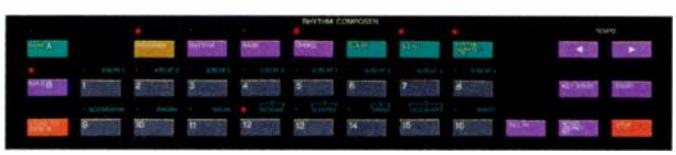


DSR-2000 stores 60 preset and 40 user voices. All selected by the keypad you see here.

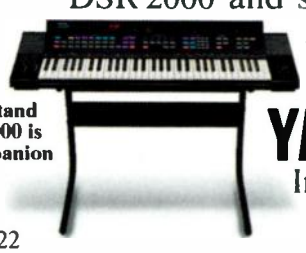
In short, there are plenty of decent electronic keyboards to choose from. Some can actually make you sound pretty good.

But then why should you settle for just sounding good?

When you can buy a DSR-2000 and sound as bad as you like.



The on-board drum machine features 16 presets with 16 more you can build from scratch.

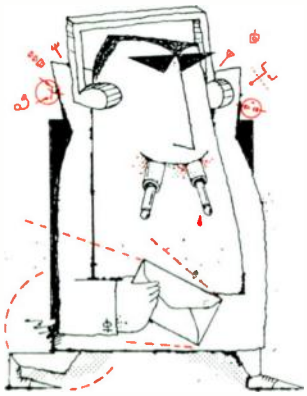


The optional stand for the DSR-2000 is a perfect companion onstage or off.

YAMAHA®
Into the future.™

P.O. Box 6600 · Buena Park, CA 90622

Reader comments: CD lending, part sources, just intonation, useful tips and tricks, another side of the copy protection issue, and more...



DAVID POVILAITIS

COPY PROTECTION: THE PROGRAMMER'S VIEW

The programmers who write music software are inconvenienced by copy protection *far* more than any user. Every music software programmer I know is in the field because of a love of music; many of us are making tools that we hope to be able to use in making our own music. None of us enjoys playing cops-and-robbers, and all of us resent the days spent discussing and installing protection; the inevitable, and nagging, worries as to whether we have done enough; the last-minute, protection-related bug fixes; and the extra hour that it takes to add protection to each new beta or release disk. The only reason that we put up with it at all is that our marketing people assure us that it would be costly, if not disastrous, to abandon copy protection.

Speaking from under my other hat, as founder and co-owner of Dr. T's, I do make a decent living—enough to live comfortably, but far from ostentatiously. I also work harder and under far more stress than I did before starting Dr. T's. Not incidentally, Dr. T's provides a livelihood for over two dozen employees, authors, and consultants. We all *very* much resent being called upon to defend the steps that we find necessary to protect the integrity of the intellectual property upon which our livelihoods depend.

Dr. T (Emile Tobenfeld)
Massachusetts

SUGGESTION BOX

I'm sure that those who have worked with the Roland MC-500 would agree with me that it is quite a handy piece of gear around a home studio. But wouldn't it be even nicer if the manufacturer built a rack-mount version? Speaking of rack-mounts, I'd like to also address the rack-mounted "lighting modules" being sold for equipment racks. Has anyone suggested (or manufactured) a lighting module with a light source for the *rear* of the rack (in addition to the standard front lighting)? Perhaps a BNC connection on the back of the module (for those little light collectors) or a custom gooseneck fitting (made by the manufacturer) would also do the job.

Roboceto Stidham
Arizona

MORE AMIGA TIPS

I would like to respond to a few of the comments some readers made in the July '88 issue concerning the Amiga computer. As an Amiga MIDI user, I feel I can clear up some of the rumors and misconceptions surrounding this machine.

First, I would like to address the issue of "stuck notes." I have had this problem myself but know how to avoid it. I use the *Mimetics SoundScape* MIDI program, which includes a feature called The Sample Player. This uses software to play sampled sounds through the computer. If I record a track from my keyboard and The Sample Player is turned on, it may lock up if I chord more than four notes. To avoid such lockups, I disable The Sample Player while recording. It works fine during playback (although it will play only four notes at a time). I have never had to reboot because of a stuck note—I just look at the SoundScape display to see which note is stuck and tap that note on my keyboard to send a Note Off.

Peter R. Van Horn
Texas

JUST INTONATION HISTORY

I was glad to see the article on just intonation by Tim Perkis in your July issue. However, readers of the "For the Beginner" inset might be even more surprised to learn that equal temperament in Western music is actually much more recent than the 17th century. The well temperaments (note: plural) which came into more common usage about that time are not the same as equal temperament. Although equal temperament was known in theory by the Chinese many centuries ago, and by Western music theorists before Bach, it was not used widely until 1845, when pianos started being made of cast iron and took on such tremendous string tension that they could not be easily retuned (see Owen Jorgensen, *Tuning the Historical Temperaments by Ear*, Northern Michigan University Press, 1977). Note that this date is after Beethoven, Chopin, Mozart, Bach, etc. Before this, it was not uncommon to retune keyboards in the middle of a concert, since this was a much simpler task. The well temperaments, of which Bach was so fond, and meantone tuning (which was by far the most commonly used tuning in the classical period) both have different interval sizes in each key. This is one of the reasons composers of that time found each of the keys to have a unique character and exploited this in their works. It is very probable that

all these composers would have found equal-tempered renditions of their works to be very out of tune and, in fact, many of them explicitly rejected certain close-to-equal temperaments for this reason (see *Temperament* in Grove's *Dictionary of Music*).

The only other comment I wanted to make is that although the TX and DX instrument's microtonality feature is great for those who want to try just and other intonations, just intonation is really not too well served by forcing it onto fixed-scale instruments. Before keyboard instruments became popular, most music was written for voices or groups of instruments without fixed pitch, like strings and early horns and woodwinds, pitches were much more flexible, and a D would have different performed pitches depending on whether it was in a D-F-A or in a G-B-D triad. To have the fifth in both chords by 3/2, and the G and A be 3/2 and 5/3 from C, respectively, you need two Ds, one a 9/8 from C and the other a 10/9 from C. This is true just intonation, where the individual harmonies are all tuned pure. Problems arose only when music was put on keyboards, which could handle only a few pitches in an octave, and therefore required compromising, or "tempering," the pitch system, changing the intervals in such a way that no interval was too far off from its just value. There really is no just intonation on a fixed-pitch keyboard, except for very limited modal music where only a few chords are used, or if the octave scheme of the keyboard is completely ignored so that it takes multiple keyboard "octaves" to hold all the pitches desired in a single acoustical octave. However, given that the DX only has 60 keys, and MIDI only 128 fixed named pitches, one quickly becomes limited by the number of octaves available. It should be noted, however, that digitally controlled synthesizers do not have to be fixed-pitch instruments, and could actually achieve just intonation if one were allowed access to the tuning in a general way.

Erling Wold
California

WHERE TO FIND PARTS, PART 1

For those of you who cannot find the 4136 quad op amp used in "The Smooth Phaser" circuit, by Thomas Henry (June '88 **EM**), they are available from Crump Electronics, 6340 West Mississippi Ave., Lakewood, CO 80226; tel. (303) 936-4407. Call or write for details.

Nancy Woodruff
California

WHERE TO FIND PARTS, PART 2

I loved C.R. Fischer's "Updating the Dinosaur" article (January '88 **EM**). In the last few months, I have been doing a bit of dinosaur updating myself, resurrecting an old analog delay. Unfortunately, finding an SAD-1024 delay line (or one of the newer R5107 replacements) was a problem until I stumbled across a sales rep who had just acquired the Reticon line: Stan Giles of Palatine Sales, 708 J. Ave, N.E., Suite 11B, Cedar Rapids, IA 52402; tel. (319) 365-8071.

Although the SAD-1024 has been obsolete for years, Reticon still has two delay chips on the market: the R5106 (replaces the SAD-512) and the R5107 (replaces the SAD-1024; for more information on these

parts, see "Goodbye SAD-1024," by Jack Orman, in the April '86 EM). To further complicate matters, according to Mr. Giles, Reticon now only sells to OEMs (Original Equipment Manufacturers). It is possible to order factory direct, but you must buy a minimum order of a least six R5107s, which comes to $102, plus $3 shipping. The complete part number for the R5107 is RD5107ANP-011; these may be ordered from EG&G Reticon (attn. Helen), 345 Potrero Ave., Sunnyvale, CA 94086-9930; tel. (408) 738-4266. Call or write for details before sending in your order.

My only gripe is, whatever happened to retail sales? If anyone out there has any ideas where hobbyists might obtain Reticon chips at retail quantities, please share this information with other EM readers. Otherwise, I guess I'll have to build more flanger/chorus boxes than I'll ever need!

Paul Higgins
Minnesota

WHERE TO FIND PARTS, PART 3

Regarding "The Smooth Phaser" article (June '88 EM), Solid State Micro Technology has a $100 minimum order. For single orders of the SSM2040, contact Anchor Electronics Inc., 2040 Walsh Ave., Santa Clara, CA 95050. Also, can this phaser slow down to a very slow pulsing sweep, too?

Kevin Ruddell
Ohio

Kevin—To slow down the Smooth Phaser, increase C10's value. Doubling the value will double the maximum period of the sweep.

MORE "FEEL" TIPS

I would like to thank your magazine for recently printing all those helpful articles about putting feel into sequenced music. It's hard to believe how much more open sequenced music sounds by doing small clock moves.

I have a few more hints that you may find interesting. In particular, changes in "gate time" (note duration) can put new life into quantized sequences. For example, record a short repetitive arpeggio. Using the editing features in your sequencer, alter the duration in different measures by a slight amount. To emphasize the effect, slightly increase velocity values

on staccato notes, and decrease the velocity for legato phrases. Using this technique will let you easily add tension or smoothness in your music.

Another useful trick is what I call "dual pitch bends," which is easy to achieve with multi-timbral synths. Call up two identical patches, but set each one to a different bend range. As you bend pitch, the variations in bend response can be subtle or dramatic, depending upon the difference between the two bend ranges.

A similar effect can be achieved by calling up two identical patches and setting their portamento ranges to different values. This will give the sound a "fat" attack. I hope you find these tips useful, and keep up the good work!

Michael Poeschl
New Jersey

THIS IS SPIRAL WRAP!

In response to Bob Damiano's letter about his search for nylon mesh tubing for "snaking" cables (March '88 **EM**), I would suggest that he try a product offered by Radio Shack called Spiral Wrap. It may not be the exact product he's looking for, but this product would seem to work on the same principle. Find it on page 134 of catalog #419. The product number is 278-1638; it comes in black or clear, and it sells for $1.79 per five-foot length. I am in a gigging Top 40 duo, and we use both spiral wrap and velcro wraps on stage and in our home MIDI studio to keep the cables under control.

Also, thanks for the great magazine! We learn a lot of valuable information from **EM** each month.

Karen Scholz-Gibbs
New Hampshire

MUSIC EDUCATION MADE EASY

A few months ago, you wrote an editorial wishing that one could rent CDs, or at least hear them in stores, so untried music could be auditioned before purchase. Like you, I think this would be an ultimate boon to the record industry, since almost any CD release would be guaranteed to go over the break-even point merely by sales to rental stores. However, as you might know, there is a law, the Record Rental Amendment of 1984, which makes it illegal to rent sound recordings. Congress is now in the process of making this five-year bill permanent, so there's no way to fight city hall on this issue.

But there are other avenues to the same goal. For years most public libraries have loaned records, but the records were usually in bad shape. Nowadays public libraries also loan cassettes. Cassettes are a better medium for library loans, because they hold what fidelity they have for a few hundred plays with little accumulation of audible damage. My public library offers a wide range of pop, classical, and voice recordings. I never end up pirating these, because after a week of listening, my curiosity is satisfied, and there are always other tapes to hear.

My librarian says it will probably take a few years before libraries start carrying CDs, but he agrees that the CD is the ultimate library medium. Libraries purchase recordings, but many items are donated. To conserve shelf space, they exercise some selectivity in what they accept, but are generally glad to accept donations.

If audiophiles would donate cassettes and CDs to their public libraries on a regular basis, the library would become the record rental setup you envisioned in your editorial, except it would be free and legal. Record companies would find it a bad PR move to antagonize libraries.

There are implications for independently produced recordings. Most independents are not too concerned with making a profit from their records; they just want to be heard. To this end, they mail tapes to AOR and college radio stations, where a song will probably be played once, at 3 a.m. on Sunday night, then given away or taped over. Independents would probably reach a bigger (and more literate) audience by sending their freebies to libraries. (It would be advisable to call or write first, to make sure the library has room for, and will welcome, the tape.)

James C. Chandler Jr.
Tennessee

James—Thanks for the suggestion. When I was first getting into classical music, I'd go to my local library and borrow two or three records a week. If I developed a taste for a particular composer, I'd eventually go out and buy a copy of the record (as you noted, most of the time records are in bad condition—but they are good enough to give you a feel for the music). I also found out about a lot of good jazz that way. The only downside, of course, is if people end up taping library materials as a way to avoid paying the artists for records they like—but I suspect that would be offset by those who end up purchasing records they would never have known about otherwise.

KUDOS FOR "20 GREAT ACHIEVEMENTS"

I must tell you how much I enjoyed reading your "20 Great Achievements in 20 Years of Musical Electronics" article (July '88 **EM**). It was really fascinating reading about the pioneers who risked almost all to create a dream—whether a Moog, a LinnDrum, or a Prophet-5. I can only guess how many hundreds of hours of work went into the production and writing of that piece. I could not put it down, to the point where I put off one of my own writing deadlines to finish reading your article. Congratulations on a sensational piece of work.

Frank Doris
New York

CALENDAR ITEM

Craig Anderton, **EM**'s founding editor will be the featured speaker at the first Swedish MIDI seminar, to be held in Stockholm on October 8-9, 1988. The seminar is co-sponsored by *Musicians Tech* and *MM—Media for Musiker*, the Swedish music magazine. In addition to talks covering many of the current and future applications of MIDI, participants will have an opportunity to view demonstrations and try out a selection of the latest MIDI gear. Similar seminars are planned for Oslo, Norway, and Copenhagen, Denmark, but dates have not been set as yet. Contact Musicians Tech at N. Ringvagen 30 A, S-72215 Vasteras, Sweden; tel. (011) 46 (0)21-12 64 91, FAX: (011) 46 (0)21-13 61 31.

ERROR LOG

In the July '88 **EM**, p. 128, the Parts List for the "CZ RAM Cartridge" should read (22) 390Ω resistors, *not* (22) 390 kΩ resistors; the schematic is correctly labeled.

The "What's New" section of the August '88 issue incorrectly listed the price for Dynacord's ADS Advanced Digital Sampler. The correct price is $4,995.

MAXIMUM CREATIVE ADVANTAGE.

D-20

The Ultimate
Multi-Timbral
Linear Synthesizer

L/A SYNTHESIS

Roland's highly acclaimed digital sound technology can now be yours in the advanced all-in-one D-20 Multi-Timbral Linear Synthesizer featuring a built-in 8-track MIDI Sequencer plus Disk Drive, Rhythm Composer, and Digital Reverb–the only complete MIDI music system designed for both performance and composition in a single affordable unit. Offering extensive 32-note polyphony, you can easily create distinctive new sounds using 128 programmable Patches, 128 programmable Timbres, plus 128 preset and 64 programmable Tones. In addition, the rhythm section provides 64 preset PCM Rhythm Sounds and 32 preset plus 32 Programmable Rhythm Patterns which can be combined to form a separate Rhythm Track. (Optional IC Memory Card doubles complete internal memory.) In Performance Mode, you can play along with your rhythms live using two individual synthesizer sounds, or activate the Sequencer (approximately 16,000 note capacity, excluding Rhythm Track) to control any external MIDI instruments as well. In Multi-Timbral Mode this amazing unit provides performance capabilities equal to 8 independent polyphonic synthesizers. A virtual self-contained instrumental ensemble, the D-20 provides everything you need to compose, record, and perform complete songs, with all MIDI data conveniently stored on a single disk (76,000 note capacity). Used as a professional Music Workstation, the D-20 offers an ideal creative environment for any musician who works at home, in the studio, or needs a compact songwriting tool to take on the road. Featuring a wide variety of musical styles, an exciting Autodemo has been specially created and built right into the D-20 to make it easy for you to directly hear its unparalleled capabilities at the touch of a button. The best way to discover what the new D-20 can do for your music is to audition it at a local Roland dealer today!

For more information call or write Roland Corporation US, 7200 Dominion Circle, Los Angeles, CA 90040. Telephone: 213-685-5141.

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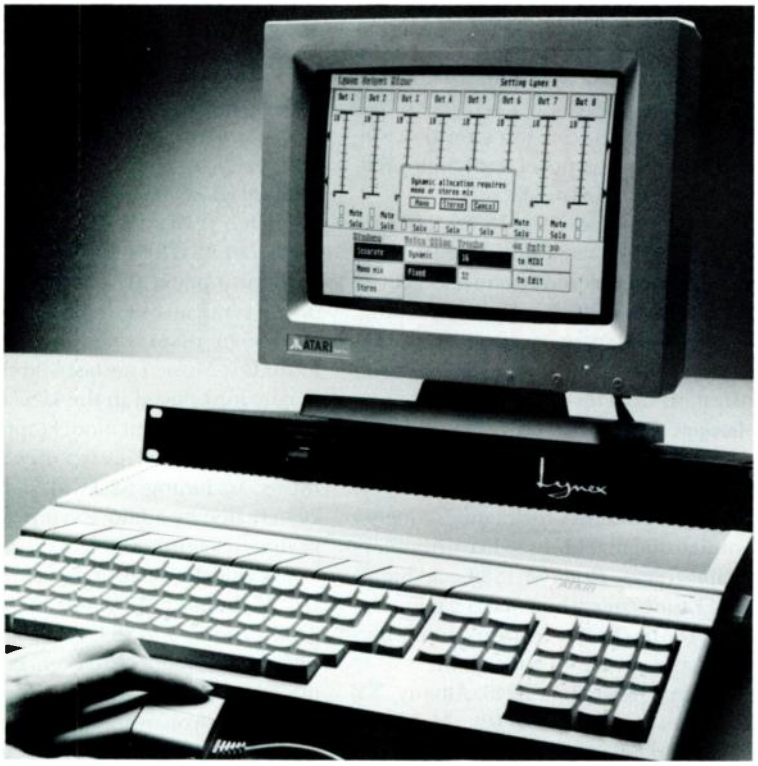
WRH

THE GREATEST HITS OF THE 1988 SUMMER NAMM SHOW

EM serves up some of the delectable new technology from this semiannual feast of tasty musical treats.

By the EM Staff



Lynex, from Commander Electronics, is an Atari ST-based sampling workstation.

Last month's **NAMM** bulletin highlighted a number of the more impressive products we saw at the June show. Since we only had the space to mention a fraction of what was there, we decided to have this month's "What's New" present a more comprehensive overview of the new gear shown in Atlanta. Even so, we *still* ran out of space in the magazine long before the industry ran out of new products to cover.

All prices are list prices as given by manufacturers at the show and are subject to change. Some products are shipping now, some should be out by the time you read this, and some may never appear; for more information, call or write the manufacturer, and reference this issue of **EM**.

Alesis (Box 3908, Los Angeles, CA 90078; tel. [213] 467-8000). *Quadraverb* ($449): multi-effects signal processor. *Micro EQ* ($125): monophonic, three-band parametric EQ.

Alfred Publishing (16380 Roscoe Blvd., Van Nuys, CA 91410-0003). *An Insider's Guide to Casio CZ Synthesizers* ($12.95) by Andrew Schlesinger (programmer of Synthetic Productions CZ-101 sound cartridges): everything you wanted to know about programming the CZ series.

Atari (1196 Borregas Ave., Sunnyvale, CA 94088; tel. [408] 745-2000): announced a joint promotion with Yamaha offering an under-$1,000, entry-level electronic music package consisting of an Atari 520ST-FM computer, Yamaha PSS-480 keyboard, and Passport's *Master Tracks Jr.* software. Two major chains—Lechmere in the East and Federated in the West—have already announced plans to carry the system.

Blank Software (Box 6561, San Francisco, CA 94101; tel. [415] 863-9224). *Alchemy 1.1* ($495; free updates to 1.0): This exceptional visual editing system for the Mac now supports Roland S-550, Casio FZ-1/FZ-10, Akai S900, Ensoniq EPS and Mirage, E-mu Emax and SP-1200, and IMS Dyaxis sample-to-disk system; other instruments are supported via the MIDI Sample Dump specification.

Blue Sky Logic (Box 5372, Akron, OH 44313; tel. [216] 867-6027). *MIXI M-100* ($995): MIDI control box with 17 faders. Outputs MIDI Volume, Program Change, continuous controllers, and other data for hands-on control of MIDI parameters in real time, with automated mixing capabilities.

Coda Music Software (1401 E. 79th St., Bloomington, MN 55425; tel. [800] 843-1337). *Finale*: music transcription software. Designed for 1 MB Macs, Finale prints music entered from a MIDI keyboard using "notation intelligence" techniques to simplify the transcription proc-

ess. An IBM-compatible version is slated for introduction in December.

Commander Electronics Ltd. (distributed by Russ Jones Marketing Group, 17700 Raymer St. #1002, Northridge, CA 91325; tel. [818] 993-4091). *Lynex*: Atari ST sampling system. Internal 1 MB RAM (expandable to 32 MB) frees up host computer memory. 16-bit stereo sampling at 50 kHz, 8- or 16-voice polyphony, 8-channel digital mixer, eight separate outputs, and visual editing capabilities.

CTM Development (Box 996, Menlo Park, CA 94026; tel. [415] 323-5054). *Patchworks* ($125): MIDI patch bay graphic editor librarian for the Mac works with MX-8, MSB+, MSB 16/20, and MIDI Central, with updates scheduled for additional units as they become available. *MidiPack* ($80): update of the original MidiPack utility program includes a real-time music calculator, program change number converter, MIDI signal processor/generator, and more. HyperCard demo stack disks are available for both programs for $10 each.

Denon (distributed by Exclusive Musical Products, 2915 S. 160th St., New Berlin, WI 53151; tel. [414] 784-8388). *EP-903* electronic grand piano ($1,999): 88 keys, PCM sound source, seven instrument sounds in addition to piano, two internal speakers, MIDI. The *EP-902* ($1,695) is a 76-key model. The *EP-933* ($2,499) includes four internal speakers and hammer-type keyboard mechanism.

Digidesign (1360 Willow Rd., Suite 101, Menlo Park, CA 94025; tel. [415] 327-8811). *TurboSynth* ($349): See last month's issue for more information on this clever "software modular synthesizer." Also new: *Sound Designer II*, an update of the first Mac visual editor, and an improved *Sound Accelerator* card for the Mac II and SE.

Alesis Quadraverb

DigiTech (5639 South Riley Lane, Salt Lake City, UT 84107; tel. [801] 268-8400). *IPS-33 Smart Shift* pitch transposer ($799.95): Choose scale mode (41 scales are available) and key center; Smart Shift provides intelligent harmonization (not just parallel harmonies). The pitch-shifted signal uses sampling techniques for exceptional sound quality.

Filmsonix (1032 N. Sycamore, Hollywood, CA 90038; tel. [213] 653-0240). *The Feel Factory* ($695): See last month's issue for details on this novel, real-time processor for MIDI timing data.

Hal Leonard Books (Box 13819, Milwaukee, WI 53213). *Power Play DX!* ($19.95) by Steve De Furia: describes how to get the most out of the DX7II via pitch bending, use of controllers, microtunings, etc. Includes performance/voice data and demonstration cassette of techniques.

Imagine Music Group (751A S. Kellogg Ave., Santa Barbara, CA 93117; tel. [800] 662-6434). *Studio E* ($299): improved version of the Human Clock syncs sequencers and drum machines to live drummers or tape tracks. *Reshaper* ($89): reshapes SMPTE time code when making tape copies. *MIDIMic* ($349): converts audio into MIDI; sing parts into your synth.

Intelligent Music (Box 8748, Albany, NY 12208; tel. [518] 434-4110). *MidiDraw* ($95): Atari ST graphics/music program with which drawing with the mouse produces music. *Cartographer 1.0* ($100): controls all functions of the Axxess Mapper. *RealTime* is an interactive software sequencer based on the rhythmic design principles of *UpBeat*, Intelligent Music's algorithmic percussion sequencer.

Kat (Box 60607, Longmeadow, MA 01116; tel. [413] 567-1395). *drumKAT* ($995): percussion controller with ten velocity-sensitive, rubber playing pads that can be electronically grouped to make bigger pads. Two MIDI inputs are mergeable to four MIDI outputs; nine analog trigger inputs; four footswitch inputs; click out. Contains 32 kits of performance settings.

Kawai (Box 9045, Compton, CA 90224-9045; tel. [213] 631-1771). *MAV-8 MIDI Patch Bay* ($129): 1U' 4-in, 8-out model uses front panel sliders for setups. Also, the *K1* synth and keyboardless *K1m* ($895 and $545 respectively) shown at the Frankfurt Music Fair last March were officially introduced in the U.S. along with the *K1r* rack-mount model (approx.$595-$650). The K1 series features 256 waveforms, including 52 PCM samples and 204 created by additive synthesis; the K1 keyboard features velocity and aftertouch.

Magnetic Music (RD 5, Box 227A, Myrtle Dr., Mahopac, NY 10541; tel. [914] 248-8208). *Texture 3.0* ($299) by Roger Powell: now includes clipboard event editing, animated track display, clip velocity, chord flip (inverts voicings), new owner's manual, and several other enhancements.

MegaMix (6 Brian St., Commack, NY 11725; tel. [516] 864-1683). *IFI-8*($1,695): Eight faders allow for real-time VCA or MIDI control; the unit is especially suited for use with the MegaMix studio automation system, which is now available for PC, Mac, and Atari computers.

MICO (Box 956, Arleta, CA 91331; tel. [818] 785-2841). *Ultrasonic Reference Series Pickups*($8): These pickups feature flat response; patching them into a programmable EQ (e.g., ART IEQ) allows for setting up response curves that mimic a wide variety of characteristic guitar sounds (Strat, Les Paul, Tele, etc.).

Middle Atlantic Audio Products (Box 96, Haskell, NJ 07420; tel. [201] 839-1011). *Rack-mount hardware and accessories*: rack shelves, utility rack shelves, vent panels, rack storage drawers, rack rails, and other extremely useful rack system accessories. Write for catalog.


Kat drumKAT

AFTER TOUCH™

OFFICIAL NEWS FROM THE YAMAHA USERS GROUP

Software update and new voices announced for TX16W Sampler.

WHEN YAMAHA® INTRODUCED the TX16W Digital Wave Filtering Stereo Sampler, the whole idea of stereo sampling suddenly became more realistic—especially for musicians on a budget.

Now come two major improvements. First, there's been an update to the operating system, called Version 2.1, that streamlines the way samples are created and organized. And second, the TX16W voice library has been expanded to include over 100 disks, giving you a rich and varied selection of sounds.

Here's a quick look at the major enhancements built into the new operating system:

Mapping, the vital process of assembling several samples across the keyboard, is now totally automated. For example, if you sample a C, then an F, then a C one octave up, the TX16W will automatically place those samples in their proper place on the keyboard and name them appropriately. This is made possible by a new feature called Pitch Detection, which can analyze a sample and determine its pitch.

Another new feature, Global Editing, lets you edit parameters such as Attack Time over the entire keyboard range. Ending the tedium of editing individual timbres one at a time.

"Templates" are a new feature that provide for automatic mapping of non-pitched sounds, such as sound effects and drums. And a new Undo function does away with the old "buffer" system, making it easier than ever to change your mind after you enter a command.

The system update affects memory, too. Now it's allocated differently, so you can have 128 timbre locations, as opposed to the previous 64. When memory is fully expanded to six megabytes, that gives you eight banks, 256 performances and 512 waves.

Another improvement is Mono/Poly mode. It gives you enhanced performance when you're using certain controllers, such as the G10 and WX7, that work best when triggering a monophonic sample.

Transferring sounds between disks has been made much easier, too. Now, when you copy a performance, all the components that make up that performance are copied automatically.

In keeping with Yamaha policy, Operating System 2.1 is being distributed free to all TX16W owners. You can get the update and try out the newly expanded voice library at any authorized Yamaha Digital Musical Instrument dealer.

NEW VOICES AND IMPROVED SYSTEM SOFTWARE FOR YAMAHA TX16W SAMPLER.

Hot Tips

Transferring voices from file to file on a DX7IIFD disk without a RAM cartridge.

You can transfer voices, up to two at a time, between files on a DX7IIFD disk without using a RAM cartridge. Here's how: Load the first file (the destination file) into the DX7's internal memory and decide which locations you want to add the voices to. Then load the second file (the source file) into the DX7's internal memory, go into DUAL mode and call up the two voices you want to transfer. Next, load the first file into memory again. The two voices from the second file are in the keyboard's Play/Edit buffer. Now store the two voices to the predetermined locations in the first file and save the file back to disk.

AFTERTOUCH is a monthly newsletter filled with the latest on Yamaha products. Get a year's subscription free by writing to: AFTERTOUCH, P.O. BOX 7938, Northridge, CA 91327-7938.

YAMAHA

Yamaha Music Corporation, USA, Digital Musical Instrument Division, P.O. Box 6600, Buena Park, CA 90622.

Music Sales (5 Bellvale Rd., Chester, NY 10918; tel. [914] 469-2271). *The Electronic Musician's Dictionary* ($9.95) by Craig Anderton: defines over 1,000 commonly used terms of interest to electronic musicians. *Arranging Techniques for Synthesists* ($14.95) by Eric Turkel: for amateurs and professionals who want to improve their arranging skills.

Oberheim (2015 Davie Ave., City of Commerce, CA 90040-1704; tel. [213] 725-7870). *Matrix-1000* ($595): 1,000 analog sounds, with 800 in ROM and 200 user-programmable, in a 1U rack-mount. *Systemizer* ($249): stores 128 setups that define keyboard splits, floating splits, layers, crossfades, controller filtering, number of voices, etc. for live performance applications. *Cyclone* ($249): advanced outboard arpeggiator includes tempo tap and real-time performance controls.

Oberon Systems (3815 W. Burbank Blvd., Burbank, CA 91505; tel. [818] 954-9591). *Oberon Music Editor* ($695): music typesetting system for IBM PCs; typeset text and music together, 180 pre-programmed macro keys, 27 pre-programmed style sheets (can be modified as needed).

Opcode Systems (1024 Hamilton Court, Menlo Park, CA 94025; tel. [415] 321-8977). *Timecode Machine Desk Accessory*: a software update for Opcode's Timecode Machine™, adding new features to the MIDI-to-SMPTE tape synchronizer. Also, company chief Dave Oppenheim's proposal for the *MIDI File Format Spec. 1.0* was officially ratified at the convention, and documentation is available through the International MIDI Association; tel. [213] 649-6434.

Optical Media (485 Alberto Way, Los Gatos, CA 95032; tel. [408] 395-4332). *Professional Universal CD Player* ($1,795 to $2,495, depending on options): plays both CD-ROM and CD-Audio discs, with options for SCSI, RS-422 interface, hand held remote, and digital outputs.

Technics SX-AX7

Passport Designs (625 Miramontes St., Suite 103, Half Moon Bay, CA 94019; tel. [415] 726-0280). *Master Tracks Pro 3.0* ($395; update previous versions for $45): now available for PC and Atari as well as Mac. Locks to SMPTE or MTC, two MIDI outputs for 32-channel operation, cue list, tempo recalculation to fit time, and controller chasing. *NoteWriter* music engraving system for Macintosh ($295): sketch notes rapidly; program interprets and places appropriate symbol. *Encore* ($395): transcribes and prints out MIDI file-compatible sequences.

Performance MIDI Systems (Box 864, Grand Forks, BC, Canada V0H-1H0; tel. [604] 442-8362. *Pro MIDI Player* ($149 U.S.): live performance Atari ST sequencer with no editing, but loads up to 26 songs in memory for instant access. Work out complex tunes at home, dump into Pro MIDI Player for gigging.

Rocktron (1900 Star Batt Dr., Rochester Hills, MI 48309; tel. [313] 853-3055). *Pro-Rax*: half-rack signal processors. The line includes *Hush IIX* single-ended noise reduction ($179), *CE1* compressor/expander ($169), *G.D.P. Guitar Distortion Preamp* with pre/post EQ and low noise ($219), *EX1* exciter ($169), *EXH* exciter plus noise reduction ($279), *EQ3* parametric equalizer ($219), *MX3* digital delay ($329), *MX4* digital delay/pitch shifter ($379), and *PWR1* power supply module ($129).

Tascam MIDiiZER

Roland (7200 Dominion Circle, Los Angeles, CA 90040-3647; tel. [213] 685-5141). While not an exhibitor, here's information on some new products. *R8 Rhythm Composer* ($950): includes "human feel" function for more realistic drum patterns, 48 16-bit sampled sounds, 1/384th note resolution, velocity-sensitive buttons, and eight individual outputs. *PAD-80 Octapad II* ($795): update of the PAD-8 features 64 internal patches, chain function, and ability to send controller/Aftertouch/Bend data with optional footpedal. *A-880 MIDI Patch Bay* ($395): Eight inputs route to eight outputs via front panel selector buttons; configurations can be stored in 64 memory locations that respond to program change commands. *S-MRC Software Upgrade* ($250): upgrades MC-500, MC-500 MkII, and MC-300 sequencers to provide extensive editing (data filtering, cut-and-paste between different songs, track swap, track merge, etc.), "humanizing" functions, and locate points. *OM-500 Hardware Upgrade Kit* ($650): converts MC-500 to MC-500 MkII. *E-Series Synthesizers*: Designed for home use, these feature one-finger chord accompaniment, built-in digital reverb, and internal drum machine and sequencer. The *E-10* (approx. $1,600) has 48 voices and 24 rhythm sounds; the *E-20* (approx. $2,100) has 64 voices and 32 rhythm sounds.

Samson (485-19 S. Broadway, Hicksville, NY 11801; tel. [516] 932-3810). *Stage 22 Wireless System* ($399): true diversity technology and dbx noise reduction in a wireless system for guitar. Ibanez and Kramer will also be building this system into selected guitars in the months to come.

Scholz R&D (1560 Trapelo Rd., Waltham, MA 02154; tel. [617] 890-5211). *MIDI Octopus* ($239.95): controls the in/out status of up to eight effects; MIDI Program Change commands select up to 100 presets. Compatible with effects that switch in and out of the signal path via contact closure to ground or any effect via optional remote loop accessory ($45, available directly from Scholz R&D).

