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EQUENCER

Electronic MUSICIAN

JULY 1987

A MIX PUBLICATION

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Live Performance With MIDI:

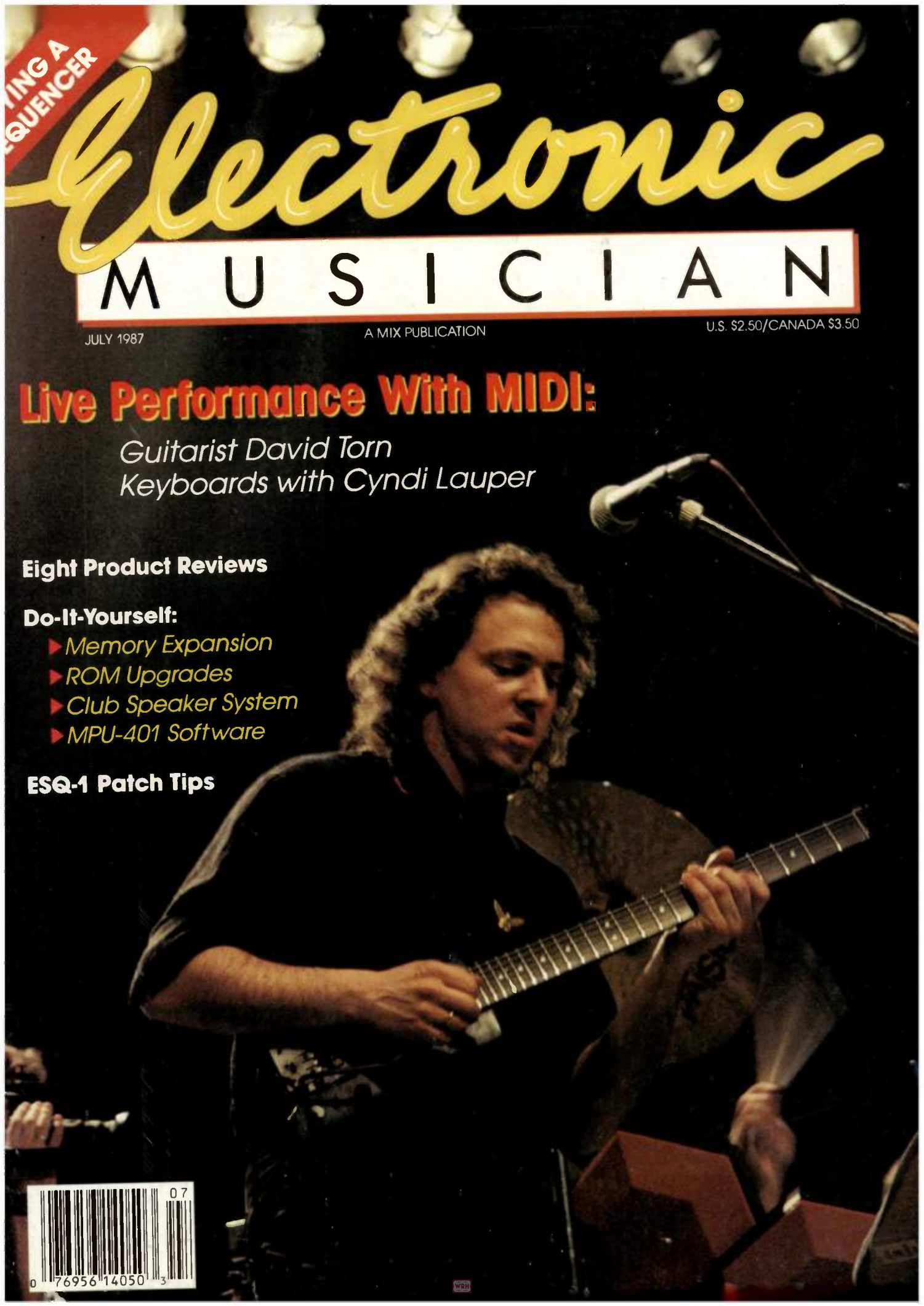
Guitarist David Torn
Keyboards with Cyndi Lauper

Eight Product Reviews

Do-It-Yourself:

- *Memory Expansion*
- *ROM Upgrades*
- *Club Speaker System*
- *MPU-401 Software*

ESQ-1 Patch Tips



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How to choose the right 4-tracker for

Start with the X-30. You couldn't do better. This is our third generation multitracker designed specifically for the beginning recordist. You'll be making better sounding tapes faster with the X-30. You can always tell what's going on just by looking at the controls, so it's really easy to use in all modes — recording, overdubbing and mixing. Plus it sounds great, thanks to Dolby* C noise reduction. Plays standard cassettes with Dolby B code, too, for full compatibility with your tape library. Remember you're buying a tool, not a toy — something that might turn a career. So if you're ready to start, check out the X-30, the smart start-up. It's all ready to go.

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MIDI, MAX

your needs:

460

The 460 is simply the best multitracker made. The cassette drive mechanism is so smart it can sync with video via the Fostex Synchronizer with software version 3.0.

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One of the hottest production rigs going is a 460 with the Fostex 8-track. Reference work on cassettes; masters on open reel; everything locked together in perfect sync.

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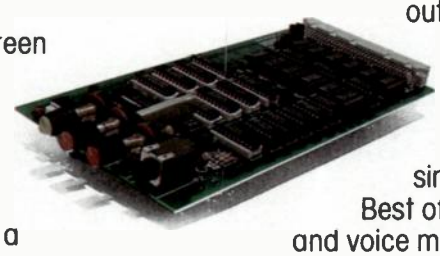

Each voice has independent tuning, volume and pan controls, and is available through direct outs or the stereo mixer. Mic and line inputs make your sampling easy, and editing commands allow you to trim and move samples at will. Save your sounds on the super fast high capacity floppy disk drive.

Driving the F16 from pads, pre-recorded drum tracks or your drum machine's trigger outs, the response time is a blinding 100 microseconds! It's dynamic sensitive, of course, with MIDI in, out and through.

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VOL. 3, NO. 7 JULY 1987

Electronic MUSICIAN

A MIX PUBLICATION

DEPARTMENTS

COVER

Just as it is changing the way that we record and compose music, technology is changing the face of live performance. David Torn, shown playing live at the 1st International Art Rock Festival in Frankfurt, Germany, is one of the new breed of guitarists who is just as comfortable with advanced signal processors and MIDI control as he is with tube amps and steel strings. Photo: Peter Hirschfeld.

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ARTICLES

Editor's Note

The other day I was having dinner with our resident nuclear chemist, fractal researcher, and German language translator Peter Hirschfeld (oh yes, he's also EM's marketing director). The conversation turned, as it invariably does, to the state of the music industry. Peter mentioned that one of the main problems facing potential computer musicians is overcoming the barriers necessary to get up and running on professional music software packages. The reason why these programs are complex, of course, is that in order to provide the features necessary to make a software package truly professional, a software developer needs to create a large number of commands that allow for a wide variety of operations. This complexity also makes it difficult for a first-time buyer to evaluate a program. As a result, people often "play it safe" and buy a more complicated program than they probably need, or most likely, just give up and don't buy anything at all.

Taking a cue from the computer industry, Peter noted that successful video games give the user positive reinforcement within the first few minutes of attempting the game, yet increase the level of challenge as the time spent with the game continues. This is accomplished by having nested "levels" that become progressively more difficult. Why not, he suggested, apply this concept to music software, and develop programs that have three to five hierarchies or levels?

The first level would contain an extremely "stripped" version of the program with only a few basic commands so that users could get up and running quickly with minimum confusion (of course, not much could be accomplished, but that's okay).

After getting comfortable with the first "level," it would be time to proceed to level two, which would add several new features (and of course would be file-compatible with level one). When level two is mastered, then a third, fourth, or even fifth level can be accessed which invokes all features of the program. To simplify operation, an "install" utility would allow users to bypass the first levels and proceed directly to the level desired.

I don't think this would be a difficult programming problem; I've often received Beta test disks where particular functions weren't implemented. The only trick would be to keep unimplemented functions from showing up on the screen, so as not to muddy the picture and impede comprehension.

Regarding the manuals, the first "level" would only require a few pages of very simple instructions, allowing for quick access. The successive levels would have progressively more comprehensive instructions.

Some companies already offer several different versions of their sequencers, with increasing complexity and upward exchange policies. However, most professionals probably don't want to buy a "basic" version program, as they're concerned it won't handle their tasks. And, they are hesitant to buy a program with the express purpose of exchanging it twice to get what they need.

Maybe this is too simple. Maybe there's some obvious flaw we're overlooking, but this seems like a pretty good idea to me. Best of all, it makes it a lot easier for musicians to have *fun* with a program—which is what music should be all about, anyway. Any comments?

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Letters

Released and Secured

One of my favorite columns is "Released and Reviewed" because it covers obscure labels and artists I would never hear of from any other source. In the last few years I had quit buying recordings, and the record stores had pretty much become vast deserts of dull music.

Through Mr. Carlberg's column, I have discovered that some good music can still be found in the record stores if you know where to look. But mostly, my record budget has gone to ordering the better-reviewed small-label (and no-label) releases reviewed in his column. This stuff is promising because it is more likely to be music the artist likes, instead of music the artist figures the typical listener will like.

Also, about my burglar-proofing project in the Dec. '86 **EM**, I've devised a way to make the assembly more secure, but with a great deal more hassle. A product called "Herculoid" is a tempered chain (about $4/ft.) that can be severed only with a cutting torch. The smallest size is too big to thread through reasonable-sized hasps, so the only way to use it would be to have a separate padlock at each synthesizer (gag!). A thief would have to cut through each hasp to get away with anything, but the keyboard rig would look like something out of an S&M fantasy. I haven't implemented this plan, but mentioned it because some musicians may find it appealing.

Can some reader find a source for small quantities of an almost un-cuttable tempered chain or cable small enough to pass through a half-inch hasp hole? There could be money in this for somebody.

James Chandler, Jr.
Chattanooga, TN

Sharing or Stealing?

I have a great deal of admiration and respect for Craig Anderton. His writing and attitudes toward music taught and guided me into the current high-tech world of home multi-tracking and MIDI. His editorial condemning the swapping of music software (July '86 **EM**) expresses the view that copying patches or taping records is stealing. I dissent. (*Ed. Note: Taping records is not mentioned in the editorial, which related only to copying software.*)

Software creators derive their living from marketing the fruits of their creative minds. I agree it is unethical to pirate and market this work. But I see a major difference between this type of stealing and simple sharing. Musicians constantly share gear, yet if those people share patches or other software, you consider it stealing. Consumers have always had the right to share their purchases. Would it add a veneer of honesty if two musician friends each co-bought their software, and then shared it?

Thanks, Craig and **EM**, for listening to this alternate view.

Bill Morse
No address given

Bill—I appreciate your point, but do feel there is a difference between "sharing," where the time allocated to use of a single product is split up among several people, and "copying," where one person creates a duplicate of a product for the use of another person. Sharing doesn't bother me at all (and I encourage cooperative ventures); copying does.

Software: Size Isn't Everything

This is in reference to Peter Vinella's sidebar "Software Shopping Tips" (Jan. '87 **EM**). Most of Vinella's points are well-taken, but I must take exception to a few. "Buy from a retailer" is good advice in general, but many retailers refuse to carry new products until the public demand is very large. This leaves specialty products like our MIDI Arpeggiator with no retail outlets.

"Try to avoid the first rev of a program." First releases do not always have bugs, but when they do, the differences between small and large software houses come down to one thing: customer service. The larger houses usually collect complaints for a long time before they release a Rev 2, if they ever do. My company and most of the smaller houses I know correct any reported bugs and ship updates (usually free) within a couple of weeks. I recently bought a CZ patch randomizer from a classified ad. It works as well, if not better, than a more well-known program for a quarter of the cost. It included an extra freebie but wouldn't load from my disk. I had a new copy within a week. On the other hand, when I bought a well-known sequencer, it took over nine months and several letters to the president just to get my backup disk. Big is not always better.

So, buyers, by all means, read reviews and try demos, but don't rule out mail-order software. There is a lot of well-written, inexpensive, and innovative MIDI software you're missing.

Jim McConkey, President
Triangle Audio, Inc.
PO Box 1108
Sterling, VA 22170

Two Sides to the Glass

I love your mag and have recently renewed my subscription. I am not one who usually writes letters of this sort, but I must contest an opinion put forth in Larry Oppenheimer's article in your Jan. '87 issue.

As a performing musician for the last 20 years, I feel it's a severe case of inflated ego to consider oneself "another member of the band" when, in fact, no actual notes are played by this "performer." This is more likely the wishful thinking of a frustrated musician.

Sound engineers will remain a necessity, and are as unlikely to be replaced by computers as musicians, so long as the human element (ears) is important. But please do not attempt to create a grey area where none exists: musicians make the actual sounds themselves; sound engineers enhance or modify these sounds.

MIDI has exceeded our original expectations since its conception, and has given us sequenced control of lighting, mixing, and yes, performance itself. But MIDI will not replace the human element, only enhance it.

If the industry were to follow Larry's concept, MIDI control would disappear from a musician's control, and lend itself only to the engineers. Musicians already entrust themselves enough to the whim of the sound mixer.

Bach is a classic example of how a musician gets involved with his sound, both from a compositional aspect and a technical one. I say: players, don't wimp out! Learn your stuff and realize that learning is a never-ending process. What you don't know *can* hurt your sound!

Steve Gunner
Studio City, CA

p.s. Would the musician's union recognize Larry Oppenheimer's wishful thinking? Ask 'em!

Larry Oppenheimer responds: "Mr. Gunner brings up some interesting points, but I believe that he draws the wrong conclusions from them. If a musician must play notes in order to be a performer, by this definition, a conductor would not qualify as a performer, a conclusion that would invalidate the skills of such dynamic personalities as Leonard Bernstein and Seiji Ozawa. Composers like Karlheinz Stockhausen and Pierre Boulez, some of whose concert works are performed by ensembles consisting of both instrumentalists and sound mixers (often including the composer) would also fail to meet this criterion. Mr. Gunner further states that, 'musicians make the actual sounds themselves; sound engineers enhance or modify these sounds.' This implies that someone who merely enhances or modifies sounds is not a musician, which then eliminates composers of musique concrete, such as Pierre Henry and Pierre Schaeffer, from qualifying as musicians. Modification and enhancement are also vital musical tasks to the current generation of artists making use of sampling instruments.

"I agree that MIDI will not replace the human element, and that element must often be provided in performances by the sound engineer (ears) as well as the musicians, but I can find no justification for his statement that the spread of the ideas I presented would cause MIDI control to disappear from a musician's control. MIDI allows a single musician to control a complex system of instruments. Sensitive dynamic control of signal processors via MIDI can provide a suitably musical *complement to this (system).*

"I also agree that musicians must often 'entrust themselves...to the whim of the sound mixer,' and it is for precisely this reason—trust—that musicians hire a particular engineer. Furthermore Mr. Gunner's exhortation to players not to "wimp out" implies that the sound engineer has such control of the sound because the players are too ignorant or incompetent to exercise it. I was

hired by the Stein/Walder Group largely because of my combination of musical ability (most of my career and college education have been in instrumental performance) and technical knowledge, especially in the area of signal processing. This freed the onstage musicians from the burden of dealing with their processing in such detail, which they did not wish to do, yet allowed them to have the sonic benefits of these devices, which they eagerly desired. Most of the effects I used were created by working very closely with Stein and Walder. It was, in fact, Ira Stein who regularly introduced me from the stage as 'the fourth member of the band.'

"Why should the person who has a direct and final control of what the audience hears not be considered a performer or musician if they provide shape and organization to the sound in an aesthetically pleasing manner?

"As useful as the Musician's Union may be, I certainly do not consider them qualified to make such artistic judgements. Consider that the union, in the early days of commercial synthesizers, tried to deny that the synthesizer was a musical instrument at all!

"If music can be defined as 'organized sound,' then a person who contributes in some significant aesthetic way to that organization must be considered a musician; and if that contribution occurs in real time during a performance, then that person is a performer.

"MIDI, with all its staggering implications and broadening applications, is still in its infancy. Techniques and concepts for using it have a long way to go to reach maturity, and our attitudes and definitions must grow accordingly. In order to reach this maturity, I most emphatically agree with Mr. Gunner that anyone using the technology must constantly strive to understand and learn what it is all about and how it can be used to make good music. This knowledge can only make it easier for performers, onstage and off, to attain the goals for which they strive."

Larry Oppenheimer
San Francisco, CA

Chorus Questions

I have only recently subscribed to your magazine. I was looking to move up to a better computer, but you saved my 64 from the scrap heap and me from feeling like a wimp in this world of Macintoshes and IBM PCs.

There is one thing that the CZ3000, CZ5000 and the CZ1 have that I wish my CZ1000 (and the CZ101) had: stereo chorus. My home-grown patches sound good on my 1000, but on the 5000 with stereo chorus, they just come alive! Can you point me in the direction of a commercially made box or a DIY kit that does the same thing?

Matthew Persico
Bronx, NY

Matthew—There are a variety of chorus boxes available; most of the low-cost ones are targeted to guitarists. The only problem you might encounter with one of these is excessive level from the synth driving the chorus into distortion. If so, turn down the synth's output level. Most digital delays can provide chorusing—read the manual or The Digital Delay Handbook *(available from Mix Bookshelf, 2608 Ninth St., Berkeley, CA 94710) for more information. Regarding DIY, we have not presented any chorus box plans, but these days it would probably cost you less to buy an old chorus box anyway.*

CLM 6000 Substitutes

I would like to clear up one point concerning my "Fuzzstain" article (Jan. '87 **EM**). Accompanying the article was a detailed explanation, written by Craig Anderton, of how the CLM6000 works. The explanation suggests that one might be able to replace the CLM6000 with a standard red LED and a CDS cell. While this will probably work, I must point out that replacing the Fuzzstain's CLM6000 must be done carefully to avoid affecting the unit's performance, which is, after all, optimized for the CLM6000.

Here are a few suggestions. Choose a CDS cell with a dark resistance of at least 10M ohms. Some of the parts in the Radio Shack assortment seem to only go up to about 200k, while others go right past 20 Megs. Hand select a part with a wide range. Choose a red LED with a voltage drop of about 1.45 volts at a current of 100 uA. To check this, put a 100k resistor in series with the LED and attach the combination to a power supply. Adjust the power supply for 11.5 volts and measure the voltage across the LED. A voltage drop of 1.40 to 1.55 volts is acceptable. Make sure that the LED-CDS cell package is absolutely light-tight as CDS cells are incredibly sensitive.

Bill Berardi
Milford, MA

Bill—Thanks for the extra information; I've had good luck using LED-CDS replacements for CLM6000s, although the CLM6000 is certainly more convenient to use. To the many readers who wanted to know where to get CLM6000s, contact Clairex (☎ 914 / 664-6602) for the distributor nearest you. For small quantities, contact Armada Sound Lab, Box 858, Southaven, MS 38671; ☎ 901 / 396-6758.

Thanks!

I would like to begin by thanking you for your review of our *EMC3* album in the February '87 **EM**. We have received many inquiries as a result. Please note that the album price is $5. Thank you again, for your time and support.

Sherene Kershner
Electronic Music Club, Secretary
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☎ 206 / 771-1500

Patch Librarian Patch and MIDIPrint Fix

In Tim Dowty's "CZ-101 Patch Librarian" listing (Feb. '87 **EM**), there is a slight logic error in the checksum routine in lines 4030 to 4050. The routine as written checks *one address too many*. When that address has a non-zero value, you get a checksum error. At first, I suspected a problem with my hardware, but some debug statements showed the problem to be the software. A fix for the checksum problem is:

```
Line 4030 IF INT(I/2) * 2 = I THEN CSM% =
CSM% + PEEK(I)
Line 4040 (eliminate this line)
Line 4050 IF INT(I/2) * 2 <> I THEN
CSM% = CSM% - PEEK(I)
```

This change is easily made and is similar to Tim's original lines of code.

After I made these changes, the program worked as advertised. The program also works for Sequential and Dr. T interfaces without any patches (same I/O addresses as the EM interface).

Regarding MIDIPrint (Sept. '86 **EM**) my MIDI interface goes into a "received data overrun" condition. The result is S L O W operation of the computer (and a rapidly flashing cursor) when the program is stopped. While it's running, the program does not respond to the synth, either. My fix is to change the value "74" on line 1080 of listing 1 to the value "42." This changes the LSR instruction used to test for "receive data register full" to the ROL instruction to test for "interrupt request." That way, any interrupt caused by the 8650 UART will be serviced and cleared. Without this change the interrupt is not cleared and will keep re-interrupting the computer.

I like all the MIDI programs that **EM** has published for the C-64. Keep up the good work!

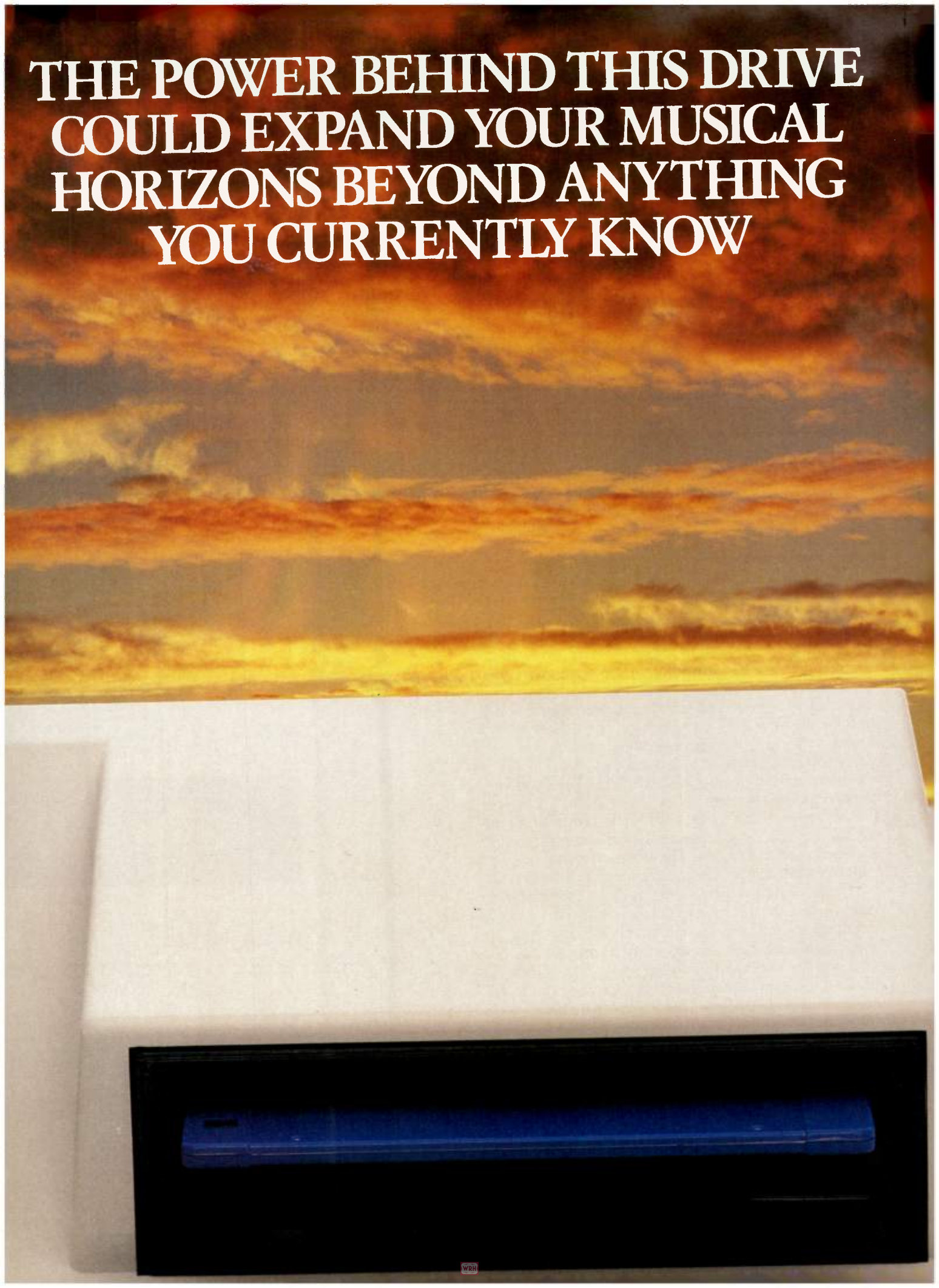
Eric Bean
South Bend, IN

Noise Reduction Noise Reduction

Since the subject of dbx type II noise reduction units surfaced in a recent letter, I wanted to give you my experience with the ones I purchased from DAK. I bought five stereo units (for an 8-track and a mixdown recorder) and, while they offer a dramatic decrease in the noise floor, they did present a couple of difficulties.

First, they are designed to work at EIA levels of -10 dBV, which is compatible with much equipment, but not with the 0 dBm my board and recorders expect. The unit has a sensitivity control to cut down the level of signals entering both the encoder and decoder stages, but the outputs must be kept low because of limited headroom. (The circuits in the dbx are powered by a 5 volt regulator.) So, if you have a 0 dBm system, you must boost the gain of the record amps on your recorder, which is not a problem unless you want to bypass the dbx unit to record non-encoded tracks.

The second issue was a little harder to cure: hum. I became aware of the low-level hum that would "breathe" with the signal, disappearing during the silences, becoming stronger with louder signals. I tracked it down to the power transformer, which, given the small case of the


THE POWER BEHIND THIS DRIVE
COULD EXPAND YOUR MUSICAL
HORIZONS BEYOND ANYTHING
YOU CURRENTLY KNOW

INTRODUCING THE MC
THE FIRST COMPUTER DEDICATED TO TH

The Goal: Total MIDI Control/We'd like you to spend a few minutes reading this ad. Because what we have to tell you takes a little time—but your time will be well spent. Because no matter what kind of music you play, you could play it better with the help of the amazing new MC-500 MicroComposer. The advent of MIDI has made incredible progress possible for all kinds of musicians—giving them power they never had before. But in order to harness that power, musicians need the proper tools. The MC-500 was created to fill that need—to harness the power of MIDI and give all musicians the power to control and use MIDI to their best advantage. In recent years, there have been various alternatives to controlling MIDI music systems. Some people have used personal computers equipped with MIDI software and interfaces. Some have turned to dedicated sequencers. Each has had its disadvantages. For all the power they offer, PC's are built for the businessman's environment, not the musician's, and as such they don't take well to life on the road. Also, they can be quite slow in performing MIDI functions, and as we all know, interfacing a computer to a MIDI system is often clumsy at best. Dedicated music sequencers are built for the musician's environment, but usually lack the features and flexibility of personal computers. Simply put, they can't be upgraded with new software, which means they can become obsolete before you've finished paying for them.

MC-500 BACK PANEL

The MC-500: A Computer with MIDI Jacks/To solve this dilemma, Roland's engineers have created an engineering masterpiece—a powerful personal computer, with more memory capacity than the average PC, that is designed inside and out (from the front panel controls to the back panel jacks) for the MIDI musician. Like a computer, the MC-500 MicroComposer has no functions of its own—its functions are loaded off a software disk via its disk drive. In this way, depending on the software you load into it, the MC-500 MicroComposer can become almost any type of MIDI control device you require: a sequencer, a sound librarian, a live performance system controller, and a MIDI interface system—all in one compact, roadworthy unit.

In the Creative Process/The benefits of this type of engineering become apparent almost immediately, as the MC-500 MicroComposer allows you to create and control music with seemingly effortless keystroke commands. In many ways it's more like working with tape recording than computer sequencing, because the MC-500 MicroComposer is laid out in much the same logical manner as an advanced digital tape recording system. The beautiful ergonomics of the MC-500 MicroComposer make it apparent that you are working with an instrument that was designed for musicians, from such easily-understood controls as Record/Load, Pause, Play, Stop, to the Alpha dial which speeds you through tasks which might otherwise slow down your creativity, to the speedy 3.5" disk drive, to the back panel—full of MIDI and tape interfaces, as well as footswitch jacks for those tasks too important to tie up your hands.

MRC-500 Software/The MRC-500 Software Disk is the first in a series of software products for the MC-500

500 MICROCOMPOSER
ULTIMATE IN MUSICAL PERFORMANCE

MicroComposer. It offers the ability to perform highly advanced MIDI sequencing, editing, disk storage of programs, as well as system exclusive control over patching and assigning your MIDI instruments. Simply load the MRC-500 Software Disk into the MC-500 and you're ready to create music exactly as you've imagined it. The MC-500 can hold performance data for roughly 25,000 notes—up to eight songs—in its internal memory, with additional storage of up to 100,000 notes on the Disk. The MRC-500 allows musical data to be entered from either your MIDI instruments, the ten-key keypad or the alpha-dial, which are then played back through your MIDI set-up. Songs can be named, and linked together, while the 40-character LCD prompts your next command. The accuracy with which the MC-500 records your performance nuance is simply breathtaking. No glitches, no weird or unnatural error-correction, just simply what you've played. The faithful re-creation of your performance is truly one of the hallmarks of this amazing tool. In fact, so good is the quality of the recording, that you'll probably notice aspects of your technique that you never noticed before.

SOFTWARE DISK

Recording Tracks/At first glance, you will see that the MC-500 MicroComposer has four polyphonic recording tracks plus a rhythm track. But, as is the case with most of the MC-500, there is a lot more here than meets the eye. A special Merge function allows you to combine the information on one track with the information on another (similar to "bouncing" tracks on a multitrack recorder). Using this function you can record up to 256 musical parts (16 MIDI channels times 16 voices) and MIDI channel information is retained for each merged track. Later, if you desire, you can un-merge tracks using another function called Extract. The MC-500 allows you to merge and un-merge as many times as you like, and because it is all digital information, none of your performance is ever lost.

The Rhythm Track/The rhythm track gives you the programming power of the most advanced rhythm machines, by creating individual rhythm patterns and then organizing them onto a track. In this way you can control sound sources such as Roland Rhythm Composers, Digital Samplers and Drum Modules, as well as most other MIDI-equipped drum machines. Up to ninety different Rhythm patterns can be created in step time, and then combined at will by using the MC-500's Copy, Insert and Delete functions. And, for the first time, you can not only create, but store your rhythm tracks along with the rest of your performance data—all on the convenient disk drive. No more separate loading of rhythm and program data.

Tempo Control/The MC-500 MicroComposer allows you to modify freely the tempo of any recorded performance. Using the alpha dial it is easy to change in real time, the tempo of the entire piece (which is displayed in beats per minute). But the MC-500 MicroComposer also contains a separate Tempo Track, which is capable of altering the tempo over the course of the piece. In this way, it is possible to create continuous tempo changes such as accelerando (a gradual increase in speed) ritardando (a gradual decrease) or even immediate abrupt tempo changes.