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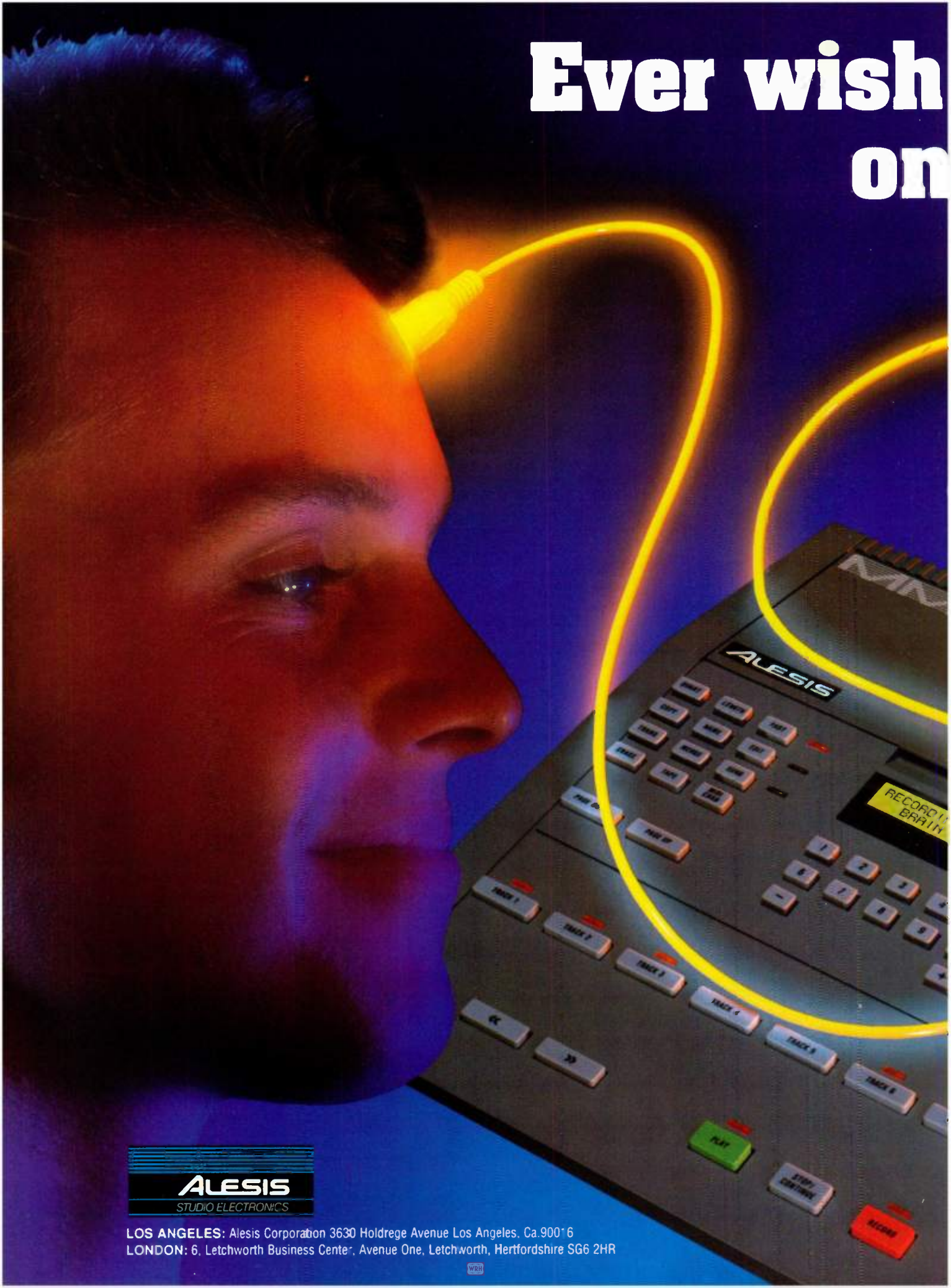
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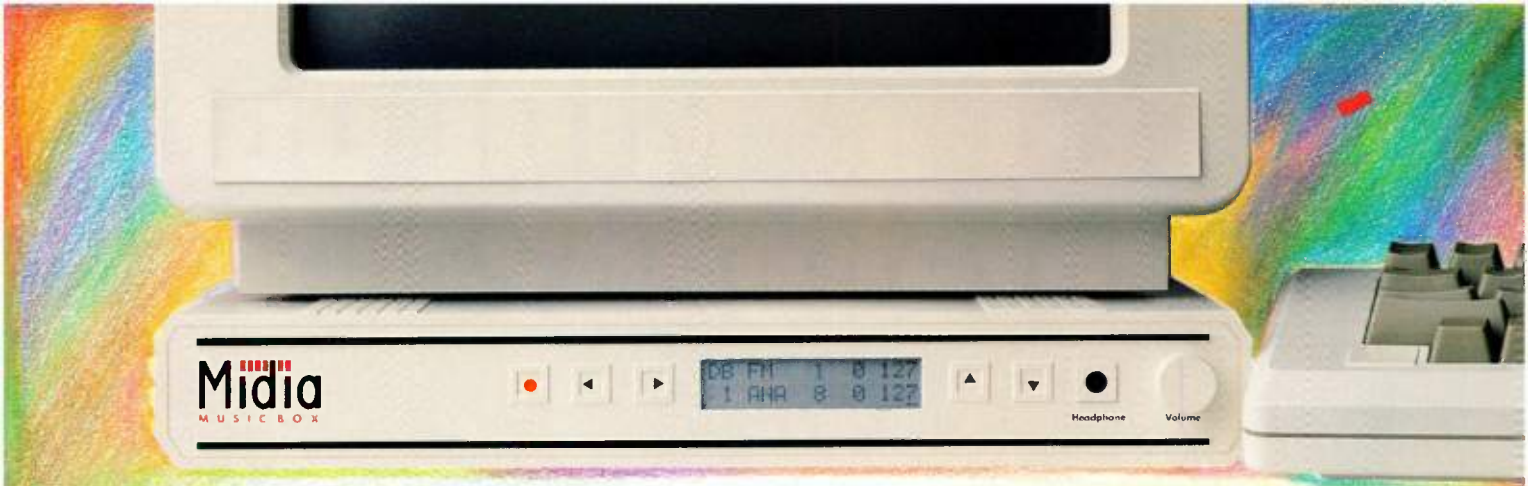

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basas, CA 91302; tel. [818] 884-2653). *Trixer* ($1,350): accepts six acoustic drum mics and drives four onboard sampled drum kits (bass, snare, four toms), mixable with acoustic sounds with a 6-input mixer. Also includes 16 digital reverb presets.

Soundcraft (JBL Professional, 8500 Balboa Blvd., Northridge, CA 91329; tel. [818] 893-4351). *Twister MIDI Automation System*: available in 16- to 64-channel configurations ($5,250 to $17,500) or 8-channel stand-alone VCA package ($1,750). Includes free Atari ST controller software for graphic editing/mixing.

Tascam (7733 Telegraph Rd., Montebello, CA 90640; tel. [213] 726-0303). *MIDiiZER* (under $2,000): multiple-function autolocator, MIDI synchronizer, and transport synchronizer. *DA-50* ($4,000): ultra-low distortion DAT. *MSR-16* (approx. $7,000): ½-inch, 16-track recorder with dbx noise reduction. *GS-30* ($225): guitar preamp with distortion and tone controls; designed to give distorted guitar effects when going direct into the board.

Technics (6550 Katella Ave., Cypress, CA 90630; tel. [714] 895-7221). *SX-AX7 Synthesizer*: includes PCM attack waveforms and synthesized sustain waveforms, 72 memories, simplified programming, PCM drum sounds, and accompaniment/bass line options. Also announced: *SX-AX5* and *SX-AX3* synthesizers, which delete some features for lower price tags.

Toa MR-8T

Toa (601 Gateway Blvd., South San Francisco, CA 94080; tel. [415] 588-2538). *MR-8T* ($2,149): 8-track cassette recorder runs at twice standard cassette speed and includes dbx noise reduction, a built-in mixer (usable as a monitor mixer when sending the MR-8T through a studio console) with patch points for adding effects, and transport memory presets for rapid location of selected parts on tape.

Yamaha Digital Musical Instruments Division (Box 6600, Buena Park, CA 90622-6600; tel. [714] 522-9011). *G10 MIDI Guitar Controller* and *G10C Guitar MIDI Converter* ($2,495 for both): Sonar-type pitch detection gives excellent tracking and fast response. *C1 Computer* ($2,995 with two 720K floppy drives; $3,995 with 720K floppy drive and 20 MB hard disk). *PF2000*

Yamaha DMP11

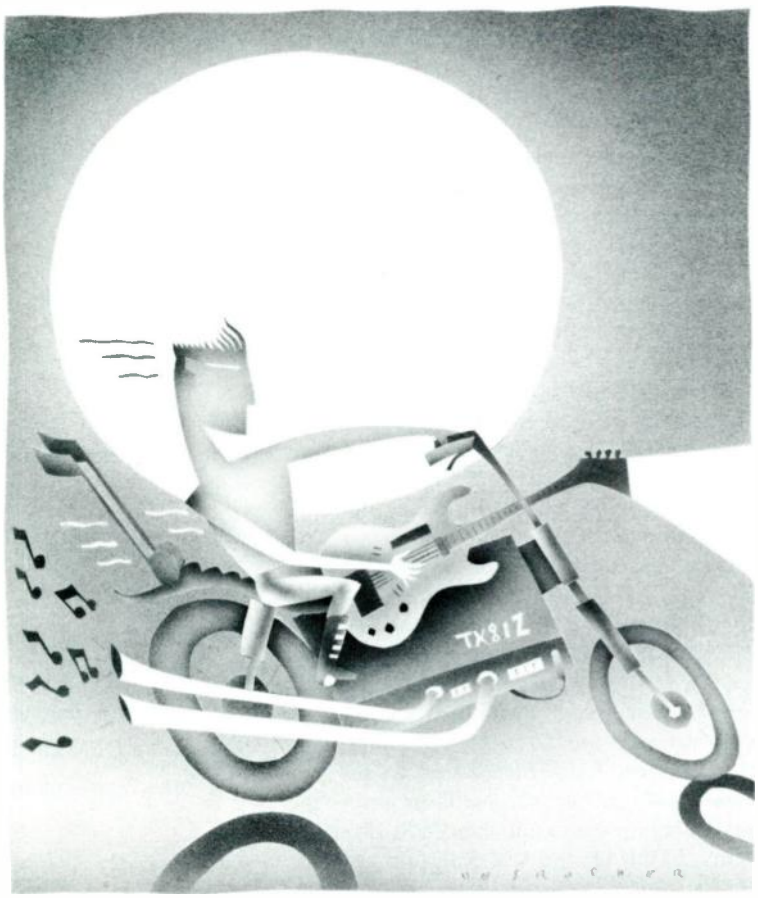
Electronic Piano: 32-note polyphony, 88 keys, 12 internal preset voices, accepts DX7II voice cartridges for access to over 10,000 sounds, includes built-in sequencer and speaker system.

Yamaha Professional Audio Division (Box 6600, Buena Park, CA 90622-6600; tel. [714] 522-9011). *DMP7D Digital Mixing Processor* ($5,995): essentially a DMP7 with digital inputs and outputs for interfacing with digital recorders and other digital formats. Accepts analog signals with the addition of Yamaha's 8-input *AD808 A/D Converter* ($4,995) and/or *DA202 D/A Converter* ($1,195). *DMP11 Digital Mixing Processor* ($2,395): rack-mount 8 × 2 MIDI-controlled mixer with two internal digital effects systems, two-band digital EQ on each channel, 96 memory locations, MIDI-controlled mixing, chain capability for more inputs, and effects returns. *IFU Series Digital Interfaces* ($525 to $875): interface DMP7D to Sony PCM3324, Sony PCM-1610/30, or Mitsubishi X800, depending on unit used; also word clock/bit clock interface for digital audio systems. *R100 Reverb Processor* ($295): compact, 16-bit digital reverb with 60 editable presets. *SPX50D Multi-Effects Processor* ($695): offers 16-bit digital effects such as delay, reverb, pitch change, digital fuzz, etc., 50 factory presets and 50 user-programmable memories. *FMC1 Digital Format Converter* ($595): converts Yamaha proprietary digital format to unbalanced SDIF-2 (Sony), CD/DAT, and AES/EBU formats. *MT100 Multitrack Cassette Recorder* ($495): switchable dbx noise reduction, two speeds, internal four-channel mixer, and pitch control. *PLS1 MIDI Programmable Line Selector* ($795): rack-mount unit designed for switching audio signals; eight channels select from four different inputs, as determined by front panel switches or MIDI commands; 99 memorized patches. Relays are used instead of semiconductor switching to minimize noise and distortion. *PC-Series Stereo Power Amplifiers* (PC1602, $995, 160 watts/channel; PC2602, $1,295, 260 watts/channel; PC-2602M, $1,395, 260 watts/channel with LCD meters): Wattage figures are higher when feeding four ohms instead of eight; includes on-demand cooling fan, clip indicators, and protection circuitry.

TX81Z TIPS FOR THE MIDI GUITARIST

Maybe the tracking problems aren't with your MIDI guitar. Are you sure your synth is set up properly?

By Craig Anderton



JACK DESROCHER

Most MIDI guitars work best in Mode 4 ("Mono" mode), which assigns each string's MIDI data to its own channel. The TX81Z accommodates this mode well, but only if its parameters are set up specifically for the requirements of MIDI guitar. This article assumes that you understand the basics of how a TX81Z works (if not, read the manual and see "Mastering the Yamaha TX81Z" in the January '88 **EM**), and also, that you understand a bit about MIDI guitar (for more information, see "Guitar Synthesis: What You Need to Know" in the April '86 **EM** and "The MIDIfied Guitarist" in the September '87 issue).

PERFORMANCE MODE EDITING

Basics: Performance mode is the one most used for MIDI guitar. A Performance is a group of up to eight voices, with each having its own sound program, MIDI channel assignment, and number of notes allocated to that voice. In Yamaha terminology, a voice with its associated assignments is called an *instrument*. For MIDI guitar Mode 4 applications, six of the instruments should be set for the six channels over which the MIDI guitar sends data, and each instrument should have one note allocated to it. Since you can't play more than one note on a guitar string, assigning one note per instrument (i.e., string) gives the most guitar-like feel. (We'll describe later how to put the two leftover voices to good use.)

Initializing Performances: You don't have to create a Performance from scratch every time, as there are five useful defaults. The most appropriate for MIDI guitar is Mono 8, which assigns the eight voices to MIDI channels 1 through 8 and also allocates one note per voice. To initialize to this default, enter Performance mode, select the Performance to be initialized, press Utility, and use the parameter keys to select the Init Perfrm? screen. Press Yes. Since the default is Single, press No to the ARE YOU SURE? prompt. Then press No three more times; once the screen shows MONO 8, press Yes twice, and the Performance will be initialized. For a listing of all parameters after initialization, see the lower half of page 44 in the TX81Z manual; assign voices and adjust the various Performance parameters to suit.

Balancing String Levels: The Performance's Volume page lets you adjust each instrument's level, which is helpful when balancing the outputs of individual strings. For example, you may want to reduce the outputs from the upper strings when playing voices designed for rhythm guitar.

What to Do With the Two Leftover Voices: Try giving them the same assignments as strings (instruments) 1 and 2, but detune the leftover voices by -2 or -3. This creates a pleasant "thickening," or chorus, effect. Since doubling two instruments will produce an output approximately twice as loud as a single instrument, use the Volume page to attenuate the instruments assigned to the first two strings.

Another option is fattening up the bass by assigning the two extra voices to strings 5 and 6. Detuning the strings as described above works well, but also try transposing the two extra voices down 12 semitones for a suboctave effect. Again, attenuate

the voices assigned to the doubled strings for the proper level balance between strings.

Fig. 1 shows a typical Performance suitable for use with MIDI guitar.

SINGLE UTILITY MENU EDITING

Adjustments for most parameters contained in the Single Utility menu are self-evident, with a few exceptions.

Global Controllers: For MIDI guitars capable of sending global controller information (see "MIDI Reaches Adolescence" in the May '88 **EM**), the Control Change page of the MIDI Control menu offers three choices: Off (no response to controllers), Norm (Control Change messages are received by each channel as assigned), or G1-G16 (specifies which of the 16 MIDI channels will be designated as the Global Controller channel). A Pitch Bend page offers the same options for pitch bend data, and pitch bend data sent over the global channel will affect all channels simultaneously.

Combine Mode: The Single Utility's Combine Off/On page, when set to On, lets each voice use whatever function parameters are programmed with the voice. With Combine Off, the current function settings (whatever they may be) will be retained when you call up a voice, regardless of what function data was previously programmed into that voice. The TX81Z powers up with Combine On, and usually this should not be changed.

EDITING VOICE PARAMETERS (SINGLE EDIT MENU)

Most voice parameters are adjusted according to individual preferences for the desired sonic effect. However, the function parameters should be set as follows.

Poly Mode (Poly/Mono): The following assumes a Performance designed for use with Mode 4, with one note assigned per instrument. With mono response, if you play a new note before releasing the old one, the envelope will not be retriggered. This gives the most guitar-like feel. With Poly mode, playing a new note will always create a new attack. This is useful if you want to play keyboard-style parts on the guitar, and is essential if you are driving a Single voice instead of a Performance to accommodate sounds with long sustains (described later).

SETTING UP OTHER SYNTHS

The TX81Z is not the only game in town for guitar synthesis, by any means. Here are some tips on setting up other synths for use with Mono mode MIDI guitars.

OBERHEIM XPANDER: If you're using Single Patch mode, hit Master Page, then CV/MIDI. Assign the voices to the same channels over which the MIDI guitar is transmitting. If using Multi-Mode, press CV/MIDI (same button as FM/Lag in Single mode) and similarly assign the voices. For the most guitar-like feel, select Page 2 of each envelope used in a given patch, and set *each envelope*'s reset mode to Single.

YAMAHA TX802: For each single Voice used in a Performance, select Voice Edit II and then Mode (button 1). Select Key Mode "mono" and *save the modified voice(s)*. Then call up the desired Performance, and using the Voice Select and Performance Edit menus, assign six voices to the same channels over which the MIDI guitar is transmitting.

Pitch Bend Range: Most guitar controllers seem to want to work with an octave pitch bend range, so set this parameter for 12 semitones (or whatever else is "standard" with your MIDI guitar setup). However, for patches where pitch bending may not be desired (vibes, piano, etc.), set this to zero and the tracking will seem more solid.

Portamento: With Poly mode set to Mono, portamento is very effective, as it occurs when changing from one note to another on the same string, but not when shifting from string to string. Experiment with various portamento effects to see if any appeal to you.

Performance Editor

name: Pulse Wave			1: INIT VOICE		5: INIT VOICE			
assign mode: NORM			2: INIT VOICE		6: INIT VOICE			
micro tune select: OCT			3: INIT VOICE		7: INIT VOICE			
effect select: OFF			4: INIT VOICE		8: INIT VOICE			
inst number	1	2	3	4	5	6	7	8
number of notes	1	1	1	1	1	1	1	1
voice number	129	129	129	129	129	129	129	129
receive ch.	1	2	3	4	5	6	1	2
key limit /L	C-2	C-2	C-2	C-2	C-2	C-2	C-2	C-2
key limit /H	G 8	G 8	G 8	G 8	G 8	G 8	G 8	G 8
detune	+0	+0	+0	+0	+0	+0	-2	-2
note shift	+12	+12	+12	+12	+12	+12	+12	+12
volume	73	73	99	99	99	99	50	50
out assign	LR	LR	LR	LR	LR	LR	LR	LR
lfo select	U1B	U1B	U1B	U1B	U1B	U1B	U1B	U1B
micro tune	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

FIG. 1: A typical Performance used for MIDI guitar. Each voice has one note assigned to it. Voices 7 and 8 double the first and second strings; these voices are slightly detuned, and the volume levels of the doubled voices are reduced to maintain string-to-string output consistency.

SOUNDS WITH LONG RELEASE TIMES

When playing sounds with long release times, allocating only one note per string gives an unrealistic effect, since if you play a note and then play another note shortly thereafter, the second note will cut off the first note's decay. Ideally, the first note would continue sounding until its decay was finished.

One solution is to drive a Single voice instead of a Performance, and set the voice to Omni mode so that it will react to notes played on any of the six strings (this assumes the guitar is in Mode 4). Remember that program changes can be mapped to either Single voices or Performances, so you are not limited to using all Single voices or all Performances. However, if you do use Single voices for sounds with long releases, this frees up Performances for other applications.

You could also program a Performance to provide the same function by assigning all eight notes to one instrument, which would then be set to Omni mode.

Whether using a Performance consisting of a single voice, or a Single voice, that voice should be set for poly response on the Poly Mode page. Also, set the pitch bend range to 0 to avoid craziness and glitching if you happen to bend two strings by accident.

The TX81Z is a great playmate for MIDI guitars, and hopefully the above tips will help you to get them playing together even more happily. Happy MIDI pickin.'

In the E-Series E is for Excellence.

Audio professionals everywhere are turning to the Fostex E-Series recorders for their production and post-production needs. So much so, you hear the results of their work nearly every day — in movie soundtracks, commercial and cable television shows, industrial and educational films and videos and, of course, hit records.

The E-Series features gapless "punching" so there's no blank space *after the punch-out point. Only recorders which are much more expensive offer this sophisticated function. But since you can't run a fully automated system without it, Fostex includes gapless punch-in/out as standard equipment on the E-Series.*

Also standard is a synchronizer port which will interface with all SMPTE time code based systems. When used with the Fostex synchronizer, Model 4030, you can then use our software program to perform sophisticated audio assembly editing.

Models E-8 and E-16 are multitrack recorders with built-in noise reduction.

Models E-2 and E-22 (not shown) are 2-track master recorders with a third, center channel for SMPTE time code control. This is a standard feature, *not an option. You will have complete compatibility with existing 2-track tapes, plus the ability to run computer derived edit decision lists and full automation.*

Servo control of the reels in the edit mode will help you pin-point cues and spot erase. When the pitch control is engaged, the exact percentage *of speed deviation is displayed so that when you need to re-set the control, you can do so precisely, and the real-time counter features search-to-zero even from the negative domain.*

The E-2 uses 1/4" tape at 7-1/2 & 15 Ips (15 & 30 Ips speeds are optional); the E-22 uses 1/2" tape at 15 & 30 Ips.

When an E-Series recorder is used with Fostex Model 4050 — autolocator and SMPTE to MIDI controller — you have programmable punch-in/out, 100-point autolocate capability. 10 programmable edits, a SMPTE time code generator / reader (all four formats), plus the ability to locate to the bar and beat.

So if you're looking for a professional recording instrument, there's a Fostex E-Series recorder that can help you wth two important "E" words: Efficiency and Effectiveness. The E-Series can also help you achieve the most important "E" word of all: Excellence.

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by Craig Anderton

COVER STORY

DAVID BISHOP

TO SOUND LIKE A DRUMMER, THINK LIKE A DRUMMER

When many people first get their hands on a drum machine, the parts they create often don't sound very realistic. Programming good drum parts is not easy; you have to *think* like a drummer and know what purpose each drum serves in an ensemble context. Of course, you can just bash away at the buttons and, through trial-and-error, find that some techniques work better than others. But if you analyze what makes a drum part tick, you'll speed up your musical evolution.

The most important point to always keep in mind is that *drums exist to keep time.* Guitarists, keyboard players, and others who play melodic instruments often tend to play drum machines from a melodic perspective and create overly busy patterns. Remember, the drum part must be fairly simple in order to leave room for all the other instruments. By holding a fairly steady groove, when the drum part does break out into some variations, their importance is heightened all the more. *As always, the fewer the notes, the greater the impact of each note.*

Of course, there are as many different ways to play drums as there are people to play them. Therefore, the following examples of how to put together drum parts are not rules, but points of departure. We'll choose pop music in a $\frac{4}{4}$ time signature as our starting point, but the adventurous among you can feel free to cast off that restriction any time you're ready. Patterns will be shown in standard music notation (see sidebar, "Understanding Rhythmic Notation") as well as a "step-time" format commonly used with drum machines. Which brings us to...

STEP-TIME PROGRAMMING

Many drum machines let you program a part in what's called *step time.* Unlike real-time recording, where you play drum parts "on the fly" using a metronome as a tempo reference, step time lets you step evenly through a rhythm pattern at whatever pace you want and record drum events where appropriate in that pattern. The manual that comes with your drum machine should give an explanation of step-time mode.

For example, consider a drum machine like the Alesis HR-16 that divides each quarter note into 96 steps. If you go through an HR-16 pattern one step at a time, you can record drum events every 96th of a quarter note. If a quarter note lasts 96 steps, then an eighth note would

FOR THE BEGINNER

Understanding Rhythmic Notation: Symbols and Signatures

If you're playing with drum machines, it really helps to know the language. This brief overview of rhythmic notation will provide the information you need to get through the examples given in the text; for a detailed description of rhythmic notation, see the books listed in the sidebar "For More Information." Caution: If you're new to all this, you'll probably have to read this section over several times and fool around a bit with your drum machine before it all falls into place.

Measures: A piece of music is divided into smaller units called *measures* (also called bars), and each measure is divided into *beats*. The number of beats per measure, and the rhythmic value of the beats, depends on both the composition and the time signature. All the examples given in the text are one measure long and contain four beats per measure.

Time Signatures: A time signature (also called metric signature) defines the rhythmic nature of a piece of music by describing the rhythmic framework of a measure. The time signature is notated at the beginning of the music (and whenever there is a change) with two numbers, one on top of the other. The top number indicates the number of beats in each measure, while the bottom number indicates the rhythmic value of the beat (e.g., 4 is a quarter note, 8 is an eighth note, etc.). If that doesn't make sense yet, let's move on to some examples.

Rhythmic Values for Notes: With a measure written in $\frac{4}{4}$, there are four beats per measure, and each beat represents a quarter note. Thus, there are four quarter notes per measure of $\frac{4}{4}$ music.

Symbol for a quarter note.

With a $\frac{3}{4}$ time signature, the numerator indicates that there are three beats per measure, while the denominator indicates that each of these beats is a quarter note.

There are two *eighth notes* per *quarter note*. Thus, there are eight eighth notes per measure of $\frac{4}{4}$ music.

Symbol for an eighth note.

There are four *16th notes* per *quarter note*. Thus, there are 16 16th notes per measure of $\frac{4}{4}$ music.

Symbol for a 16th note.

There are eight *32nd notes* per *quarter note*. Thus, there are 32 32nd notes per measure of $\frac{4}{4}$ music.

Symbol for a 32nd note.

There are also notes that span a greater number of beats than quarter notes. A *half note* equals two quarter notes. Therefore, there are two half notes per measure of $\frac{4}{4}$ music.

Symbol for a half note.

A *whole note* equals four quarter notes, so there is one whole note per measure of $\frac{4}{4}$ music. (We keep referring these notes to $\frac{4}{4}$ music because that is the most commonly used time signature in contemporary Western music.)

Symbol for a whole note.

Triplets: The above notes divide measures by factors of two. However, there are some cases where you want to divide a beat into thirds, giving three notes per beat. Dividing a quarter note by three results in eighth-note triplets. The reason we use the term eighth-note triplets is because the eighth note is closest to the actual rhythmic value. Dividing an eighth note by three results in 16th-note triplets. Dividing a 16th note by three results in 32nd-note triplets.

Symbol for eighth-note triplets. Note the numeral 3 above the notes, which indicates triplets.

Rests: You can also specify where notes should *not* be played; this is indicated by a rest, which can be the same length as any of the rhythmic values used for notes.

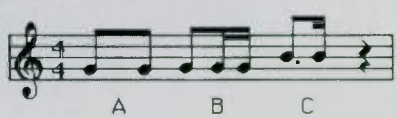
Rest symbols (from left to right): whole note, half note, quarter note, eighth note, 16th note, 32nd note, and 64th note.

Dotted Notes and Rests: Adding a dot next to a note or rest means that it should play one-and-a-half times as long as the indicated value. For example, a dotted eighth would last as long as three 16th notes (since an eighth note is the same length as two 16th notes).

A dotted eighth note lasts as long as three 16th notes.

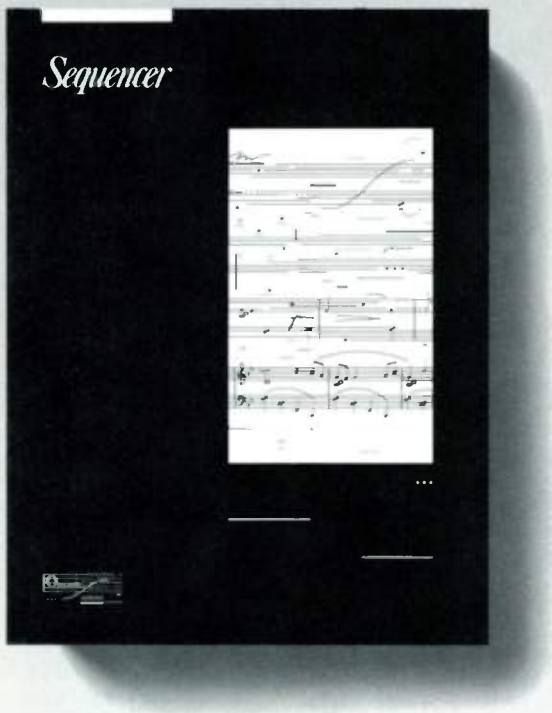
Uncommon Time Signatures: $\frac{4}{4}$ (and to a lesser extent $\frac{3}{4}$) are the most common time signatures in our culture, but they are by no means the only ones. In jazz, both $\frac{5}{4}$ (where each measure consists of five quarter notes) and $\frac{7}{4}$ (where each measure consists of seven quarter notes) are often used. In practice, complex time signatures are often played like a combination of simpler time signatures; for example, some $\frac{7}{4}$ compositions would have you count each measure not as 1, 2, 3, 4, 5, 6, 7 but as 1, 2, 3, 4, 1, 2, 3. It's often easier to think of $\frac{7}{4}$ as each bar of $\frac{4}{4}$ followed by a bar of $\frac{3}{4}$ (or a bar of $\frac{3}{4}$ followed by a bar of $\frac{4}{4}$, depending upon the phrasing), since as we mentioned, $\frac{4}{4}$ and $\frac{3}{4}$ are extremely common time signatures.

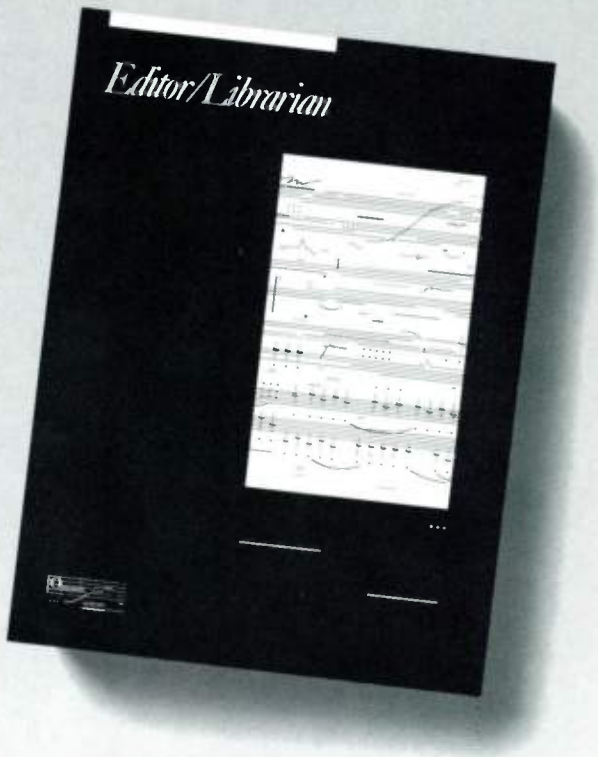
Other Symbols: There are many, many other symbols used in music notation. > indicates an accent; + indicates closed hi-hat; o indicates open hi-hat; beams are used to connect notes to simplify sight reading; and so on. Any good book on music notation can fill you in on the details.



Drawing beams on notes makes them easier to sight-read.

Expand





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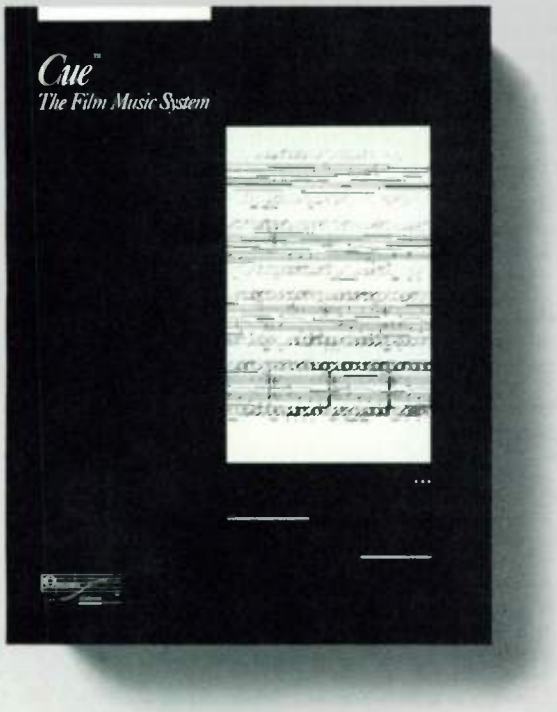

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last 48 steps, and a 16th note 24 steps. Since stepping through 96 events for each quarter note can get pretty tedious, this particular drum machine (and several others) lets you take bigger steps—16th notes, for example. When set this way, you can step through a rhythm pattern in 24-step "chunks." When the display shows the step where you want to record a drum event, simply press the desired drum, and it will be recorded at that step. Some early drum machines, like Roland's "Dr. Rhythm," were designed so that *all* programming had to be done in step time; nowadays, most drum machines give you the option of recording in real time or step time.

However, some drum machines may divide each quarter note differently, perhaps into 48 or 24 steps instead of 96. The following chart relates different note values to different step divisions.

Number of steps per quarter note

96	48	24	NOTE VALUE
384	192	96	Whole note
192	96	48	Half note
96	48	24	Quarter note
64	32	16	Quarter-note triplet
48	24	12	Eighth note
32	16	8	Eighth-note triplet
24	12	6	16th note
16	8	4	16th-note triplet
12	6	3	32nd note
8	4	2	32nd-note triplet
6	3	NA	64th note
4	2	1	64th-note triplet

In the following examples, all numbers given for step-time settings will be referenced to 96 steps-per-quarter note drum machines and expressed as a beat number plus a certain number of steps. For example, 1+00 means that a drum event occurs exactly on the first beat of the measure. 2+48 means that the drum event occurs two beats and 48 steps into the measure; if you need to translate the number of steps to some other protocol, refer to the above chart (e.g., 2+48 would be 2+12 with a drum machine that operates at 24 steps per quarter note). HR-16 owners will feel particularly at home, since the step-time numbers correlate to the step-time number entry system used in the HR-16. Feel free to combine drums from different examples into one pattern (for example, use the disco bass drum part and the rock snare part and see what happens). Above all, experiment—and remember to leave room for the other instruments.

Kick drum parts are seldom flashy and instead tend to hold down a constant, yet relatively sparse pattern.

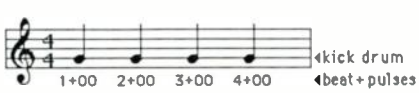
Note: Rests are shown in the following examples but not indicated with an event number since with most drum machines, unless you program a drum event, a rest automatically occurs. Rests are provided for the convenience of those who are more comfortable seeing a pattern expressed as both notes and rests.

DRUM ROLES

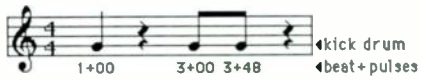
Each drum in a drum set is there for a reason and fills a specific musical purpose. While the following represents a subjective evaluation, it should help get across how different drums serve different roles in an ensemble.

Kick Drum: The kick (or bass) drum is the lowest-pitched drum of the drum kit and provides a solid "anchor" for the part. Kick drum parts are seldom flashy and instead tend to hold down a constant, relatively sparse pattern. In many tunes, you "feel" the kick drum more than you "hear" it.

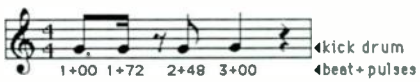
For example, in early disco music, the bass drum would simply hit on each beat of every measure. This "drives" a song and creates a fairly hypnotic groove. Unless you have some interesting percussion on top, though, a constant kick drum beat can get pretty boring:



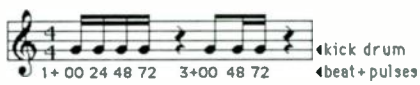
Rock and roll kick drum parts tend to throw in some eighth notes as accents. Here's a typical kick drum pattern for classic rock and roll (and surf music):



Modern dance music improves on the monotonous disco beat mentioned above by adding some 16th notes. This creates more "motion" toward the bottom end of the music:



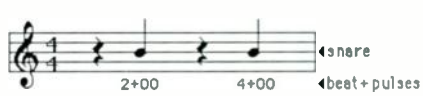
With some rap and heavy dance styles, especially with tunes where there isn't a lot of other percussion happening and the kick drum has the spotlight, you'll find even more 16th notes:



When you're playing several notes in a row on a drum, you'll want to accent certain notes more than others. Generally, the accent falls on the quarter-note beats or on the eighth-note beats for very busy parts. This is totally subject to your own personal taste, of course.

Snare Drum: The snare drum also anchors the song, but unlike the kick drum, it is heard more than felt. This is because a snare drum covers a very wide frequency range that cuts through the rest of a kit's sound.

In most rock music, the main purpose of the snare is to provide a solid backbeat on the second and fourth quarter notes of a measure. This seems to help get people up and dancing:



Because the snare is such a strong sound, it's best not to overuse it. If, however, you would like a somewhat more complex part, try adding an eighth-note "echo":

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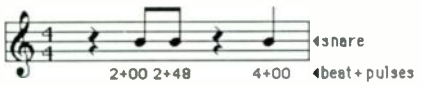
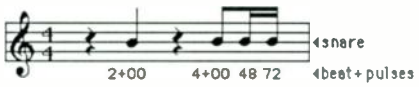
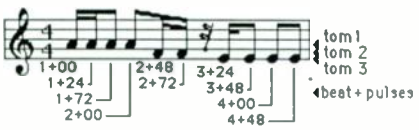


Throwing in some 16th notes at the end of a measure can also work very well, especially if you're leading into another part:



Toms: Toms are tuned drums that occupy a fairly narrow range of the audio spectrum (generally lower midrange). Unlike a snare drum, toms tend to be perceived as a little more in the background due to their simpler timbre. Therefore, complex fills and patterns are often done on toms to push a part along *without* drawing too much attention to the drums. Often these fills occur after a series of repeating measures to break the monotony and create some interest. For example, suppose we create a pattern (which we'll call pattern "A") with the disco kick drum beat and simple backbeat snare pattern given earlier. Now copy that pattern to another pattern. In this "B" pattern, use three different tom sounds, and add the following tom parts as indicated:



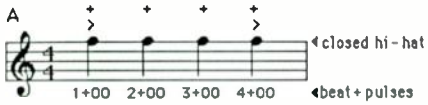
Make up a song that goes AAAB and loop it (or if looping isn't available, create a song that goes AAABAAABAAAB); you'll hear how the toms give some motion and help mark the end of each four-measure section when they lead back to the simple "A" pattern.

You'll also probably note that the toms sound very artificial if each one is at the same volume. Go back into step mode and vary some of the tom levels (if your drum machine provides for this), and note how much this improves the realism of the sound.

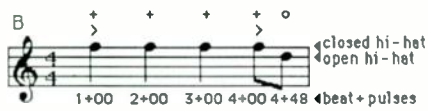
When tuned low, toms can sound extremely powerful. Single, loud tom hits can add a striking emphasis to a particular beat or part. Peter Gabriel's drummer, Jerry Marotta, is a master of this techique.

Hi-hat: The hi-hat is often used like a fancy metronome in that it keeps a fairly constant time. When marking time, one usually hits the *closed* hi-hat so that the sound is fairly short and not too loud. An *open* hi-hat effect is useful for adding emphasis and can be used in place of a closed hi-hat if the part is not particularly dense. If you're hitting 16th notes, a closed hi-hat usually sounds best; with eighth notes, a partially open hi-hat (available on some drum machines) sounds real good. Here is a typical quarter note, closed hi-hat pattern:

Peter Gabriel's drummer, Jerry Marotta, is a master of using single, loud tom strikes for emphasizing a part.

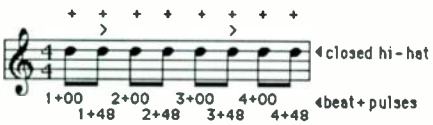


After listening to that for a bit, add an open hi-hat sound at the last eighth note of the measure (i.e., 48 steps into beat 4):



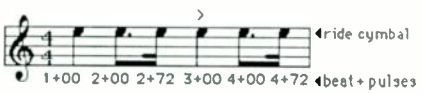
On most drum machines, note how the closed hi-hat sound cuts off the open hat sound to keep it from ringing, thus giving the most realistic hi-hat effect.

Now try programming an eighth-note, closed hi-hat pattern with two accents added to make the part more interesting:



Crash and Ride Cymbals: A crash cymbal is loud and covers a fairly high-frequency part of the audio spectrum. It's therefore a pretty overpowering sound and is used sparingly, the way a painter might use a daring splash of color. Cymbal hits frequently occur on the first beat of a measure but zillions of other variations are possible. Mick Fleetwood and Omar Hakim, in particular, know how to add very effective off-beat cymbal crashes.

Ride cymbals are used a lot in jazz; here's a fairly stereotypical pattern (play at about 140 bpm):

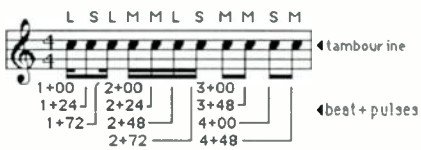


Now just for the fun of it, let's make it more jazz-like. If your drum machine has a "swing" option, set the swing factor for around 66.6% (this may have to be done prior to entering notes; with the HR-16, swing can be added after the fact). Like, pretty cool, man.

Percussion: Percussion (tambourine, agogo bells, congas, etc.) keeps a drum part from plodding. Percussion instruments are usually much softer and more delicate-sounding than trap drums and therefore can be pretty busy while the kick, snare, and toms hold down the sparse and heavy end of things. Here is where some really imaginative patterns go down (although percussion sounds such as tambourine also work very nicely with patterns like the eighth-note, hi-hat pattern presented earlier).

Crash cymbals should be used sparingly, the way a painter might use a daring splash of color.

Percussion is also used a lot for double-time parts to help maintain an active feel in a tune, particularly with dance music. With dance songs, it's usually the percussion parts that get people in the groove and shape the overall feel of the tune. Try the following part with a tambourine or maracas sound, and put a constant kick and backbeat snare behind it (note that suggested volume levels—loud, medium, and soft—are included for each tambourine hit):



S = Soft M = Medium L = Loud

This is a good example of a fairly busy percussion part that helps propel a song along. While the song is playing, reduce the tambourine level to remove it from the mix; note how mechanical and martial the part sounds. Now bring the tambourine back in, and the part comes to life.

THE NEXT STEP

Although we've talked about keeping a drum part simple, that doesn't mean it has to be mechanical and metronomic. The more you can get a drum part to *flow* smoothly in the context of the song, the better. Probably the all-time definitive article on adding "feel" to sequenced or programmed drum parts is Michael Stewart's "The Feel Factor" in the October '87 **EM**; I recommend it very highly.

This is just the beginning, but hopefully some of your creative juices are already starting to flow. Remember to keep your parts varied—level and dynamic changes are essential—and listen to drummers as much as possible, from the sounds they get out of their drums to the phrasings they use. Above all, practice: You'll have fun and learn a lot.

Craig Anderton *is the author of several books on musical electronics, including* The Electronic Musician's Dictionary. *He is currently working on a book about choosing, using—and occasionally abusing—samplers and plans to release his next solo album sometime prior to the turn of the century.*

FOR MORE INFORMATION

There are several books available from the EM Bookshelf to help acquaint you with drum machines, drumming, and music notation (see page 6 for more info).

The *Roland Drum Machine Rhythm Dictionary* by Sandy Feldstein ($14.95), while basic, is just the ticket for the beginner who wants to study or program a wide range of drum machine patterns.

How to Make Your Drum Machine Sound Like a Drummer, by David Crigger, includes an audio cassette of examples. Separate editions are available (at $29.95) for the Yamaha RX5 and RX11/15; Roland TR-505, TR-626, and TR-707; Korg DDD-1 and DDD-5; and a "generic" version priced at $21.95.

The Complete Electronic Percussion Book, by David Crombie ($10.95), is a more hardware-oriented book that covers topics such as synchronization, MIDI, computer-controlled percussion, etc.

Alfred's Pocket Dictionary of Music ($3.95) is a concise but thorough explanation of music theory and terms for music students or teachers alike.

Practical Theory Complete, by Sandy Feldstein ($9.95), is a self-instruction music theory course that begins with the basics—explanations of the staff and musical notes—and ends with lesson 84: "Composing a Melody in Minor." The course is also available in a three-volume version on computer disks ($199.95) for the Apple II+/IIe/IIc series, IBM, and Commodore 64/128 computers.

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WRH

You never know when you're going to need a channel filter—and this is one of the best. Its hardware design gives lightning-fast response, and you can build it yourself for a song.

The EM MIDI CHANNEL FILTER

By Tim Dowty

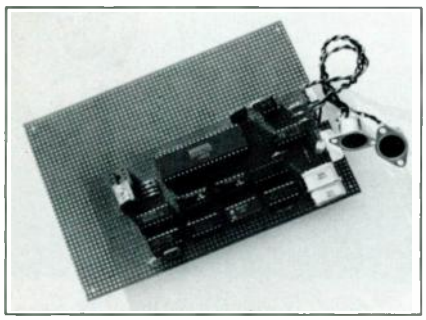

FIG. 1: The completed Electronic Musician Channel Filter circuit.

High-tech music making isn't always a bed of roses. Putting the finish on the *last* tape track of a recent project, I hooked my sequencer to a MIDI-retrofitted Minimoog, which promptly began playing *all 16* MIDI channels. The Moog's retrofit, of course, worked only in Omni Mode.

Fortunately, I had written a software channel filter a few months before that could block out all but one channel of MIDI data going to the Moog. But—the thorn on the rose—my computer was already loaded with my sequencer program, so I couldn't use the software channel filter. Arrgh!

DON'T GET MAD. GET WIRE WRAPPING.

Rather than stewing, I got out a pencil and began sketching a hardware solution. The object was to create a box that would solve my filtering problem and be useful in other situations as well; I also wanted a design general enough to let me stick the circuit into *any* MIDI data stream without real time fiddling or "yeah, buts" to worry about. That meant that the circuit would need to filter *all* channel messages (both voice and mode) while passing all system common and real time messages, no matter which channel I selected.

In addition, the circuit had to handle both running status and system real time messages that appeared in the middle of *other* messages. It would have been nice to be able to send System Exclusive data through this thing too, but "without getting carried away" was my first rule, and I felt Sys Ex crossed that line.

The circuit (**Fig. 1**) meets these design criteria and has given me good, solid operation. Along the way, a few spin-off applications have come up, one of which (a MIDI channelizer) I'll present in a follow-up article. Before we dive in and start building, let's spend some time looking at the issues underlying the design.

The Electronic Musician Channel Filter (EMCF) works by retransmitting a selected subset of the MIDI data stream pumped into it. In retransmitting a given byte, the deciding factor is whether the byte is intended for a specific MIDI channel, and this is a tricky question.

If we were to grab a byte at random from some MIDI data stream and analyze it in isolation, it would be hard to tell which channel it was meant for, but that same byte, in the context of its surrounding data, is quite channel-identifiable. This is because rather than allowing free-form data transmissions, MIDI requires data be sent in small multi-byte packets called "messages," and only one byte in each message has a channel designation stamped on it. (I'm leaving System Exclusive messages out of this discussion. For more on Sys Ex, see the "CZ Patch Librarian" project in the Feb '87 **EM**.)

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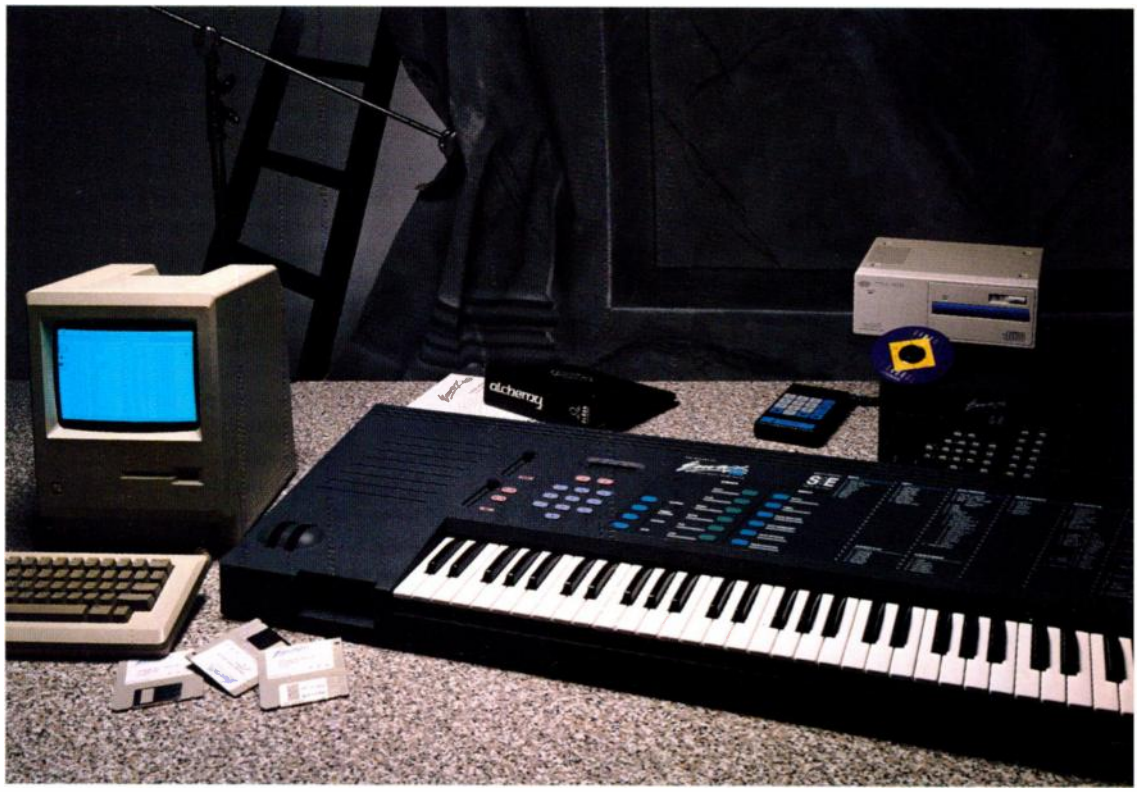

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MIDI MESSAGES

The first byte of any MIDI message is called the *status byte*. Information-wise, this is where the action is: the status byte contains the channel number *and* an indication of the MIDI activity (Note On, Program Change, etc.) to be performed. Following the status byte are zero, one, or two *data bytes* that contain further information about the action specified by the status byte (*which* note on, *which* program to change to, and so forth). The number of data bytes that will follow a given status byte is determined by the status byte itself. For instance, a status byte that initiates a Note On will have two data bytes following (the note number and velocity, respectively), while a Program Change status byte will have one byte (the new program number) following. All right, let's wade out into a MIDI data stream.

Suppose the following five bytes (shown in hexadecimal) show up, one after the other, at the input of the EMCF:

91 36 40 C5 51

Further, suppose we want to filter out all data except channel six data. Which bytes stay and which bytes go?

To answer this question, the MIDI channel filter must first separate out the MIDI message packets, since the filtering needs to take place on a message-by-message basis. It can't simply throw out a byte here and a byte there; it has to manipulate the data as discrete, multi-byte chunks, those chunks being MIDI messages. We know that each MIDI message begins with a status byte, so by locating the status bytes in the data stream we will automatically identify the message packets.

Status bytes can also be distinguished from data bytes using a simple test: if a byte's most significant bit (MSB) is *set* (logic 1), it is a status byte; if its MSB is *reset* (logic 0), it is a data byte. (If you're a software hacker-type you'll probably find it easier to look for status bytes this way: if the byte is equal to or greater than 80 [hex], it is a status byte; if the byte is 7F [hex] or less, it's a data byte.) Looking at the MIDI data, we see two status bytes: 91 and C5. They begin the two messages, 91 36 40 and C5 51. Note that these two messages are of different lengths. This is perfectly all right and, as we'll see, immaterial to the EMCF.

The EMCF can be used as a jumping-off point in the design of other MIDI data filters, such as aftertouch and continuous controller filters.

Now that we've separated the two messages, let's go to the second filtering task: identifying the MIDI channels over which to send each of these messages. I mentioned earlier that each status byte is stamped with a channel identification, but that may be overly dramatic. Simply, the least significant hex digit of the status byte indicates the MIDI channel, such that a zero indicates channel one, a one indicates channel two, and so on, up to

"F" which indicates channel 16. Therefore, the message that begins with status byte 91 is stamped for channel 2, and the message that starts with C5 is intended for channel 6. Our task is to filter all but channel 6 data, so we need to throw away all three bytes that make up the first message—91 36 40—and retransmit the second message—C5 51.

THE FILTERING ALGORITHM

These two tests—identifying status bytes and comparing channel numbers—are the central tests the EMCF performs. (See the flowchart in **Fig. 2**.) The EMCF uses the results of these tests to set or clear a hardware flip-flop that tells the retransmission circuitry what to do. Based on the state of the flip-flop, data is either "kept" (retransmitted) or "thrown away" (*not* retransmitted). What makes this work is that the state flip-flop is *consulted* each time a MIDI byte arrives but *updated* only when a received byte is a status byte. For instance, when the MIDI data in our example comes into the EMCF, the sequence of events goes like this:

1. The first byte in is 91. The EMCF checks to see whether the byte is a status byte (if its MSB is set).

2. It is, so the filter looks at the lower digit of the status byte, indicating the MIDI channel number, and compares it to the selected pass-through channel number. (Here, it's channel six, so a status byte channel value of five will match.)

3. There is no match, so the state flip-flop is cleared to the "don't transmit" state.

4. The state flip-flop is not in the "transmit" state, so the EMCF does not transmit the current byte and waits for the next byte in the MIDI stream.

5. The next byte is 36. It is not a status byte, so the state flip-flop is not updated.

6. The state flip-flop is not in the "transmit" state, so this byte is not retransmitted.

7. The next byte, 40, is not a status byte, nor is the flip-flop in the "transmit" state, so this byte is thrown away.

8. C5 is a status byte, and we get a channel match, so the flip-flop is set to the "transmit" state.

9. This byte—and each of its attendant data bytes—are retransmitted. As promised, this scheme works regardless of the number of data bytes that follow each

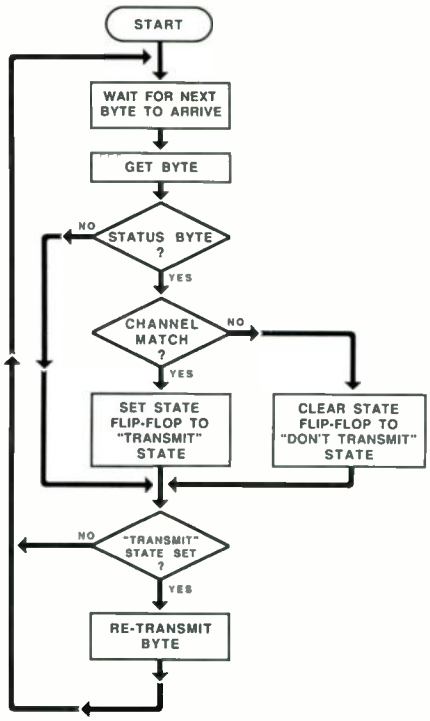
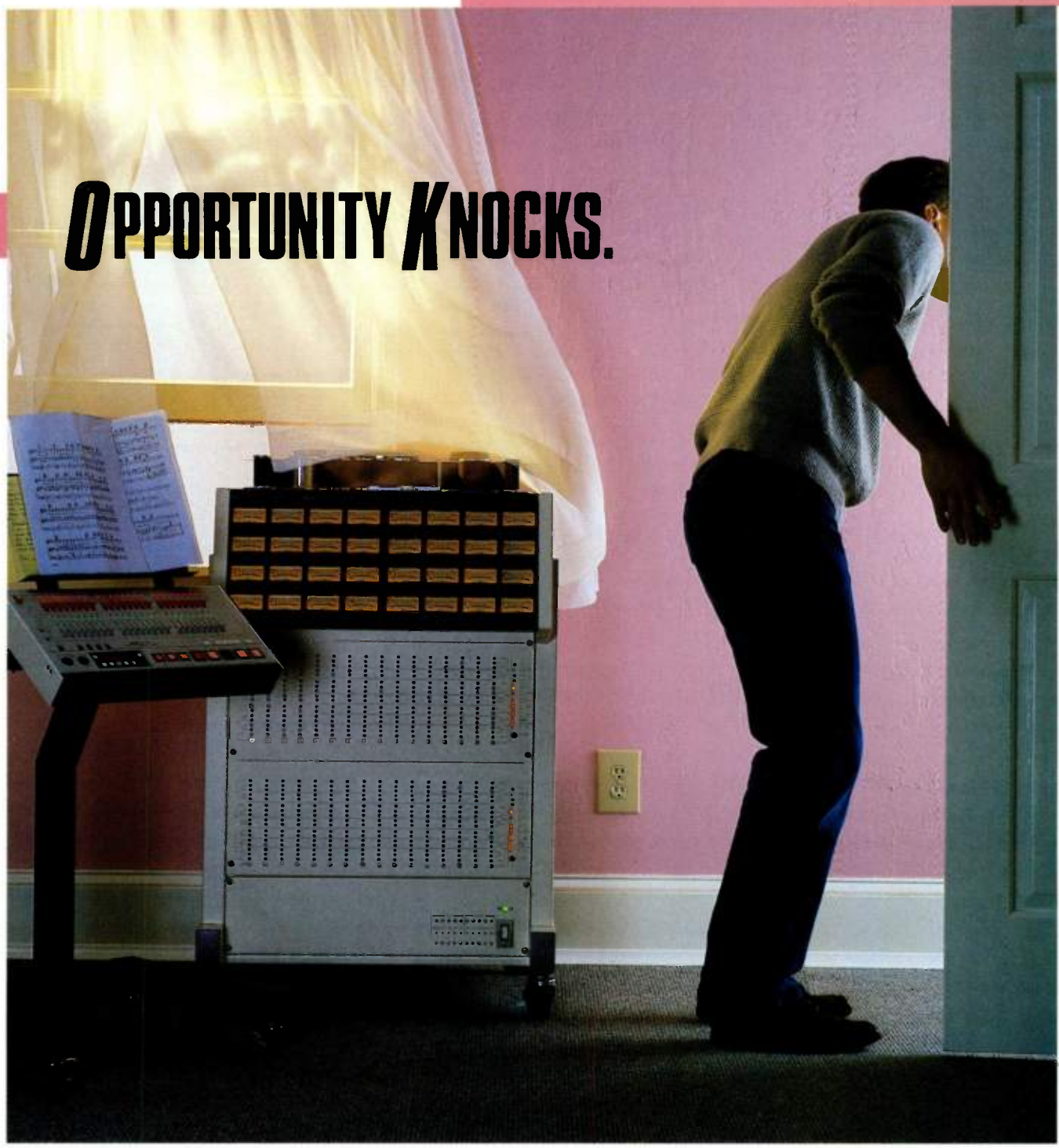


FIG. 2: The basic filtering algorithm, using the flip-flop to detect status bytes.

MX-80 32-CHANNEL TAPE RECORDER



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OTARI

status byte. There is a hidden bonus, too: by updating the state flip-flop on status bytes only, we automatically handle MIDI Running status. (This is an anti-data-clogging convention that allows instruments to remove redundant information from the MIDI data stream. An instrument is allowed to skip sending a status byte if it would be the same as the previously transmitted status byte.)

REFINING THE ALGORITHM

So far, so good; we've come up with a simple technique that the EMCF can use to filter MIDI data, even when it has been transmitted using the Running status convention. In MIDI parlance we can say that, to this point, the EMCF works with channel messages. Looking back at our stated design goals, though, we see that we want the circuit to handle MIDI *system messages* as well. Like channel messages, system messages always begin with a status byte but have no channel designation, and are to be acted on by all of the listeners in the MIDI system no matter which channel(s) they are set to.

Two frequently used system messages are *Song Position Pointer* (defined as the status byte F2 plus two data bytes) and *MIDI clock* (which consists solely of the status byte F8). Unfortunately, since the lower hex digit of system status bytes doesn't indicate the message's channel, our filtering algorithm won't work with system messages. (To verify this, run through the **Fig. 2** flowchart with MIDI clock. It will be retransmitted only if channel nine is selected as the pass-through channel.) The good news is that detecting system status bytes in the data stream isn't difficult (thanks to the intelligent assignment choices in the MIDI spec), and we can refine our filtering algorithm to handle these messages in a special way.

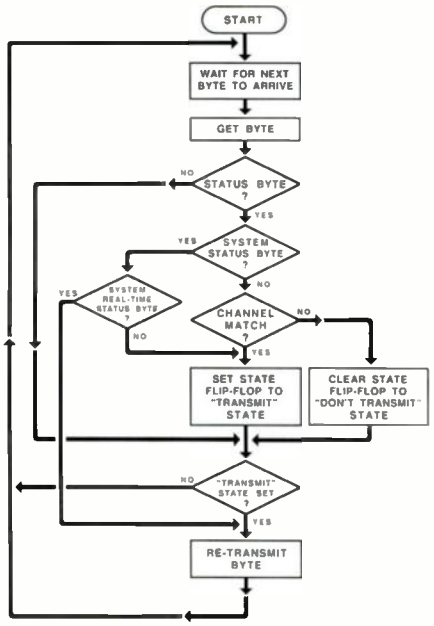


FIG. 3: The refined filtering algorithm.

SYSTEM MESSAGES

System status bytes are electrically unique in that their upper hex digit is always F, making them relatively easy for the EMCF to pick out. However, the special handling of system messages is a little bit tricky due

PARTS LIST

RESISTORS (¼ watt, 5% tolerance)

R3, R4, R6	220 ohms
R7	270 ohms
R5	2k2 (2.2k)
R2, R9-R12	10k
R8	1M
R1	10M

CAPACITORS

C1	100 nF (0.1 μF)

SEMICONDUCTORS

D1	1N914 or equivalent
IC1	IM6402 UART
IC2	74LS05 hex inverter
IC3, IC5	4001 quad NOR gate
IC4, IC9	4081 quad AND gate
IC6	4013 dual D flip-flop
IC7	4022 1-of-8 counter
IC8	4024 binary counter
IC10	74C85 4-bit comparator
IC11	PC900 opto-isolator

OTHER PARTS

Y1	2.0 MHz crystal
J1, J2	5-pin female DIN jack
DS1	4-position DIP switch

MISCELLANEOUS

Wire, solder, IC sockets, case, power supply, etc.

to the nature of the information these messages can convey.

There are actually two classes of system messages: system real time messages and system common messages. The latter look a lot like channel messages (except, of course, that they aren't channelized). They get stuck into the data stream in the spaces between other messages and play by all the rules we've discussed so far. System real time messages, on the other hand, are a maverick breed; these one-byte messages can appear *anywhere* in the data stream, even in the middle of other message packets. Because of their time-critical nature (MIDI clock is a real time message), it simply must be this way.

The refined features of the EMCF's filtering algorithm come into play whenever a system message status byte is received. (See **Fig. 3**.) As mentioned above, these bytes are identified by their upper hex digit, which is always F. System real time status bytes have the added characteristic of having a lower hex digit between 8 and F (inclusive), and system common status bytes have a lower hex digit between 1 and 7. When a status byte indicating a real time message is received, the EMCF simply bypasses the usual updating and consulting of the state latch and always retransmits the byte. All system real time messages consist of just the single status byte (no data bytes), so all the EMCF has to do is to make an exception for one byte; there's no need for a second state latch or other "keeping track" mechanism.

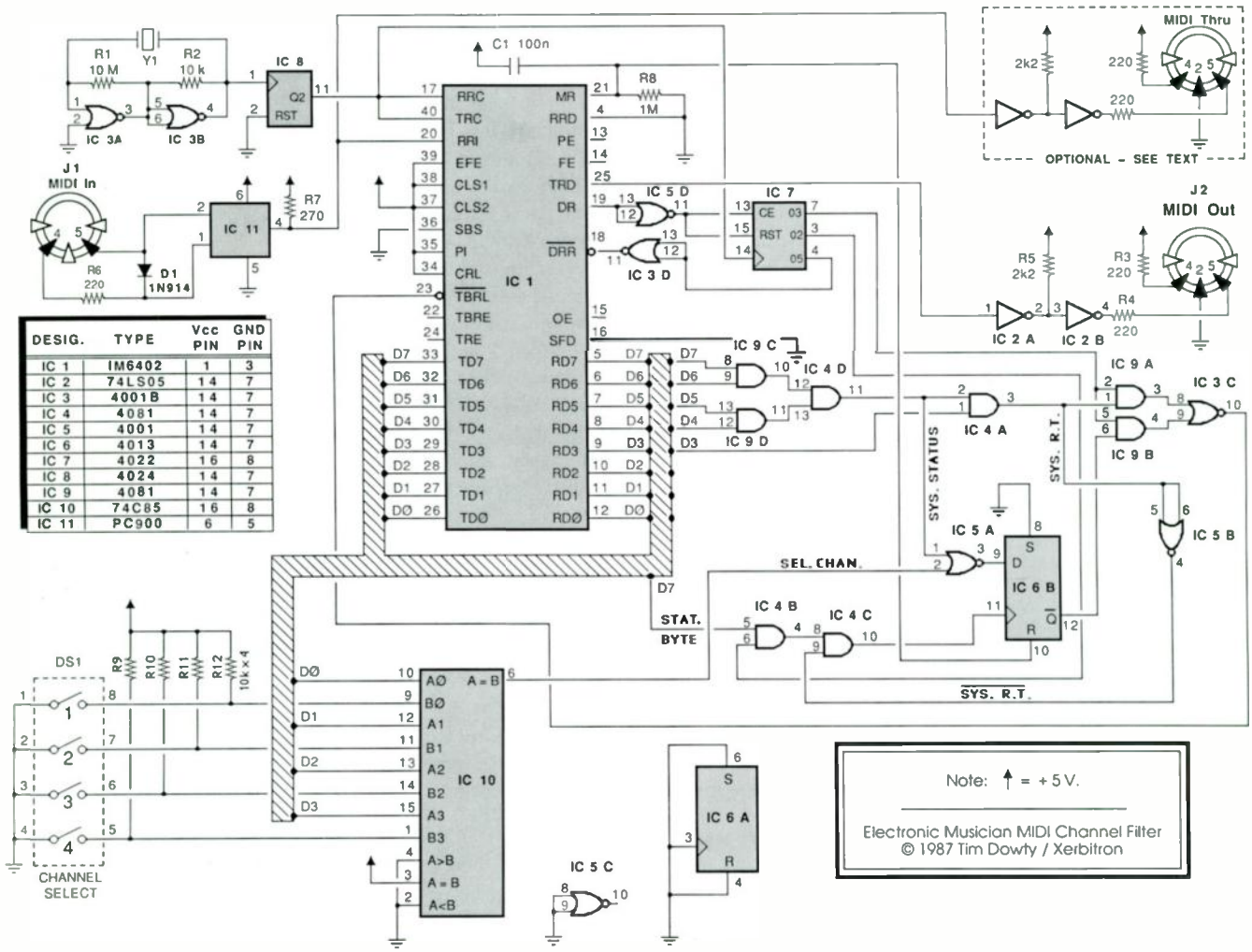
When a status byte indicating the start of a system common is received, the channel match test is bypassed, and the state latch is automatically set to the transmit state. If you want to see how this works, make up a couple of sample system messages and run them through the **Fig. 3** flowchart.

THE CIRCUIT

Fig. 4 shows a complete schematic of the EMCF. I regret there isn't space to go into detail about its gate-level operation, but

ANOTHER ONE RIDES THE BUS

The heavy lines shown on the schematic in Fig. 4 indicate a group of signals that are *bused* together. Busing signals means showing a group of logically distinct connections (the eight data lines), not as eight separate lines on the page, but as a single, thick line. Each signal in the bus has a unique name (in this case the signals are named sequentially: D0-D7). Where individual connections need to be shown, individual "tributaries" are drawn from the bus, and each signal's name is written alongside the smaller line. Busing is used on the schematic to reduce clutter and communicate the circuit's functions more clearly. Remember that all of the tributaries with the same name connect together.