Recording a Performance/The MRC-500 Software allows a performance to be recorded in Real time or in Step time. Overdubs on additional tracks can be made within a few keystrokes of recording the original track, so you can never lose the feel for the music due to complex record set-up. If you make a mistake, the Punch In/Out feature can fix it with minimal fuss (just like on tape) but faster and more reliably than on any tape machine. For sequenced parts or others that are hard to play in Real time, the MC-500 allows Step programming—and since Roland invented this method of programming, you can be sure that it is done here in a manner that is both easy and precise.

FIGURE 1 EDIT FUNCTION CHART

Performance Editing	Track Editing	Merge		Disk Editing		Rename
		Extract				Delete
	Measure Editing	MIDI Channel Reassignment				Transfer
		Transpose				Back-Up
		Change Velocity		MIDI Message Editing	Note	Micro-Scope Functions
		Quantize			Polyphonic After-Touch	
		Erase			Control Change	
		Delete			Program Change	
		Insert			Channel After-Touch	
		Copy			Pitch Bender	
	Note Editing	Note Name	Micro-Scope Function		Exclusive	
		Note Strength			Tune Request	
		Note Length (Gate Time)				
		Delete				
		Insert				
		Timing (CPT)				

Precision Editing/The distinction between a good and a great program comes in the attention to detail, and it is in the editing process where the MC-500's detail shines clearly through. Any performance, whether recorded in Real or Step time can be fully edited down to the most precise detail. (Figure 1) An exclusive feature built into the MC-500's controls is the Microscope function. By entering the Microscope, you can then manually walk through your performance (event by event, forward or backward) simply by turning the alpha-dial. Microscope can be used to isolate any unwanted notes or MIDI events, and then they can be easily deleted, corrected or re-written.

Advanced MIDI Implementation/In its MIDI implementation, the MC-500 is perhaps the most advanced MIDI control device ever made. It can receive or send MIDI messages on any or all of the 16 channels, and can receive or filter polyphonic aftertouch, pitch bend, channel aftertouch and system exclusive (even for instruments not made by Roland). (Figure 2) The MC-500's system exclusive features alone could save you hundreds of dollars in the cost of memory cartridges.

FIGURE 2 MIDI MESSAGE TRANSMISSION CHART

Setting of Output Assign	Both MIDI Out connectors transmit MIDI messages on all MIDI channels			MIDI channels can be assigned individually for each MIDI Out connector			MIDI Out 1 connector transmits MIDI messages on all MIDI channels and MIDI Out 2 connector transmits only MIDI clock message		
Functions	Timing Clock	Exclusive	Soft-Thru	Timing Clock	Exclusive	Soft-Thru	Timing Clock	Exclusive	Soft-Thru
MIDI Out 1 Connector	On/Off	On/Off	On/Off	On/Off	On/Off	On/Off	On/Off	On/Off	On/Off
MIDI Out 2 Connector				Off	Off		On	Off	Off

In the Studio/On the Road/The MC-500 is designed to be at the heart of any MIDI system, and as such it is equally at home in the studio as well as on the road. Because of its flexibility, edits can be made to stored programs with breathtaking ease. Does the producer want you to change your song to drop one verse and add another chorus? It only takes a second. For film work there has never been anything in this class before. By synchronizing the MC-500 to Roland's SBX-80 Sync Box, SMPTE sync is perfect. Plus, the ability of the MC-500 to allow parameter editing in real time means that you can change parameters while you are watching your performance. On the road, the MC-500 can handle as many keyboards as you can throw at it. Need to change programs and parameters on all your instruments eight times for eight different songs? With the MC-500's Chain play ability, you can string eight different songs together for access in three keystrokes. And with the speed of the MC-500's disk access, you won't ever wait long for new material.

The Result: Total MIDI Control/If you need to control a MIDI system, there is no better choice than the MC-500 MicroComposer. For not only will it fill your needs today, but it will fill your needs in the future through software updates and new uses. Plus, at only $1495.00* the MC-500 must also rank as one of the world's greatest computer bargains, especially when compared to the cost of a personal computer, software and interfaces. If you think it's time you mastered MIDI, rather than the other way around, the best way to do that is with the incredibly versatile, amazingly affordable MC-500 MicroComposer. The MIDI Computer. RolandCorp US, 7200 Dominion Circle, Los Angeles, CA 90040 (213) 685 5141.

*Suggested Retail Price

Roland®
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unit, was unavoidably close to the high gain circuits of the expander section. I solved the problem by removing the power transformer and by using a 12 volt 250 mA plug-in transformer instead. I will be glad to send other owners the transformer and instructions for making the modification for $6.

Thanks for EM, and keep up the good work. I especially appreciate your printing of sources: whether of terms, information, or parts. And I would like to see more reviews.

Rick Seaman
2715 NE 14th Ave.
Portland, OR 97212

Momentary Contact Footswitches

If you're having trouble finding momentary contact footswitches for Tim Dowty's "MIDI Footswitch" project, I have purchased a limited supply of high-quality, heavy-duty steel shank footswitches. These switches give a positive click when stepped on, and require a fair amount of pressure, so accidental tripping is unlikely.

I will make these switches available for $2.50 each, plus 5% shipping and handling (California residents include 6.5% sales tax). Allow six to eight weeks for delivery. Send orders to: Electric Ear, 26 Redwood Road, Fairfax, CA 94930.

Thomas Figueiredo
Fairfax, CA

Clone Controversy, Month Seven

In response to Mr. Colopy's letter (March '87 EM), this letter may erroneously lead your readers to assume that a PC Clone is not a good choice in a sequencing system, when in fact it is more likely that a poor choice of software will cause problems.

It is not a clone's compatibility with an IBM PC, but the compatibility of the software with the system—including add-on cards and peripheral devices—that indicates how well a clone system will work. I handle customer support for buyers of computer music systems of all kinds, and have yet to find a compatibility problem with any one kind of computer system. Most problems are caused by add-on RAM cards, turbo speed processors, video cards or bugs in software.

Without inspecting his system, I would not want to argue with Mr. Colopy as to his problems, yet I'd like to see how a well-written, professional program like Sequencer Plus worked with the PC Limited Clone. It is not easy to determine what is at fault in any system, and Mr. Colopy's advice to avoid clones is not necessarily sound.

While it is always wisest to "try before you buy," it is not always possible. Besides, there is no guarantee you will uncover every problem during your test drive. The best advice is to buy products from people who know enough about them to avoid, prevent, or at least solve whatever problems might occur. And never pay more than you have to.

Thomas B. White
Customer Service Manager
Future Music
Reno, NV

Correction Noted

I am writing to clarify a minor point in Steven Smith's review of the Sonus Super Sequencer for the C-64 and 128 (March '87 EM). The sequencer clock functions are not hidden commands. The clock is set directly via the function keys and is accessible through the main menu.

It was this article which finally prompted me to write you and commend your publication in general.

Todd Cameron Rogers
Van Nuys, CA

Just Research

Applause to EM for the articles on just intonation in the November '86 issue. The use of this "pure and natural" tuning on synthesizers was inaugurated by Thaddeus Cahill in the early 1900s. His second Telharmonium, completed in 1906, could be played in equal temperament and just intonation simultaneously, though not in all keys. Cahill designed the Telharmonium so that the same alternator (oscillator) that supplied a harmonic for an equal-tempered scale tone could also be used as the fundamental of another note in just intonation. There were up to 32 notes per octave, deployed over a four-bank manual. The synthesizer was such a nightmare to play that Cahill dispensed with the entire scheme in his third Telharmonium, a strictly equal-tempered instrument completed in 1911.

I am nearing the end of a major research project on this marvelous machine, and would like to invite readers who may have information on the Telharmonium to contact me. Many thanks.

Reynold Weidenaar
Asst. Prof. of Film & TV
New York University
721 Broadway, Room 952
New York, NY 10003
☎ 212 / 598-3702

For those who wonder who reads and responds to your letters, here's a two-dimensional representation of EM*'s diligent yet fun-loving editors: (L-R) Vanessa, Tim, Craig.* EM

ACCESSORIES

▶The **MIDIface II** ($119.95) MIDI interface box, for all models of the Macintosh computer, is a two-channel device that supports use of the modem and printer ports simultaneously. Two MIDI inputs and six MIDI outputs allow for controlling multiple music synthesizer setups. In addition, a switch lets the user configure the MIDI outputs to the software being used. This allows all six MIDI outputs to be routed to the modem port for programs that only use that port for output. Alternatively, in the other switch position, three MIDI outputs are routed to the modem port, and the other three MIDI outputs are routed to the printer port. No power is drawn from the computer itself.

Austin Development
227 Marin Street
San Rafael, CA 94901
☎ 415 / 454-9620

▶The **RZ Plus** ($299) is an expansion circuit board that installs inside the Casio RZ-1. The kit expands the sound capabilities of the RZ-1 from 16 to 52 onboard sounds. These are grouped into three banks of acoustic, electronic, and Latin sounds for a total of 36 resident ROM sounds. Additionally, the user sampling is expanded from four to 16 positions. The RX Plus kit requires installation at selected Casio service centers, or through Drumware, Inc. New alternate sound sets ($89 each) are also available separately. Each chip set contains 12 sounds that replace the factory internal sounds. A demo cassette is available for $4.

▶A **sound effects library** for the Sequential TOM drum machine consists of 15 cartridges ($99 each) and two internal chip sets ($75 each). The library includes: Atomic Drums, Rock Drums, Analog Drums, Techno Drums, Percussion 1, Percussion 2, Hippefex, Orchestral, Brushes, Ethnic, Brazilian, Latin Percussion, Sound FX, Contemporary, and Basic Percussion. The two internal chip sets, Basic Drums 1 and Basic Drums 2, are designed to upgrade the factory internal sounds. A demo cassette of all sounds is available for $4.

Drumware
12077 Wilshire Boulevard, Ste. 515
Los Angeles, CA 90025
☎ 213 / 478-3956

Emax Rack sampler

KEYBOARDS

▶The **Emax Rack™** Digital Sampler ($2,695), a convenient, rack-mountable version of the Emax digital sampling keyboard that will give any MIDI controller all the capabilities found in the Emax, is now available. The multi-timbral Emax Rack is ideal for adding power to a current MIDI system, to link to an Emax keyboard for true 16-channel capability, or even to deliver sampling power to a MIDI guitar.

E-mu Systems, Inc.
1600 Green Hills Road
Scotts Valley, CA 95066
☎ 408 / 438-1921

RECORDING

▶The **SynHance MTS-1** ($229) is a low-cost, easy-to-use tape synchronization system that brings full chase-lock capabilities to any hardware or software sequencer that supports MIDI Song Pointers. This synchronizer delivers SMPTE-like performance to tape and sequencer locking applications where it is important for the sequencer to start in precise synchronization with the tape, regardless of whether it is at the beginning, the middle or at the end of the tape.

A proprietary "beat code" recording method captures the tempo and beat information of a performance, including accelerandos and decelerandos. The time code works with a wide variety of tape recorders and a wide range of signal levels.

The MTS-1 works with any MIDI sequencer product that accepts external MIDI synchronization. This includes most hardware and software sequencers. Chase locking is achieved when the MTS-1 is used along with a sequencer that implements MIDI Song Pointers. However, even sequencers that do not implement Song Pointers can benefit from using the MTS-1 as its tape sync interface because of a unique error-correction method that allows it to operate properly even in the presence of the kind of tape drop-outs that normally ruin an FSK sync-track.

The MTS-1 also includes two separate built-in MIDI merge functions to facilitate use in a MIDI setup. This not only eliminates the need for a MIDI switcher, but also opens up the possibility for recording into the synchronizer while locked to tape playback. The second built-in merger also provides a "keyboard echo" capability to those sequencers that do not support this function for live overdubbing of sequenced material.

Harmony Systems Inc.
PO Box 2744
Norcross, GA 30091
☎ 404 / 662-8788

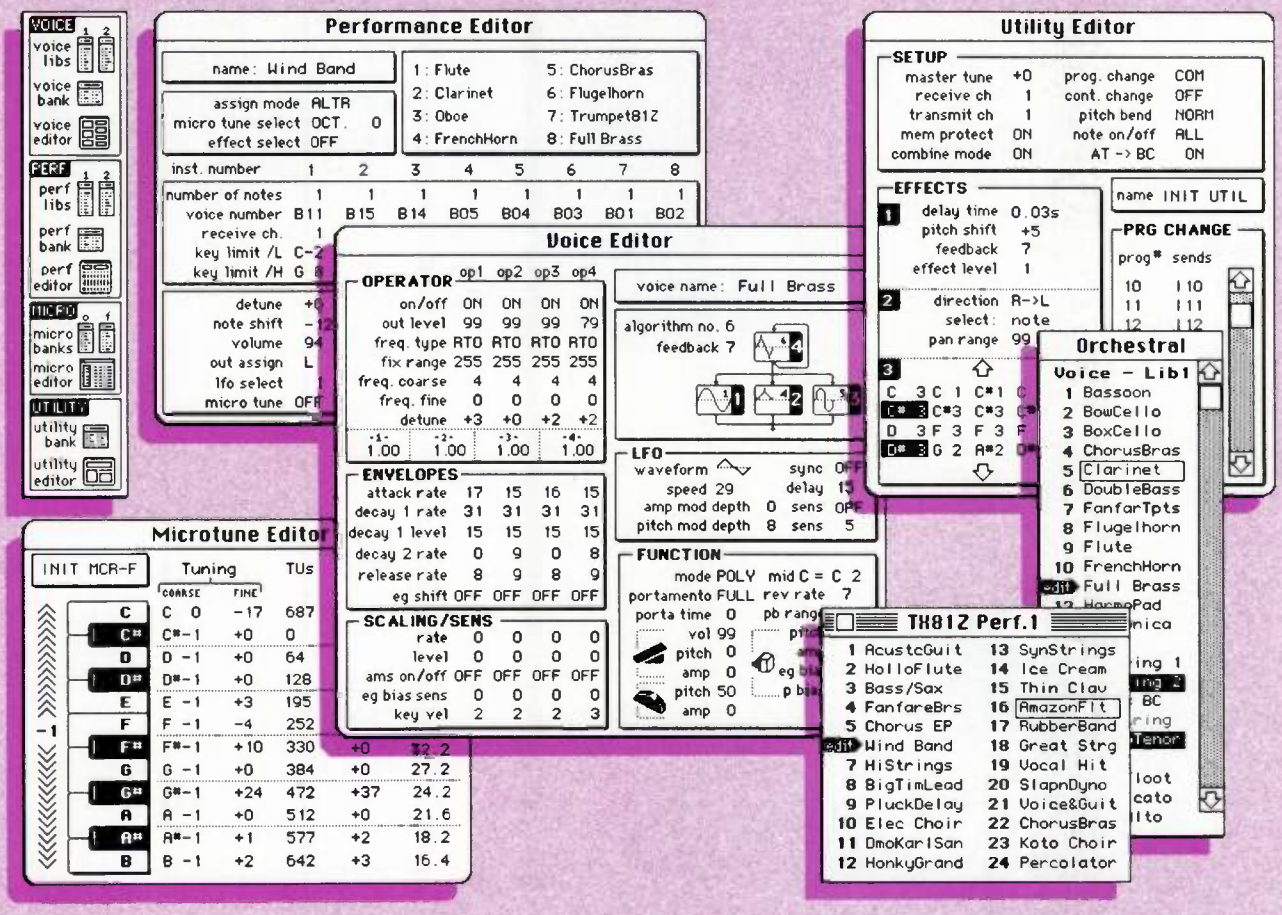
Maxell R-120DM digital audio tape

▶The **R-120DM DAT Cassette** will record up to two hours of digital sound equivalent to that of compact discs. Pertinent specs are tape width, 3.80mm; tape length, 61 meters; total thickness, 13.0 μm; and coating thickness, 2.5 μm.

Maxell Corporation of America
60 Oxford Drive
Moonachie, NJ 07074
☎ 201 / 641-8600

Introducing...

TX81Z PRO



Explore *all* the capabilities of the TX81Z. Voices, performances, microtunings, and effects can all be edited quickly and easily.

TX81Z PRO's new library windows let you alphabetize and arrange hundreds of voices and performances.

TX81Z PRO also allows you to organize, catalog, and printout your sounds, all at the click of a mouse.

TX81Z PRO — the powerful yet easy to learn voice editor and librarian in one simple, integrated program.

Now available for the Macintosh 512, Plus, and SE. Suggested retail price $139.

For further information, ask your local dealer or contact us directly.
Ask us about our other voicing programs.
Demo disks are available for $5.

Digital Music Services

23010 Lake Forest Drive, Suite D334, Laguna Hills, California 92653

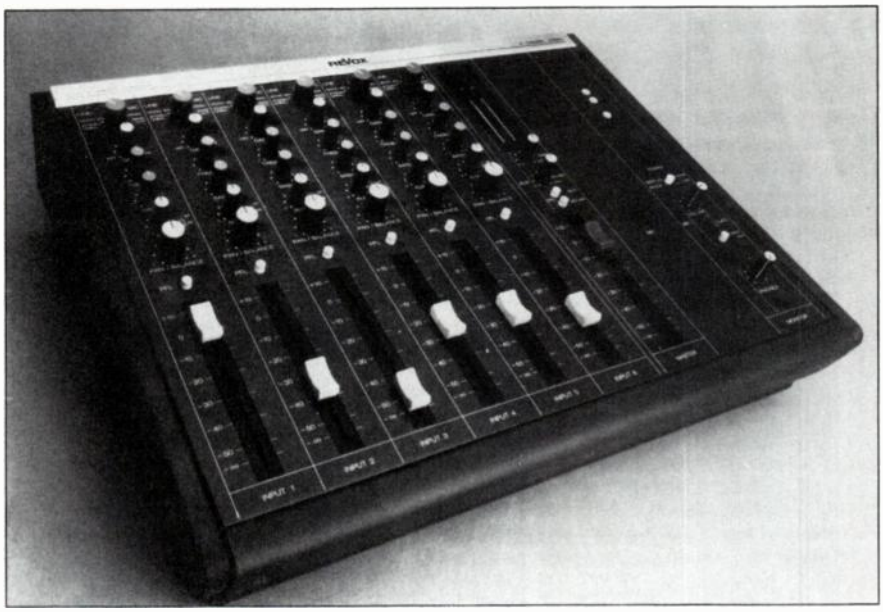
(714) 951-1159

Dealer inquires invited! TX81Z is a trademark of Yamaha. Macintosh is a trademark licensed to Apple Computer. © 1987 Digital Music Services.

▶The **C279** ($2,699) is a compact 6-input audio mixer. Designed for relatively basic production chores, all six input channels of the C279 are switchable to accept either balanced microphone, balanced mono line, or unbalanced stereo line inputs. Professional grade long-throw faders control input level through voltage controlled amplifiers.

Other features include click-free solid-state switching in audio circuits, phase metering for mono/stereo compatibility, built-in monitor speaker and talkback mic, headphone output, and level control for monitoring. Both balanced XLR and unbalanced master outputs are provided.

Studer Revox
1425 Elm Hill Pike
Nashville, TN 37210
☎ 615 / 254-5651



Studer Revox C279 audio mixer

Boss LM-2 limiter

SIGNAL PROCESSORS

▶The **LM-2 Limiter** ($109.50) eliminates undesirable overload conditions by sharply compressing any transients or peaks which exceed the set threshold level. The LM-2 incorporates a high-performance VCA for low-noise operation. Controls include Level, Tone, Threshold and Release. The Threshold control determines the level where limiting is activated, and the Release control determines the time required for limiting to be cancelled after the input signal falls below the threshold level.

RolandCorp US
7200 Dominion Circle
Los Angeles, CA 90040
☎ 213 / 685-5141

SOFTWARE

▶The **Xpress Patch-FM** ($24.95) library utility is the first in a series of Amiga computer MIDI software products which support the Yamaha DX7, TX7, and FB-01. Features include:

- pull-down menus
- load/save patches, banks, configurations from/to diskette
- customize voice banks (DX7, TX7, FB-01)
- customize configurations (FB-01)
- load multiple copies for simultaneous functions

Version 1.2 AmigaDos is required, as well as any Amiga-compatible MIDI interface.

Digitools
PO Box 7417
Buffalo Grove, IL 60089

▶The **Copyist™** ($195) is an Atari ST publishing-quality transcription and scoring program. It runs on the 520 and 1040 ST computers with either color or monochrome monitors. Printers supported are the Hewlett Packard Laserjet Plus, Epson FX, Hewlett Packard Inkjet, or Hewlett Packard or Roland DG plotters. The Copyist program both reads and writes Dr. T's KCS and MRS files allowing for a truly interactive method of composition.

▶**4-OP Deluxe™** ($99) includes editors for all of the four-operator Yamaha synthesizers including the TX-81Z, FB01,

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How Many Different Products Would You Have To Buy To Get All These Features?

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❑ 18-bit floating point sampling ❑ 14 sampling rates ❑ Six sampling modes ❑ Variable trigger input sensitivity ❑ 100 seconds of sampling at 5KHz ❑ 10 seconds of sampling at 50KHz ❑ 31 assignable samples per keyboard ❑ Full editing of user samples, including trimming, looping, reversing, tuning, dual amplitude keyboards ❑ SUPERAM I—doubles sampling memory ❑ SUPERAM II—quadruples sampling memory ❑ QLS™ (Quick Load System) software for rapid loading to and from Macintosh™ personal computer. Includes: SD Convert for using Sound Designer™ and Soft Synth™ sound editing programs, Keyboard Mover and Sequence Mover ❑ Kurzweil 250 Sound Library ❑ Simultaneous use of sampled and resident sounds

12 Track 12,018-note Sequencer

❑ Sequence MixBoard—mute, solo ❑ Punch in/out ❑ Record continuous controllers (pitch bend, volume, etc.) ❑ Looping ❑ Quantization on playback ❑ Set play/record pointer ❑ Record and play back over MIDI ❑ Sequence chaining ❑ Full track/event editing ❑ Call section, section copy, track copy ❑ Variable rate external sync and MIDI sync ❑ Simultaneous access to all on-board sounds

And More

❑ Powerful MIDI implementation ❑ Multi-timbral over MIDI ❑ Responds to continuous controllers over all channels, including poly-pressure

We Racked Our Brains

The Kurzweil 250 RMX is the new rack-mount version of the Kurzweil 250, measuring 19"(W) × 10.5"(H) × 22"(D) and weighing only 53 lbs. The Kurzweil 250 RMX can be purchased in the same configurations as the Kurzweil 250, with all the same great features and sounds.

You could buy a sampler, a sequencer, hundreds of sounds on disk, a mixing board and more and still not equal the power of the Kurzweil 250. The immediacy and convenience of the Kurzweil 250 as a compositional tool are unmatched. And now you can buy the Kurzweil 250 RMX, the Kurzweil 250 in a 19" rack that is portable and space-saving.

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Kurzweil Music Systems, Inc. 411 Waverley Oaks Rd. Waltham, MA 02154 (617) 893-5900

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Now the sound of a piano joins 19 other instruments in our most remarkable keyboard system ever.

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The new Technics SX-PR60 uses advanced digital technology called PCM to achieve the rich sound of an acoustic piano and 19 other instruments.

Play up to five instruments simultaneously. Enjoy musical accompaniment and bass sound automatically. Even pick from 17 rhythms. The digital ensemble also has 88 touch-sensitive keys. It's MIDI compatible. Stores music for playback. And more.

So if you're a pianist who'd also like to be a trombonist, organist or flutist, have a seat. At the new Technics digital ensemble.

For information: Technics, 6550 Katella Ave., Cypress, CA 90630. (714) 895-7218.

Technics
The science of sound

DX100, DX27, and DX21. An additional conversion program converts DX100 voices to FB01 voices. 4-OP Deluxe features point and click graphic editing of the operator envelopes as well as the ability to play the synthesizer with the mouse from the computer screen.

▶**Waveform™** ($149) is a graphic editor for the Ensoniq Mirage synthesizer and the IBM PC computer. It completely replaces the control panel of the Mirage and allows handling of all sampling and editing functions directly from the computer. It requres 384K, two drives, and either Hercules or CGA video cards.

Dr. T's Music Software, Inc.
220 Boylston Street, Ste. 306
Chestnut Hill, MA 02167
☎ 617 / 244-6954

▶Opcode librarians, some of the most popular patch librarians for the Macintosh computer, now feature **Patch Factory** random patch generation; this creates sounds using any of several supplied algorithms. Librarians with Patch Factory also include a countless number of new small features, many suggested by current librarian users. A future version will also support split-architecture synthesizers such as the DX7 II, Matrix-6, JX-10 and Super Jupiter, directly on the screen.

Opcode Systems
444 Ramona
Palo Alto, CA 94301
☎ 415 / 321-8977

▶**Sonic Editor** ($245) is a visual editing program for Atari ST computers and Ensoniq Mirage and Multi-Sampler instruments.

Parameters from either the upper or lower sound, any of the eight wavesamples, or any of the four programs may be displayed. Wavesample, envelope, and filter settings are shown on different screens with both Mirage parameter number and title for each. Values may be edited from the computer keyboard and sent to the Mirage.

Waveforms are transferred between the computer and Mirage with MIDI. A waveform of any length can be saved to an ST disk for later use. Several analog and additive synthesis sounds are provided on the program disk.

A FM synthesis routine can be used to create complex sounds. Loop Edit mode calls a display of the loop end and start pages side-by-side to streamline operations. Loop points can be set by a command from the computer. Several advanced looping techniques are included.

Sonus Corporation
21430 Strathern Street, Ste. H
Canoga Park, CA 91304
☎ 818 / 702-0992

OTHER NEWS

▶**CompuSound** is a full service facility dedicated to the computer/MIDI software-oriented musician. Among the nationally marketed services planned for the facility are: sales and support for MIDI/music software and major brand name computer systems, software-based music education programs, personal MIDI system design consultation, and high-end system accessories including tape/video recorders and synchronizing systems.

CompuSound
5715 Buford Highway, Ste. 201
Atlanta, GA 30340

▶***The Complete Guide to MIDI Software* by Howard Massey and nine other contributors, Amsco, 1987 ($19.95) ★★★★**

This 252-page book contains reviews of eight IBM PC programs, 11 Mac programs, 12 for the Apple II, four Atari ST programs, 23 for the Commodore 64 (plus one for the C128), and finally, the TI 99/4A's lone MIDI program. There is also a two-and-a-half page introduction that briefly describes the various computer families, and a four-and-a-half page "What is MIDI?" section (neither of these will make you an expert, but I assume they would be helpful to those who need a quick refresher before plunging into the rest of the book).

Each review includes a "product summary" box like the kind that graces EM's reviews; this includes information on the program (author, manufacturer, system requirements, version tested, price, special features, and limitations). This is followed by a "guided tour" that takes you through the program's major features (several screen dumps help illustrate important points), followed by a conclusion.

Of course, in a fast-paced world like computer software, a book like this is obsolete the day it leaves the author's word processor. As a result, there are no programs from newer companies like Sonus or Blank, yet programs from Syntech (which is now out of business) are included. Furthermore, the versions tested are often not the versions sold currently in stores; some bugs mentioned in the reviews have been exterminated since the book was published.

Although these factors work against the book being a source of the "latest, up-to-datest" information (that's more the role of magazines), the information contained would still be of tremendous value to someone about to make any significant software purchases. This book is about as close as you're going to come to visiting a well-stocked music store and getting demos of everything out there, and after reading through some of the programs you'll be well aware of the various features available, which will make the buying process easier. And for a magazine editor, this book is great—when someone mentions a program with which I am not fluent, it's easy to look it up and see what everyone's talking about.

Had this been released six months ago, I would have given it five stars, but even though it's a bit dated now, it still rates a solid four stars. I was going to advise subtracting a star for every five months that pass by, but Howard Massey assured me that he expects to update the book regularly. Meanwhile, *The Complete Guide to MIDI Software* serves a valuable function for those who need an in-depth survey course of what's out there in the wide world of MIDI software.

—Craig Anderton

First Take is just that—people's first impressions of some of the latest products. Ratings are provided by each reviewer according to the following standards:

★★★★★ *The cream of the crop—offers exceptional value or vision*

★★★★ *Very good product with few, if any, flaws*

★★★ *Solid, workmanlike product but not particularly exciting*

★★ *Below-average for its field; often flawed in some way*

★ *Has serious problems—try before you buy!*

We would like to remind you that these are opinions, not gospel, and as always, EM is a communications medium and we welcome opposing viewpoints.

Music Sales Corporation
24 East 22nd St.
New York, NY 10010
☎ 212 / 254-2100

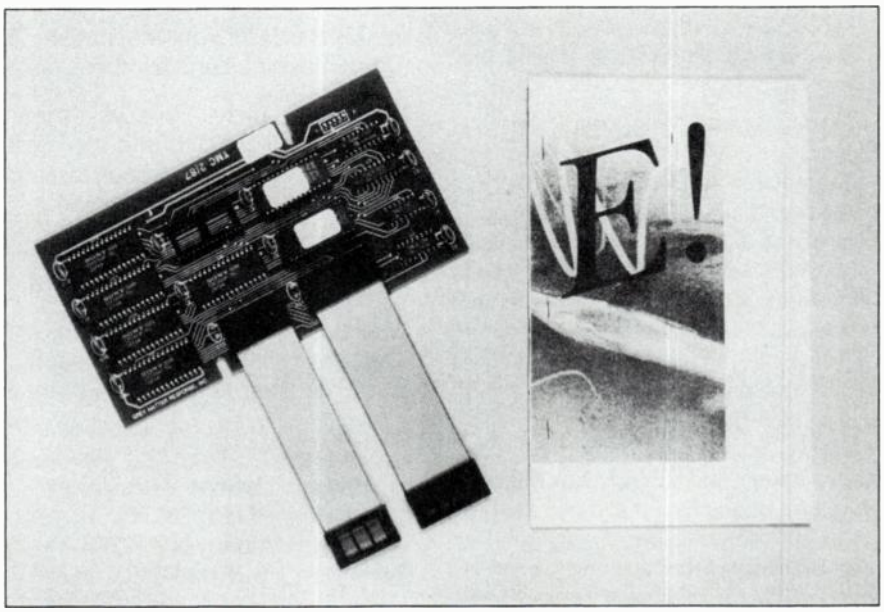
▶**GREY MATTER RESPONSE E! Revision 2 ($399) ★★★★★**

E! Revision 2 is the most recent incarnation of GMR's unique memory and function expansion retrofit for the Yamaha DX7 (Rev 1 was reviewed in the April '86 EM). While Rev 2 software re-incorporates most of E!'s original features, it is for all practical purposes an entirely new product, with over twice as many functions as before—and even more memory! The new board is smaller and easier to install (there's no need to remove the DX7 keyboard first), though E! installation is still a job for a qualified tech.