DESIG.	TYPE	Vcc PIN	GND PIN
IC 1	IM6402	1	3
IC 2	74LS05	14	7
IC 3	4001B	14	7
IC 4	4081	14	7
IC 5	4001	14	7
IC 6	4013	14	7
IC 7	4022	16	8
IC 8	4024	14	7
IC 9	4081	14	7
IC 10	74C85	16	8
IC 11	PC900	6	5

FIG. 4: The complete EM Channel Filter schematic.

the descriptions above can point the way if you're interested in figuring it out. If you do dive into the schematic, here's a hint: start with IC7, and look at what happens when IC1's DR (Data Received) line goes high. DIP switch one selects the pass-through channel, and **Fig. 5** shows the mapping of switch settings to channel numbers.

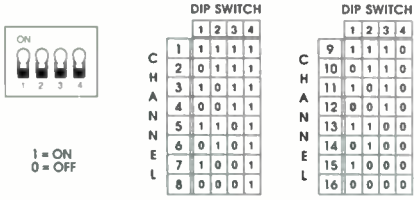


FIG. 5: Select the pass-through channel by setting the four DIP switches.

CONSTRUCTION

The circuit uses wirewrap techniques, which I recommend highly. This is the quickest and easiest method for constructing digital circuits. If you're careful and take the time to do a static wiring check (see "Build the EM MIDI Interface" in the May '86 **EM**), you should have no problems. The PC900 opto-isolator is available from the EM Bookshelf, tel. (800) 233-9604, and the other parts are stocked by most mail-order suppliers.

There is nothing critical about the physical layout of the circuit, but remember to hook up the inputs of the unused gates as shown at the bottom of the schematic, and be generally tidy with your work. The circuit requires a well-regulated 5V, 100 mA power supply. Sprinkle three or four 0.05 μF bypass capacitors between Vcc and ground.

CIRCUIT MODS AND TIPS

Adding a MIDI Thru (unfiltered) to the circuit as shown in the upper right corner of the schematic only takes three extra resistors and a DIN jack; the inverters are spares from IC2. IC10 (the 74C85 comparator) has one output that goes active when input A is *greater than* input B, and another that tells you when input A is *less than* input B. These enable the EMCF to filter all but a range of MIDI channels, instead of just one.

You can use the ideas and flowcharts presented here to implement a channel filter in software, but don't forget to consider latency issues; the hardware filter delays the MIDI data it retransmits by a very short four to six microseconds. The EMCF can be a jumping-off point in the design of other types of MIDI data filters, too: aftertouch filters, active sensing filters, and continuous controller filters, to name a few.

By the way, the Minimoog sounded *great* on the demo—I'm glad I hung in there. Happy building!

Tim Dowty *lives in San Diego where he works as a design engineer, plays his Stratocaster, and enjoys baseball. He recently consulted with authors Paul and Gail Anderson on their book* Advanced C Tips and Techniques, *which was published by Hayden Books in June.*

The Akai EVI and EWI:

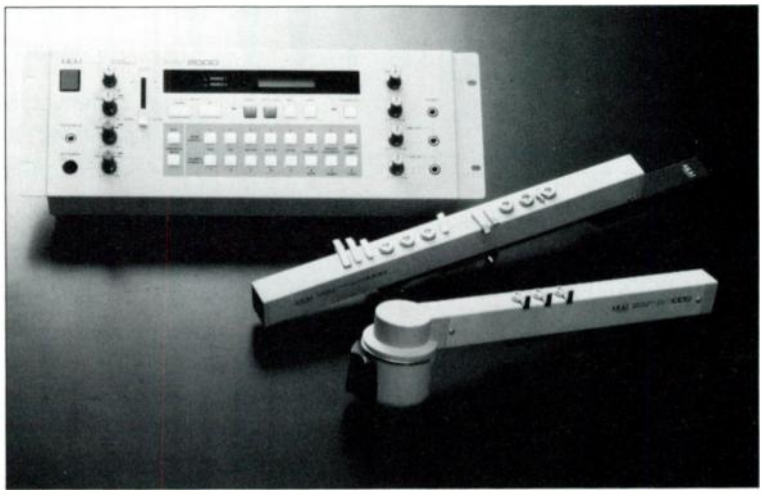
A Personal Approach

A wind instrumentalist puts a lot of time and effort into getting the instrument "just right." This may involve adjusting key height or trying to find the right mouthpiece, neck, bell, or slide, or it might be trying out reeds of all makes and types. So why should a wind *synthesizer* player be any different?

The Electric Wind Instruments from Akai—the EVI1000 and EWI1000—combine trumpet- and sax-like controllers with an analog synth module—the EWV-2000—to offer one of the first successful examples of synthesis for wind players. Exactly as they approach the "instrumentality" of their acoustic cousins, the EWI and EVI require similar modifications, tweaks, and personalizing to make them a bit more

Just getting chops on Akai's Electric Valve Instrument wasn't enough for this player. He found some clever ways to get closer to his instrument.

BY CRAIG HARA



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4EMA

playable and a little closer to "just right." Here are a few modifications and maintenance tricks I developed to put my EVI more in line with my playing needs.

DUPLICATE INPUT/OUTPUT JACKS

The EWV's input and output jacks are on its front panel, and when the module is rack-mounted, routing audio cables to these jacks is cumbersome. Fortunately, there is sufficient space to duplicate them on the rear of the unit with just a little bit of tinkering.

Open the EWV case by removing the 14 (!) screws around the perimeter of the case, including those holding the rack ears. Be forewarned: There is only a *minuscule* amount of slack in the wiring (primarily to the LCD), so don't expect the front panel to separate very far from the bottom. With the unit facing you, hold the front panel by the edges and carefully work it toward you, away from the bottom chassis, following the diagonal slant of the unit. Stop at any resistance: I've heard of people actually breaking a circuit board through careless removal. Once top and bottom are separated, stand the front panel perpendicular to the bottom.

With the case facing up, punch or drill ⅜-inch holes directly above the cassette dump jacks where they're marked on the template in **Fig. 1**. The template accommodates three jacks (Line Out, Ext. In, Up/Down Footswitch), and the measurements give you room to use right-angle or straight ¼-inch plugs.

For the audio connections, locate the circuit board for the Phones/Line Out/Ext: In on the extreme left of the front panel (looking from the back). From the Phones board, unplug the white, six-wire connector that originates from the front panel, and from the bottom board, unplug the white, four-wire connector that originates from the Phones board. Remove the circuit board bracket from the front panel, then remove the bracket from the board. If you need a little more working slack in the other wires, follow the remaining wires and clip the offending wire ties. Locate the terminals for each jack on the circuit board (see **Fig. 2**), and solder two 12-inch lengths of shielded cable to the indicated leads on the board. Reattach the board to the board bracket, mount the bracket to the front panel, and reconnect the four- and six-wire connections to their respective locations. Solder the other end of each cable to a ¼-inch jack, and mount the jack in one of the prepared mounting holes. Don't forget to mark which jack is which.

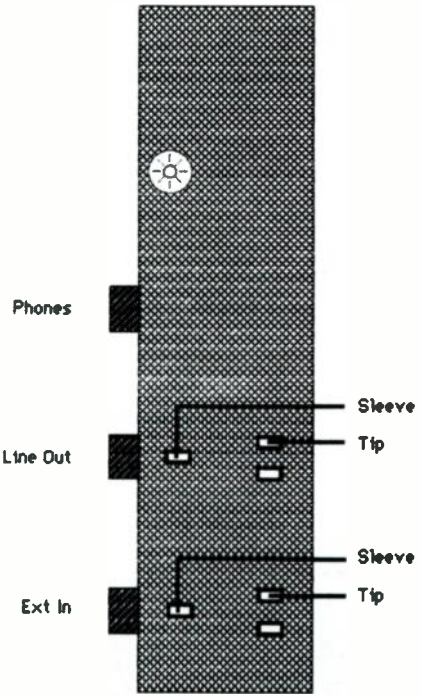

FIG. 2: Location of Line Out and Ext. In terminals.

FOOTSWITCH JACK

The EWV can accept either a single momentary switch with a mono plug to advance program numbers, or *two* momentary switches, attached with a stereo plug, to move program numbers both up and down.

Remove the circuit board for the footswitch (on the extreme right of the front panel). Locate the proper terminal connections and solder a 15-inch length of two-conductor shielded cable to the leads indicated in **Fig. 3**. Reinstall the board. Connect the other end of the cable to the ¼-inch stereo jack, and mount the jack in the remaining hole you drilled.

To test your handiwork, insert dummy plugs (with no wires attached) into the Ext. In and Footswitch jacks on the front panel, then make your audio and footswitch connections in back. Confirm that everything is functioning as it should. If not, check the plugs and your solder connections. If all is well, use wire ties and route the new cables conveniently. Carefully replace and secure the front panel of the EWV, observing the same precautions you did when opening it.

A TOUCHING SITUATION

A frequent complaint about the EVI and EWI is their tendency to generate glitches and jump octaves. This happens because the keys interpret the slightest finger contact as a note change. One solution barely mentioned in the controller manual is the *Touch Sensor Sensitivity*.

The EWI/EVI keys work by sensing the change in capacitance generated by the touch of your fingers. The Touch Sensor Sensitivity fine tunes the threshold at which a note change is recognized. Turning it down (further from the warble) means *more* of your finger must contact the key to generate a note change. This reduces stray notes caused by stray fingers. It will also force you to be more tactile-ly aware and to execute fingering with more physical conviction. (By the way, the sensor adjustment on my EVI is exactly the *opposite* of that described in the manual: stable high pitch at the right extreme, stable low pitch at the left, the warble somewhere in the middle.)

The Pitch Bend thumb sensor pads also work with capacitance, and you can tailor their response with the judicious application of a lifesaving, high-tech, live-performance tool: sticky tape, any kind from gaffer's to electrical Scotch™ (nail polish is too messy for this). I set my voices to bend a maximum of two half-steps, then adjust the amount and position of the tape on the pads so a moderate thumb roll bends a half-step, and more yields a

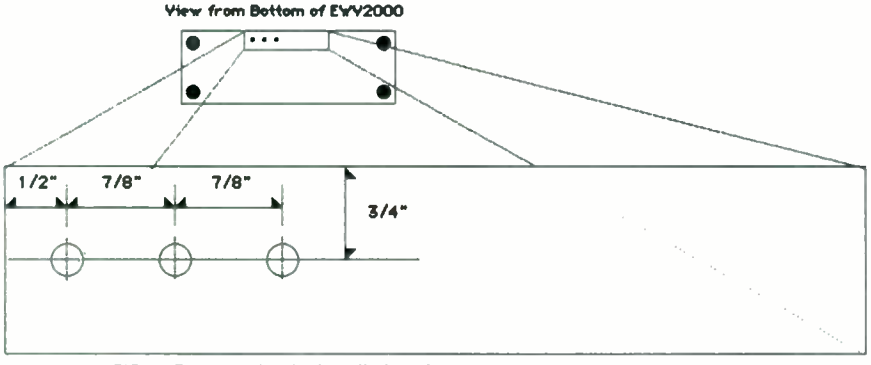

FIG. 1: Template for the installation of the ¼-inch jacks.

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whole step. I cover just the little tail of my EVI's up-bend pad, about half of the large plate area, and the tail on my down-bend pad (see **Fig. 4**). On an EWI, you can adjust the response of the glide plate similarly.

ZEN AND THE ART OF EVI MAINTENANCE

Rollers: The EWI/EVI rollers turn around a stationary center post screwed onto a circuit board. Occasionally, the coating on the post inhibits contact with the rollers, causing it to respond intermittently or not at all. If you experience this problem, remove the roller assembly from the circuit board and take the rollers apart. Gently sand the black coating off the post, put a drop of motor oil on it, and reassemble.

The rollers aren't exactly easy to remove, and trying this may damage the circuit board, so if it ain't broke, don't fix it. If you do damage the traces of the circuit board, repaint them with nickel print-conductive paint, available at most electronics stores.

Bite Sensor: The manual says to use only lip pressure on the bite sensor to get EWI vibrato or EVI glide, but Tim Tully's EWI review (Feb. '88 **EM**) quotes inventor Nyle Steiner saying you *should* bite with the teeth. Frankly, I find the easiest way to activate the sensor is to *bend* the mouthpiece. Bending the mouthpiece gives you much more pitch bend range than biting does anyway, and you *know* you won't bite through with this technique.

Vibrator Sensor: If your EVI vibrator sensor is too sensitive to minute motion no matter where the vibrato adjustment is set, stick a ⅛-inch layer of soft foam (or one of those little adhesive keyboard pads that come with keyboard stands) over the sensor; don't cover the earth plate.

Mouthpiece Angle: Most trumpet players I know hold their horns turned a little clockwise for easier fingering, and to reduce strain on the left hand. Well, EVI players, it's completely undocumented in the manual, but this can be done with your instrument, too. Remove the rubber

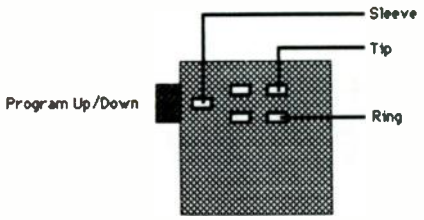

FIG. 3: Location of Program Up/Down footswitch connections.

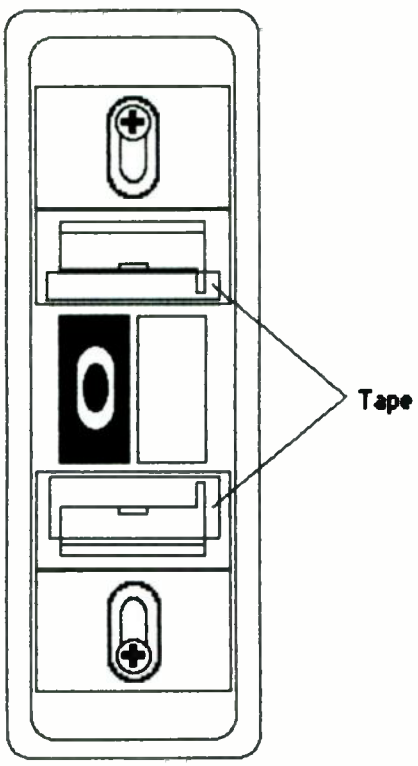

FIG. 4: Taping of Pitch Bend pads.

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Announcing the Wendel Jr. from Roger Nichols' Wendel Labs.

Three reasons why Wendel Jr. sounds better:

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2) These samples weren't recorded by some second engineer, but by **Roger Nichols, one of the best engineers in the world.** They were recorded direct to the 3M Digital Mastering System and then transferred directly to the EPROMs used in the Wendel Jr. So Wendel Jr. samples have *always been in the digital domain!* (Many drum machines' samples are from analog tapes.)

3) Incredibly long samples give you unmatched realism and sound quality, superior to any drum machine at any price. Just listen to other ride or crash cymbals and compare them to the Wendel Jr. You'll find that their typical cymbal sounds last only 2-3 seconds, while **the Wendel Jr. Ride cymbal is 8 seconds long!** The most expensive drum machines in the world can't even come close to Wendel Jr.'s long samples.

The world's fastest trigger!

Wendel Jr. does *not* use MIDI triggering because it's too slow (as most of you sophisticated MIDI users have already found out). Instead, Wendel Jr. drum sounds are triggered by an incredibly fast circuit. It is so fast that you can listen to the original drum sound and the triggered Wendel Jr. sound side-by-side and you'll hear **no timing difference!** The trigger input can take virtually any signal (drum machine output, tape signal, shorted footswitch, etc.).

Drum sounds so real, they have that human feel.

The optional "Snare Pair" cartridge gives a "left hand-right hand" feel to the snare rolls. This is a subtle effect, but it makes your drums sound human — as opposed to machine-like. **The Wendel Jr. is the only product that is capable of giving you this incredible "two-hand" feel.** When are other manufacturers going to realize that nobody plays all the drums with just one hand?*

Prevent your drum machine from becoming obsolete:

Wendel Jr. is a percussion replacement device, not a drum machine. As mentioned earlier, you can use your existing drum machine output(s) to drive the Wendel Jr. Or, for example, let's say you wanted to replace the mediocre snare drum sound on track 3 of your recorder. Just take the track 3 tape output to the trigger input of Wendel Jr. and record the new Wendel Jr. snare sound on another track. You don't have to keep buying a new drum machine every year. Perhaps more important-

*Rick Allen notwithstanding

DRUMS YOU CAN BUY
YOUR DRUM MACHINE
NG OBSOLETE!

ly, you can now use the drum machine that's easiest for you to program, and then replace key sounds with the Wendel Jr. as needed.

The ultimate drums for sound reinforcement:

Wendel Jr. is the perfect answer for sound reinforcement problems. Just use "trigger" mics on the real drums to feed a rack of Wendel Jrs. patched directly to your PA mixer. Bingo, you have incredible drum sounds without any feedback loops. All in a matter of minutes, not hours.

How to audition the Wendel Jr.:

Just listen to "Hey Nineteen" on Steely Dan's "Gaucho" album. Or try other albums by Steely Dan, Steve Winwood, Rod Stewart, Starship, Al Jarreau, Stevie Wonder, Kenny Rogers, Diana Ross, Duran Duran, Huey Lewis, Toto, Miles Davis, Pink Floyd, Heart, Supertramp, George Benson, Paul Simon, Christopher Cross, Bruce Hornsby and the Range, David Foster, etc.

Now here's the deal:

Roger used to sell the Wendel Jr. with one cartridge (kick *and* snare) to his dealers for $720 with a suggested retail price of $1000. **But direct from us, the Wendel Jr. is NOW ONLY $600!** And if you decide to buy before September 30, 1988, we'll send you a second cartridge free. So take advantage of this offer now! *Many* optional sound cartridges are available.

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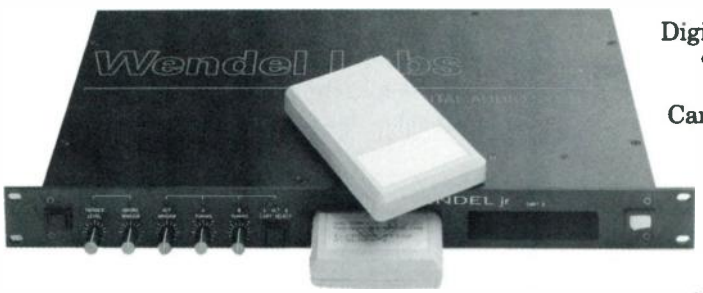

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Signature _____ Date _____

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bushing around the mouthpiece base; it should slide right off. Remove the three screws around the mouthpiece end of the controller, one on each side next to the Akai logos, one next to the cord connector. Hold the mouthpiece steady, and remove the top cowling surrounding the mouthpiece. Reinstall the two side screws.

The mouthpiece is mounted on a flat metal bar, bent on one end to accommodate two screws. Loosen these screws, turn the mouthpiece counterclockwise, and tighten the screws. *Be careful not to overtighten*, as the screws are self-tapped in the black plastic. Remove the two side screws, and reassemble the top cowling. Don't forget the bushing! You can now turn the EVI controller to a more comfortable playing angle.

EWV2000 PROGRAMMING TIPS

Ext. In: The Ext. In jack routes the sound of another synth through the analog amplifier and filter of the EWV's Oscillator 1, allowing you to impose analog volume and/or filter control on your MIDI synth or sampler. To make the most of this, remove all velocity sensitivity from your synth voice, and adjust the EWV filter to the range you desire. You now have total control of volume without any interference from the synth responding to velocity values. Adjust the envelope settings in the synth so that note changes occur smoothly. Remember that since the synth is routed through the EWV, when you stop playing, the sound stops—period. Long release times are ineffective.

Breath-Controlled Filter: With EWV sounds, to make sure the filter doesn't open completely before your volume peaks, blow hard into the instrument while lowering the VCF Breath Intensity control from 100. Stop when the filter starts to close (the sound gets duller). Play a little, and tweak this setting to get maximum control.

This breath setting interacts with the filter cutoff frequency. If you find a good timbre, but you'd like the sound to start out brighter, raise the cutoff frequency, then lower the breath VCF setting by the amount you added to the cutoff frequency. This puts you in the ballpark, and a small amount of fine tuning should optimize the response.

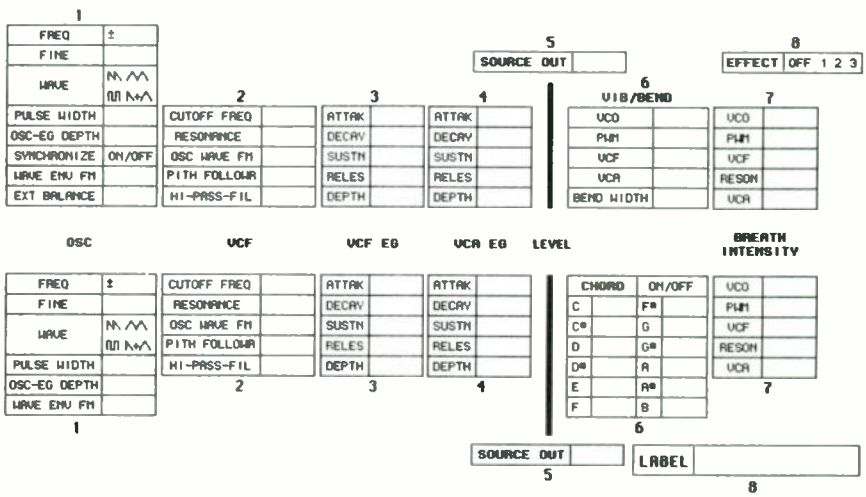
All of this also holds true when routing another synth through the EWV. If you want only volume control, and no filtering, set the cutoff frequency to 100.

Velocity Settings: While the original EWV2000s only sent a MIDI velocity of 64, a ROM update included in newer units (contact any Akai service center) lets the EWV send the full range of velocity values. This chip adds another page to the MIDI button that acts as a MIDI monitor, and reads:

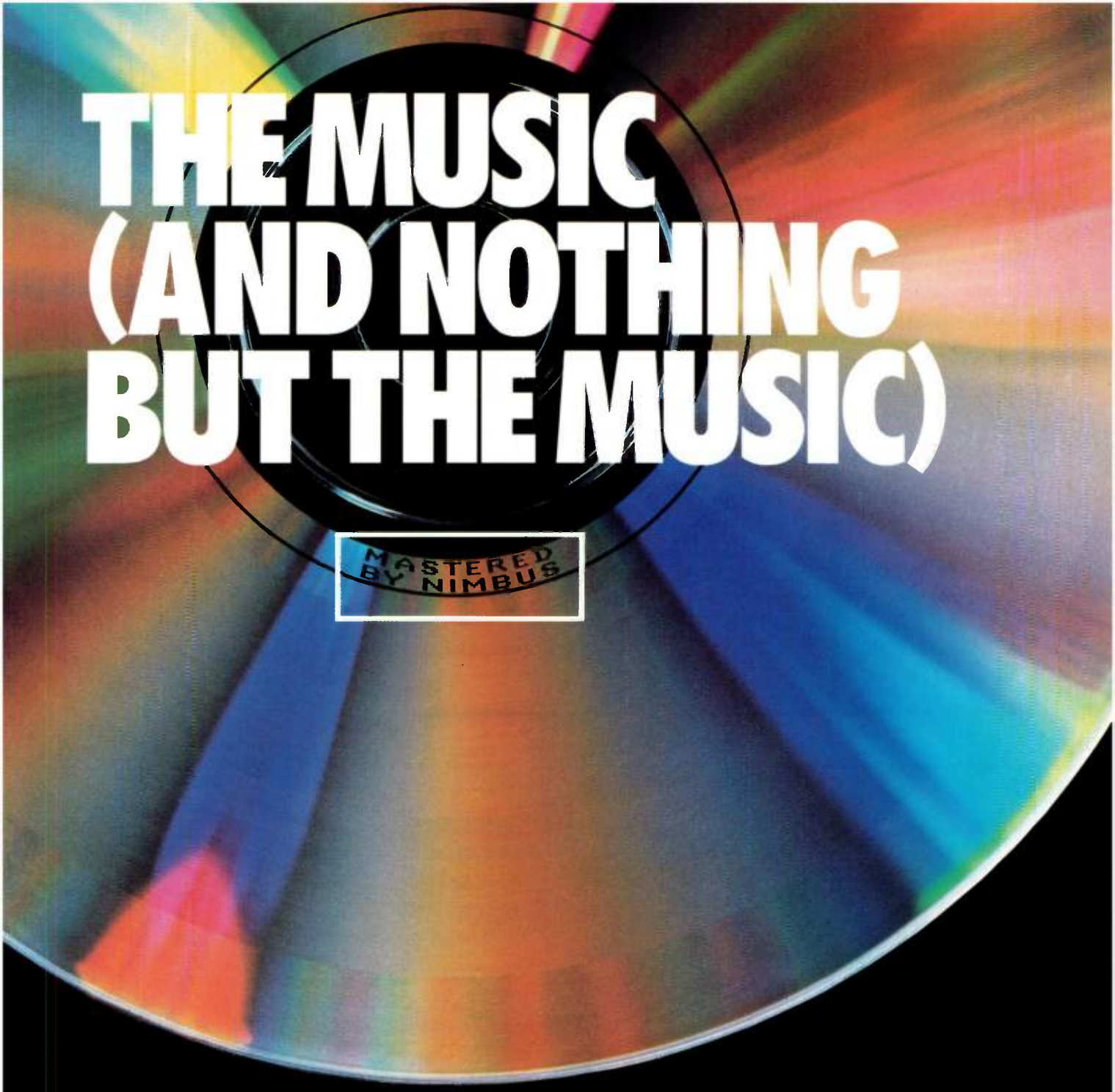
CPT:nn VELO:nnn

where CPT is capture time, and VELO is velocity of the last note played. Capture time determines when, during your articulation, the EWV sends a velocity value.

Most wind/brass players don't produce a percussive attack envelope (strong attack with lesser sustain and/or decay) on a continued basis, as all keyboards do. Rather, we wind types have a nasty habit of swelling into notes, whether slowly or quickly. So if the envelope created by your attack goes from 0 to 127 in 100 ms, the velocity that's sent could be anywhere from 1 to 127, depending on how long



EWV2000 patch sheet



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PARTS LIST

Duplicate Input/Output and Footswitch Jacks

2 chassis-mount, ¼-inch mono jacks (one each for Line Out and Ext. In)

1 chassis-mount, ¼-inch stereo jack (footswitch)

Single-conductor shielded cable (for Line Out and Ext. In)

Two-conductor shielded cable (for footswitch)

2 ¼-inch mono phone plugs (used as dummy plugs for Ext. In and footswitch)

Plastic wire ties

the EWV waits before it thinks, "Okay, he's at the volume (velocity) at which he wants to play." Particularly when you're playing a sound that you want to be always percussive, regardless of your breath pressure (e.g., a piano sound), this can make the difference between pulling off a nice line and having notes that don't sound.

For sounds like this, I find the EWV's delay unacceptable unless set to three or below. (This may be due to my particular unit; I've heard of people setting it to five and higher with satisfactory results.) So set a capture time as high as tolerable, and play as percussively as possible.

The Yamaha MEP4: A great tool for interfacing the EWV2000 with other synths is the Yamaha MEP4 MIDI Event Processor. (See the July '87 **EM** sidebar, p.38.) It houses four MIDI processors that can channelize, convert controller data, transpose, and more. If the EWV doesn't interface with your synth, the MEP4 may solve the problem. If you're sequencing, the MEP4 will selectively filter the large amount of continuous data the EWI and EVI send and negate the occasional pitch wheel flutter.

Craig Hara *is a freelance trumpet player, drummer, EVIst, synth programmer, and overall glutton for digital punishment, residing in Los Angeles. He thanks electric wind gurus Nyle Steiner, Seth Krimsky, and Scott Wilkinson. His PAN handle is CRAIGHARA.*

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THE FAIRLIGHT "MIDI SLAVE": Champagne Sounds on a Beer Budget

You have expensive tastes, great tunes, and a very limited budget. But there is a way to get world-class sounds without a world-class price tag.

By Ric Richardson

DANIEL MARTINEZ

The new demands of electronic music production have changed both the look and design of modern recording studios. Pictured above is Ignited Productions, a 48-track studio in Hollywood, California. Its spacious control room incorporates multiple keyboards and other MIDI instruments (including a dual Fairlight system) into the mixing environment.

More and more musicians are discovering how to save money (and hassles) by working out sequences at home using inexpensive gear, then renting time at a major studio and playing those sequences back into an arsenal of big-bucks equipment. Many times, the equipment of choice for this kind of application is a "digital workstation" along the lines of an N.E.D. Synclavier, WaveFrame AudioFrame, or Fairlight CMI. However, there's a bit of a learning curve when you want to get familiar with these complex and sophisticated instruments—and you don't want to pay for learning the instrument at studio time rates.

This article prepares you for working with the Fairlight Series III and describes how to take advantage of its most salient features without having to become a Fairlight "expert." Once you've experienced laying down exquisite, beautifully recorded acoustic sounds without spending hours of studio time setting up mics and rehearsing player after player—or heard the sizzling crack of a 16-bit stereo snare drum—you'll become a convert to this relatively cost-effective way of making music.

For your home setup, you'll need a flexible, editable sequencer (I use Southworth's *MIDIPaint*), a number of MIDI synths, and a drum machine (or a multitimbral MIDI sound module, such as the Roland MT-32) to hear your songwriting and arranging as it progresses. Once you have your sequences perfected, you're ready to book time and replace the sounds of your budget synths.

So why doesn't everyone use something like a Fairlight to improve their sound? Historically, a number of factors have limited general access to the Fairlight, but I've developed a number of techniques to overcome them.

IT'S NOT "JUST ANOTHER SAMPLER"

Remember that you're not just working with an upscale version of a standard, consumer-level, under-$10,000 sampler. Consider that two or three of the Fairlight's larger sound files (e.g., piano, acoustic bass, and brass) would fill about 20 3.5-inch floppy disks; the cheapest version of this instrument uses enough memory to equal ten or more normal samplers and stores sounds at many times their resolution; and it stores most sounds on *streamer tapes* that hold close to 70 times the information of a normal floppy.

With all this unique technology, the Fairlight tends to have its own way of doing things. As a result, a major stumbling block to occasional use of the Fairlight has been investing in enough studio time to become familiar with its built-in sequencer (called *Page-R*), and there's a gamut of specs and options that look positively overwhelming. It took me many weeks just to become moderately familiar with the machine, but by diverting some of the chores normally handled by the Fairlight to equipment I know better, the task of using this major league equipment looks much less daunting. Essentially, I use four simple concepts that should help you, too:

Sequencer: Instead of the Fairlight's Page-R software, use your own MIDI sequencer, with your own keyboard as a master MIDI controller.

Operator: By using only the most elementary levels of the Fairlight's control software, you greatly reduce the need for an operator/assistant (although, if you're completely unfamiliar with the Fairlight, count on needing this person to a pretty large degree).

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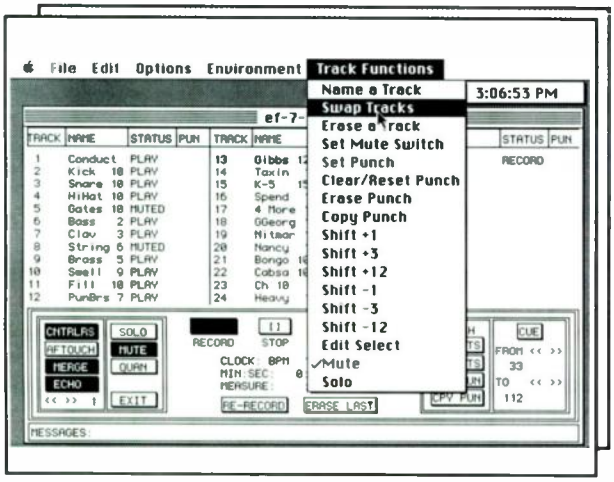

Level II Mac (Atari ST, Amiga)

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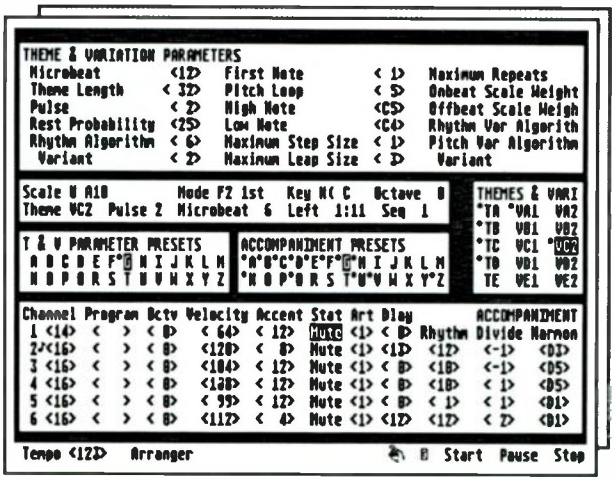

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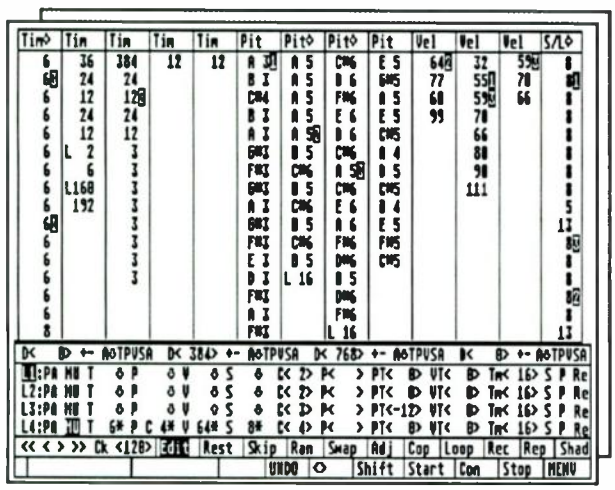

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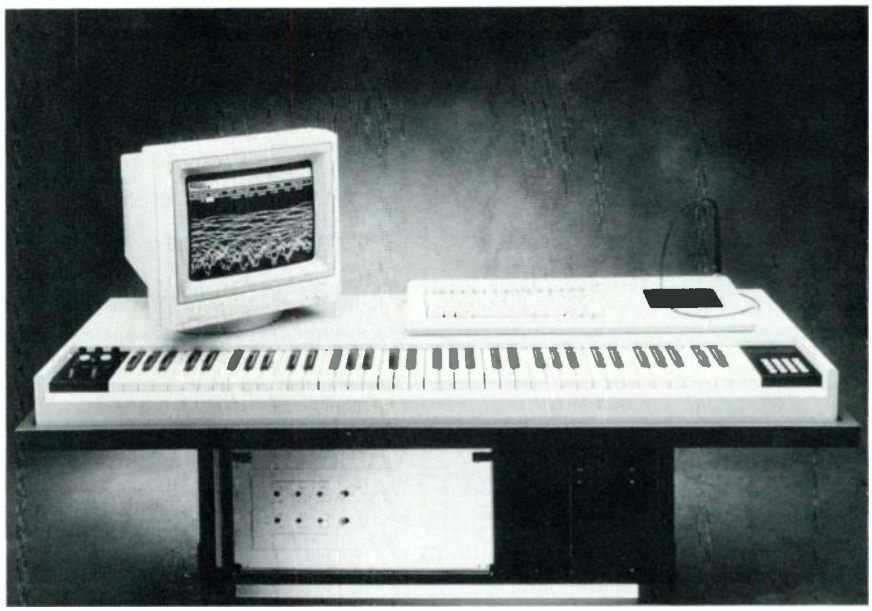

Fairlight's Series III is an expandable, 16-bit sampler, available in versions ranging from a basic 8-voice/4 MB RAM setup to a full-blown 40-voice/50 MB RAM system with 600 MB disk and 400 MB WORM drive.

Operator cooperation: To utilize your expensive studio time more efficiently, the machine's owner or operator can often provide you with material to study and audition before the studio meter starts ticking.

Preparation: Fine-tune the information in your own sequencer to suit the Fairlight sounds you use.

THINK BEFORE YOU LEAP

Once your sequence is finished, it's time to stop and think rationally. Do you want to replace that fantastic JX-8P bass sound or the magical sax solo that somehow found its way to tape the other morning at 3 a.m.? Probably not. In cases such as this, you'll have to make arrangements to bring your synth and tape deck to the studio and determine how to sync them to the master tape along with the Fairlight.

Next, visit the owner of the machine you intend to use, and ask for access to the Fairlight Sound Library audition tapes. Fairlight usually supplies Series III owners with these audition tapes to help find sounds faster and hear new samples to add to their existing library. Some studios (like Alberts in Sydney, Australia) supply their own library audition tapes to prospective clients or allow their clients to use low-fidelity copies of the samples in their own samplers for pre-production purposes. The current library has a very wide selection of pop, rock, and orchestral sounds, and there is a listing by category in the back of the Fairlight User Manual that you may want to photocopy for future reference.

Run through the audition tape, making note of interesting sounds and writing down the location and *instrument number* of the sounds you'd like to use. Keep in mind that the library takes up six streamer tapes (a total of 360 megabytes). In its smallest configuration, the Fairlight's main hard disk can only hold two of these tapes' worth of sounds at any one time, and since it takes 15-20 minutes to load the sounds from tape, it saves you time and money to select sounds before you go to the studio for your session. Call the owner and mention which sounds you want to use, and you may find it loaded free of charge prior to your arrival.

The more organized you are, the better. Put together a well thought out, short list of the sounds you will use, as well as a couple of alternatives in case your selection doesn't work well when you get to the studio.

While you're at the studio getting the audition tapes, photocopy the Series III manual's MIDI implementation chart to learn how to make the instrument respond correctly to your particular sequencer.

THE SEQUENCER

It's imperative to adjust your sequence to suit the sounds you'll be using on the Fairlight. For example, if you want to replace a slowly swelling "pad" sound with

a fast-attack string section, the starting point of the notes will probably need to be adjusted to take into consideration the difference in envelope attack rates.

Also consider the way drum sounds are arranged. While most drum machines and modules send all their sounds as different MIDI note numbers on the same MIDI channel, each Fairlight drum is loaded as a separate instrument that defaults to its own MIDI channel. This approach allows for a great deal of flexibility, but also requires an equally flexible sequencer. Since you'll probably start composing your sequence with a conventional drum machine, your sequencer must be able to reassign (easily, if possible) each group of MIDI notes assigned to a particular drum to an individual MIDI channel, and be able to change the note numbers on each of these channels to any other note number. Unless you want to pay for sequencer editing time at studio rates, have your drum sequence finished before the studio clock starts ticking.

Finally, before heading off to the studio, call the Fairlight operator and mention the streamer tape numbers you intend to use. A common practice is to clean the hard disk directory after each client, but if you'll be using the same library that was already loaded by the studio's last client, you may save a half-hour of studio time by calling first.

LOADING THE FAIRLIGHT

Loading the instruments you've chosen from the audition tapes is the most complicated part of this process. On starting up, the Fairlight monitor defaults to the main directory page, which shows all the sounds that are available on the Fairlight's hard disk (**Fig. 1**). Select the first sound with the light pen (all sound files have the suffix "VC"), then press the F5 key to load the first instrument. Select your next voice, hold down the Shift key, press F5 again, and you have loaded your

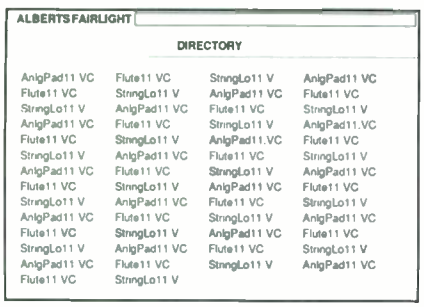

FIG. 1: Main Directory page.

second instrument. Repeat this procedure to load all the sounds to be used for your project. The main limitations to keep in mind are a maximum number of 16 voices at any one time and a maximum polyphony (*nphony*, in Fairlight lingo) of 16. For example, a piano sound with an nphony of eight would leave only a total of eight voices to be shared by the remaining instruments. To set the nphony value, go to the System Configuration page (type SC and hit return), and reset the value in the nphony column for each instrument you have loaded.

Generally, the first (and trickiest) thing is to load the drum kit and check for the right MIDI channels and note numbers. The first instrument you load from the Fairlight's hard disk defaults to both instrument number and MIDI channel *one*, the second instrument is number two, and so on. Following the channels you've assigned to each drum in your sequencer, load the Fairlight appropriately. Since the Fairlight drum sounds will have their own MIDI note numbers, you should have edited your sequencer to send the right note number to the right drum. But some Fairlight voices (e.g., "Snares 16") contain several different samples—different snare drums in this case—each assigned to its own range of notes. By varying the note your sequencer sends, you can play different drum sounds on a single channel. Again, preparation and an easy-to-edit sequencer pay off in time (and money) saved.

Follow the same procedure for the rest of your instruments, and the Fairlight Series III will be ready to play your sequence over separate audio outputs, a necessity for individual outboard effects processing and separation while recording in a multi-track context.

As you play the sequence into the Fairlight, you may notice some minor glitches or inconsistencies. For instance, the attack of a string section may sound unrealistic, or a drum sound may not respond properly to MIDI Note Off information. These problems can be fine-tuned using the Fairlight's Effects Page, but I suggest that you get the operator to help you before careening off into the complexities of Fairlight operation.

Before closing, remember that the Fairlight does not recognize MIDI Program Change information, but it does respond to most other MIDI controller messages in a very flexible way. Velocity and Pitch Bend work as they do normally, but other MIDI messages, such as Aftertouch, Channel Volume, Modulation, Vibrato, Stereo Pan (for stereo samples), and so forth, must be assigned to the parameter you want them to control, and fine-tuning to this degree can get expensive in terms of studio time.

Having successfully used this technique dozens of times, I know it's worth trying for any of you whose musical ambitions are bigger than your wallet. Using the Fairlight in this way has also made me acutely aware of all the time I have wasted trying to save up for my own sampler, when for a fraction of the cost, I can rent the ultimate sampler and get on with the business of making music. Maybe it's time you had a look at using some of the latest digital audio workstations in your work.

Additional information is available from a book I wrote, the *Alberts Fairlight User Booklet*. Good luck!

Ric Richardson *is a freelance journalist, musician, and publisher of a small Australian music technology magazine called* Music & Video. *He earns his bread and butter sequencing, programming, and MIDI troubleshooting in Australian studios.*

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QUESTIONS AND ANSWERS: Reader Pot-pourri

Our resident tech gives advice on a variety of topics ranging from "airport-proofing" your tapes to cleaning pots.

By Alan Gary Campbell

RICK BISACCIA

Q. How should I pack PCM-encoded videocassettes when I ship them out for mastering? I've heard that shielded, metal cases are necessary to keep security X-ray devices from erasing them. Also, are paper cassette mailers adequate protection against stray magnetic fields? I've sent demo cassettes out in these things for years, with apparently no problems, but...

A. X-ray devices that scan parcels for security purposes operate at relatively low power levels and are generally considered safe with regard to inadvertent erasure of magnetic media. Nonetheless, if you're carrying the master tapes from the Beatles' *White Album* in your briefcase, I'd definitely suggest checking with airport security to avoid the scanners, just in case! Seriously, parcels shipped via typical interstate carriers (UPS, USPS, Fed Ex, etc.) are rarely scanned, and in this context, metal cases are overkill. (*I've been told that problems involving tape and airport X-ray machines are not caused by the X-rays themselves, but by components within the machine that generate magnetic fields. Can anyone who knows about these machines confirm or deny this?—Ed.*)

The main considerations in shipping tapes or other magnetic media are protection from physical abuse and from stray magnetic fields—problems with a simple solution. The magnetic permeability of air is rather low. 3M Company's Magnetic Products Division suggests that a mere three inches of "air" space (packing paper, foam chips, etc.) around tapes in transit is sufficient to protect them from any external magnetic fields—including those from tape-head demagnetizers or bulk erasers operated at the surface of the package!.This also protects tape from physical damage in transit. (This data is reprinted as an appendix—"The Handling and Storage of Magnetic Recording Tape"—in Robert E. Runstein's *Modern Recording Techniques*, published by Howard W. Sams and available through EM Bookshelf; tel. [415] 653-3307 or [800] 233-9604.)

While the danger of alteration or erasure *is* remote, you are taking a chance when mailing demo cassettes in tight-fitting paper sleeves. Was that last demo rejected for musical reasons, or because of a bad tape? It's worth considering.

Q. I've heard that Freon™ solvent should not be used to clean noisy open-frame potentiometers, as it washes away necessary lubricant, causing damage. Is this correct?

A. Most modern pots are self-lubricating by virtue of their composition and are not harmed by exposure to dichlorodifluoromethane or trichlorotrifluoroethane, i.e., Freon-12™ or Freon-113.™ But to be safe, you might use a Freon-silicon mixture (such as Radio Shack's TV Tuner & Control Cleaner & Lubricant, catalog number 64-2315) for cleaning *and* lubrication to reduce track/wiper friction and noise. Disadvantages of such products are that the overspray leaves icky slime all over the place, and research strongly suggest that chlorofluorocarbon contamination may deplete the earth's atmospheric ozone layer (see "Safety in the Electronic Music Workplace" in the June '87 **EM** for more information), so don't overdo it.

Pot potpourri: *Never* test the resistance of a potentiometer with a conventional VOM. (*You can, however, measure the resis-*

tance between the outside terminals of a pot with a conventional VOM; it's measuring the resistance from the wiper to one of the outside terminals that causes problems.—Ed.) When you reach the end of the track, the only resistance in the circuit is the pot "end resistance," which is but a few ohms. Even at low voltage, you'll exceed the maximum wiper current almost instantly. Instead, use the "low-power ohms" resistance-measurement function on a DVM, and limit the duration of the test as much as possible. Do *not* clean pots with Color TV Tuner Cleaner (Radio Shack catalog number 64-2320) or similar compounds; these contain abrasives that can cause permanent damage. For more on pots, a superb, comprehensive reference is Bourns Incorporated's *The Potentiometer Handbook*, published by McGraw-Hill.

Q: I have an Alesis MIDIverb™ and a MIDIfex.™ The MIDIverb has a hum in the output. I opened up the unit, and it doesn't have the foil shield inside that the MIDIfex has. Are both units supposed to contain a shield, and if so, could this affect the hum?

A. Apparently, some early production MIDIverbs don't have the shield, which is intended mostly for RFI emission suppression, and probably won't affect hum pickup. The component culprit is elsewhere.

But before you grab your soldering station in a fix-it frenzy, note that while Alesis does not authorize field service centers, they currently repair units *returned* to them, in-warranty or not, at no charge! They're considering charging a small fee for out-of-warranty work in the future, but for the moment, this transforms do-it-yourself repair into don't-it-yourself, if you know what I mean. Note: Before you return anything, contact their Service Department at Alesis, 7336 Hinds Avenue, North Hollywood, CA 91605; tel. (213) 467-8000.

If you haven't had your minimum daily requirement of masochism, and simply must repair *something*, check the easy stuff first: ground loops, defective wall transformer, broken jacks, cold solder joints on jack terminals, etc. If that doesn't do it, check the power supply caps and regulators. If the unit persists in humming, well, try teaching it the words! (Sorry, I couldn't resist.)

Q. What's the difference in TDK SA90 cassettes with the chrome label and newer SA90s with the gold label? I've heard that the gold-

labeled tape is intended for recording from digital sources.

Q. When recording the sound from digital synthesizers and samplers, like my Yamaha DX7II and Casio FZ-1, should I use the new cassette formulae touted for use with digital sources? I want to get the best possible results from my 4-track.

A. TDK's Customer Service department informed me that the difference in the chrome- and gold-labeled SA90s is the package. However, TDK constantly upgrades its tape formulations to improve performance, so no doubt there may be subtle changes. But in tests I've run, the two types performed virtually identically. If your 2- or 4-track cassette machine works well with the old color, it most certainly will with the new. Buy whichever shade is on sale.

With regard to the new high-tech cassette formulations for use with "digital sources," those hot licks pour out of your digital-MIDI-whatsit in the *analog* domain. What makes tape good for analog-*or* digital-source recording is what makes any tape good: low noise, wide bandwidth, flat response, wide dynamic range, and resiliant physical characteristics. Though it's hard to separate hype from hertz, any cassette that offers superior performance is desirable for any kind of recording.

Though it's hard to separate hype from hertz, any cassette that offers superior performance is desirable for any kind of recording.

Moreover, new types that are supposed to be compatible with old may not be, and 4-track recorders are notoriously picky about tape formulation and bias requirements. Also, few 2-tracks have front-panel bias adjustments, so it's best to optimize bias for one established type of tape and stick with it. And despite advances in tape formulations, metal tapes, which aren't compatible with most 4-tracks, still offer the best performance—if you can afford them.

Q. I've noticed that when I hold compact discs up to the light, there are pinholes in them! I've heard that the data "pits" on the CD surface are microscopic. Won't these pinholes cause data errors? I'm building a library of samples on CD, and I want the best audio quality possible.

A. A single-bit data area on a CD is about the size of a healthy bacterium, so these pinholes—areas of incomplete plating—can cause data errors. However, data is not encoded linearly along the CD data spiral, but in an interleaved fashion called Cross-Interleave Reed-Solomon Code, or CIRC, for short. Depending upon the sophistication of the error-correction algorithm in a given CD player, the data can usually be reconstructed. (There is actually more error-correction data on a CD than sound data.) If not, you'll normally hear an interval of silence, rather than garbled sound.

Though pinholes are common, they're not often a problem. I have a copy of Chick Corea's *Elektric Band* that you can

practically read **EM** through (this is admittedly a fluke, as the GRP label CDs are favorites of audiophiles), and it's the best-sounding fusion CD I've heard. In fact, the only CD I've ever seen that didn't have pinholes was a CBS Masterworks release manufactured in Japan by Sony. (*Some CDs are plated with a thin layer of gold in an effort to eliminate the pinhole problem; for example, Optical Media offers gold-plated CDs for their CD-ROM system.—Ed.*)

Q. I recently had new software installed in my Ensoniq SQ-80, and now, when I save sequences to disk, my patches are erased! The salesperson at the store where I bought it says this is normal. Huh?

A. SQ-80 software versions *later* than 1.6 use the first ten bank files to automatically store the 40 internal programs whenever one or more of the ten sequence files is saved. If you have data disks created with Version 1.6 or earlier, you should rescue your patches from these disks before you save any sequences on them! Load the bank files, one at a time, and use the SAVE NEW FILE command to resave with the same name as before. The new software automatically resaves to a safe area of the disk. This is explained in detail in the "SQ-80 Software Version 1.8 Update" sheet, which you should have received with the update. If not, contact your dealer or Ensoniq for a copy of this important document.

Q. My Ramsa 8112 mixing board has a switch to turn on phantom power to all the mic inputs simultaneously. I've read that if phantom power is applied to dynamic (magnetic-type) mics, their response and other characteristics may be permanantly altered due to the voltage passing through the coil of the output transformer and saturating its core. Is this the case? I'd like to use both dynamic and condenser mics, preferably without modifying the mixer.

A. At first glance, this seems like science fiction (not the kind with robots and aliens, the *other* kind). Standard, or "simplex" phantom power, applies an equal voltage to pins 2 and 3 of the mic jack, as in **Fig. 1**; so each side of the output transformer or coil is at the same potential, and no current can flow. Even if one of the powered pins is shorted to ground, the current is limited by a series resistor: with the 6k8 (6.8 kΩ) value shown, at 48 volts of phantom power, assuming a 150Ω mic coil resistance, the coil current is only 7 mA, and the power dissipation, 7 mW—in general, not enough to do any damage.

But Tim Vear, marketing coordinator for Shure Brothers, informed me that the "A-B" phantom power scheme used in Europe does place a voltage differential across the pins. This is problematic, since the resulting current can induce a diaphragm-position offset in magnetic mics, resulting in distortion and loss of headroom; but it is highly unlikely that this would damage a mic. Fortunately, A-B type phantom power supplies are usually clearly marked as such, and it's unlikely that you'll see this scheme in the U.S., since the only common mics that use it are the Sennheiser 416 and 816 "shot-

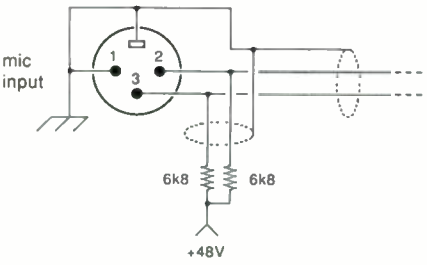


FIG. 1: Typical phantom power circuit.

guns"—not something you find in most home studios.

By the way, modifying an input jack to disable phantom power usually involves simply desoldering two wires. You could easily have your unit de-modified if you ever decided to sell or trade it.

Q. I built the DIN-sync converter circuit in the October '87 "Service Clinic" so my Dr. T's MIDI interface could sync to my Roland drum machine, and it works great. But in "Getting the Most from Your Drum Machine," by Daniel Shear in the May '88 issue, there's a more complicated circuit for connecting an MPU-401 DIN-sync Out to a Drumulator's Clock In. Don't these two circuits do the same thing? Which one is better?

A. The circuits are, in fact, *functionally* identical. Daniel Shear's TTL-based circuit (**Fig. 2**) uses one-quarter of a Quad AND gate as a "transmission gate": the Run/Stop signal from the MPU-401 Sync Out gates the clock on and off. The op amp-based circuit (**Fig. 3**) achieves the same result by using the Run/Stop signal to "gate" the positive supply pin, effectively turning the op amp and the clock on and off—not a standard engineering practice, but it works (the required supply current is so low that there is no danger of damaging the Sync Out circuitry).

Since both work fine I couldn't say that either is "better." Shear's circuit represents a more conservative engineering approach; if you're incorporating a DIN-sync converter in a module that already has +5 volt power (and perhaps a spare gate), then it makes sense to use it. However, for optimum performance I'd recommend the following improvements (shown with dotted-line connections in **Fig. 4**): add a 100n (0.1 μF) ceramic capacitor to pin 14 of the 7408 to keep its switching noise off the module's supply, and tie any unused inputs of the 7408 to +5 volts to avoid noise-induced random switching and excess power consumption. If, for some reason, you decide to construct this version as a free-standing circuit, you might also want to add a 10 μF, 16-volt, electrolytic cap to the regulator input, to improve its transient response.

However, for a free-standing converter, the op amp version is preferable. It works just as well, saves several components, including three wasted gates, and requires no power supply. These two circuits do underscore, however, that completely different designs can accomplish the same function.

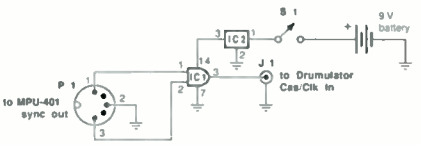


FIG. 2: TTL-based sync circuit.

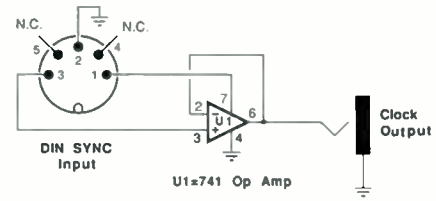


FIG. 3: Op amp-based sync circuit.

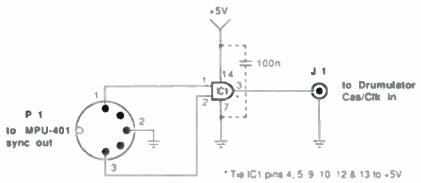


FIG. 4: Improved sync circuit.

Q. The bottom-panel screws on my Casio CZ-3000 keep coming loose and falling out. How can I stop this?

Q. I've lost some screws out of my CZ-5000. I tried to order some from a service center, but they said that Casio doesn't sell them. Where can I get them?

A. The bottom-panel screws on the CZ-3000 and 5000 can sometimes loosen when these instruments are subjected to vibration during performance or transport; and, believe it or not, Casio really doesn't sell screws! Your local hardware store probably won't have them, either, since they're M4-0.7 × 10 millimeter metric Phillips pan-head machine screws (also used in some Yamaha products). Check your local Yellow Pages, under *Bolts & Nuts*, for a supplier near you. Most of those listed are wholesalers that sell bolts only by the case (or the pound), but some smaller companies have "customer counters" where you can purchase broken cartons and sample quantities for a fixed "cash ticket" price (usually two to five dollars). They may even stock fasteners in the elusive black anodized finish! (But don't count on it.) Make sure you know what you want before you get there, or at least take a sample part with you; salespeople in such places are geared to dealing with the industrial sector.

Alternately, you might order similar screws through a service center from a

manufacturer that does sell them; e.g., Yamaha. This can be about the only way to obtain small quantities of black screws at a reasonable price (the shipping and handling will probably cost more than the hardware). Recently, I've noticed that some of the Radio Shack Hardware Assortments, catalog number 64-2890, contain quantities of black-finish screws; the quality varies, but the price is right—a pound for $1.69.

To keep CZ-3000/5000 screws from falling out in the first place, add an internal-tooth lockwasher to each. Though an M4 metric lockwasher is the correct size, a common #6 will work—and *these* you can get at the hardware store (usually).

An aside: CZ-101 case screws are a different type. You can substitute a common #4 × ½-inch Phillips pan-head tapping (sheet metal) screw for these. Just cut a bit off the end of each with a bolt cutter or a pair of Vise Grips,™ and file it smooth. The fit is a bit tight, but if you're careful as you drive them in, they'll work fine.

Q. I got a good deal on a Wurlitzer EP388 Digital Electronic Grand—I think. When I set the unit up, though, a bunch of keys wouldn't play, or didn't have any velocity response. The dealer hasn't been able to help. What's wrong with this thing?

A. Reportedly, the grease used to lubricate the key springs on some EP388s is excessively viscous and restricts the key motion, resulting in a "sluggish" action. Removing all the keys to "degrease" them is no easy task, but luckily, in the field I've observed a much simpler problem with the same symptoms: some EP388 actions are simply not properly adjusted.

To adjust the action, unplug the unit, remove the two large Phillips screws at the extreme left- and right-center of the bottom panel, and hinge the top panel back. Check all the keys, especially the black keys, for adequate travel. If any key feels as if it really doesn't "go very far," turn the *rear* adjustment screw very slightly *counterclockwise*, to raise the key height. Don't overdo it! Just the slightest adjustment should be adequate. When you're satisfied that all the keys "feel" right mechanically, go back and check to make sure that none of them are raised too high above their neighbors. If they are, lower them slightly to compensate.

Next, power up the unit (keep away from the power supply area!) and play each key, in turn, first lightly then *hard* (it helps to engage the damper pedal as you proceed); you should hear a marked difference in volume and timbre as you do this. If not, turn the *front* adjustment screw for any affected key *counterclockwise*, a little bit at a time; again, don't overdo it. You'll know when you've got it right: the key will suddenly work perfectly; this is *not* a gradual adjustment. When you're done, close the unit up and enjoy playing it.

Q. I purchased one of the first Ensoniq EPS Performance Samplers. It's a killer axe, but there's some noise in the output. I've tried all kinds of things to get rid of the noise. Do you know of any hardware or software bug that can cause this?

A. A small number of early production EPSs had noisy outputs, due to some out-of-spec components in the output stage. If your EPS has this problem, simply have an authorized service center replace the unit's

mainboard, and you'll be in business.

Conversely, the resolution of the EPS will magnify every little noise, alias, and glitch on poorly recorded samples, especially those ported from the 8-bit Mirage. So before you blame the EPS, consider the quality of the *samples*.

Q. My DW-8000 doesn't work properly with my EX-8000, MIDI-wise.

A. The key-contact plating on early DW-8000s is not reliable; cleaning the contacts provides only a temporary fix. To correct the problem, replace the key-contact strip with the DW-8000 Keyboard Contact Update Kit, an improved assembly employing gold-plated contacts. For DW-8000s with serial numbers below 12,247, Korg authorized service centers provide the update at no charge to the original owner, whether the instrument is under warranty or not.

DW-8000s with EPROM Versions 9.0 and earlier won't work properly with the EX-8000 (user error is not the problem) and may also exhibit glitches when used with a MIDI sequencer. To check the EPROM version in your unit: power down, press and hold the "1" and "2" buttons, and power up; the LED display will show the installed-version number. Authorized service centers install the current Version 12.0 EPROM at no charge to the original owner, warranty or not.

Q. I have Syntech's *Studio II* sequencing software for my Apple, and I've created a lot of music files with it that I'd like to keep. Trouble is, the Studio II software is copy-protected, Syntech is out of business, and I don't have a backup disk of the program—if this disk crashes, I'll lose access to all my previous work. Is there any way around this, short of dumping the sequences in real time to another sequencer? I like Studio II, but I need a backup, or something.

A. Sonus Corporation offers several current sequencing programs that will read Syntech files, such as *Super Sequencer 128* for the IIe with expanded 80-column card, *Glasstracks* for the II+, and *Sequencer 64* for the Commodore 64; and you can trade in your old Syntech disk, plus $50, for a copy of one of these—now that's a liberal trade-in policy! Sonus also has available limited quantities of backup disks for *some* of the Syntech software. For more info, contact: Sonus Corporation, 21430 Strathern Street, Suite H, Canoga Park, CA 91304; tel. (818) 702-0992.

SERVICE UPDATE

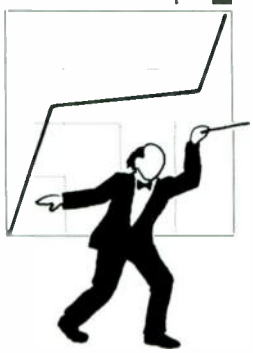
Readers interested in acoustic instrument service might want to investigate the Western Iowa Tech Community College *Piano Tuning and Repair* program, a four-quarter/48-week, in-residence course. I received a flyer on this, and it looks quite comprehensive. Contact: Admissions Office, Western Iowa Tech Community College, PO Box 265, Sioux City, IA 51102.

EM readers who work abroad might want to write for a copy of a new brochure, *International Adapters*, from International Configurations, Inc., P.O. Box 3374, Enfield, CT 06082; tel. (203) 749-6380. Included are descriptions of adapters that allow standard NEMA 5-15 and 6-15 line plugs to work with European CEE-7 Schuko-type outlets. (Converting equipment for international power requirements was discussed in the May '88 "Service Clinic.")

Alan Gary Campbell *is owner of Musitech.™ There was a recent sighting of him, confirmed by several independent observers, at the Atlanta Summer NAMM show.*

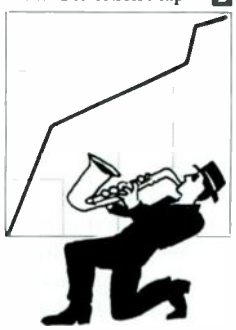
It Don't Mean A Thing If It Ain't Got That Time Distortion.

Time Distortion Map 1



It's amazing how much a little time distortion can change the personality of your MIDI music. If you've got time distortion, you can go all the way from sounding mechanical to sounding like a real live human being, and back again. Jam Factory's got it. And that's only the beginning.

Time Distortion Map 2

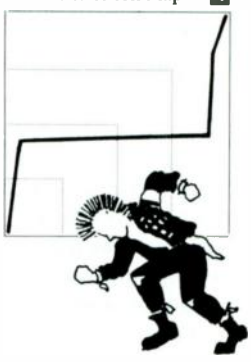


With Jam Factory, a few bars of material can produce an entire piece of music. Just play your basic ideas and Jam Factory's players start jamming. But that doesn't mean you lose control. It's your music and you're the leader of the band.

Time Distortion Map 3

Whether you're working on a film score, a jingle, a song, or just playing around, Jam Factory's graphic controls let you direct virtually every aspect of the players' performances—instantly. Like articulation. Interpretation. Speed. Volume. Accents. Rests. And much, much more. Simply point the mouse, click the button, and it's done.

Time Distortion Map 4



And like all Intelligent Music software, Jam Factory lets you hear your music as you're composing it. Not after you've sequenced it. While you're making it. In real time.

If all this still ain't enough, Jam Factory's got that swing, too. So what are you waiting for? Check out Jam Factory for the Macintosh today. Call or write us for the dealer nearest you. Or send us a $10 check and we'll send you a demonstration package.

Time Distortion Map 5

Time Distortion Map 6

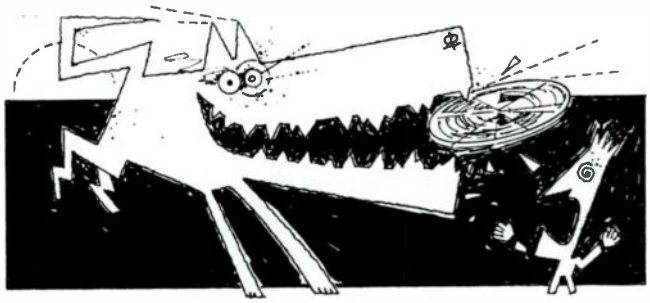
JAM Factory™

MIDI software for the Macintosh

Intelligent Music®
116 North Lake Avenue
Albany, NY 12206 USA
518-434-4110

INSIDER INFO:
Tips from EM Readers

A Sad Ending, But a Beautiful Finish



My heart stopped: I had dropped one of my most prized compact discs. It had fallen against a wooden bookcase before hitting the floor, and several scratches had been deeply engraved into the plastic coating. I inserted the disc into the player to determine if I would have to replace fifteen dollars' worth of aluminum; the results confirmed my worst fears.

As you probably know, CD players utilize sophisticated error-correction techniques that sense scratches and "fill in" the lost data if the scratches are minor enough. If a scratch is too big, however, the computer will panic and perform some bizarre operations—such as take five-minute bites out of certain selections, or continuously restart a particular song. It might even reject the entire disc and not play a single bit.

In this instance, the disc now had two major flaws. Even at close range they were miniscule, but to the computer each resembled a canyon. I wondered if I could fix it myself...

There is some stuff on the market that you spray onto a CD and wipe off, thus eliminating scratches, but it costs almost $15 a bottle—virtually the same cost as replacing the disc. Right then and there I decided to activate the chemistry lab (all right, the kitchen) and see what homemade material I could use. Toothpaste did not work, as it was too gritty and even added a few minute scratches (although it did make the disc smell a lot better). Then I remembered that Marc Ellis, an antique radio restoring expert, wrote in *Hands-On Electronics* magazine that he had once used Brasso metal polish to remove scratches in plastic faces of radio dials. With nothing to lose, I found a can of the stuff and escorted it to the "lab."

Previously, I had placed the damaged CD, label-side down, on a soft cloth on top of a hard, flat surface to keep the disc stabilized. I shook the Brasso can and put a small amount on another soft cloth. With my forefinger on the rag, I gently but firmly polished away at the scratch. For several minutes I labored, periodically replenishing the liquid. While the polishing continued, the liquid dried and left a dull film to be buffed off, just like waxing a car. After ten minutes of pour-wipe-scrub-buff, one of the scratches was completely gone. Six minutes after that, the other one was gone, too. Even the toothpaste etchings were obliterated. What's more, the disc looked totally brand-new. A performance in the player confirmed that the disc worked perfectly; it still does.

Here are some more useful hints, should you need to try this. First, work in a well-ventilated area, far away from open flame; Brasso is flammable. Second, use soft, cotton cloths (baby diapers are perfect). Third, polish *along* the scratch, rather than across it. Finally, after polishing, dispose of the Brasso-soiled cloth where it won't ignite, wash the disc with water, and dry with a soft cloth.

Brasso is available at your local hardware store for about four dollars a can. Great stuff! It is totally liquid and doesn't leave residue. I hope you never need it, but if your digital copy of *Phaedra* hits the ground, it's nice to know about an inexpensive way to restore it. Although I haven't tried this technique with other discs, it should also work on CD-ROMs, CD sound effect libraries, CDVs, and laser discs.

—Matt J. McCullar

Audio-For- Video Tips

MIDI studios are perfect for doing film and video scoring preproduction. But does a small audio-for-video studio need an expensive video deck? Happily, many standard, living-room type VCRs will do the trick if you know what features are important.

Format is no longer a question. For whatever reasons, Beta's superior resolution didn't prevent VHS from winning the popularity—and hence, compatibility—contest, and most of the work tapes in video production today are half-inch VHS, not Beta.

Audio Dubbing is the most important feature of a preproduction video deck. This is a deck's ability to record audio on *longitudinal* (audio) tracks after the video is already in place. On videotape, the longitudinal tracks are standard analog audio tracks that use an equally standard stationary audio head—not the moving head the video tracks use. Record your mix to this track, and a quick playback will tell you whether you're synched to the video. Remember, in the VHS Hi-fi format you *cannot* record audio tracks without wiping off any video that's already laid down.

Stereo audio will allow you

ILLUSTRATIONS BY DAVID POVILAITIS

to record a SMPTE time code track for synchronization as well, giving you even more flexibility.

Dolby noise reduction is not a bad idea for the longitudinal tracks, since at the super low video tape speed, the audio needs all the help it can get. Unfortunately, Dolby is not included all that often in consumer-type VCRs, and may of necessity end up last on your list of priorities.

Stop Action and *Single Frame Advance* are essential features for the composer. It's almost impossible to find an exact frame or SMPTE code location without them. This requires a four (as opposed to two) head machine. Note, however, that you need to be careful when examining some of the new digital VCRs; many do slow motion by skipping frames, which presents problems when trying to find an exact frame location.