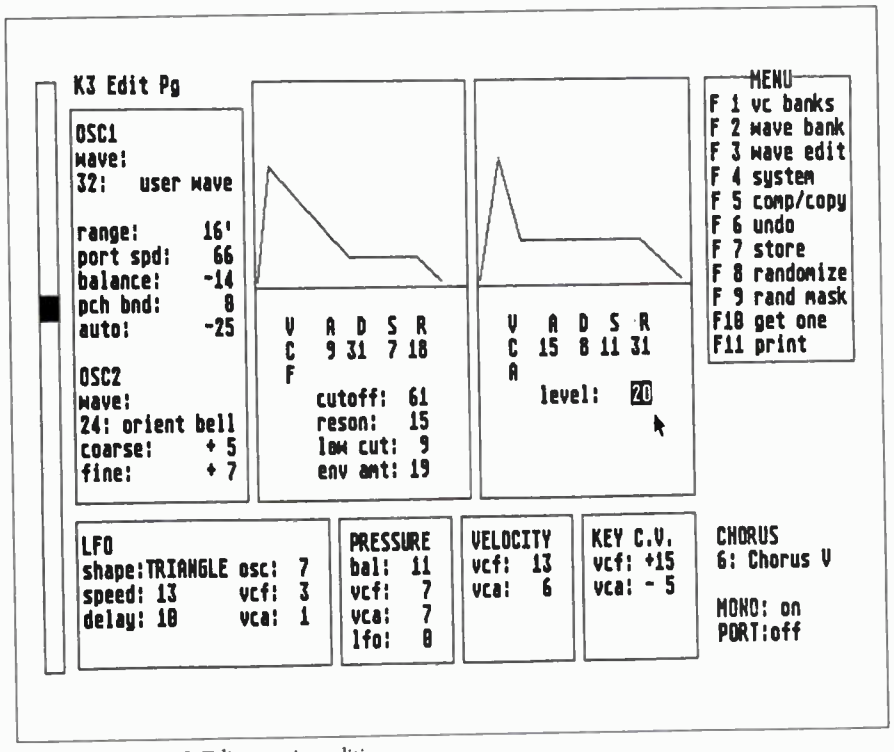
E! Rev 2 allows storage of up to *320* internal patches, *each* with individual function parameters, including new programmable functions such as: Patch Volume, Velocity Curve, Velocity Limit, Velocity Offset, Timbre (scales all modulators simultaneously to control brightness), Keyboard Mode, Key Limit, MIDI Output Channel, and MIDI Output Transpose. Or, you can store 256 patches and 16 alternate tunings for the keyboard. Just, mean tone, even arbitrary tunings can be created with a resolution of 1/3 cent, and Rev 2 has onboard compilers to facilitate creation of equal-tempered (with any number of notes per octave) and microtonal tunings.

Plus, E! can now contain your favorite DX patches in *ROM* as *presets!* GMR will burn a custom 256-patch ROM for an additional fee, or techno-types can burn their own (details on all this are in the manual). If that's not enough, Rev 2 also has a special cartridge format mode that allows a regular DX-type RAM cartridge to hold 32 programs *and* function data for each.

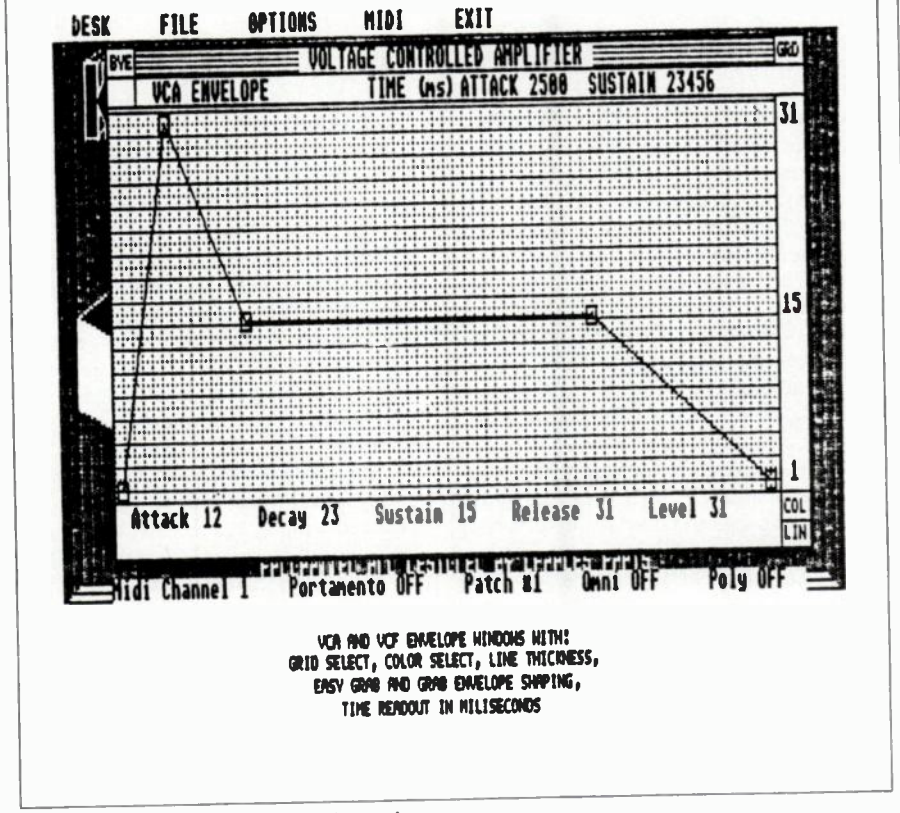
Alternate keyboard modes now include: *Rolling* (alternates note assignment between the MIDI Out and internal tone generators), *Track Hi* (high note to MIDI Out, all notes to internal tone generators), *Float Hi* ("smart" right-hand floating split), and *Normal* mode—each with a programmable Key Limit function. These features provide some amazing fixed and moving splits. *Stack* mode assigns two voices per key for a fatter sound, and *Random Detune* mode simulates tuning imperfections in acoustic instruments; combined, these two modes sound outrageously fat and animated, like an analog synth. Rev 2 even has a *MIDI*



Grey Matter Response E! Rev 2



Dr. T Atari ST K3 Editor, voice editing screen



Compu-Mates K3P0+ VCA envelope edit screen

Guitar mode that provides true legato control of each voice: the DX7 behaves like a 16-voice, single-timbre mono synth (but polyphonic pitch bend is not implemented).

Extensive data filters are separately programmable for the MIDI In, MIDI Out, and Local Control. Running Status and Active Sensing can be enabled/disabled (hooray!). With Rev 2, the DX7's MIDI Input can merge controller, Note On/Off, or MIDI clock data; and the MIDI Output can echo Note On/Off data, sent to the internal tone generators (from whatever source), on Channel 1. The LCD automatically provides a readout of Sequence Stop/Run functions and Beat Number, or MIDI Time Code (MTC) position!

And if *that's* not enough, you can now map MIDI program change commands so that an incoming program change number can call up any internal or cartridge program (that's up to 352 programs!); and each of the internal programs can retransmit two *different* program change numbers, on separate channels. You can advance through the patch map using the Portamento Pedal. Also, you can map the Mod Wheel, Foot Controller, Breath Controller, or Data Entry Slider outputs to function as other controllers (there's still no way to map aftertouch into pitch bend, though).

If you're worried about your old DX7 becoming obsolete, stop worrying. E! Rev 2 has some features you won't even find on the new DXs (at least until GMR makes a retrofit for them); and if I had to choose between a new DX7 IID or an old DX7 with E! Rev 2, it would be a *tough* choice. Best of all is the price: Rev 2 costs the same as the old version—$399 (less installation); and owners of Rev 1 can upgrade their units to full Rev 2 capability by simply installing a new EPROM set, for *$20!* The original E! was remarkable; Rev 2 is incredible.

—Alan Gary Campbell

Grey Matter Response
15916 Haven Avenue
Tinley Park, IL 60477
☎ 312 / 349-1889

▶Dr. T Atari ST K3 Editor ($99) ★★★★★
▶Compu-Mates K3PO+ Atari ST K3 Editor ($99.95) ★★★★

I'm quite a fan of Kawai's K3M rack mount synthesizer, and since I also like to program all my own patches, I've been on the lookout for a good voice editor/librarian for quite some time. Well, I needn't look any further.

Dr. T's program (written by Bob Melvin) is a no-nonsense, straightforward, easy-to-learn program that is low on flash but very high on practicality. One absolutely genius feature is that you can "play" notes at any time from the mouse, with the horizontal position specifying the note and the vertical position the velocity (no chords, though). For rack mount

owners, this saves a lot of time and trouble; now you can *hear* the effect velocity has on a patch, using a method that is in some ways more repeatable than a keyboard.

All voice editing parameters are accessed on a single page—click on the parameter, grab the "virtual slider" with the mouse (this can be done in a number of ways to make editing even faster), and tweak away. You can also type in parameter values, which in many situations is faster than doing it with the mouse. A random patch generator function is included; a "randomization mask" determines which parameters will be randomized, and you can adjust the amount of deviation from the existing setting (0 to 100%). There's also a screen for diddling around with the additive waveform synthesis; this can be a lot of fun—especially compared to trying to do it from the front panel.

The Librarian section stores up to four complete banks. Voices may be quickly copied or moved between banks, erased, renamed, and so on. Everything happens in RAM (except for saving to, or loading from, disk) so operation is very speedy (disk operation is fast too). In addition to the standard "compare" feature, which lets you compare edited and unedited versions, you can compare to a different patch altogether in *any* of the four banks. The display highlights any differences, and any of these parameters can be copied to the patch you're currently editing. Thus, you could copy just the envelope parameters (or whatever) from one patch, even in another bank, over to another patch.

A handy *merge* feature lets you plug a keyboard into the Atari's MIDI In, which merges this data along with the patch editor data and sends it over the MIDI Out. You can therefore make changes and play the new patch instantly from a master keyboard.

Compu-Mates' K3PO+ editor (written by Charles Faris) is somewhat more unwieldy than the Dr. T program, but has its own attributes. The randomization function (which, like the Dr. T version, has a randomization "mask") seems to produce a significantly higher percentage of good patches. The user waveform randomization feature is also quite effective. Like Dr. T's program, the Compu-Mates editor includes the stock Kawai patches on disk, but whereas Dr. T includes only a few original sounds, K3PO+ goes one step further by including several original sounds of varying quality (including 100 patches by—no kidding—Dr. Timothy Leary, some of which are quite good).

K3PO+ devotes three screens ("pages") for the voice editor parameters (the VCA and VCF modules each have their own pages). The VCA/VCF envelopes can be altered simply by grabbing their breakpoints with the mouse and dragging them wherever you want; times are also shown in milliseconds (thanks!). Dr. T's program requires numeric or slider entry of envelope parameters, although there is a graph of the envelope shape that changes as you change parameters. The Compu-Mates approach coddles the user a bit more, is certainly flashier (you can select various grid backgrounds too) and arguably more intuitive, but having to switch between screens slows down the programming process. Another hassle is that selecting a different preset requires calling up a preset change menu, changing the preset, and going back to your editing (although this process will supposedly be simplified in future revisions); and you can have only 50 patches "on-line" at any one time, as opposed to the 200 patches with Dr. T's program.

"Compu-Mates' K3PO+ includes 100 patches by—no kidding—Dr. Timothy Leary"

Although K3PO+ is a fun and useful program that invites experimentation, a serious flaw is that the only way to generate test notes when using the rack-mount K3M is through the virtually useless "diddle" function, which sends a fast burst of random notes into the synth. With the K3, of course, you can play the built-in keyboard; with the K3M, you would have to do some kind of hardware merge (either with a merger or with some clever MIDI patching) to play with the results of your editing. Transferring the user waveform into the K3M, and playing it back, is also bothersome. I mentioned these problems to Compu-Mates, who said that the next update will include a simple sequencer—which is probably the best way to evaluate patches anyway, since you can play chords and single notes in the style of the sound you're trying to synthesize.

The speed, convenience, and expanded library functions of the Dr. T program—coupled with a highly efficient user interface and high reliability—earn it five stars. Rating K3PO+ is a little harder. Because of the problem using it with the K3M, I was going to give K3PO+ two stars when used with the K3M and four stars when used with the K3. But if it includes the sequencer, K3PO+ makes it fully into the four-star category. —*Craig Anderton*

Dr. T's Music Software
66 Louise Rd.
Chestnut Hill, MA 02167
☎ 617 / 244-6954

Compu-Mates
8621 Wilshire Blvd., Suite 177
Beverly Hills, CA 90211
☎ 213 / 271-7410

▶Maartists Musicpack™ Plus CZ RAM Cartridges with Patches
Volume 1 ($59) ★★★★
Volume 2 ($59) ★★

The Maartists Musicpack Plus CZ cartridges store 64 patches in four 16-patch banks, using battery-backed RAM. (The cartridges are also available with 16 generic patches for $49.) Physically, they're much the same as other CZ cartridges: there's the usual telltale bulge on one side of the case, where the battery holder spring pushes out on the plastic! (Is there a cartridge-design engineer alive who has passed an engineering materials course?) Banks are selected via miniature slide switches on the top of the cartridge case, so if your CZ is at the top of a three-tier stand, good luck.

Maartists offers two different 64-patch sets: *Volume 1* contains a selection of keyboard, synth, and conventional instrument sounds (bass, guitar, flute, strings, percussion, etc.); including two banks by programmer Tom Becker, with performance notes, and two uncredited banks that don't even have patch names (I've called these banks "2A" and "2B"; Maartists' patch/bank nomenclature is incredibly confusing). There are some standout patches: *Dream Piano* and *Hammer 2* are strong synth piano/clav sounds. *Elf/Bass 2* is a super lead patch—it sounds great Tone-Mixed with itself. *Breath Flute* is an imitative flute with just the right amount of "breath" noise; *Faraway* is a chiffy synth-woodwind. *Wheeze!* is a pretty convincing Simmons simulation. A number of the keyboard sounds are powerful: 2-A #8 (no names, remember?) is a nice "stacked" sound—Line 1 provides a percussive koto/clav, and Line 2, a hollow synth woodwind; 2-A #10 is a great honky-tonk piano (really!); 2-A #13 is a strange, subtle koto-like sound; 2-B #5 is a punchy bass/clav hybrid; 2-B #8 is a ethereal, Kalimba/bell-like piano; 2-B #10 is an odd nasal clav; and several of the "straight" pianos are acceptable over a limited range. 2-B #14 is a hollow-body guitar patch that's a reasonable substitute for the often-used DX7 "Jazz Guitar." The numerous synth timbres in Volume 1 sound uncannily like a mid-priced hybrid synth (e.g., a Roland JX). This could be just the ticket for those MIDI musicians who've traded in their older gear for DXs and CZs, and miss those analog-like sounds.

Maartists CZ RAM Cartridges with Patches

Volume 2 concentrates on synth sounds, opening with *Pow*, one of the strongest CZ timbres I've ever heard—it's like a cross between a Memorymoog sync-sweep patch and

the infamous DX7 "Wasp Sting"; it's outrageous. And there's other good stuff: *New Age* is dreamy flute with echo and timbral afterenvelope; *Bright Electric Piano* has a compelling glassy quality; *Lute Ensemble* actually sounds like a synth woodwind with a vocal format; and *Violin* makes a *great* accordion—polka fans take note! Some of the sounds are really fat: *Synth Strings with Percussive Attack* evokes a Memorymoog patch; *Orchestration II* is like a flanged electric harmonica; and *Power Bright Brass Ensemble* sounds very Keith Emerson-like, with a little tweaking. Unfortunately, a number of the remaining sounds, especially in Bank 1-B, are rather generic. This seems like padding. In fact, one patch, *Strings with Horn Attack*, is virtually identical to CZ Preset 09 *BRASS ENS.2*.

Volume 1 is a well-balanced set; in that respect, it's recommendable. Volume 2 contains some truly superb patches, but its weak points make it harder to recommend. Maartists could combine the best patches of both Volumes and have perhaps the best CZ patch set available; but patch marketing doesn't seem to work that way. If you need a RAM cartridge, the additional cost for patches certainly seems justifiable, but patch quality is subjective—check out the sounds before you buy (demo cassettes should be *mandatory*).