A *Tach Pulse Out* feature will let you access the VCR's tachometer so it can chase a synchronizer in fast forward and rewind modes. Forget about getting this information from the salesperson; a call to the factory service center is usually necessary.

Decide the amount of money you want to spend, then go to your local video store and you'll see literally dozens of machines from which to choose. Determine your own needs, remember there will always be tradeoffs, and take your pick.

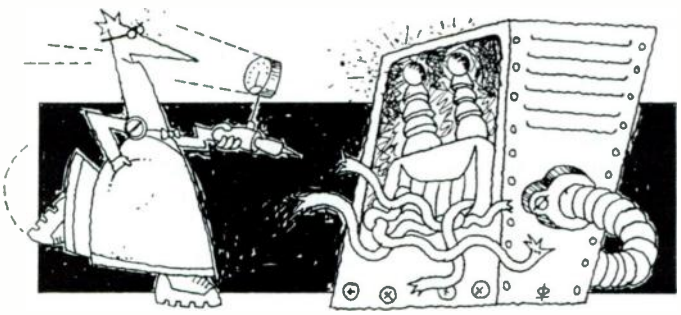
—Bob Hodas

Safety First

Here's a safety tip I picked up from a power engineer at school. When repairing electronic musical gear, one often experiences high voltages, and it is important to use extreme care when working with AC line voltage and high DC voltages. When repairing tube amplifiers, be aware of filter capacitors and their terminals. Even if the unit has been turned off for a long time, the current path used to drain the filter caps may have been opened (by stand-by switches in some cases) causing the capacitor to remain charged, and you can get a healthy zap from an otherwise dormant-looking amp. The same problem may arise when a fuse blows. Depending on where the fuse is in the circuit, installing a new fuse may complete the circuit, causing a high-voltage discharge (more zap).

There are two ways to save yourself from surprises:

1. When working with high voltages, always make sure that the unit under test is supported firmly (*you* shouldn't be holding it up) and *keep one hand in your pocket*. This may sound unusual, if one part of your body is touching ground and the other touches a high voltage source capable of delivering a lot of current (and one amp *is* a lot of current), then your body becomes the main path for that current and it will pass through your heart on the way to ground, which can damage your heart and even kill you (especially if the power is still on). Make sure your shoes are electrically insulated (wear rubber-soled shoes and never work in your bare feet) and don't let more than one part of your body come in contact with the circuit—so with one hand in your pocket, you won't inadvertently shock yourself.



2. Measure the voltages on the filter capacitors (with the unit turned off and disconnected from AC). If there is a high voltage present (anything over a few volts, actually) and you have to solder something, discharge the caps first. A low-value, high-wattage resistor (e.g., 50 ohm/1 watt), jumpered between the cap and ground, can short out the cap to ground and drain off any charge without too much of a light show; be sure to use insulated alligator clips to connect this jumper resistor and, again, don't let more than one hand at a time touch the circuit. It may take several seconds for the cap to discharge completely, depending on the value of the resistor.

Practice safety at all times, and you can avoid making mistakes that lead to injury or even death.

—Grant P. Beattie
Music Technologies Group
Edmonton, AB, Canada

More Expressive Drum Machine Parts

So you've got your shiny new drum machine or sequencer hooked up to some drum sound modules, and you start programming away. If you're like most non-drummers, you'll begin by programming way too many notes—the temptation to use all those buttons and sounds is too strong. After you settle down, you realize that indeed, *less is more*, especially with electronic drum parts. But then there's another problem: maybe some drummers can play a simple, repetitive drum part and make it sound great, but when you try the same thing, it comes out sounding—well, simple and repetitive.

The secret to getting a great drum machine part is to *make every note count*. If you just program a couple of patterns and loop them over and over, you're not creating a drum part; you're creating a metronome that just happens to have drum sounds. Drum patterns require just as much editing and tweaking as any sequencer part, so here are some tips to help you tweak those parts to perfection.

■ *Vary dynamics within the entire kit, not just one drum.* If you have a pattern churning along and you fade up, say, a snare roll, remember to add a little bit of level change in at least some of the other drums too. Don't just turn everything up or down, though—if the snare is fading in from full off to full on, you might want to have the bass drum go from three-quarters full to full on over the same time period, and a

quarter-note hi-hat part range from half to full on.

■ *Add acoustic cymbals to drum machine tracks.* Have you heard a good sampled cymbal yet? I thought not. So don't fight it; get a real cymbal or two and overdub them on tape along with your drum machine part. Having a real acoustic sound can fool the listener into thinking the rest of the drum sounds are real, too. I'll often throw in a real tambourine, maracas, or cowbell to heighten the illusion even further. (And if you own a sampling drum machine, just think how much memory you'll free up by getting rid of a cymbal sample.)

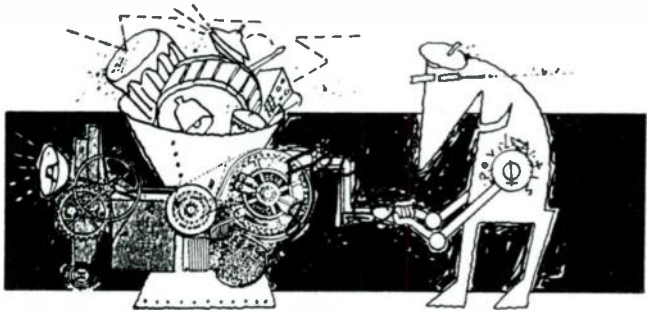
■ *For good hand claps, record one quantized hand claps part, then overdub a part with quantize off.* Drum machine hand claps never sound very good because a group of people don't all clap their hands at the same time; there will be a cluster of attacks during the first few milliseconds of the hand claps sound. First, quantize a hand claps part, then turn off quantization and try to overdub an identical part. You'll come close, but every now and then you'll be a little bit off, and the real time part will come in just a fraction of a second before or after the quantized clap. While the second clap may cut off the first one (it will on most drum machines), the resulting sound still has the kind of multiple attack sound that adds considerably to the part's realism. Here's another hint for better hand claps: use a delay line or echo unit to add a bit of slapback echo to the hand claps output, then add just a bit of modulation to vary the slapback echo time.

■ *Lock in with another instrument every now and then.* For example, suppose the bass player hits a pattern like this:

quarter note, quarter rest, eighth note, eighth note.

Have the kick drum beat the same pattern. The effect is very cool, especially if the bass player hits the note and then slides down as the bass note decays.

■ *Throw in triplet fills occasionally.* Many neophyte drum programmers program a quantization value and stick with it. But when recording something like tom fills towards the end of a four-bar section, try using triplets. They'll give a feeling of motion that leads well into the next section of a piece of music. Some fast snare rolls also sound better as either eighth-note or sixteenth-note triplets (depending on how fast you want your mechanical drummer to play).



■ *Use tempo changes where appropriate.* Drummers are humans, not machines, and they know when to "push" or "retard" the beat. One or two slight variations per minute can really alter the mood of a tune. For example, slow down just before reaching the big chorus, or inch up the tempo during the lead guitar solo—only to drop it back down again when the singer returns.

■ *Beware the effortless drummer.* If you've just programmed an incredible drum roll followed by a cymbal crash on the down beat, make the cymbal crash just a *tiny* bit late. It will heighten the illusion that the drummer really had to sweat to do the drum rolls, and was therefore a bit late on the downbeat.

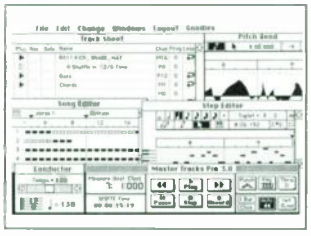
■ *Turn off quantize for one part in a pattern.* Go ahead and quantize a rock-solid kick drum and hi-hat—but then turn off the quantization and put on a "humanized" snare drum part. Or quantize the snare drum part, but have the hi-hat lead the beat a little. Even slight variations can banish any feelings of mechanicalness. For more information on the creative use of small time variations, read Michael Stewart's article "The Feel Factor" in the October '87 **EM**.

■ *If a pattern (segment) repeats many times, program some patterns with minute variations, and use these variation patterns from time to time.* Many times during a solo (like the lead vocal), a drum part will repeat for several measures, playing essentially the same part—bass drum, maybe a snare drum on the second and fourth notes of the measure, and an eighth-note hi-hat part. Although it's a temptation to just loop repetitive patterns over and over, adding even the slightest variations—a snare accent, an open hi-hat hit instead of a closed one—keeps the drum pattern from becoming monotonous, yet doesn't get "busy" enough to divert attention from the solo line.

■ *Add signal processing to minimize "insistent" sounds.* Nothing can sound more dull and repetitive than a hi-hat part that hits on every eighth-note. A real hi-hat sounds a little different with each hit; a sampled one usually does not. I solved this problem on one tune by putting the hi-hat through a phase shifter, and lightly modulating the amount of phase shift at a very slow rate (about 1 Hz). Each hit therefore sounded just a little bit different, and the part became far less mechanical. As an unanticipated bonus, the phase shifter "warmed up" the sound somewhat.

■ *Listen to real drummers a lot.* This is probably the best way to learn to be a good drum programmer. Listen to how good drummers use notes and space, and how they can get across incredible emotion with just a few well-placed hits. And remember that drums are the rhythmic foundation of the music; think support, not solo, unless you have the chops to pull it off. —*Craig Anderton*

Stop Playing Hit and Miss with Audio for Video Production.



If you write music for film or video, you know that writing cues and making last minute changes can be a tiresome game of hit and miss. Until today, your choices have been limited. You could sell the house and buy a monster production system, or you could piece together components from various manufacturers and pray they all work together.

Now, you can toss out your clickbook and calculator and enjoy fast, accurate and *affordable* soundtrack production. Passport offers you a fully integrated music production environment that combines a powerful sequencer, a MIDI interface with SMPTE sync capability, and a program that calculates and prints hit maps for film and video synchronization. With Passport, you're assured a hit every time.

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MIDI SAMPLE AND HOLD

Let your computer's "fingers" do the walking, and create some amazing sounds with this algorithmic composition/performance program for the Commodore 64.

By Don Malone

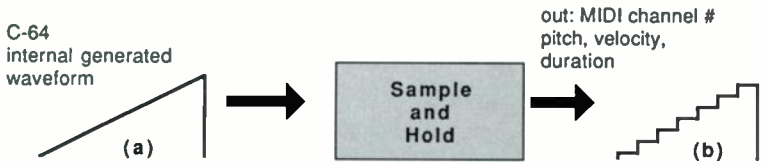


FIG. 1: Applying sample-and-hold processing to a sawtooth wave changes it to a staircase wave.

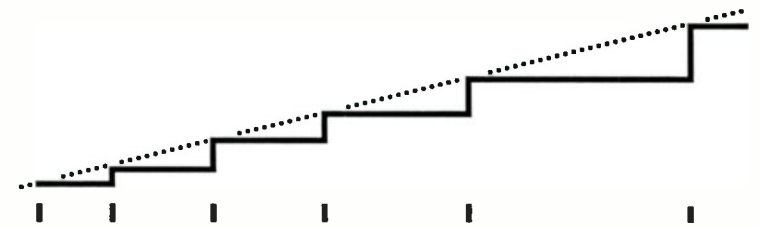


FIG. 2: Using the modified wave in Fig. 1 to modulate the frequency of a sound source produces a stepped, scale-like, upward pitch movement.

This program (for the Commodore 64 with an EM/Sequential Circuits MIDI interface or a Passport interface with the modifications suggested in the sidebar) weds your computer to your synth so your computer becomes "intelligent fingers" under your direction. This allows you to make music using your analytic capacities, unencumbered by your physical prowess. To form this perfect union, the *MIDI Sample and Hold* program uses: something old—algorithmic composition; something new—MIDI; something borrowed—a modular analog synthesis technique; and something blue—I'll tell you about that later.

SOMETHING OLD

The only thing new about algorithmic composition is the name. Theories and formulas have been applied to music composition for centuries. There were motets in the Renaissance that used serialized melodies and rhythms, and the Baroque period produced some incredible musical formulas. My favorite is a duet by Bach in which counterpoint is produced by one player reading the page right side up, and another player reading it upside down. There is also Mozart's famous dice music, not to mention the chance-oriented experiments of the 20th century. I could go on and on, but the point is that theoretical thought has been a compositional construct in this culture for quite a while. The latest flavor is algorithmic composition in which you program a computer to follow a set of rules, or guidelines, to assist in the compositional process. For more information on algorithmic composition, see "Chord—An Algorithmic Composing Program in Atari ST BASIC" (April 1988 **EM**); "Drumbox: The ST/CZ Connection" (February 1988); "The Arrival of Intelligent Instruments" (August 1987); and "Random Rhythms" (April 1987).

SOMETHING NEW

Although algorithmic composition has been around for a few decades, MIDI and the availability of powerful personal computers have allowed this technique to enjoy widespread popularity. Computers take the drudgery out of number-crunching and manipulation, and MIDI lets the computer act as a controller for synthesizers, so you don't need tremendous physical dexterity to play all the parts you compose.

SOMETHING BORROWED

For those of us who still wear patch cords around our necks, those patch cords have a lot to do with determining the nature of a composition. One of the basic constructs of any musical style is the design of its instruments; for example, one makes very different music with a ribbon controller than with a keyboard controller, and a MIDI guitar pulls different noises out of a synth than if that synth is keyboard-controlled. Since nothing is preset in modular synthesis, the design of both timbre and musical activity is part of the same process; compositional patching is one of the most fulfilling aspects of modular synthesis. This program was written to facilitate compositional "patching" with non-modular synths.

The word "sample" conjures up visions of a trip to a medical laboratory or the sound-generation technique based on digital recording. However, we won't be sampling a sound source, as this program samples a controller. For example, referring to **Fig. 1**, if we sample a sawtooth (a) at defined intervals and hold that level until the next sample, the sweep becomes a staircase wave (b). We now have a processed version of a controller that is a series of stepped control signals instead of a continuous control signal. If we apply the original control signal (a) to the frequency of a sound source, the result would be an upward pitch sweep. If we apply the sample-and-hold version, we would get an upward, stepped, scale-like sequence instead of the continuous sweep. The characteristics of the samples (**Fig. 2**) depend on the shape and frequen-

cy of the wave being sampled and the sample timing. The height of the wave at the beginning of the note determines the value of the sample.

Applied directly to the frequency of a sound source, these sequences would give us higher pitches for higher sample values. If, however, we define a set of eight

RUNNING THE PROGRAM WITH A PASSPORT INTERFACE

To run *MIDI Sample and Hold* with a Passport interface, three changes must be made to the program. The first change is made to line 30. As indicated in the REMark at the end of that line, the first statement on the line should be changed from cr=56832 to cr=56840. The second and third changes occur in line 140: the first data value on the line should be changed from 2 to 8, and the eighth data value should be changed from 1 to 9.

In each case, the changes remap the addresses the program uses to communicate with the interface card. In particular, the addresses correspond to registers in each card's communication chip. Since both the EM and Passport interfaces use the same communication chip (6850 ACIA), the MIDI interface functions of both cards match exactly; you simply use different addresses to access them.

To assist you in converting other programs, here are the ACIA register addresses for both interface cards:

Register Name	EM Addresses (Decimal/Hex)	Passport Addresses (Decimal/Hex)
Control Register	56832/$DE00	56840/$DE08
Transmit Data Register	56833/$DE01	56841/$DE09
Status Register	56834/$DE02	56840/$DE08
Receive Data Register	56835/$DE03	56841/$DE09

For more information, see "Build the EM MIDI Interface" in the May 1986 **EM**, or the user's manual supplied with your commercial interface. (***Note that the difficult-to-find PC-900 opto-isolators required to build the EM MIDI Interface are now available from the EM Bookshelf; see page 6 for contact information.—Ed.***)

—Tim Dowty

different specific pitches (like a major chord), then use the sample to determine the element in the set rather than use it directly, the sequence can become quite sophisticated. In this program we use this technique to sequence MIDI channel, pitch, velocity, and duration.

SOMETHING BLUE

Actually, I lied about the blue part so I could use that funky intro. Now let's talk about the program itself. Press shift and the Commodore logo key simultaneously to go into the lower/uppercase mode, then type it into memory (the program really isn't that long). *Be sure to save it before running it in case you made any typos!* If you don't want to spend time typing it in (and possibly debugging it for typos), send $5 to Don Malone, 21806 River Road, Marengo, IL 60152, and I'll send you a disk with this program (bug free) on it.

Lines 10 through 210 make up the initialization routine. If you don't have an EM/Sequential-type interface, be sure to note the reminders in lines 30 and 140 (see the sidebar on how to make EM interface programs compatible with the Passport). 120-140 poke in the machine language subroutine that spits out MIDI notes. 220 samples the wave. 230-260 interpret the sample differently for each parameter. Try using (#,sand7) inside the parentheses in these lines and you'll hear a much simpler pattern. 270-300 play a note. 310-470 are the editing routine. 480-560 print the screen. 570-730 contain the disk routines.

This is a pretty simple program, intended only to demonstrate the concept. Use the routines as the basis of your own algorithmic composition/performance

MIDI sample and hold program listing

```
10 printchr$(14)chr$(147):poke214,10:print
20 printtab(5)"MIDI Sample & Hold"spc(40)"by Don Malone
30 cr=56832:pokecr,3:pokecr,21:rem passport cr=56840
40 mi=49152:m=54272
50 pokem+17,8:pokem+15,peek(162):poke650,128
60 dimpr(3,11):fork=0to3:readpr$(k):forj=8to11:readpr(k,j):next:next
70 data"Channel ",1,1,1,16,"Pitch ",36,84,12,119
80 data"Velocity ",16,127,1,127,"Duration ",4,16,1,255
90 fork=4to7:readpr$(k):next
100 data"Waveshape ","Frequency","Save","Load"
110 fori=0to39:bl$=bl$+chr$(32):next:bl$=bl$+chr$(145):b$=right$(bl$,27)
120 fori=0to22:readda:pokemi+i,da:next
130 data166,252,32,12,192,166,253,32,12,192,166,254,173
140 data2,222,41,2,240,249,142,1,222,96:rem passport 8------9--
150 dimp$(119),n$(11):fori=0to11:readn$(i):next
160 data"C","C#","D","Eb","E","F","F#","G","Ab","A","Bb","B"
170 fori=1to9:forj=0to11:p$(i*12+j)=n$(j)+right$(str$(i-1),1):next:next
180 fori=0to3:readw$(i):next
190 datatriangle,sawtooth,square,noise
200 fork=0to5:gosub430:next
210 printchr$(147)chr$(154):fork=0to7:gosub480:next:k=0:goto410
220 s=peek(m+27)
230 poke252,pr(0,s/32and7)+143
240 poke253,pr(1,s/16and7)
250 poke254,pr(2,s/8and7)
260 poke161,0:poke162,256-pr(3,s/4and7)
270 sysmi
280 ifpeek(161)=0then280
290 poke254,0
300 sysmi
310 getk$:ifk$=""then220
320 ifk$=chr$(13)thengosub430:ifk>5then210
330 ifk$=chr$(145)thenzk=zk-1:ifzk<0thenzk=7
340 ifk$=chr$(17)thenzk=zk+1:ifzk>7thenzk=0
350 ifk<>zkthenprintchr$(154):gosub480:k=zk
360 ifk>3then410
370 ifk$=chr$(200)thenpr(k,9)=pr(k,9)+1:ifpr(k,9)>pr(k,11)thenpr(k,9)=pr(k,11)
380 ifk$=chr$(72)thenpr(k,9)=pr(k,9)-1:ifpr(k,9)<pr(k,8)thenpr(k,9)=pr(k,8)
390 ifk$=chr$(204)thenpr(k,8)=pr(k,8)+1:ifpr(k,8)>pr(k,9)thenpr(k,8)=pr(k,9)
400 ifk$=chr$(76)thenpr(k,8)=pr(k,8)-1:ifpr(k,8)<pr(k,10)thenpr(k,8)=pr(k,10)
410 printchr$(5):gosub480:goto220
420 gosub480:goto220
430 ifk>3thenonk-3goto460,470,570,640
440 forj=0to7:pr(k,j)=int((pr(k,9)-pr(k,8)+.5)/255*peek(m+27)+pr(k,8)):next
450 return
460 w=peek(m+27)and3:pokem+18,(2^w)*16:return
470 f=65535/255*peek(m+27):hf=int(f/256):pokem+15,hf:pokem+14,f-hf*256:return
480 poke214,0+3*k:print:printb$:printpr$(k);:ifk>5thenprint:return
490 ifk>3andk<6thenonk-3goto550,560
500 ifk=1then530
510 print"low"pr(k,8)"high"pr(k,9)
520 printbl$;:forj=0to7:printpr(k,j);:next:return
530 print"low "p$(pr(k,8))" high "p$(pr(k,9))
540 printbl$;:forj=0to7:printp$(pr(1,j))chr$(32);:next:return
550 print:printbl$w$(w):return
560 print:printbl$;f*.0609594583"Hz":return
570 input"Filename";f$
580 open15,8,15:open2,8,2,"0:"+f$+",s,w"
590 gosub700:ifen>1then630
600 fori=0to3:forj=0to9:print#2,pr(i,j)

ready.

610 next:next:print#2,w;chr$(13);f
620 gosub700
630 close15:close2:zk=0:return
640 input"Filename";f$
650 open15,8,15:open2,8,2,"0:"+f$+",s,r"
660 gosub700:ifen>1then630
670 fori=0to3:forj=0to9:input#2,pr(i,j)
680 next:next:input#2,w,f
690 gosub700:goto630
700 input#15,en,em$,et,es:ifen=0thenreturn
710 printem$:print"Press a key to continue
720 getk$:ifk$=""then720
730 return

ready.
```

program. For starters, you might want to add deterministic editing, save files for your favorite sequencer, and use interrupt timing. If you're really interested in algorithmic programming, Phil Winsor has a good beginner's book out called *Computer-Assisted Music Composition* (Petrocelli Books).

HAVE FUN 'TIL YOU'RE BLUE IN THE FACE

Be sure your computer is connected to your synth(s), then run the program. If you like what's happening, sit back and enjoy, get up and dance, or whatever.

If you want to edit the patch, use CRSR up/down to highlight the parameter you want to change. Press RETURN, and a new set of values will be chosen by the algorithm within the range. The sequence will respond to the new set immediately. To edit the range, press H, SHIFT-H, L, or SHIFT-L to decrement or increment the high or low limit. Press RETURN when Save or Load is highlighted to write or retrieve the parameters to or from the disk.

The durations are in jiffies (1/60th of a second). Actually, each duration has added to it the amount of time it takes for the program to work. Since the samples are taken at the beginning of the note, the durations will determine the sample timing. The samples are taken from four possible waveshapes. The sawtooth and triangle waves will produce recognizable patterns drawn from all elements of the sets. Since the square wave only has two levels in its shape, only two elements from each set can be chosen. If the waveshape is square when you edit a set, the set will contain only the upper and lower limits of the range. The noise wave is aperiodic, so it will produce a random pattern.

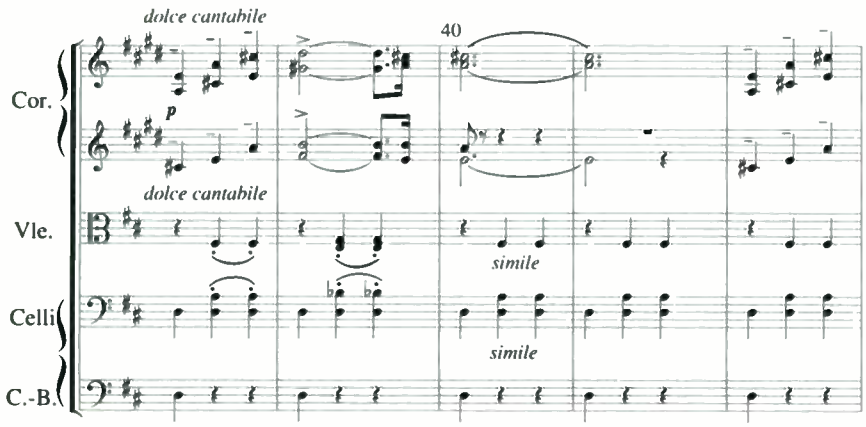
If you want to save these performances as MIDI sequences, you'll need either a stand-alone sequencer or a separate computer (thank goodness C-64s are so inexpensive). Simply take the MIDI Out from your synthesizer, and connect it to the MIDI In of your second computer (with built-in or external interface) running a sequencer program.

Well, that's it. One more tool for your bag—algorithmic composition/performance. Enjoy! Compositional patching isn't just for modular synthesis any more. I hope this leads you to more creative music.

Don Malone *is the director of the Electronic Music Studio at Roosevelt University in Chicago and an admitted sonic nympho.*

FIRST TAKE: Capsule Comments

This month we look at a Macintosh music notation program, the latest entry in the under-$500 reverb wars, and an electronic drum pedal to get you kickin'.



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

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

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

the EM rating system

HB Engraver Scoring Software for the Macintosh ($495)

By Paul D. Lehrman

One of the "second generation" music-notation programs for the Macintosh is *HB Engraver* from HB Imaging of Orem, Utah. Its intent is to go beyond programs like *Professional Composer* and *Deluxe Music Construction Set* by offering more flexible layout and editing and removing the restrictions on page size, number of notes, and other features that characterize the earlier programs.

Engraver is strictly a publishing program; it has no direct musical input or output via MIDI or anything else. (It *will* let you convert Professional Composer files, which in turn can be converted from Mark of the Unicorn's sequencer, *Performer*, but that seems like a lot of work. Future releases may allow importation of MIDI Files.) It can support up to 50 staves and up to eight voices per staff, but no more than 50 voices total (although the number of simultaneous notes can be much higher, since a voice can consist of chords). In addition, 50 distinct lyric lines (i.e., verses) can be created. In its initial release, the program is capable of printing only full scores and cannot extract and print individual parts.

Notes are entered from an input window, which shows a single voice on a single, large staff that makes a half-dozen or so notes visible, but displays no clefs, beams, signatures, or other markings. With the Mac keyboard or the mouse, you select a time value for each note you want to enter, then click on the staff at the pitch you want. The large size of the screen means placement of the mouse is not critical, which the authors claim serves to speed up entry and minimize errors.

Other musical elements besides notes are shown on different windows. There is a screen for placing lyrics, where syllables can be tagged to particular notes in a particular voice by separating them with spaces, hyphens, or underscored characters. Dynamics, including slurs, trills, etc., are placed in another window, and they too are tagged to a specific bar and beat. Block text for titles and credits is entered in another window, and yet another window is used for page layout and system placement.

The program does very well in setting stem directions and beaming notes, it supports continuous beaming of voices that cross staves, and it also deals exceptionally nicely with proportional spacing of complex rhythms, i.e., the relationship between note durations and how much physical space the notes take up. Setting rules for proportional spacing is one of the infamous "black arts" of professional music engraving, and Engraver's rules are highly effective.

Unfortunately, they are also inviolable. If you want to do something with stem directions or spacing that the program

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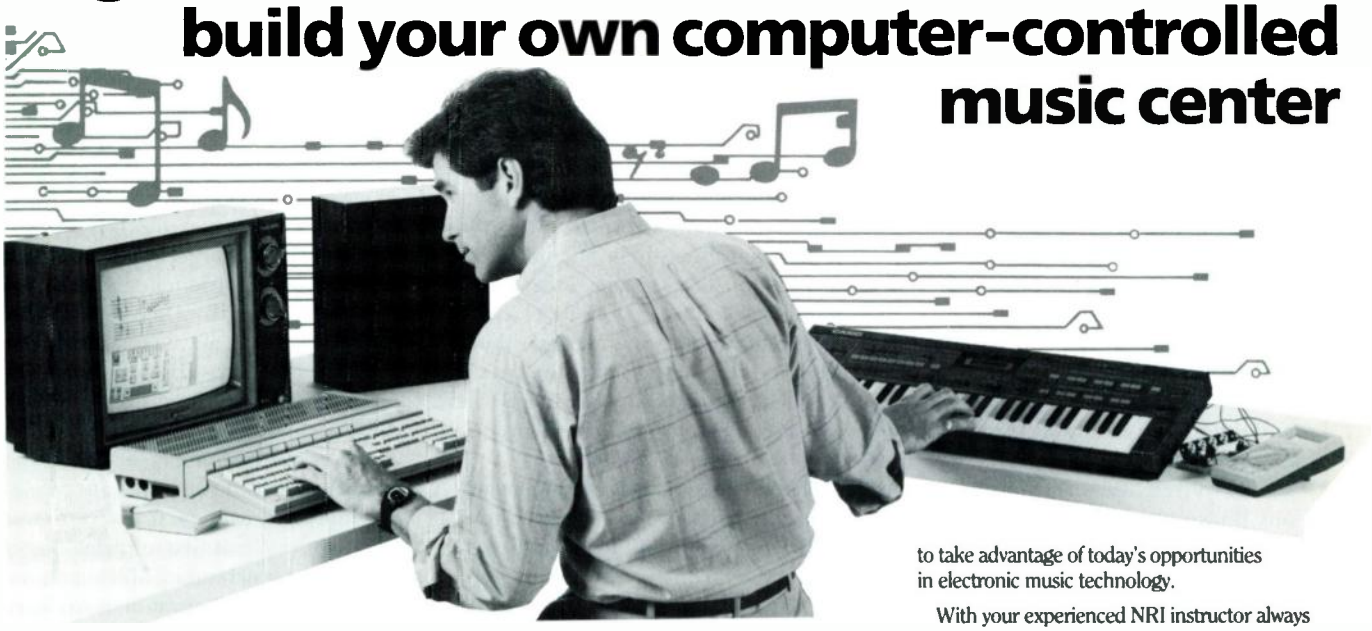

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doesn't agree with, you're out of luck. If you have Adobe *Illustrator*, you can export a file into it for further tweaking, but you can't go the other way around.

The program is designed primarily for use with a laser printer and comes with both screen and PostScript versions of its own musical font, *Interlude*, which looks good; it's similar to *Sonata*, with the important difference being that the company plans to make Interlude available in an editable form to those users who would like to customize it for their own special notational needs.

Although Engraver is capable of excellent printed output, its user interface is almost unbearably clumsy. It is designed to be used linearly: You are supposed to lay out the pages first, then enter the notes, the lyrics, the dynamic markings, and the block text. As long as you don't make any mistakes, this can work, but should you discover an error from a previous phase, the path back to it can be labyrinthine indeed.

Each new operation requires a different window, but unlike most Macintosh applications, you can only have one window open at a time, and getting back and forth between them can take awhile. In some cases, what you do in one window doesn't show up in others; in some cases, it *only* shows up in others. For example, since the Input window shows nothing but raw notes, if you want to see what the stems or beams look like, you have to go to the Lyrics or Dynamics screens. Once there, however, you can't enter or edit the notes.

If you want to see how placing lyrics affects the note spacing, you have to leave the Lyrics window and go to the Block Text screen. Once there, should you happen to notice a mistake in a dynamic marking, you have to close Block Text, go back to the Input window, open Dynamics, find the bar you want (the program does not consistently remember where you are as it moves from screen to screen), and perform the edit.

The screen update is so slow that, when typing in lyrics, it's very easy to miss a space or a hyphen while you're note-tagging. If you do this, you have to backspace all the way to the error and retype everything from there.

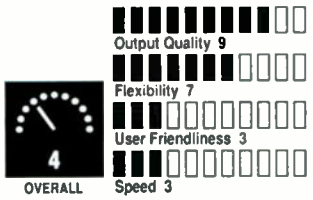
The program decides for you how many bars should appear in a system. You can override its decision, but at your peril. It's frighteningly easy to painstakingly respace the measures through a dozen pages, get to the end of the section, do something the program doesn't like, and watch all your work be destroyed.

Finally, the manual, although not badly *written*, is in desperate need of proofreading.

The flexibility of this program allows you to create very complex scores, but the user interface makes the task far from easy. For simple projects, you'd probably be happier with a friendlier, if less sophisticated, program like Deluxe Music Construction Set. Despite its power as a music-notation tool, HB Engraver is a tough program to like. It forces you to work in the exact manner dictated by the authors, and you are essentially not allowed to make mistakes. If you have your own way of entering music, or if you're the sort who likes to shoot first and clean up the mess later (which many Macintosh owners are), then the frustration factor of this program may be much too high for you.

(Note: According to a company spokesperson, beta site testing of HB Engraver Version 1.1 was being completed at press time. Upgraded features in this new version are said to include the ability to extract and print individual parts, and offer user control over the size of the system displayed in the input window—Ed.)

Paul D. Lehrman *writes music and articles, not necessarily at the same time. He just moved from one suburb of Boston to another and is still unpacking boxes, looking for his "Nick Danger" script.*



HB Imaging
560 South State Street
Suite G1
Orem, UT 84058
tel. (801) 225-7222

Lexicon LXP-1 Multi-Effects Processing Module ($499)

By George Petersen

The LXP-1, Lexicon's newest signal processor, shares a common legacy with the company's other digital innovations, beginning with their 1972 introduction of the first digital audio device. This breakthrough was followed up by a long and successful series of professional audio products, including the 224, 224X, 200, and 480L reverbs, as well as the cost-effective PCM60 and PCM70 units. When the PCM60 debuted in June of 1984, it surprised an industry that believed quality reverb could not be achieved in an under-$1,500 device. Now, almost exactly four years later, Lexicon has pulled another rabbit out of the hat, this time in the guise of the LXP-1, a fully programmable, multi-effects processor in a pint-sized case, at an equally miniscule $499 retail price.

Certainly, there are other low-cost digital reverbs on the market—some as little as one-half the LXP-1's price—yet none of these units compare to this half-rack wonder in depth of parameter control, programmability, or versatility. Lexicon has obviously done its homework concerning the market requirements for such a unit, and with excellent results. Most importantly, the LXP-1 can be operated on four different levels, depending on the user's requirements and needs. After selecting one of the 16 presets, the next level involves tweaking sounds via the two front panel (*Delay* and *Decay*) controls. Combinations of these settings can be stored into user registers, or parameters can be assigned to different controller functions—such as mod wheels or foot-pedals—and altered in real time, via MIDI. The last stage is controlling the LXP-1 through System Exclusive data from a computer.

Starting from the top, the LXP-1 owner's manual is excellent, and it is unfortunate that the author or authors are not credited for this outstanding work. The operation of the unit is spelled out in a concise and informative manner, and the

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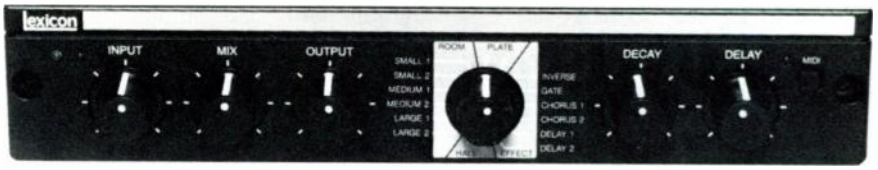
text contains numerous clear examples of a variety of applications. One extremely useful chapter is the 22-page MIDI implementation data provided for software developers. Besides offering this valuable information to users, Lexicon has paved the way for the many patch editor/librarian programs for the LXP-1 we'll undoubtedly see in the months to come.

The LXP-1's front panel is logically laid out, with the usual input, output, and wet/dry (source/processed signal) mix controls; program select switch; MIDI pushbutton (for selecting MIDI channels and storing registers); and two parameter controls. The Delay and Decay markings on the latter, actually refer to predelay and reverb decay on the standard reverb programs only; these parameter knobs control entirely different functions in the LXP-1's effects programs, and the user must refer to the manual to know what parameters are being altered.

The back panel connectors include MIDI In, MIDI Thru (an internal jumper changes this to MIDI Out for dumping program and patch data), ¼-inch, line-level stereo inputs and outputs, external 9



VAC input jack, and a defeat footswitch input. A generic (single-pole/single-throw) guitar amp-type footswitch worked just fine. Hitting the defeat footswitch made the reverb stop after decaying naturally, which was nice. Going one step further, I used the sustain pedal from my Yamaha KX88 (a normally-closed, momentary footswitch). This had the result of defeating the effects at all times except while the footswitch was depressed, which simplified effects mixing and was great for adding delay to the end of a vocal passage or instrumental solo.

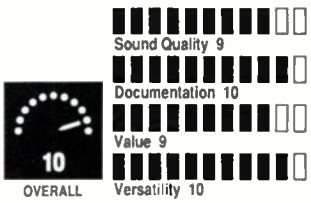
Programming the front panel parameters and assigning them to the LXP-1's 128 internal user registers was a simple matter of holding down the unit's MIDI button while sending a Program Change message from any MIDI controller. This brings up one of the LXP's disadvantages: Its internal memory settings cannot be accessed without using an external device such as a MIDI controller, computer, or the forthcoming Lexicon MRC, a remote box specifically designed for programming the LXP-1, PCM70, and many FM synthesizers.

While the LXP-1's flexiblity and depth of programming levels are impressive, the bottom line is the unit's sound, which is very good, both in terms of audio quality and the algorithms of the reverb and effects programs. I particularly liked the plates, halls, and medium rooms. Since these are the types of programs I use most often for recording projects and live sound, I am most critical about their sound when auditioning any reverb, and the LXP-1's programs passed the test. I had the opportunity to use the LXP-1 as a vocal reverb at an outdoor concert, and

the unit performed without a hitch, despite sitting atop an amp rack in 90-degree direct sunlight for five hours.

While the LXP-1 doesn't provide a wide variety of effects programs, those that are offered (gated and inverse reverb, chorusing, and delays) are, perhaps, those most commonly needed and are a valuable addition to the unit. Most notable is Chorus 1, which yields almost analog-quality flanging; Chorus 2 is another sound that is sure to please most users, with its 12 tuned resonators and front-panel control over resonance and tuning.

With its great sounds and under-$500 price, it seems that the LXP-1 is another winner from Lexicon. However, when such features are combined with a flexible, multi-level interface, allowing users to grow with the unit, Lexicon may finally achieve the signal processing version of *Everyman*, and I'm sure we'll be hearing more from this half-rack wonder in the future.



Lexicon, Inc.
100 Beaver Street
Waltham, MA 02154
tel. (617) 891-6790

Shark Electronic Drum Pedal ($289)

By George Petersen

Like a fine wine or an aged cheddar, good ideas and good designs take time to develop into something special. And the same can be said for music products. Inventor Arndt Anderson spent over four years refining his Shark electronic drum pedal (originally developed for Missing Persons drummer Terry Bozzio), and the result today is a device that is both superbly crafted and, most important, eminently playable.

The pedal itself is a study in simplicity. Exerting pressure on the footboard causes a roller-mounted swingarm to push against a piezo sensor. This action sends a single voltage spike to the unit's ¼-inch output jack, which is sufficient to drive just about any trigger-to-MIDI converter

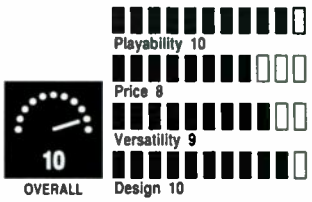
or drum machine equipped with drum pad inputs. A high/low output switch allows users to match the pedal's output with the sensitivity requirements of most systems, while fore and aft adjustment springs allow the pedal's action to be matched with the sensitivity requirements of most drummers.

Unfortunately, the stock rubber bumper supplied with the swingarm reduced the output of the piezo so much that the sensitivity switch had to be in the high output position to get enough output to drive the drum machines and trigger devices in my studio. Aware of the problem, the manufacturer has recently developed a mylar swingarm bumper, which dramatically improves the Shark's trigger output level. The Imagine Group will supply the mylar bumper upgrade free of charge to Shark owners.

As one who is often guilty of "try-it-out-first/read-the-directions-later," I opened the box, plugged in the pedal, and was immediately disappointed. I could hardly hit more than a couple of notes without the pedal sliding around uncontrollably on the studio carpet. There's a lesson to be learned here, and I certainly felt foolish when I looked in the box and found the two self-adhesive Velcro™-style strips that mount under the pedal to keep it from sliding. These were truly amazing in their ability to fasten themselves not only to the pedal's polished aluminum surface, but any carpeted surface. In fact, these grippers held so securely that removing the pedal from the carpet required an extraordinary amount of force, and drummers would certainly not have any pedal "creep" problems with the Shark.

I was quite pleased with the pedal's operation and was surprised by its smooth action, which offered much less resistance than an acoustic drum pedal. While playing the Shark required some getting used to, the advantages of such a light action are obvious to anyone trying to play rapid kick drum runs, and the Shark triggered much faster than any pedal/electronic bass pad combo I've tried. The pedal's narrow design (only three inches wide) allows for placing several Sharks side-by-side in a cluster or next to the kick and hi-hat pedals in a traditional or electronic drum kit. Other than the mylar upgrade, the only improvements I could suggest would be a continuously variable sensitivity control (rather than the two-position switch) and the addition of a second output jack for triggering multiple devices or daisy-chaining two pedals together for double-kick applications. Overall, the Shark is a well-crafted, highly playable unit that would be an welcome addition to any electronic percussionist's kit.

George Petersen *lives with his wife and two musical dogs in a 100-year-old Victorian house on an island in San Francisco Bay.*

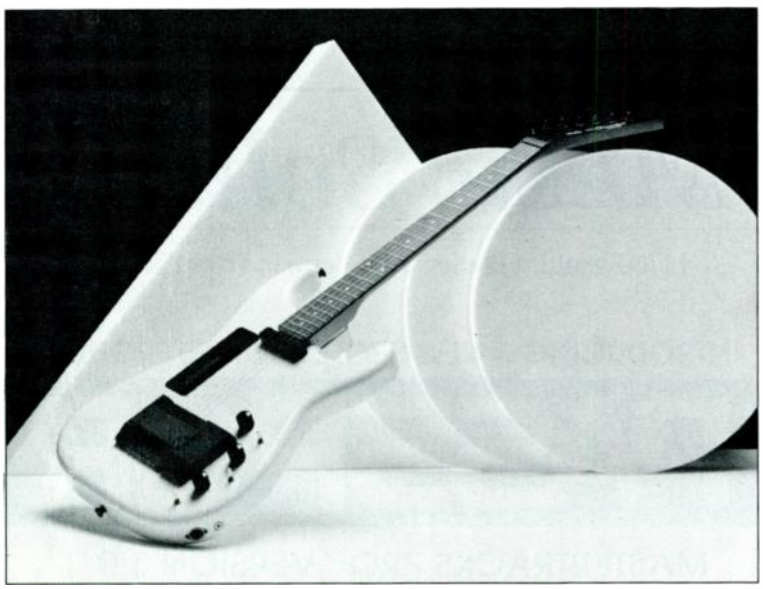


Imagine Group
751 A Kellogg Avenue
Santa Barbara, CA 93117
tel. (805) 683-3340

Beetle Quantar MIDI Guitar

Guitarists, the wait is over. It took some clever technology, but finally there's a fast, economical MIDI guitar that accurately tracks what you play.

By Craig Anderton



C R KING

With most low-cost MIDI guitars, once you pluck a string, various electronic circuits analyze the note you've played and output MIDI data representing that note. Unfortunately, this analysis process takes time, which is why MIDI guitars tend to feel "sluggish." Nor is the analysis process perfect, so the note that goes out over MIDI may not always be the note you played. Fret wiring, an alternative approach to MIDI conversion, can be more accurate but inherently does not allow string bending; other transducers are required to sense bending and amplitude changes, and (of course) more transducers add up to more bucks.

Beetle has taken an entirely different approach with their Quantar guitar. The bridge sends ultrasonic energy down each string and measures the reflection time from either the nut or a fret (if the string is fretted). Since guitarists fret a string a fraction of a second before plucking it, the Quantar knows which pitch to play *before* you actually pluck the string. The result? No noticeable delay, and virtually error-free tracking (although harmonics cannot be sensed). You can play with your fingers, a flat pick (this gives the best response), or even a thumb pick.

The Quantar looks like a regular guitar, but there's a MIDI plug instead of an audio output, all the strings are the same gauge (a light-gauge, unwound G string), there are two displays (LED and LCD), and you won't find any pickups; this is a dedicated controller that produces only MIDI data. But perhaps the major difference between this and the other MIDI guitars I've played so far is that this one combines cost-effectiveness *and* exceptional performance—a winning pair, to say the least.

GETTING STARTED

Finding the right combination of synthesizer and guitar settings takes some time, and the manual is of little help. For example, while we're told that it's important to set the correct string height, there's no information on how to recognize if the setting is incorrect. Calibration is also crucial, but poorly explained. And some statements are just plain wrong (the manual claims that string tension is unimportant, but heavier picking requires more tension to maintain accurate tracking). As a result, I spent some time on the phone with the folks at Beetle trying to find out things that really should have been in the manual, and it took me several days to get everything optimized. To be fair, though, this is brand-new technology, and I think we're all climbing the learning curve together.

The Quantar can be battery-powered, in which case you simply plug a MIDI cord into the output, and you're ready to go. You can also use rechargeable batteries; there's a separate jack in the body for plugging in a charger. Another option is to buy an accessory box that plugs into the wall and feeds low-voltage DC power through a cable that plugs into the Quantar's MIDI Out and your synthesizer's MIDI In, then connects to the MIDI Out of the accessory box. The accessory box also provides jacks for hold, sustain, and select footswitches, and a jack into which a volume pedal inserts; the volume pedal can be programmed to produce several different types of MIDI controller data, as described later.

WHICH SYNTHESIZER?

Since the Quantar can send data for each string over its own channel, the associated synth should be able to operate in MIDI Mode 4 (Mono mode) so that each channel/string controls its own voice. (For more information on MIDI modes, channels, and controllers read *MIDI for Musicians*, available from EM Bookshelf—see page 6 for details.) Furthermore, each voice should respond monophonically (i.e., picking a new note before releasing a previously played note should not retrigger the envelope). Poly mode is also available from the Quantar; this is useful with single-note leads, but overall, Mono is the way to go. In either Poly or Mono mode,

setting a voice for polyphonic response produces interesting results: hammer-ons produce new notes, and simply sliding up and down a string sounds like you plucked each and every note—lightning fast runs, anyone? Polyphonic response also makes it easier to mimic keyboard voices, since each note you play on a keyboard produces a new pitch and attack (you can't "slur" piano notes as you can with a guitar).

Remember, though, that most synths are not designed with guitar synthesis in mind. I tested the Quantar with the Oberheim Xpander, Yamaha TX802, and Yamaha TX81Z, all of which meet the requirements described above. However, even if the synth is set up properly, factory programs are seldom programmed with guitar synthesizers in mind—so expect to spend some time reconfiguring your synth programs for guitar. (For more information on what makes a good synth program for MIDI guitar controllers, see my article "TX81Z Tips for MIDI Guitarists," elsewhere in this issue.)

EDITING

The Quantar includes three controls and three three-position switches. Since these multi-function switches and knobs aren't labeled, you'll find yourself constantly referring to the manual's somewhat cryptic diagram until you become familiar with the system.

Normally, the three controls affect: MIDI Volume (controller 7), master transpose (which works like a capo), and the velocity difference between the softest and hardest plucks. One switch is a function switch that selects play or edit modes, one controls power, and the third selects between lead, rhythm, and "QPatch."

Lead sends data over a selectable channel (or group of six consecutive channels when in mono mode), as does rhythm. Thus, you can set up two synths for lead and rhythm sounds and switch easily between them. (Typically the lead will send out data in poly mode, and rhythm will send out data in mono mode, although there are several other possibilities.)

QPatch, for "Quantar Patch," recalls a combination of parameter settings including individual string transpositions, channel assignments for the rhythm and lead switch settings, controller assignments (more on this later), bend range, tap mode on/off, and the program change numbers to be sent over each string when you call up the QPatch. Ninety-nine QPatches can be stored and recalled, either via footswitch or holding the edit switch in a momentary position and playing a fret (although for some reason I had a hard time getting this feature to work). Tap mode lets you tap the strings for two-handed playing techniques *a la* Emmett Chapman (see the May '86 issue of **EM**) or Eddie Van Halen, and if you set bend range to "slide," you can play MIDI slide guitar (!). This simply has to be heard to be believed, and for some people (myself included) will be worth the price of admission by itself. (When using the slide guitar mode, make sure the accompanying synth's pitch bend range is set to exactly one octave to allow for maximum slide range.)

CONTROLLERS

There are four controllers: electronic whammy bar, palm pressure plate, string bend, and footpedal (if you have the accessory box mentioned earlier). Bend controls your choice of Pitch Bend (usually assigned to string bend and the whammy bar), Aftertouch (usually assigned to the palm pressure plate), volume (controller 7), or Modulation (controller 1). Pedal can be assigned to all of the above plus mute; palm and whammy have the same options as pedal, plus hold and sustain. The palm plate is great, although response also depends on the synth and patch being used; the whammy bar is a bit awkward; pitch bend is more than acceptable, but not as responsive as other systems I've played, since you have to bend the string significantly off center before the pitch actually starts to change. Two more peculiarities are that if you pluck the string, bend it a little bit, pluck it again, bend it, and so on, this will often not produce a pitch change; and bending a note before plucking, plucking, then releasing the bend will give unpredictable results. Generally, bend works best for traditional bending, where you pluck the string and then go into a bend shortly thereafter. But there are also some advantages to the way Beetle handles bending. Small amounts of unintentional bending won't spew out loads of pitch bend data, which helps conserve memory when using sequencers (**Fig. 1**). Also, pitch bend can be programmed to produce downward as well as upward pitch shifts.

USING IT

Once you get your synth patches squared away and learn how to use the Quantar's various options, you're ready to reap the rewards of a MIDI guitar that responds with uncanny accuracy to what you play. Change the velocity sensitivity or volume controls, and the large, two-digit LED display reads out those changes. After a few seconds the display shuts off, presumably

FOR THE BEGINNER
Fret Wiring

Fret wiring is a technique where each fret, and each string, of a guitar controller is wired to its pitch detection circuitry. Each string/fret combination is electrically equivalent to a switch; pressing a string against a fret closes the "switch," thus triggering the note to be played. This is a very accurate way to detect pitch since it resembles the way a keyboard works (i.e., switches are closed to select pitch). Limitations of the fret wiring approach are that the strings and frets might become dirty, thus leading to intermittent contact problems; and there is no response to string-bending, unless special sensors designed to detect pitch bend supplement the fret wiring system.

FOR THE BEGINNER
Background on MIDI Guitars

It's much easier to generate MIDI data from a keyboard than a guitar, since the keyboard consists of a series of switches which, when closed, trigger specific notes. Although a variety of approaches have been tried to translate the notes played on a standard guitar into MIDI data, the results have often been neither reliable nor particularly responsive. Some companies have produced guitar-like instruments dedicated specifically to producing MIDI data rather than normal guitar sounds; while more effective than trying to use a standard guitar, in the past these controllers have been quite costly since they require custom tooling. Although the Quantar is also a dedicated controller (albeit based on a less-expensive standard guitar body), it uses a new sonar-based pitch detection process for greater speed and accuracy.

● **BEETLE GUITAR**

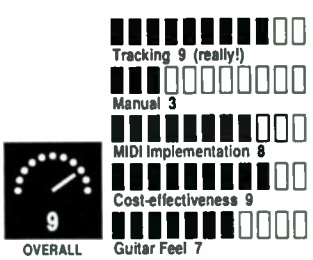
to conserve power if you're using batteries. The LCD is not backlit, but this is usually not a problem since its main use is for pre-show programming of QPatches. However, if you want to do transpositions on stage under poor lighting, you'll wish the thing was backlit. You'll also probably wish the displays were angled a bit more toward the player.

For live performance, the Quantar is very easy to use once you get the hang of it. The controllers are helpful for adding expressiveness (although I wish the palm plate was not quite as high off the body), and the lead/rhythm selector is a great idea. Having memory on board the guitar is convenient and economical, as you don't need an additional rack-mount "brain." I also found it surprisingly easy to get used to playing all the same gauge strings, and since they are deadened somewhat, you won't hear them jangling atonally in the background as you play.

Speaking of strings, at present all strings are tested for uniformity and selected by Beetle, and can be obtained only through the company at $9.95. Beetle says there is a routine built into the Quantar that will let you test strings yourself, but how to do this is not revealed

Product Summary

PRODUCT:
Quantar
TYPE:
Dedicated MIDI guitar controller
PRICE:
$1,295 ($99 for optional accessory box/power supply, $99 for case)
CONTROLLERS:
Whammy bar, palm plate, pitch bend, footpedal (with accessory box)
MANUFACTURER:
Beetle
120 N. Victory Blvd.
Suite 208
Burbank, CA 91502
tel. (818) 841-9922



in the manual. Let's hope they tell us soon. (*According to a company spokesperson, this glitch in the manual has been corrected in the latest revision—Ed.*)

SO IS THIS WHAT WE'VE ALL BEEN WAITING FOR?

Well, after years of searching for a functional and affordable dedicated MIDI controller, I am delighted to have found the Quantar. Yamaha's G10 MIDI guitar

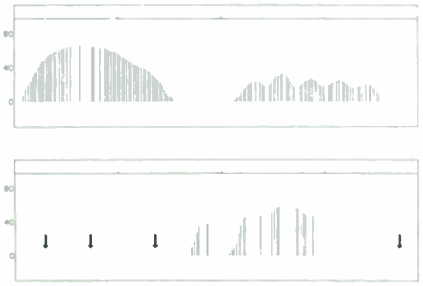


FIG. 1: Passport's *Master Tracks Pro* windows show Quantar's smooth pitch bend and vibrato curves (top), while very little extraneous data is generated before and after a pitch bend (bottom).

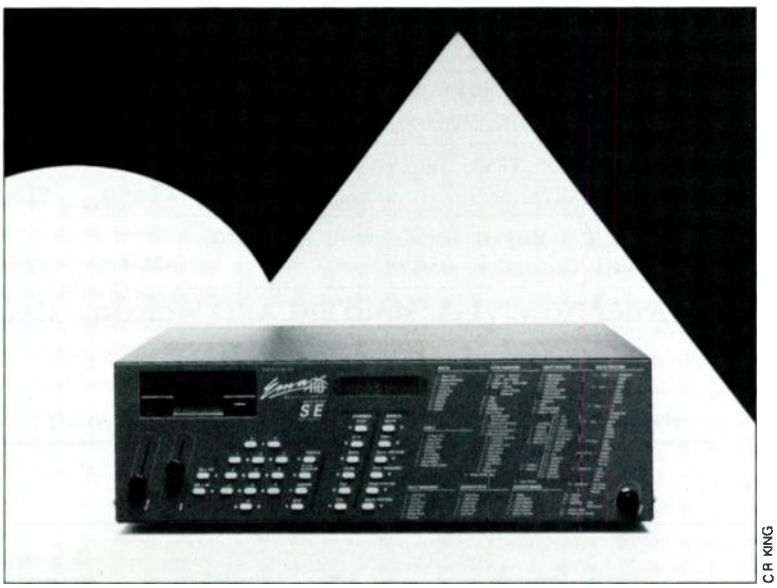
controller hasn't been made available for review yet (it uses a similar principle of operation but costs considerably more), so I can't offer any head-to-head comparisons. But I will say that as far as I'm concerned, the Quantar *blows away* the best of the pitch-to-MIDI converters based on standard pitch extraction techniques. In fact, a more accurate comparison is to big-bucks controllers like the SynthAxe and Stepp—the Quantar is *that good*, yet amazingly enough, costs $1,295 (plus $99 for the optional accessory box and another $99 for the case).

Beetle is a small company, and they have their work cut out for them: improve the manual, make patch sets available for those synthesizers best suited for the Quantar, label the knobs and switches, show people how to select their own strings, and perhaps most importantly, convince guitarists that it's worth going through the expense and learning curve of getting into MIDI guitar. But if Beetle manages to accomplish these goals, they're not going to be a small company much longer. The Quantar is real, it works, it delivers value for money, it doesn't force you to compromise your technique except in extremely minor ways, and it *really tracks*. What more can one ask for as a MIDI guitarist in 1988?

E-mu Systems Emax SE HD

By combining powerful synthesis capabilities with a hard disk, has E-mu taken the flexibility of this mid-priced sampler to the max?

By Tim Tully



C.R. KING

E-mu's versatile Emax sampler has added a couple of features that take the instrument's already high concept a few steps further. The upgraded unit, the Emax SE HD, has a 20-megabyte hard disk that holds 36 banks—36 floppy disks worth—of sounds, which it can load or save in a flash. The "SE" in the name stands for "Synthesis Enhanced" and refers to the Emax's ability to perform one of the most flexibly implemented versions of additive synthesis I've encountered in a package this size.

With the SE functions, you can create sounds of any length between 0.2 and 17 seconds. To synthesize a sound, you "draw" a curve by moving the data slider up and down as a cursor moves across the unit's LCD, defining a *frequency spectrum* (the amplitudes of a series of partials). Therefore, the cursor moves not through *time*, but up through your sound's harmonic series. You can think of a spectrum as a "snapshot" of part of a sound—a profile of its harmonic content at one instant, perhaps a millisecond long. You can draw up to 99 of these spectra and edit them by moving the cursor from one of the 24 harmonics to another, while raising or lowering the amplitude of each one.

Emax then provides *time slices* that divide whatever length sound you've selected into 24 equal parts. You can place any of your spectra into any of these time slices, and Emax will synthesize a sound that changes smoothly (or steps abruptly, if you tell it to) from the timbre represented by the first spectrum to that of the second, and so on, all the way through to the 24th. This evolving timbre is the edge that additive sounds have over those created with other forms of synthesis. The problems with additive synthesis have been the time it takes to specify so many parameters and the computer power needed to crunch all those numbers.

THE SE APPROACH

The Emax SE's answer to the first problem is both clever and powerful. After you draw, edit, and/or copy the spectra you want, and place them in any of the 24 time slices (which you can draw, edit, and copy in the same fashion; see **Fig. 1**), you can switch over from seeing the amplitudes of many partials at one given instant to seeing the *contour* of each partial's amplitude—how the partial changes over the entire duration of a sound—and edit and copy this amplitude envelope as you did the frequency spectra and time slices. To add even more complexity to the sound, you can also specify the way the *pitch* of each partial changes over time with the *pitch contour* function, using the same draw-edit-copy tools. These three different ways of approaching a sound essentially let you draw 24-stage envelopes for three different parameters, edit each "stage" one by one, and copy the whole display into any other location.

There's still another way to control your additive sounds. Although the Emax spectra default to the natural harmonic series, the *pitch/ratio* function lets you not only define the pitch of the sound you're synthesizing, but detune any of its partials away from the natural series. This lets you make a sound's partials non-harmonic, usually resulting in more clangorous, bell-like sounds, and is about as easy to use as the other additive elements, using the cursor and data slider to determine the ratios of the partials to the sound's fundamental.

NO SILK PURSE

Despite all its power, this process has limitations. Synthesizing a long sound from scratch requires a lot of sitting and waiting while Emax crunches numbers. If you decide to make a three- or four-second sound, draw one spectrum for the first time slice and another for the last, it will not only take Emax up to four minutes to synthesize a sound from this information, but you won't hear the sound until the synthesis process finishes. If you want to get even a little fancy and have the sound change from one *group* of spectra to another, it'll take even more time to synthe-

size, and again, you won't hear the results until all the numbers have been crunched. Worse, this number-crunching occurs both when creating *and* editing the sound. Doing this with a maximum-length Emax sound (17 seconds) would be trying, at best.

While other reviewers may have faulted the Emax for this aspect of its performance, it appears to me that putting *flexibil-*

FOR THE BEGINNER

Additive and Other Kinds of Synthesis

There are three methods commonly used to synthesize sounds. *Subtractive synthesis*, used in the first commercial synthesizers and still in use today, is based on an electronic circuit, called an oscillator, that generates a periodic waveform often rich in harmonics. To add dynamic variation to this sound, the instrument filters out some of its harmonics (hence the name "subtractive"), according to one or more set patterns (*envelopes*) or periodically, using low-low-frequency oscillators. The Prophet-5, Oberheim OB-8, and Korg Polysix all made use of this technology.

Yamaha, in its DX and TX series, popularized a digital (computer-generated) type of synthesis called *Frequency Modulation* (FM), where microprocessors generate sine waves, then modulate them with other sine waves, according to a number of different algorithms. This process produces a set of sounds with a readily identifiable quality. (Casio synthesizers use another kind of digital synthesis called *phase distortion*, which modulates the phase of a basic sine wave to produce different timbres. Sounds produced this way have a quality similar, but not identical, to FM sounds.)

Additive synthesis works by adding a number of sine waves together. Each added wave has a frequency higher than that of the previous one and usually a lower amplitude. The amplitude and/or pitch of each wave also changes individually over time. This independent motion gives additive sounds not only a richness, but an interesting, natural-sounding dynamic sound. It also means sounds based on additive synthesis are often complex and difficult to program. —*Tim Tully*

ity rather than speed in Emax's additive functions was right on target. It shows that E-mu has correctly identified both the strong and weak points of the sampling process itself, and has engineered Emax to optimize the strengths, not to alleviate the weaknesses. Specifically, once sampled, a sound is fixed. In the 17-second example above, your trying experience would produce a nice, long, complex, evolving sound that—since Emax treats it as a sampled sound at this point—will change in *exactly the same way* every time it's played. It will evolve in the same way in the low registers as it does in the high; its modulations will mathematically replicate themselves whether the key is hit hard or hit softly. This kind of uniformity is not very musical and is certainly not the way acoustic instruments sound. Lacking mainframe-league processing and storage, this problem plagues all samplers.

But by mixing some elementary psychoacoustics, just a little imagination, Emax's various processing abilities, and the Synthesis Development disk that E-mu supplies, Emax SE functions allow us to synthesize dynamic, unusual, *short* sounds in ways we can control, conceptualize, and reproduce. These can be used in combination with simpler, sustained sounds in ways that optimize the strong points of both.

The Emax SE works these solutions by very clever means and gives us the potential to engage in some powerful and rewarding sound craftsmanship. This *is* a different approach to synthesis than you'll see elsewhere, however, and it bears a little explanation.

SPECTRUM SYNTHESIS DEVELOPMENT

Loading the development disk (called *InstAttacks* on the hard disk) will fill the Emax with a full sound development kit: the sampled attacks of 31 different acoustic instruments, a number of short samples of silence—from 0.2 to 1 second long—and 95 different looped waveforms, each a single wave cycle long. In addition, InstAttacks loads 95 different spectra into Emax's *spectrum palette*, each representing the harmonic profile of the 95 looped waveforms in the presets. This means when you invoke the additive synthesis function of the Emax, you'll find 95 different spectra waiting to be played with, *and* presets 1-95 will let you hear how each spectrum will sound when synthesized.

There are, of course, many ways to use these tools. Play through the sounds in presets 1-95, and you'll hear sine, square, sawtooth, pulse, and triangle waves, and various duty cycles of many of them; waves that are simulacra of various acoustic instruments; half a dozen each of basic "tine" and "organ" sounds—95 of 'em altogether.

Using your ear and imagination (unavailable as a commercially produced package), think up a sound you'd like that would start out as one of these, then evolve into another, then another, and so on, up to 24 total evolutions. As you do this, keep in mind the basic psychoacoustic principle that a sound's attack—its first few fractions of a second—determines how our ears perceive it much more than do the seconds that follow. (Roland's L/A series synthesizers use this principle to create sounds by splicing harmonically

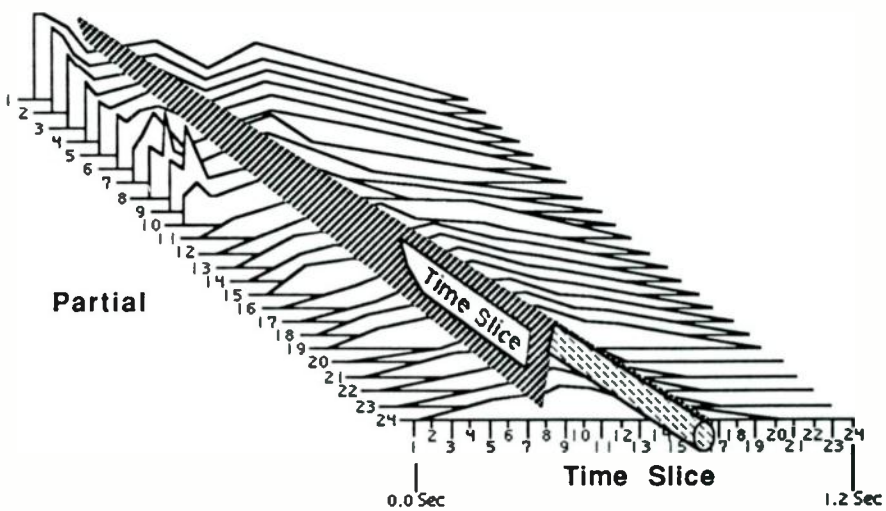


FIG. 1: The SE divides sounds into 24 equal parts called time slices; spectra can be edited, drawn, copied, or placed into any of these divisions.

SE's different approach to synthesis gives us the potential to engage in some powerful and rewarding sound craftsmanship.

rich attacks onto simpler sustains that are then made interesting by filters and other analog-type processing.)

Select the preset ".2.4.6.8,&1" to put blank (silent) samples .2, .4, .6, .8, and 1 second long under the keyboard, and go into the Synthesis function. Pick a length—let's say six-tenths of a second—and drop the spectra representing the presets you'd like to combine into different time slices: say 1, 7, 13, 19, and 24. Synthesize this (since we're talking about a sound just six-tenths of a second long, this will only take about 20 seconds), play it, and you'll hear a sound that evolves, in six-tenths of a second, through the timbres you picked.

You can edit the sound using any of the additive tools, then resynthesize the edited sound without too terrible a wait for it to resynthesize. Even better, since Emax now thinks of this sound as if it were a sample, you can loop it so it continuously repeats all or part of that evolution or just its static, final timbre; splice it to another sound, and loop that; layer it over another sound so they both play together; or even synthesize another short sound, and combine these in any of the above ways (or even some others I haven't mentioned). With just a little experimentation, you'll find the additive sounds you make can have a completely different quality from those produced by either analog or the popular digital techniques.

Since Emax has extensive *analog* processing features, too, you can concentrate on creating interesting additive *attacks*, tacking simpler sounds (which take up less memory) onto them for sustains, and adding character to the sustains with analog LFOs, VCFs, and the like.

If your creativity outstrips the supplied sounds (a highly desirable situation), you can make up your own spectra, synthesize short versions of them, and save both *a la* development disk, creating your own library of sound building blocks and your own style of sounds.

This is probably the least complex implementation of a truly complex process I've seen. That it's workable at all without the assistance of an external computer is amazing. That it works so well is downright inspiring. I've had a lot of fun with this machine and made some nifty noises in the process.

DIGITAL SIGNAL PROCESSING

Emax also boasts a new set of Digital Signal Processing functions. *Pitch conversion* digitally rewrites a sample at a different pitch. If you want to splice or combine two samples taken at different pitches, just resample one so it matches the pitch of the other, then splice away without any pitch discontinuities. If you'd like to extend the range of a preset that's already transposed as high as it can go, digitally retune a copy of the sample, and lay it into the range you desire. Digital process-

MIDI

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ing can also help you create effects like chorusing and flanging: simply copy and slightly detune a sound, then recombine it with the original voice.

Another feature, *sample rate conversion*, can conserve memory by letting you save samples at rates lower than those at which they were taken. In addition, you can take all your samples at the Emax's high rate (42 kHz) for quality, then resample them at a lower rate to fit in a tight preset or for archiving. This feature can also match Emax samples to the rates of other samplers, which allows for portability when using the MIDI sample dump standard, yet still preserves the original pitch.

TRANSFORM MULTIPLICATION

Transform multiplication creates another class of sounds by doing Fast Fourier Transform (FFT) analyses on two sounds and multiplying the two together, sample by sample, to generate a third sound. This process produces "ghostly" sounding timbres that, like additive synthesis, have their own special character. This feature definitely exists in the "as if all this weren't enough" category. It's a little cumbersome to use since it takes up a lot of memory, but if you truly need a different-sounding sound for that potential chart-buster, you'll probably find it here.

HARD DISK

The hard disk, in addition to coming loaded with 30 banks of sounds (a deal in anyone's book), gives Emax exceptional speed for live performance. Loading a bank of 99 presets takes about three to four seconds. That's fast enough to do by hand in the middle of a song. With the MIDI Global feature, which will load a hard disk bank and a specified preset via any MIDI Program Change number from 00 to 99, we're talking real-world capabilities here. (MIDI Global also lets you select a single MIDI channel for the entire machine to allow access to *all* presets over one MIDI channel.)

E-mu says that in developing the hard disk, their priority was durability. To this end, they environmentally tested the hard disk, subjecting it to heat and "roadie treatment." While I didn't practice my drop-kicking with the Emax SE HD, E-mu fully warranties the disk and claims to have spent a year and a half developing it specifically for the road, even including special hardware to park and lock the head when it's shut down. While the disk may be a little loud for continual close-up studio work, its speed and convenience are unquestionable.

Other new features compared to the original Emax include the Preset Stack Mode, which lets you play up to four consecutive presets at once, each with its own time and timbre characteristics. This can create either thick, rich sounds, or cause different timbres to glide in and out at the press of a single key.