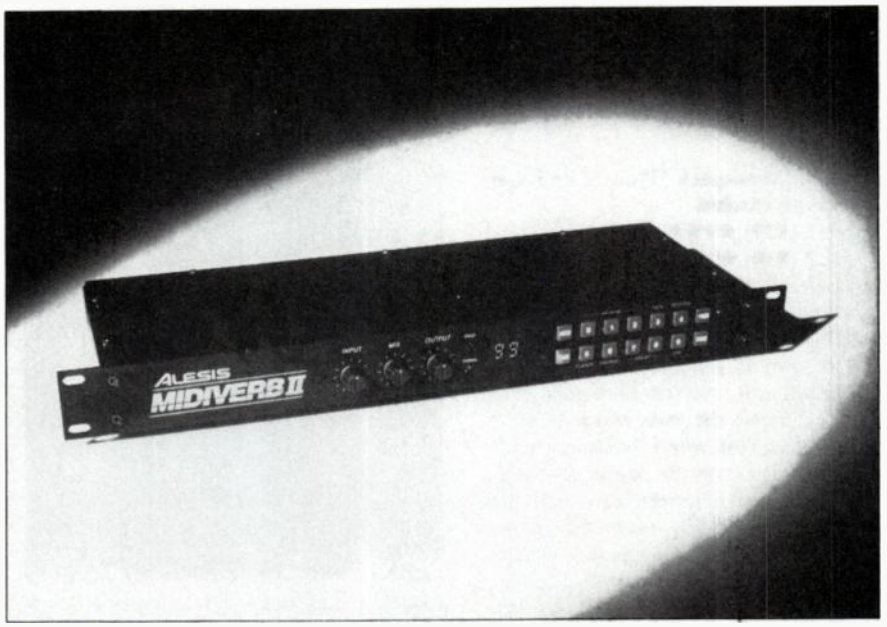
—Alan Gary Campbell

▶Alesis Midiverb II ($399) ★★★★★
▶Alesis MPX MIDI Patch Transmitter ($99) ★★★

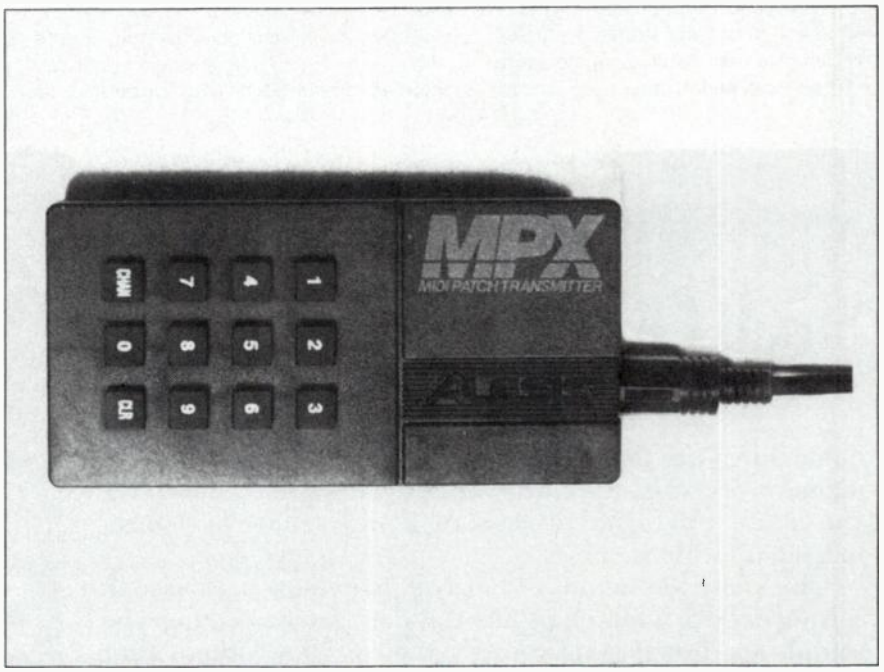
Midiverb II is a rack-mount 16-bit preset digital reverb, following in the RISC (Reduced Instruction Set Computer) footsteps of the Midiverb, Midifex, and Microverb. The front panel includes Input Level, Output Level, and Mix controls; a keypad; a two-digit LED display; and various indicator LEDs. The rear panel provides ¼-inch unbalanced stereo inputs and outputs, MIDI In and Thru jacks, a "Cancel" footswitch-input, and a ⅛-inch mini phone jack input for the included external transformer (no power switch is provided).

Midiverb II processes in stereo: the left and right inputs are combined, then processed to produce separate left and right stereo reverb signals, which are added to the left and right dry signals, respectively. Does 16-bit resolution make a difference? It does. The 'II sounds bright and very clean (the published effect bandwidth is 15 kHz), and the chorus and flange programs are useable even on screaming high notes from synths, with no noticeable artifacts or aliasing, whatsoever.

The 'II's 100 programs can be accessed directly, via the keypad or MIDI program change numbers 00 to 99 (on a selected channel); however, there's no way to single-step through the programs. Alternately, 32 MIDI program change numbers can be mapped to call up any selected program; and the unit remembers the map when powered down. There are



Alesis MIDIVERB II



Alesis MPX Patch Transmitter

29 reverb programs, 20 single-repeat slapback programs, and ten each of gated reverb, reverse reverb, chorus, flange, and effects programs; program "00" defeats the effect.

The reverb programs sound simply great. Though I've been impressed with other preset reverbs, their sounds sometimes just don't "gel." But with Midiverb II, *you are there!* The programs range from small rooms to immense cathedrals, some with response variations that follow the program material, and other effects. The reverb tails are surprisingly stable. My only quibble in this regard is with Program 27, a gargantuan hall simulation: there was noticeable 3 to 4 Hz amplitude modulation during the decay, especially following dense program material, though this might not be audible in a mix.

The slapback programs vary, for the most part, with regard to delay time. Devoting 20 programs to a single type of effect may seem redundant, but how else can you provide variety in a preset unit? Redundant or not, there's probably something here for most every application, and the sounds are tight and

—continued on page 106

We've created a monster.

Introducing CUE™—the monster Macintosh program for film music scoring.

CUE automates every time-consuming paperwork and calculation task that occurs when you create film music.

That means you'll be looking at one terrific picture of productivity on your Macintosh screen.

You can make a cue sheet that toggles between feet/frames, minutes/seconds, 24, 25, 30, and drop frame SMPTE; it can even show you two of these time formats at once.

You can calculate and display beats for each cue point, in addition to displaying up to 100 meter changes and 100 tempo changes in several common formats.

You can make short work of calculating tempos because CUE instantly searches up to 36 tempos at once and shows you which cue points are hit within two frames. And if no tempo works, you simply use accelerando/ritard to land on the beat you want.

In addition to CUE's ability to print score paper with your instrument names and clefs, with beat times, bar numbers, click numbers, abbreviated cue point descriptions and tempo changes printed at the top of each system, you can print out master cue lists and performing rights cue sheets.

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As you can see, CUE is the complete program that'll keep those doomsday deadlines from squeezing your creative time down to nothing at all.

For more information on CUE, contact the music dealer nearest you or call Opcode and ask where you can preview a screen test.

Then start creating some monster hits of your own.

Opcode systems

444 Ramona
Palo Alto, California 94301
(415) 321-8977

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User Groups

Attention User Groups! *To be listed in* EM, *simply describe who and what you are: name, address, phone, areas of interest, membership dues and qualifications (if applicable), and services offered to members. Notice of specific, dated events must arrive at* EM*'s offices three months prior to the cover date. (For example, we would need to know by July 1 about any meetings planned for October.)*

To be listed, you must notify us every month *(hey, that's what computers are for) that you're still active. Sorry to put you to the extra effort, but otherwise we have no idea of which groups are still around when it's time to put together the latest list. Send info to* User Group Listings, EM, *2608 Ninth St., Berkeley CA 94710. There is no charge for this service.*

Note: EM *cannot check into each of these organizations. Call or write first for additional information (or go to a meeting) before sending any money to any users group.*

▶The **Akai AX-80 Users Group** helps AX-80 owners swap patches/techniques, modifications, and setups. Membership is free.

AX-80 Users Group
c/o David C. Diener
105 Niles Hill Rd.
New London, CT 06320
☎ 203 / 442-5186

▶The **Canadian Electroacoustic Community** (CEC) has been founded by more than 95 composers coast-to-coast in Canada. The CEC's first aim is to develop communications systems for this far-flung, multifaceted community. Activities include publication of a newsletter and the creation of a computer-based conferencing and electronic-mail system. The CEC has members in every major center in Canada and operates fully bilingually, in English and French. For more information or to obtain a sample copy of the newsletter, write:

CEC
PO Box 757
N.D.G. Station
Montreal, Quebec
Canada H4A 3S2

▶The **Canadian MIDI Users Group** (C-MUG) is a Toronto-based nonprofit international group of musicians, manufacturers, educators, technicians, and programmers. C-MUG provides meetings, a newsletter published six times a year, and MIDILINE, a MIDI dedicated BBS (Bulletin Board Service). Contact:

Canadian MIDI Users Group
c/o Eric Baragar
PO Box 1043
Belleville, Ontario
Canada, K8N 5B6
☎ 613/ 966-6823 (BBS)

▶The **Champaign/Urbana MIDI Users Group** meets on the third Thursday of every month at 7:30 p.m. We discuss applications, problems, and have new product demos every month. As of now, there is no membership fee. Meetings are held at:

C. V. Lloyde Sound System Products
102 South Neil Street
Champaign, IL 61820
For information contact Andrew or Matthew at:
☎ 217 / 352-7031

▶**CX5-US Users Group** maintains a 1,200+ voice library, available upon joining, for the CX5M. A number of public domain games, utilities, and programs are also in the library. Monthly meetings are held the first Tuesday of each month at the address below at 8 p.m. A newsletter is also distributed on an irregular basis. Membership fee is $20/yr. Contact:

CX5-US Users Group
c/o Mike Dwyer
5218 Scott St.
Torrance, CA 90503
☎ 213 / 540-3758

▶The **Digidesign BBS** provides technical support and user tips for registered owners of Digidesign software, as well as general news about the music biz, computers and music, etc. Sound Designer format sound files (for use with *Sound Designer* and *Burner*, Digidesign's EPROM programmer) are on-line for downloading, and users are encouraged to upload sounds. Parameter files for Digidesign's new *Softsynth* program will also be on file for up/downloading. The BBS is on-line 24 hours a day, seven days a week, and supports 300 and 1,200 Baud communications (auto-selected by the BBS). Set your modem for 8 bits, one stop bit, no parity. ☎ 415 / 494-0264.

▶The **DW User Group** supports the Korg DW/EX-8000, DW-6000, and the new DS-8. Information and sound patches for the synths are exchanged through a bi-monthly newsletter. To receive information, send a self-addressed, stamped envelope to the address below, or send $4 (US) to receive the first newsletter (make checks payable to the editors, Scott Kahn and Jim Kierstead, not to DWUG). Mail can also be left via Compuserve mailbox [72356,3317].

DW User Group
21 Boonstra Dr.
Wayne, NJ 07470

▶**The DX User** for the DX7 synthesizer publishes a newsletter on an irregular schedule and provides members' original voices for the DX7 on paper and in a variety of disk formats. The first issue had a bit over 20 pages of info, and 96 voices. For info on how the group operates, send three 22-cent stamps.

The DX User
Al Duester
PO Box 209
Woods Hole, MA 02543

▶**Electrogenesis, Noisician/Music Futurism Network** publishes a bimonthly newsletter that focuses on the electronic noise composer, noisician, music futurian, and music computer enthusiast. Diverse areas such as psychoacoustics, physics, science fiction, and electronic poetry are also featured. Also included are homespun tape reviews, interviews, a classified network and member contact for music computer programmers or anyone interested in the above topics. Annual dues are $29.99/yr. (US) and $39.99 (all others). Write:

Electrogenesis
Noisician/Music Futurism Network
c/o Len Wiles, President
1940 Ginger St., Suite 40
Oxnard, CA 93030

▶**GEMUG MIDI Users Group** for the Baltimore/Washington area is free to anyone and meets semi-monthly. Meetings feature demonstrations of MIDI/computer gear and roundtable discussions so that people can get the most out of their equipment. Public domain synth patches and samples are available for the K250, Prophet 2000, E-II, Akai S900, OB Xpander and Matrix 6, DX and CZ synths.

Guitar Exchange
attn: Glenn Workman
17 Melrose Ave.
Baltimore, MD 21228
☎ 301 / 747-1022

▶**Forte Systems** has opened a MIDI section, available 24 hours a day, on their BBS that provides (among other services) electronic mail, several SIGs, and a listing of musicians on the island of Maui.

Forte Systems
240 Waiehu Beach Rd.
Wailuku, Maui, HI 96793
☎ 808 / 244-0999 (voice)
☎ 808 / 244-9789 (BBS)

▶The **Michigan Commodore Users Group** has over 500 members and meets at the Warren Woods Middle School the third Thursday of every month. C-64, C-128, and Amiga computers are supported.

Michigan Commodore Users Group
PO Box 539
East Detroit, MI 48021
☎ 313 / 751-3971 (voice)
☎ 313 / 758-5165 (BBS)

▶Join the **Mirage International Users Group** (M.U.G.) for the price of one factory disk and receive one complimentary disk of the latest samples. Monthly updated list of members

with addresses and phone numbers. Monthly lists of quality user samples for trading, buying or selling. One year membership is $20; lifetime $65 (you also receive two complimentary disks).

M.U.G.
G-4 Productions
622 Odell Avenue
Yonkers, New York 10710

▶**Newssounds** supports the Casio CZ synth series. We currently have over 100 members to whom we offer: a monthly newsletter providing information about playing, programming, MIDIing, purchasing, etc., the Casio CZ synths and related products; and over 150 sound data sheets (over the course of the year's membership) written by us and our subscribers. We pay $2 for each sound written by our subscribers that we publish. A one-year membership is $25.

Newssounds
1756 Wright Ave.
Suite #56
Mountain View, CA 94043

▶The **Normal MIDI Users Group** is a users group for the residents of Bloomington-Normal, Illinois, and the surrounding areas. It provides an informal forum for the exchange of information, ideas and data on the concerns and uses of MIDI and related hard/software. Monthly meetings are held at 8 p.m. the second Thursday of every month at Walter Midi (a retail music store) and feature guest speakers and product demonstrations.

Walter Midi
121 E. Beaufort
PO Box 806
Normal, IL 61761
☎ 1-800 / 255-2255, ext. MIDI

▶**The Pulse MIDI Group** would like to correspond with other MIDI users (or people interested in MIDI). Our main goal is to print a newsletter with ideas, questions, patches, articles and software programs written by anyone who wishes to contribute. Membership requires the contribution of information and a self-addressed, stamped envelope with each letter.

Simon Thorsley
Pulse MIDI Group
49 Weybourne Cr.
London, Ontario
Canada N6H 4H2

▶The **Sequential Prophet 2000** digital sampler group is an exchange club to swap sounds and disks. The subscriber contributes copies of disks not currently in the library, and in return, is entitled to a copy or copies of library sounds. The subscriber pays for return postage and handling, and the cost of the blank disks. Selection is made via cassette, and/or phone/mail. For more information, cassette, and a current library list contact:

The Prophet 2000 Library
c/o P.A.F., Scot Fleming
2616 Voelkel Ave.
Pittsburgh, PA 15216

▶**Synthesized Music Enthusiasts of Los Angeles** (SMELA) is for those in the Los Angeles area who share an interest in all kinds of synthesizers. Professionals and amateurs are welcome. Write to (please specify the equipment you use and main musical interests):

SMELA
12702 Emelita Street
North Hollywood, CA 91607

▶The **Xpander Users Group** offers a members' contact list and quarterly newsletter, *Xpansions*. For a membership application, send a self-addressed, stamped envelope to:

Mike Mellay/Xpansions
Mystech Productions
PO Box 81175
Pittsburgh, PA 15217

In this first installment in the series, we outline how you can please your audience and yourself with this compact, high-fidelity sound system that gives everyone the best seat in the house.

A Wide Dispersion Sound System, Part I

BY MIKE SOKOL

For a moment let's forget about the pure artistic side of live musicianship and think at more practical levels. Why are you on stage? Who put you there?

Who's making the next payment on your new guitar?

That last question is the clincher. Without a few dollars rolling in from gigs, you can forget about all those new toys. Who put you on stage? Your audience of course, and you better not forget why

Mike Sokol *owns Sokol Electronics, Inc., a board-level computer repair shop, and JMS Productions, a recording studio specializing in jingle production for radio and TV. He has been involved in building and playing electronic instruments for over 15 years and currently uses MIDI interfacing to speed up commercial productions.*

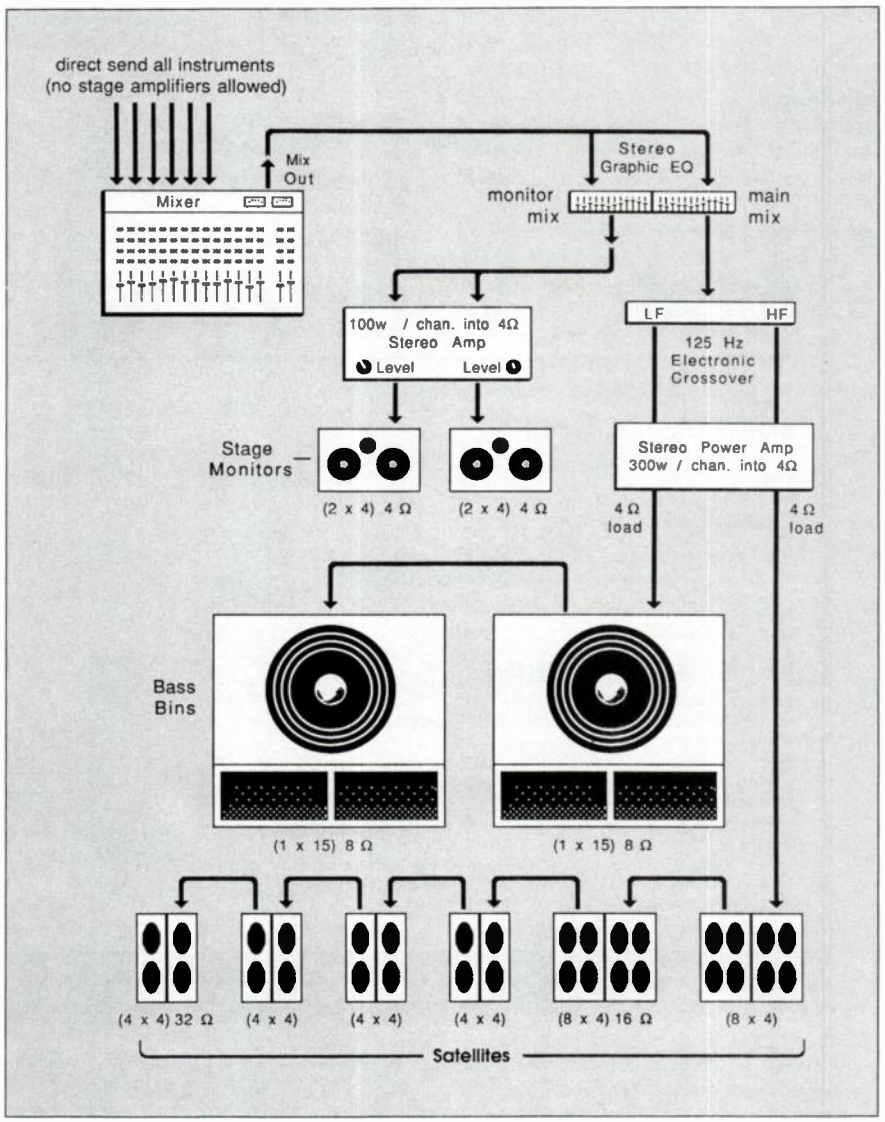

Fig. 1 *The complete live performance system.*

You Asked For It

Professional musicians like to call 360 Systems to talk about their projects, and to tell us how they've used our Midi products. We've been particularly interested in what they had to say on Midi Bass, because after all, they use it every day in studio work, and we don't.

So 360's Design Group made up a musician's "wish list" with all the new ideas that our studio friends suggested for a new generation of Midi Bass.

Here's What the Pros Wanted:

- **Make it rack mount.** We did. 1¾" high, AC powered, no "wall adaptor."
- **It should hold more sounds.** We agree; now it holds 16.
- **Make the filter and loudness programmable.** We did.
- **How about "zones" for different sounds on the keyboard?** Good idea. Pro Midi Bass has two programmable zones, with two sounds on each.
- **Velocity Crossover™ from one sample to another?** Absolutely. Now choose any two samples, and change at the velocity of your choice.
- **A "pro" product needs a good display of all its settings.** So we've included a full two-line LCD display that tells all. It even looks great.
- **Decay and Release should be programmable too.** And now they are.
- **Keep the price down! I've got enough $1,800 samplers.** We've done better than that. You could buy *three* Pro Midi Basses for the price of a sampler.

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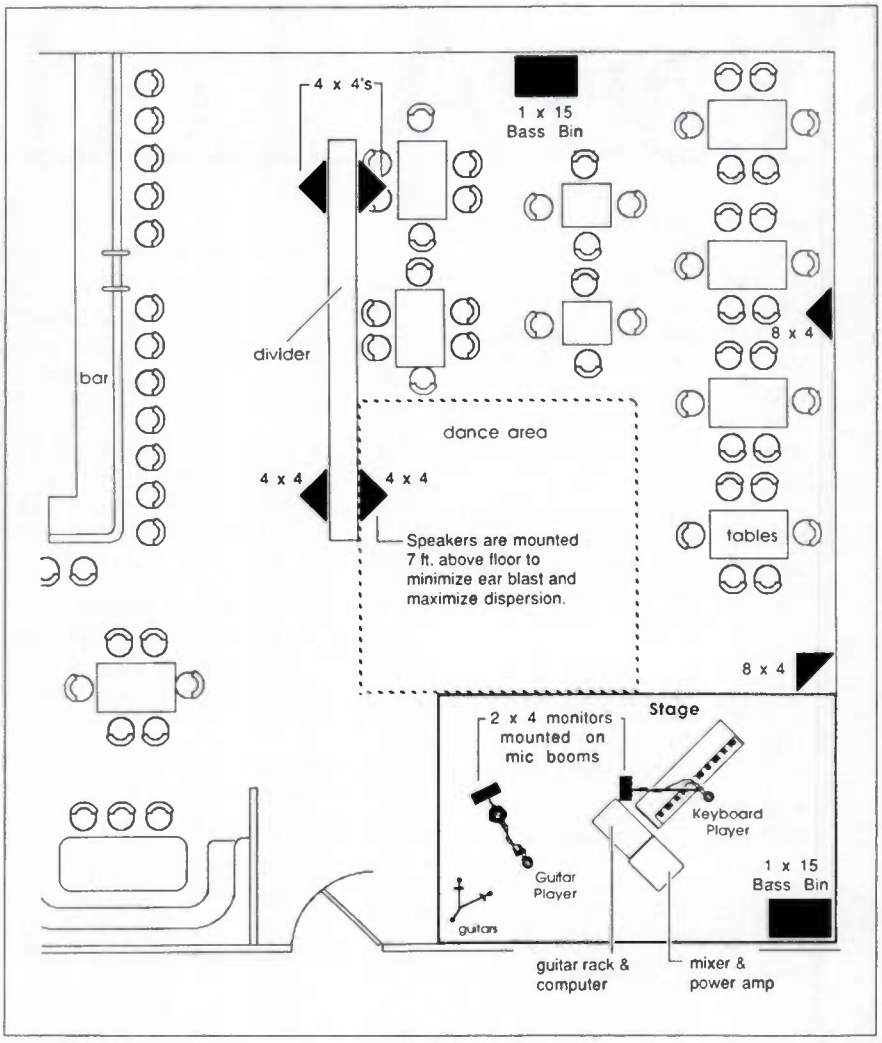

Fig. 2 *Typical club setup*

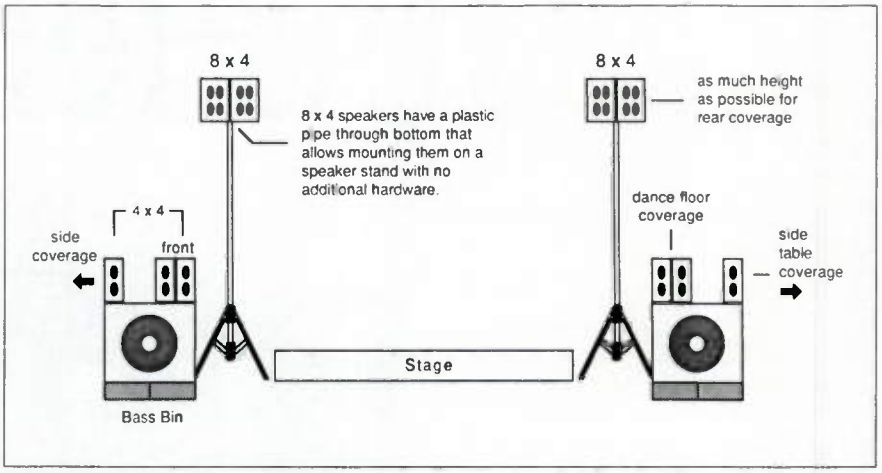

Fig. 3 *Typical wedding reception setup; note elevated position of 8 x 4 speakers.*

you're up there either: it's to please the crowd so they'll buy your next guitar for you. These are the performer's facts of life, but not many musicians think about them enough and their show suffers accordingly.

I'm not advocating selling out—merely making enough money to survive in this new high-tech musical world in which we all find ourselves. And how do

we do that?

By pleasing our audience.

What I find annoying about most live bands is that they're too darn loud. I'm not talking about concerts. If your audience will pay $17.50 a pop to get in, you

> **"The rest of the bands will be no competition and you can hog up all the best gigs at the fanciest places in town"**

don't need my advice on how to run a sound system. I'm talking about the other 99% of us who rely on club gigs, weddings, and dances to fill up those empty wallets. When I go to a club with the lady of my choice, the last thing I want is some band's sound system parked in front of my table and the drummer doing a pretty good imitation of the soundtrack from "Earthquake." You may respond that for everyone in the back and at the bar to hear the music, you need the "Warp 27" setting. This is not true. What you *do* need to do is spread your sound system around the whole club so that everyone gets an even mix.

Sounds like a lot of work, doesn't it? It is, but in the long run it will pay off in happy clients. If done correctly, you will have people coming up to you asking you how in the world you sound so good. The rest of the bands will be no competition and you can hog up all the best gigs at the fanciest places in town. How do I know this is possible? Quite simply, I tried it and it works. My band started a two-piece club act and within a year we were charging as much as any five-piece band in the area. Of course I hope that talent and good taste were a part of it, but from the comments I received, people liked the band because it *sounded* so good and they could *still* carry on a conversation without yelling.

All this success and adulation revolved around a low-profile, wide-dispersion sound system I designed and built myself. You can do the same for your

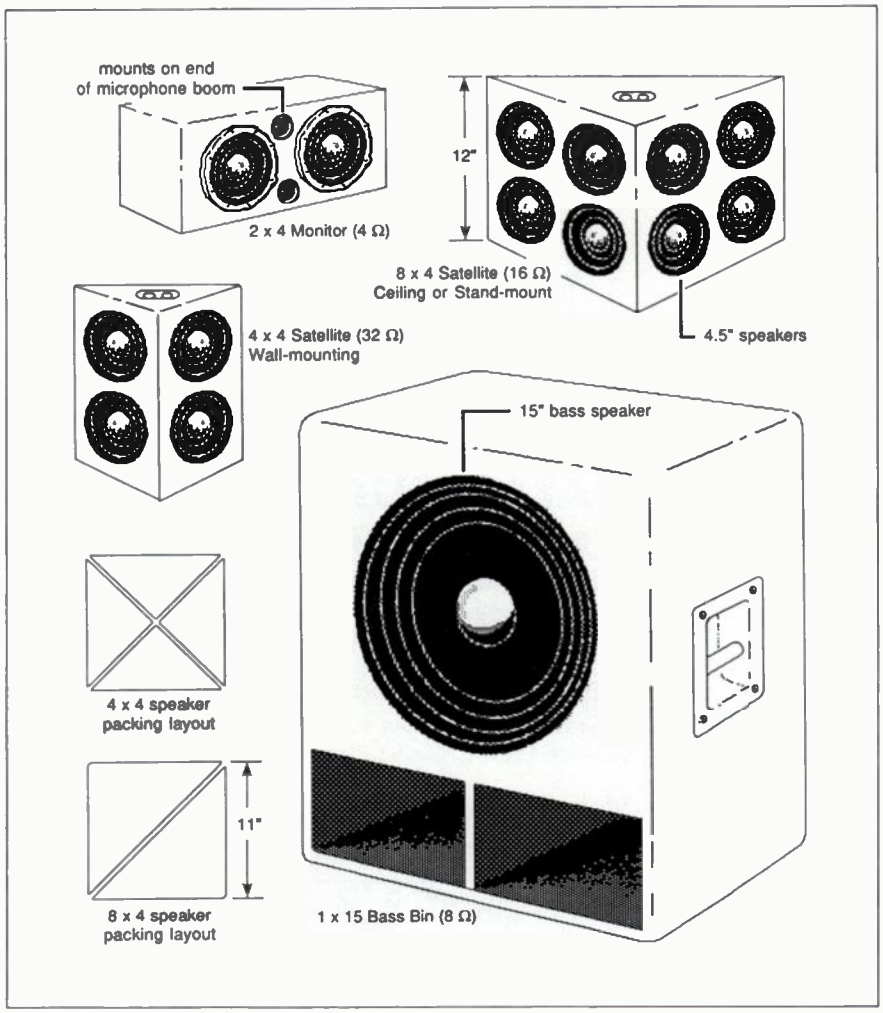

Fig. 4 *The system's individual speaker units*

own band if you'd like, but it will mean throwing away a lot of preconceived ideas about sound systems and doing some tweaking and experimentation until you get used to the system. When everything is done, you'll have a sound that will turn their heads at *any* volume you choose. And if you *do* play at a low level, you can get away with songs you never dreamed you could. How about Van Halen at a wedding reception, or Springsteen at a bar mitzvah? Come on, the only thing you have to lose is your poverty.

The system consists of six mid- and high-frequency "satellites" (two triangular cabinets of eight, and four cabinets of four 4½-inch full-range speakers); two bass bins (for everything below 125 Hz), each with one 15-inch speaker; and two stage monitors with two 4½-inch speakers apiece (see **Fig. 1**). This comes to 36 speakers for a complete system with monitors. The system is also designed for compact packing. Two of the 8-speaker units will pack up as a cube for transport, as will four of the 4-speaker units. Your entire system, from 125 Hz on up, packs into only two cubic feet of space.