Overall, the Emax SE HD offers a speedy and convenient hard disk, a couple of new categories of sounds, and challenging but potentially rewarding new sets of ways to do synthesis. These features alone are valuable; add them to an 8-output, multi-timbral, fine-sounding sampler with a simple but effective sequencer, and even an arpeggiator, and you've got an exceptionally valuable sound production tool on your hands.

Writing articles on music, computers, and related topics, **Tim Tully** *spends more time in front of a computer screen than any natural man should.*

Product Summary

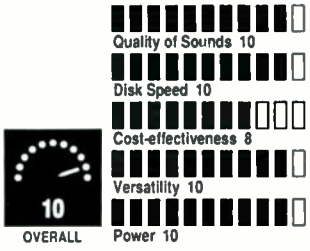
PRODUCT:
Emax SE HD

TYPE:
Sampler with digital synthesis (SE) capability and internal hard disk

FEATURES:
System includes 20 MB hard disk, 3.5-inch floppy drive, 61 velocity-sensitive keys on keyboard version, 8 separate outputs, left/right stereo outputs, RS-422 port, and 30 banks of sounds

PRICE:
Emax SE HD with keyboard, $4,295 complete; rack-mount Emax SE HD, $4,095 complete; SE upgrade for Emax owners, $300; HD upgrade, $1,195

MANUFACTURER:
E-mu Systems, Inc.
1600 Green Hills Road
Scotts Valley, CA 95066
tel. (408) 438-1921



Take Your Cue: Film Scoring Software From Opcode

When scoring for film or video, free up your creative energies by letting your Macintosh keep track of details and do all the tedious number-crunching.

By Jeff Rona

C.R. KING

Congratulations! After years of sending demo after demo to every studio and producer you could find, you finally got your first film scoring assignment by striking up a conversation with the producer's assistant at a barbeque in your cousin's back yard. So now what? The demos from your bedroom MIDI studio sound terrific, but you've never done a real movie score in your life. It's no big deal: Lay down a good backbeat at 120 bpm, and they'll love it, right? So you go see the movie; it has a very low music budget (get used to that) for lots of synths. It also has action, romance, car chases, kissing, gunshots, aliens—you name 'em, this movie's got 'em.

New considerations begin to nag slowly at you, and you struggle to subdue your panic. The music you're about to compose has to not only tell a story, but move in perfect synchronization with the picture on the screen. You'll need to line up a bushel of musical events *exactly* with specific frames in the film, so tempos must be set with fantastic precision. The truth is, people notice discrepancies between visual and corresponding audio events as small as two frames—about one-twelfth of a second.

The movie has a deadline, too, and *this* clock is ticking at exactly 60 beats per minute.

CUE THE SOFTWARE!

Enter Opcode's Macintosh program *Cue —The Film Music System*, designed to do the mathematical drudge work associated with film scoring. It is an incredibly extensive and thorough system that can be useful from the beginning of a project to the end, and is meant specifically for composers who need to sync music to the precise and variegated tempos of film and video.

The first step in writing for film, *spotting*, is the process of watching the film and selecting the points in each reel where music, sound effects, and other sound events will start and stop. One of Cue's features is a word processor that makes this very simple. You enter the beginning and end times where you'll put each of these musical compositions ("cues" in movie parlance) into the *spotting notes*, and these are used by Cue's primary document, the cue sheet.

A cue sheet (**Fig. 1**) is a list of all the important events from the beginning to the end of a cue and the exact moment the event occurs. This can be either the "absolute" time, based on time code on the video or the footage counter on a film editor, or time relative to the start of the music. One of the really nice things about Cue is the Input Window, where you enter these events using a variety of commands that speed up the process. After you enter the description of the event (a "hit") and its time, in any sequence, Cue automatically puts them into the cue sheet in chronological order.

Because of the variety of formats used for video and film, Cue lets you enter time in any of a number of ways. The *Format* command lets you select how Cue will display time in the two time columns on the cue sheets and lets you use virtually any known format to enter the hits. By

offering time formats for film and all video formats (drop frame, non-drop frame, black & white), Cue can handle synchronization chores for any type of system used in the U.S. or Europe (where 25-frames-per-second video is common). Cue makes hit entry even easier by eliminating the need for redundant typing of numerics, and it provides command key equivalents for several often-entered phrases.

Once all the significant moments have been entered into the cue sheet, Cue becomes a composer's assistant, helping make all the tedious chores of writing music for picture a breeze (or at least a good gust).

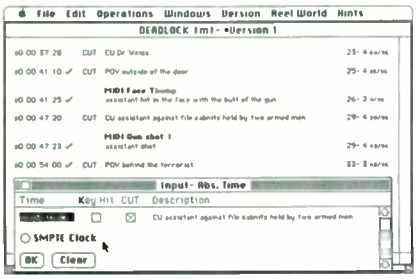


FIG. 1: A cue sheet lists all the important events in a cue, and their times.

BUT CAN IT DANCE?

The main event is the *Search Tempo* function. The key to scoring pictures is to get specific beats of the music to align with the hits that were previously chosen. This can be a difficult and time-consuming process, even for a veteran movie composer, and in this aspect, Cue works like magic. Simply give Cue an approximate tempo for the music, and it will show you how many of those hits occur on a musical beat for each of several adjacent tempos. It will even show tempos that can catch hits on eighths or triplets.

So what do you do if none of the tempos you want will catch hits? No problem: Cue will calculate and implement accelerandos and ritardandos—sometimes so slight you won't even hear them—to accommodate problem hits. You can also put significant tempo changes on *any* beat, to get all the hits in the picture to match up with musical beats or simply to change the pace. At any rate, Cue will give you every opportunity to find the magic tempo (or tempos) that will work. By the way, Cue does have a weak point. Although it *will* do searches starting from points other than the beginning of the tape, it always goes all the way to the end. It would be nice if it searched for tempos and hits in a specifiable range of time within a cue.

Although searching for tempos will probably be the focal point of the program for most people, there is a near-universe of functions, features, details, and options that will keep Cue at a composer's side during an entire project. One of these is the program's ability to generate score paper—on Apple dot matrix or any PostScript laser printer—for writing music. You can specify the clefs and the number of staves you desire, and all the information entered into the cue sheet will appear along the top of each staff (see **Fig. 2**). This eliminates the normal drudgery—drawing beats and indicating hits along the top of a score—that most film composers suffer. While Cue does not generate professional quality score paper, the output is useful for getting sketches down on pre-prepared, "smart" paper.

The *Conversions Window* is a handy calculator that thinks in either real time or SMPTE. It will convert values from any film or video format to any other format Cue recognizes. One very useful aspect of this is the ability to enter values as equations. This makes calculating offsets ("What's 1:02:03:22 - 00:07:42:29?") much simpler; anyone working with synchronizers will use this function at one time or another. The Conversions Window also calculates, in either beats per minute or frames per beat (in any film or video format), delay times based on tempos, to put your DDL in sync with the music.

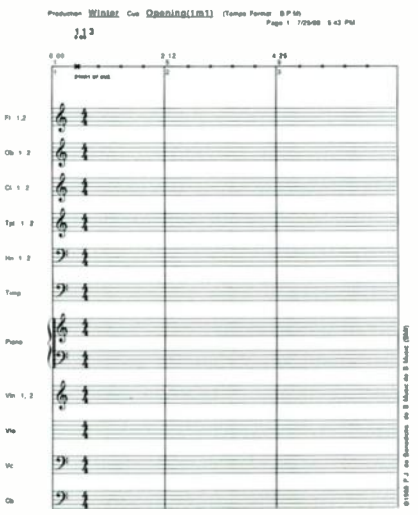


FIG. 2: "Smart" score paper generated by Cue, showing clefs, staves, and "hit" information along the top of each staff.

While most film situations will call for the mathematically perfect tempos that Cue generates, the user can also tap a tempo map into the Macintosh by tapping on the computer keyboard. This "human feel" tempo map can be edited just like the standard tempos. If the Macintosh is locked to MIDI Time Code (MTC), hits can be entered into the cue sheet automatically by clicking the mouse button while watching the picture, entering the current SMPTE time into the Input Window. For anyone who needs a lot of frame-accurate hits, Cue is capable of reading VITC (Vertical Interval Time Code), which lets the computer see time code even when the tape is paused.

DOWN TO WAX

Once the score has been written, Cue provides a number of real-time operations and services for recording the music that make it an integral part of any session, whether for synthesizers or live orchestra. To cue musicians flexibly, you can turn metronome clicks to the musicians' headphones on and off, anywhere within a cue. Cue displays both the current time within the cue and the "streamers and punches"—standard movie industry marks put on a film to tell the conductor when the next tempo change or important point in the scene is approaching. This last can be especially important during "free time" sections of a cue, when precise tempo isn't necessary, but the conductor needs to prepare for a point coming up. With the right hardware, Cue can even display streamers and punches, along with the picture, on a video monitor.

An important aspect of picture scoring is locking audio events—particularly audio tape, musicians' performances, and sequencer timing—to the videotape while recording. With a SMPTE-to-MIDI Time Code converter, such as the Southworth JamBox or Opcode's Time Code Machine, Cue will lock directly to any SMPTE source. This means you can start a videotape at any point, and Cue will synchronize an audio tape deck or sequencer and send clicks to musicians with complete frame-accuracy. (Since Cue uses SMPTE code as a master timer, it can be used to score for film by first copying the film to video, working with that, then recording the final sound to the original film.)

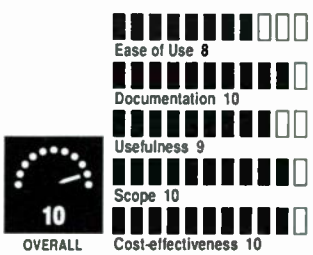
Cue will also generate MIDI sync codes to drive an external sequencer, though anyone with a Macintosh will probably want to use the Mac as a sequencer. Cue can handle this in one of two ways. It can dump the tempo map it created to an external sync box (such as the JamBox, Garfield Time Commander, or the Roland SBX-80) via MIDI System Exclusive, which takes about two seconds. You can then run the Mac's sequencer, locking it to picture or tape with the sync box. To do this optimally, use the Mac's *Multifinder* or *Switcher*, programs that allow you to move from one application to another without quitting and rebooting.

The other way is a bit less useful until sequencers have full implementations of the MIDI Standard File Format. Cue has both "Copy MIDI File to Clipboard" (Clipboard is a Macintosh buffer used to store data temporarily) and "Save MIDI File to Disk" functions. Sequencers should soon be able to add that information to a sequence and, through it, lock directly to MTC. Since the clipboard in the Macintosh can be shared by several programs, running Cue and one of these sequencers together under Multifinder will make a fast, easy composition system that will lock to picture.

From time to time, a composer may be called upon to provide sound effects, either synthesized or sampled, that must sync with the picture without needing to sync to the music. Cue lets you define up

Product Summary

PRODUCT:
Opcode Systems Cue
TYPE:
Film Scoring Software
PRICE:
$595
HARDWARE REQUIREMENTS:
Macintosh +, Mac SE, or Mac II; MIDI interface; printer recommended: program supports dot matrix and laser printers; SMPTE-to-MIDI converter recommended
MANUFACTURER:
Opcode Systems
1024 Hamilton Court
Menlo Park, CA 94025
tel. (415) 321-8977



The music you're about to compose has to not only tell a story, but move in perfect synchronization with the picture on the screen.

to 40 different *MIDI events*, each consisting of up to five Note On messages, its own key number, velocity, channel, and duration (in frames). Any hit in the cue sheet can be made to trigger a MIDI event with a single keystroke command. Each MIDI event can be triggered an unlimited number of times within a single cue. Lock Cue to picture or multi-track with a SMPTE-to-MIDI Time Code converter, and the MIDI events will trigger each sound effect exactly on the specified frame.

ART, SCHMART. GET A JOB

So enough about art and technology, let's talk business. Based on the length of each cue in a film, Cue will calculate your royalty and publishing rates—very handy in collaborations with composers or lyricists. Cue is a well thought out and complete system. It's a complex program with a multitude of commands and takes time to learn and master, though there are many effective short cuts. As with any Macintosh application, Cue can be run entirely with the mouse. For the most part, screens and windows are well laid out, and the program runs very, very fast. The manual is complete and clearly written, with plenty of examples and a merciful dose of humor. Cue is well worth the consideration of any serious film composer; after all, you never know who you might meet at that next barbeque. (*At press time, Opcode announced the release of Cue Version 2.1, which includes the ability to open a MIDI File and play it back locked to SMPTE, as well as MIDI channel remapping and octave-changing features. The updates are being sent out free to registered owners—Ed.*)

Jeff Rona *is a composer, synthesist, author, and reformed software developer from Los Angeles. He is currently president of the MIDI Manufacturers Association.*

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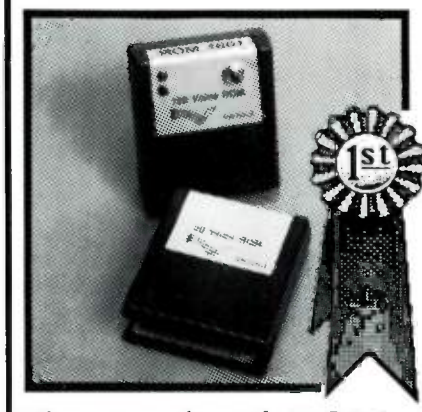

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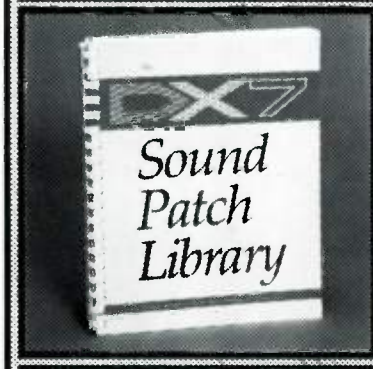

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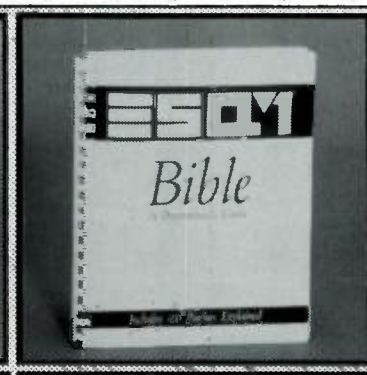

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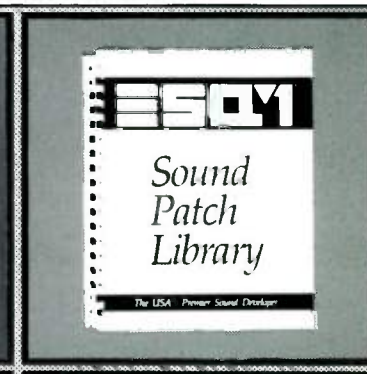

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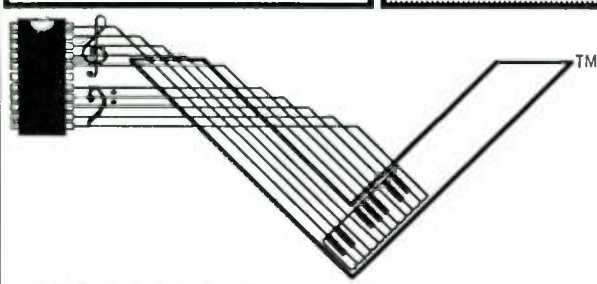

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HUMPBACKS ON THE EDGE

What does the unification of the two hemispheres of the brain have to do with great music, whale songs, and this month's independent releases?

By Robert Carlberg

Music is a constant battle between the intellect and the emotions. I was listening to an interview with jazz pianist Keith Jarrett the other day, and he admitted totally losing his intellectual side while performing. He plays completely emotionally, as the mood strikes him, often with no preconceived structure at all. On the other hand, many first-time musicians may lose the emotional side of the music altogether by having to concentrate too hard on getting the notes right. Somewhere in between lies great music. For instance, Paul Desmond and Terrance Bruce are able to quote a half-dozen other melodies within the span of a short saxophone solo. This indicates processes going on in their heads that reconcile and coordinate the wild emotional sphere of their brains with the controlled intellectual side. I don't want to overplay the pop psychology aspect of "dueling brain hemispheres," but it does seem to me that all great music walks this knife-edge of controlled hysteria.

Music that falls to either side fails to excite the whole brain. The experience of music is unique in that it *can* excite the whole brain. A brain-damaged patient who has lost the power of speech due to injury may still be able to sing lyrics, yet cannot speak any words otherwise. A tune will often incite all sorts of non-auditory memories, and songs can be remembered intact over decades, long after the particulars are forgotten. Doubtless, this is why oral histories were handed down in the form of song before the invention of writing. What is it about music that makes it such a powerful mnemonic device? Why would such a unique trait, with no obvious evolutionary advantage, emerge as a near-universal characteristic of the species?

Only one other genus, the whale, is known to compose music. Oh, many species have songs or calls, but they're always the same and serve specific purposes such as territory marking or attracting a mate. We sometimes refer to these as "songs," but we wouldn't go so far as to say they compose music. Whales, on the other hand, sing songs in the true sense, lasting from six to 35 minutes and repeating exactly. There is no beginning or end to their songs, as they can start a "cycle" anywhere and sing it through from that point. Their songs gradually change over about five years, until they have metamorphosed into completely new compositions. Before man polluted the oceans with the sounds of propeller ships and oil-drilling rigs, these songs would carry halfway across the globe, which back then was a lot of whales. Nobody knows the exact purpose of these songs. Are they newscasts or just entertainment? It seems entirely possible that the whales are handing down their own form of oral history in their epic poems.

Among whales, humpbacks are the acknowledged virtuosi, singing songs of greater range and variety than any other species. This month's column covers some of the "humpbacks" of the indie music scene, who create songs with enough skill to end up with exactly the result originally intended, but with enough variety, humor, and intelligence to keep the mind engaged. It's not an easy knife-edge to walk (or swim).

Tim Harman (910 Second Street, Lancaster, OH 43130; tel. [614] 654-1273) is a songwriter with an unusual outlook. In "I'm Not Happy (With My Face)," he sings, "My face doesn't feel the same inside as what you see, you're looking at the victim of some insane muscular conspiracy." In "Different Heads," it's "This morning I woke up in bed, a stranger in my home; on my neck a different head, my thoughts were not my own." This sort of disconnection from physical reality pervades his tape, *Passion vs Sleep* ($7 postpaid). In addition to writing and singing the lyrics, Harman provides substantial instrumental backing and four very strong all-instrumental tracks, on synthesizers, guitars, and bass (with Sam Hooff on drums and drum machines). Harman's voice, though untrained, comes from the Frank Zappa school of Kabuki delivery, and I'm not sure a more polished singer could do justice to his lyrics anyway. His guitar playing ranges from acoustic to wall-of-sound distortion, and his synthetic constructs of baritone saxophone, fiddle, cello, and horn section are little short of amazing. Continued listening revealed multitudes of detail work: sound effects, buried instruments, quotations from *Mayberry RFD* and "Singin' In The Rain," all in a very clear mix with no technical glitches. The three-page (typed, single-space) letter that came with it indicates Harman knows exactly what he's doing, and he makes some salient points about technology not replacing the musician. Harman says he doesn't consider himself a virtuoso on any one instrument, only that he's good enough "to put the songs across." That may be, but he's a humpback in my book.

Last month we began a regular feature of listing Robert's ten favorite releases to date. This month we begin a listing that is somewhat the flip side. Robert says, "Everybody who sends something in for review deserves some acknowledgement, if only to let them know that it arrived safe and sound. It bothers me that I don't have the stamina to respond individually to each artist, but the simple fact is that this gig doesn't pay well enough to give up what's left of my social life, too. The second addition, then, is this listing, 'Other New Arrivals,' which are items received but not reviewed. Just because something didn't get reviewed doesn't necessarily mean I didn't like it. It may have been similar to something else recently reviewed, or by an artist who's sent in a lot of stuff, or on a major label that should get adequately reviewed elsewhere. I also may simply have nothing to add—in which case silence is the best defense. I even reserve the right to change my mind later and review something passed over previously. But I think it's important to acknowledge receipt even if I can't feature everything received, and I hope you agree."

TEN BEST SO FAR

1. **Richard Burmer** *Bhakti Point (April)*
2. **Djam Karet** *The Ritual Continues (March)*
3. **Mark Isham** *Castalia (Sept.)*
4. **Peter Buffett** *The Waiting (Sept.)*
5. **James Newton Howard** *Promised Land (June)*
6. **Jerry Goodman** *It's Alive (June)*
7. **Latitude** *Latitude (May)*
8. **Patrick O'Hearn** *Rivers Gonna Rise (Sept.)*
9. **David Arkenstone** *Valley In The Clouds (April)*
10. **Kazumi Watanabe** *Spice Of Life (June)*

OTHER NEW ARRIVALS

Alexandros *Antithesis*
Monte Allums *Millennium*
Art Of Noise *In No Sense? Nonsense!*
AzIBrax *In The Valley Of The Shadow*
David Benoit *Every Step Of The Way*
Joe Berger *Impromptu Outtakes*
Randy Bernsen *Paradise Citizens*
Iva Bittova/Pavel Fajt *Svatba*
The Bonedaddys *A-Koo-De-A!*
David Borden/Mother Mallard *Migration*
The Borman Six *Built To Rage*
Dan Bradford & Patrick Hill *Theory and Fact*
Thom Brennan *Mountains*
Jim Brock *Pasajes*
The Buddy System *The Buddy System*
Ray Buttigieg *C.O.D.E.S.—Diary Of An Earthling*
Eugene Chadbourne *Kill Eugene*
El Chicano *Viva! El Chicano*
Billy Childs *Take For Example This*
Club Anonymous *Nuclear Winter*
Steven Cooper *Key West Afternoon*
Steven Cooper *Angels of the Sun*
Chick Corea *Eye of The Beholder*
Cruel Frederick *The Birth Of The Cruel*
Eddie Daniels *Memos From Paradise*
Das Damen *Triskaidekaphobe*
Doppler Effect *Hard At Work*
Elements *Illumination*
Dave Erickson *Demons from Heck*
Kevin Eubanks *Shadow Prophets*
Salvador Ferreras *To Drive in L.A.*
Damien Gossett/Robert Tabb *R,r(ar)*
James Hardman *Lapis Lazuli*
James Hardman *Pleiadian Suite*
George Howard *Reflections*
Paul Howey *Is It Any Wonder*
Jean Michel Jarre *In Concert/Houston-Lyon*
Michael Jones *After The Rain*
Keeler *Outward Signs*
Keeler *Autofocus*
Gershon Kingsley *Much Silence*
Randy Klein *While I Was Waiting*
Geoff Leigh/Frank Wuyts *From Here To Drums*
Eric Marienthal *Voices Of The Heart*
Arnold Mathes *Taboo*
Glenn Meade *Momenta*
David Merrill *Pro-Run The Challenge*
Mila *Night Jasmine in June*
Phil Miller *Cutting Both Ways*
Jose Montalvo *Shark Dreams*
Montanera *Metamorphosis & Others*
Glen Neff *The Voice in the Garden*
Glen Neff *The Inner Journey*
New Law Nightmare *New Law Nightmare*
Nova *She's Not There*
Other Skies *Vistas*
Lauri Paisley *The Fire Of Dreams*
John Patitucci *John Patitucci*
D. Andrew Rath *Impressions of the City*
D. Andrew Rath *Extended Meditations*
Red Zone *Red Zone*
Sean Reynolds & JEEM *Free Reign*
Bill Rhodes *Interfaces*
Sam Riney *Lay It On The Line*
Zoogz Rit *Nonentity*
Role Models *Bound to Play*
Dave Samuels *Living Colors*
John Sargeant *The Cauldron of Thoth*
Klaus Schulze *En=Trance*
Mark Sherman *A New Balance*
Tami Show *She's Only Twenty*
Ben Sidran *Too Hot To Touch*
Neil Slade *Parallel Universes*
Brain Slawson *Distant Drums*
Dennis Soares *Crazy Dreams*
Special EFX *Double Feature*
Spooner *Wildest Dreams*
Spyrogyra *Rites Of Summer*
Strange Romance *Charms*
Mike Tornoe *Chasing Light*
The Ugly Ones *The Ugly Ones*
Various *13 By Thirteen*
Roland Vazquez *The Tides of Time*
Rob Wasserman *Duets*
Jake Welsh *Maui: The Hawaiian Demigod*
Denny Zeitlin *Trio*

• MUSIC RE:VIEWS

Another example of the range of human invention is *Freshness Test*, by **Thrift Bakery** (Hopewell Records HW07, 23 West Devonshire Street, Winston-Salem, NC 27127). Many things about this album appeal to the sense of the weird, starting with the band members' names: D. Luxx, Bob Hair, and Terrie Cloth, on vocals, sax, and bass respectively. Recorded at The Oven, published by Songs Reduced For Quick Sale, and credits for "Everything Else by Chance"—you get the idea. Musically, Luxx's bag is rappin', probably because he couldn't carry a tune in a basket. Terrie picks out a mean bass guitar over the drumbox, while Hair keeps it moist with a thrift synthesizer (Casio?) and an occasional sax solo. The lyrics are as silly as the presentation, but the songs display more development and thought than most real rap music. The Bakery probably would like you to send them some dough to prove the motto on the cover: "All you have to do to be a pop star is be in a band."

You wanna talk weird? Try thrash metal with no guitars. *Jubilee "O" Kindness*, by **Damage** (LP), is performed entirely on "a Moog Liberation, Mirage sampling keyboard, Korg 800 module, Korg RK-100, and a Pearl Export drum kit. No guitars, sequencers, or drum machines were used . . . needed . . . or wanted." It's loud, nasty, fast, and just as raucous as the all-guitar norm. Their lyrics—decipherable only because they're printed inside—put down everything from TV preachers to skateboarders, striking some blows for freedom of speech along the way ("Tried to stop us once before, Paula Hawkins you political sore. Burning books and rating records, protecting people from themselves. Manipulating peoples' lives, it's the new hobby of Washington wives."). They adroitly assess the Damage in the title track: "With distorted keys ablazing, we beat the music to a pulp!!" This is music to scare the wits out of your mother, and it's all performed on synthesizers, the instrument of that wimpy dweeb Kitaro. Unbelievable. (1727 Barcelona Way, Winter Park, FL 32789.)

UHF is a rock duet of Rich Hallock (synthesizers and vocals) and Jeff Hanson (guitars and vocals). Their self-titled demo cassette EP (C-17) shows them to be smooth, contemporary pop with influences ranging from DEVO and Talking

Heads to a-ha and Wham! The vocals, stumbling block of so many unsigned bands, are surprisingly strong here, and all five songs are the kind of catchy, but well-done, generic pop that record companies love to sign. They've recently added drummer Donald Patrick; you can catch them live around the Bay Area, or write 1290 47th Avenue, San Francisco CA 94122.

Another example of "fractured rock" is *Happy To Be Here*, by **Proof of Utah**. Proof of Utah (does anybody really doubt it exists?) is perhaps equal parts early Mothers of Invention, DEVO, and some of the German experimentalists. P.O.U. is more elaborate than most Zappa-wanna-be's, however, due to the addition of a very competent horn section. At the center of the fray are Mike Brosco (voice, guitars, bass, keyboards) and Louie Simon (voice, drums, percussion). Bass is actually the loudest instrument, with Brosco's half-spoken lyrics next-most-prominent. A sense of humor and some sizzling instrumental sections make me happy to have it here. The record is on Germany's Recommended No Man's Land Records (supposedly distributed), but you can write Louie at 26925 Woodland Court, Millbury, OH 43447, or Mike at PO Box 840, Champaign, IL 61820; tel. (217) 359-2716.

In a completely different vein is *Timbral Planes*, by **J. Greinke** (Dossier Records ST-7549, again from West Germany). Jeff has released four cassettes and an LP on his own Intrepid Records (612½ North 43rd Street, Seattle, WA 98103) and another LP on Dossier, *Places of Motility*. Of the ones I've heard, *Timbral Planes* is far and away the best. Greinke works with processing, making drones and noise col-

lages out of found tapes and heavily processed instruments. What sets *Timbral Planes* above the others—and it's not a new idea, because Jon Hassell's been doing it for ten years—is that he sets these collages above a beat of ethnic percussion, giving them some motion and momentum. Without movement, I found them curiously unmusical, like ingredients in a recipe yet to be processed into food. *Timbral Planes* ($7 postpaid from Intrepid), I'm happy to report, closes the gap between noise and music, proving once again that there's more than one way to make an omelette.

Heart Skips a Beat is the second tape sent in for review by **Charlie Esposito** (PO Box 2018, Vineyard Haven, MA 02568; $8 postpaid). The first, *In Real Time*, was dismissed rather summarily in May's "Near Misses" column, but *Heart* is too good to ignore. He again uses a Siel DK-600, Yamaha DX100 and FB-01, and effects to create a dozen tunes lodged somewhere between new age and world fusion music, but with more variety and greater melodic content. The result is much stronger. He uses mostly percussive, tuned-pitch voices, sounding like kalimbas of vastly different sizes, in gently undulating patterns. Also included is ample exotic percussion: shakers, tablas, and bottles, or good approximations (Sam Holmstock is credited with "real world percussion"). Though each track is built of similar elements in various combinations, the texture is different enough on each one to keep the overall program (45 minutes, repeated on each side) interesting through several listenings (in fact, it took me a couple of passes to realize sides A and B were the same music). That's not easy to do with new age music.

Like Charlie Esposito, **Brian Gingrich** gets the most out of some percussive synthesizer voices, this time on Chroma Polaris. Also appearing are Casio synthesizers and drum machine, bass guitar, Chapman Stick, and various percussion ("sampled"). Gingrich's tape, *Prairie Safari* ($5 postpaid from 5301 South Rockwell, Chicago, IL 60632; tel. [312] 778-3912), is unusual in that it doesn't seem to spring from any one inspiration. There are chord changes reminiscent of Tangerine Dream, guitar loops that sound like Fripp & Eno, and treatments that are neo-Eno, but the construction is perhaps most similar to David Van Tieghem's second album, *Safety In Numbers*. Gingrich goes Van Tieghem one better, though, by frequently going against the tendency to make tracks denser and denser as they go along. Instead, Gingrich will drop instruments out, leaving one or two to play alone against a backdrop of excellent ethnic percussion. Add to this the tasteful mixing of shimmery synthetic chords with organic bass and percussive effects, and you have a real whale of an effort. It's subtle—it doesn't sound real unusual at first—but the more time I've spent with it, the more I've come to appreciate Gingrich's ability to create some very strong music without the need to be splashy. I guess if you can have a safari across a prairie, you can be a non-splashy humpback, eh?

And with that analogy stretched to the limit, it's time to take a break. Next month we'll take a look at records that come in sets and explore what new age music has in common with disco.

Robert Carlberg, *deaf from birth, has lost both the battle for intellect and the battle for emotion. In his case, his "dueling brain hemispheres" decided total disarmament was the only solution, leaving only an arid wasteland. Music for his rehabilitation may be sent to PO Box 16211, Seattle, WA 98116.*

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IS THIS ANY WAY TO RUN A BUSINESS?

The key to a rosy future for the mainstream record industry may come from *not* underestimating the listening public.

By Craig Anderton

So what's wrong with the record industry, anyway?

Even as profits soar to new heights, the number of recordings released each year diminishes. Artistic control is becoming rarer and rarer as record companies determine which songs will be sung, how images will be built, and who will produce an artist's record. The concept of building acts is bowing to economic realities: it's easier to pick up an act with a proven track record (either by virtue of being a star in another country, or from working up through the "indie" ranks) or simply repackage a bunch of stuff into yet another "hits" package. If it wasn't for the CD, the relatively high list price of which generates a lot of dollar volume, the record industry would be in deep trouble.

There are plenty of excuses for the current spate of problems: people don't want new music, current demographics work against record companies, home taping is killing music. Yet upstart labels like Enigma and Rykodisc have become real contenders and managed to break a bunch of acts into national prominence. Also consider all the independent labels that caught the new age wave and are doing just fine, thank you. Bear in mind that all these companies started out with several strikes against them: the fashion-oriented nature of the industry, well-funded competition from established labels owned by multinational conglomerates, and a distribution system most charitably described as archaic. Nonetheless, these labels, and several like them, have succeeded. Why? And why have the major labels not seized the opportunities exploited by the underfunded and understaffed independents?

The theory of most major labels seems to be that certain demographic groups listen to very specific types of music. If you're on the graying end of the baby boom, you listen to new age. If you're a teenage boy, you listen to heavy metal. If you're a teenage girl, you listen to pop music. And of course, white people don't listen to "black" music. Apparently radio stations subscribe to the same theory, too. These people seem to feel that you, the listener, have little intellectual curiosity and equally little desire to hear types of music not associated with your particular demographic group.

I suspect, though, I'm not the only person who will put on some Bach, follow that up with Public Image Limited, and then segue right into vintage Miles Davis. Then maybe some Ramones, Matia Bazar, Jimi Hendrix, David Arkenstone, or Los Lobos. . . wash all that down with some Talking Heads, and I'm in heaven. Surely I'm not alone in wanting to hear more than one style of music. Mainstream radio stations don't address what I want, so I hardly ever listen to the radio. I know exactly what I'm going to hear, which is precisely why there's little incentive to listen to it.

Major labels will sometimes come up with a Laurie Anderson or David Sylvian, or buy artists discovered and nurtured by independent labels (the latter phenomenon is, indeed, adding some welcome variety to the catalogs of major labels). Still, it seems paradoxical that small labels with limited resources discover and refine the talent, while the big labels, with their considerably greater resources, use those resources—in many cases—to buy out contracts of independent artists who want more exposure than a small label can give.

If record companies want to expand their market in the face of shrinking demographics, they need to interest the average listener in hearing more, and different, types of music. Looked at from today's point of reference, it seems incredible that you could go to a concert in the '60s that billed acid-rock bands with blues stalwarts like Muddy Waters, perhaps with a folksinger or poet as the opening act. Radio stations were equally "free form." The generation of open-minded listeners cultivated during those years became the engine that drove the record companies to previously unimagined profit levels in the '70s. Where are the open-minded listeners going to come from who will insure a healthy music industry in the '90s?

I would think that the same people who worship the Sex Pistols could find a somewhat similar level of excitement and adrenaline in John Coltrane's *Ascensions*. And if you're into musical electronics and haven't checked out what's going on with today's rap and R&B records, you're missing some of the most provocative use of synthesizers and recording techniques around. Yes, I really do think there are a lot of people who, given the chance, would be eager to embrace a wide variety of music. It's unfortunate that so far, many major labels appear uninterested or unwilling to give them that chance.

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