This system requires no sound mixer, which gives the responsibility of mixing back to the musician. Since your stage mix is an exact duplicate of the main mix, you just adjust your instrument levels until everything sounds good. You will feel more like you're mixing in a studio than playing live; the system calls for very precise mixes and will actually challenge you to improve your musicianship at the same time. My guitar player and I chose to use a drum machine instead of a biological drummer. A live drummer who uses electronic drums or possibly an acoustic drum set with microphones will also work, however the latter will mean that your drums will sound different around the room and will miss a lot of the electronic reverb and effects that make everything sound cohesive. Bite the bullet and get some electronic drums.

Figs. 2 and **3** show the layout of two of the clubs we work in and how our system handles them. **Fig. 2** points out the (typically) irregular and un-acoustical playing area we have to cover. Careful placement of the satellite speakers lets us adjust both coverage and relative volume in all parts of the room.

Fig. 3 is a typical reception or party setup. There is a dance floor right in front of the band stage, tables to the left and right of the stage, and tables in the rear of the room. We place the 8-speaker satellites on speaker stands as high as we can, and the 4-speaker satellites closer to ear level. This allows the 8-speaker satellites to cover the tables in the back without blasting out the people on the dance floor and front tables. The 4-speaker satellites cover the dance floor and any side tables. Since the 4-speaker systems are wired for 32 Ohms and the 8-speaker systems for 16 Ohms, the speakers will be at an appropriate relative volume for each location. The 8s have a plastic pipe running through their center for stand-mounting. The 4s have a slotted hole in their backs for hanging them from a nail or screw in the wall. Most clubs won't object to small screws in the woodwork, but check first.

Overall power requirements are 60 Watts per monitor, 300 Watts for the bass bins, and 300 Watts for the satellites. I chose a 125 Hz crossover as the best compromise between satellite bass response and directionality effects. I dumped everything below 100 Hz from the monitors and allowed the bass bleed from the main system to fill me in on the bass mix. Since the 4- and 8-speaker units are wired for 32 Ohms and 16 Ohms respectively, they match a 300-Watt/channel into 4 Ohm amplifier perfectly and let you daisy chain the whole system together.

"Your entire system, from 125 Hz on up, packs into only two cubic feet of space"

Adjusting your main level is simple

once you learn the correct indicators. In a club situation, watch to see how closely people lean towards each other to talk. If they get right in each other's ear and scream, you're too loud. Adjust with your main mix and your relative levels will remain the same. When your audience stays between one and two feet from each other to converse, you're on the right track. It's better to start a little soft and work your way up than to have to turn down.

> **"You will *have* to correct musical problems once masked by excessive volume. This can lead to some very precise playing and inspire you to try more complex material. No kidding"**

This type of system does not translate into a weak sound. You can do some fantastic material that will rock with the best of them; you simply do it at a volume most people can enjoy, and you will *have* to correct musical problems once masked by excessive volume. This can lead to some very precise playing and inspire you to try more complex material. No kidding. Assembly details follow.

The satellites can be constructed from half-inch plywood. Dimensions are not critical because there are no bass frequencies to contend with and the triangular shape gives them a lot of rigidity. The bass bins are a different story. I struggled with many designs until I came up with a shelf-loaded bass reflex that matched a pair of Electro-Voice SRO speakers I had lying around. You can copy my design or come up with one of your own. Two 15-inch woofers, each rated for 150 Watts RMS, are enough for any club situation.

As you can see from **Fig. 1**, you will probably have to make some changes to realize the full potential of the system. You must hook everything up "direct-send" to the board and the stage monitors must not face the audience. I push the monitors with the board's main out signal (with an equalizer in line to dump the extra bass) and keep all the reverb and other effects to give me a good feel for what things sound like. I used the same 4½-inch speakers throughout the system to keep a consistent coloration.

In a typical system with lots of speakers on stage, you could never get away with something like this because of feedback problems, but remember, we're trying to cut backstage volume as much as possible, and in fact, about 60 Watts per monitor gives me all the volume I need.

The speakers, part number A11EC80-02F ($7.49 each), are available from McGee Radio and Electronics Corp., 1901 McGee St., Kansas City, MO 64108 (☎ 816/842-5092; 800/34MCGEE for charge card orders); write or call for shipping/handling charges and additional information. A subsequent article will have full assembly plans along with some tips on construction; see you then. EM

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WRH

Live Keyboards with Cyndi Lauper

TODD KAPLAN

In case you're looking for inspiration and direction for your live MIDI rig, here's a world-class setup organized by someone with the mind and the money to do it right.

BY DAVID ROSENTHAL

Last summer, I became the keyboardist for Cyndi Lauper's 1986-87 world tour. During pre-production rehearsals, I designed a state-of-the-art keyboard rig especially for the tour. I put a lot of thought into deciding what equipment to use, how to set it up, and how to interface it. The result is a flexible system that's versatile, practical, sounds great, and even looks great. I'm still very excited about it, and I'd like to pass on some of my enthusiasm—and contribute some ideas—in the form of a guided tour.

The system (Fig. 1) can be broken down into three basic parts: the *audio* section (synthesizers, processors and effects), the *monitoring* section (mixing board and on-stage amplification), and the *MIDI* section. First, let's take a look at the keyboards.

THE SYNTHESIZERS

In the FM synthesis department, there's a Yamaha DX7, TX7, and TX-816 rack. This gives me the equivalent of *ten* DX7s. I can split them into two separate MIDI systems of six and four, or I can use all ten together for *seriously* massive sounds. More on this in the MIDI section.

My sampling keyboard is the Emulator II+. During performances, I need to duplicate some of the effects from Cyndi's records that would be impossible to synthesize live; the Emulator lets me sample these effects and play them back on stage with no problem.

Even though its MIDI implementation is somewhat primitive, I'm still using my Memory Moog Plus for its fat, three-oscillator-per-voice, analog sound. The Moog is always in Omni mode though, which necessitates a MIDI channel filter to filter out all but one channel, thus simulating Omni Off mode.

The remainder of the analog department consists of a Roland Juno 106 and a Korg EX-8000 (the rack mount version of the DW-8000), both running in stereo. Although the Juno 106 only has one oscillator per voice, its sub-oscillator and on-board stereo chorus unit fatten up the sound nicely. It's great for recreating a lot

of the analog sounds characteristic of Cyndi's LP, *She's So Unusual*. The EX-8000 offers 16 preset, digital waveforms for building sounds that blend nicely with the DXs and the Juno.

Last but not least, I've got a set of the old Moog Taurus Pedals (bass pedals such as you find on home or church organs). They're not MIDIed, but quite simply, nothing else sounds like they do.

The Effects

My effects arsenal consists of two Yamaha SPX90s, a PCM41 delay, and a PCM70 multi-effects processor (the latter two from Lexicon), and an Eventide 910 Harmonizer. The first SPX90 functions mainly as a stereo MIDI delay line. Its maximum delay time is only 250 milliseconds, so the PCM41 is useful for longer delays. The PCM41 only has a mono output, but that's acceptable for long delays since you don't want to clutter the stereo field. The second SPX90 works mostly as a stereo harmonizer and for pitch-shifting effects (such as stereo flanging and chorusing).

"I'm still using my Memory Moog Plus for its fat, three-oscillator-per-voice, analog sound"

I use the PCM70 as my main reverb. It adds a very warm sound to keyboards, and offers tremendous control over all of its parameters. The 910 Harmonizer is the kind of box that works great on almost every patch. Since it is mono, I use it sparingly so as not to destroy the stereo imaging.

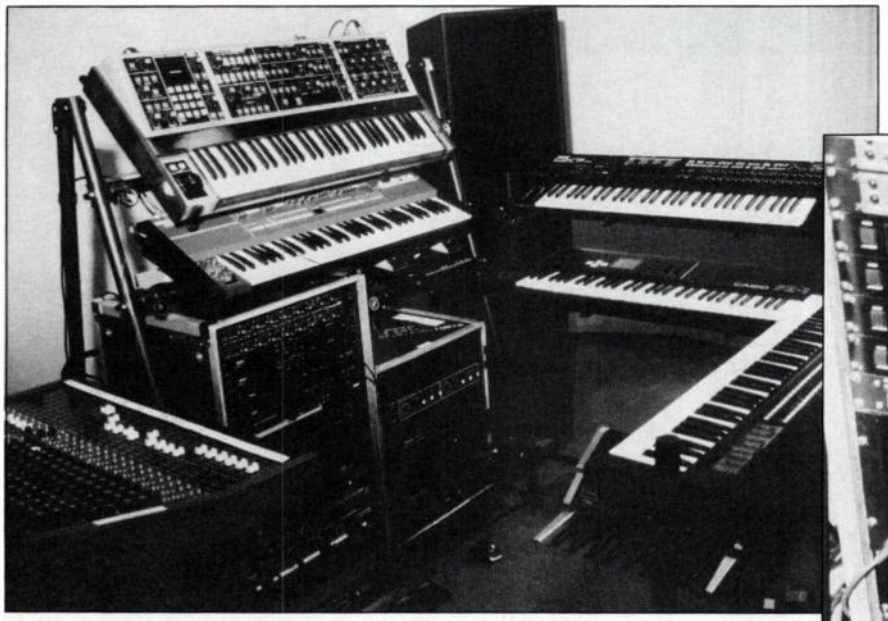
The two SPX90s are chained together in series and receive program change data only. Each SPX90 has program number offset capability, so it's easy to access different memory locations in each even though they receive the same data.

The MIDI Controllers

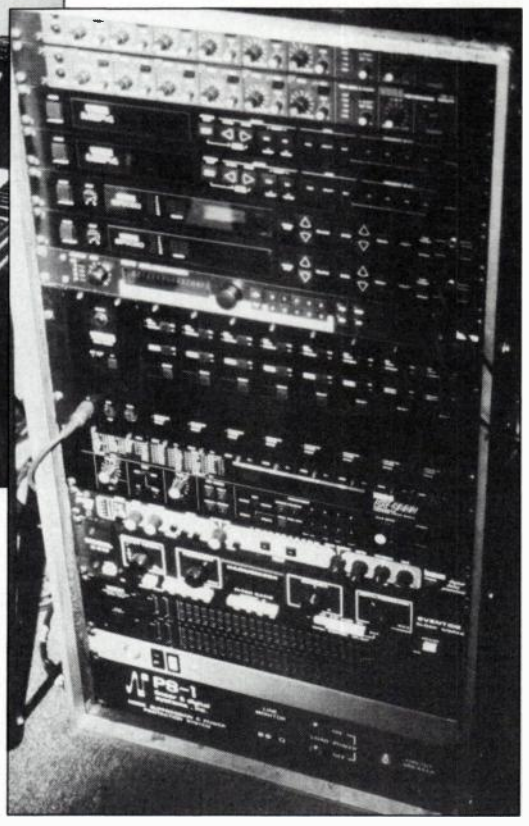
One of the toughest decisions was choosing a MIDI controller—there are so many good ones, all with their advantages and disadvantages. I chose the Yamaha KX76 because of its synthesizer-type action. It has a great feel (very similar to the DX7) that I prefer to a weighted piano action. With my background as a classically trained pianist, my hands are sensitive to different actions, and when I'm playing synthesizers, I want a synthesizer feel. In addition to its good feel, the KX76 interfaces very efficiently with the other Yamaha gear, the DX7s and MEP4 MIDI Event Processors. The KX76 has 16 memories that store different configurations of the keyboard and front panel: splits, doubles, MIDI channel data, MIDI control data, and other performance-oriented information. The KX76 also has 128 program memories.

MEP Mania

Along with the KX76 controller, the MIDI



David's complete tour setup. Note the Casio FZ-1 (just below the DX7 IIFD in the upper right-hand corner), which was just added to his setup.



The signal processing rack. Units that are adjusted less frequently are located towards the bottom of the rack.

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system's central command center is built around two Yamaha MEP4s—the very powerful MIDI event processors. When I recall one of the KX76 programs, it calls one of the 60 memories in the MEP4, which in turn processes and distributes MIDI data to all of the slave devices. The MEP4 has four independent data processors, each of which connects to one slave device and can control and manipulate *any* MIDI data before passing them on to a slave. From the MEP4 I can turn any of the slave keyboards on and off; change patch number to access any memory location in any slave device; and reassign any parameter to control any *other* parameter by altering its controller code.

The MEP4 also functions as a channel filter capable of transposing MIDI channels, and offers far too many possibilities to mention here. See the sidebar for a more detailed description of this flexible machine; I'll focus here on its primary live functions.

Though the KX76 is my main MIDI controller, the DX7 functions as the master of a "secondary" MIDI system which consists of the DX7, TX7, and modules 7 and 8 of the TX816. The Memory Moog Plus can be added as a slave to this system by switching A/B box #2 to the B position. When this box is in the A position, the Moog is slaved to the KX76 (via processor 2 in the second MEP4).

The Yamaha MEP4

The MEP4 is a single rack-space MIDI Event Processor that accepts MIDI data from a device (typically a master keyboard controller or a sequencer) and modifies the data with four separate processors. Each processor can be programmed to manipulate the data in a wide variety of ways and then route it to any one of four individual MIDI Outs.

In its RUN mode, the MEP4 lets you select or store one of its 60 memories, each of which calls up the particular type of MIDI processing you've pre-programmed. You can also turn each processor on or off in this mode, to include or eliminate various synthesizers in the mix.

Put the MEP4 in the EDIT mode, and you can program an individual processor to modify the MIDI data it receives according to any of the following six general functions.

1. The ***Data Presetter*** is a function that occurs only once when a memory is selected. It will send a Program Change, a Pitch Bend position (for detuning), and two selectable Control Change messages. This control offsets the chosen parameters by the chosen amount as long as that memory is selected. You can detune, set MIDI volume, modify aftertouch, velocity and so forth by amounts that stay fixed for that memory.

2. The ***Channel Filter*** listens to the MIDI stream and outputs data over any number and combination of the 16 MIDI channels. Channel Assign functions also let you "transpose" channels, so data coming in on one channel goes out over another. This is an important function where a master controller is used to play a number of slaves and different configurations of synths and MIDI channels are needed.

3. The ***Message Filter*** eliminates program changes, pitch bends, aftertouch and other specified types of MIDI messages. A valuable use for this function is to strip data from sequencer tracks to economize on memory or to salvage a take where the note data, for example, were perfect but the pitch bends were unacceptable.

4. The ***Data Modifier*** partially or completely changes a MIDI message, of whatever type you specify: it can convert Pitch to Aftertouch, Note On to Note Off, and so forth.

5. The ***Delay Processor*** delays the output of the MIDI data from zero to three seconds for delay-type effects.

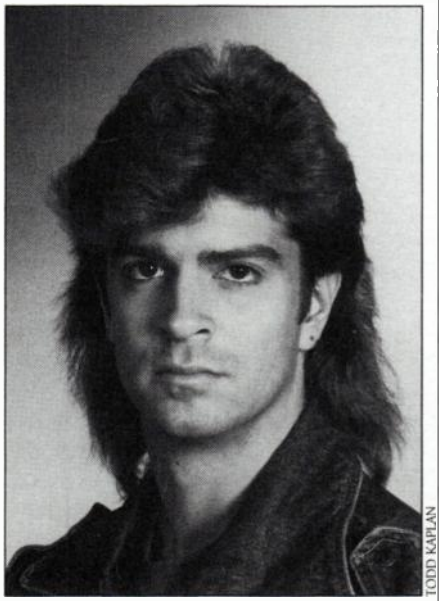
6. The ***Output Assigner*** routes any one of the four processors to any one of the four outputs.

In addition the MEP4 can ignore or respond to Program Change data, assign a footswitch, and accept all, none, one or any two Control Change messages. For multi-keyboard MIDI setups, this is a nifty and powerful device.

—Tim Tully

The secondary MIDI system can be made independent of the KX76 by having the second MEP4 filter out the KX's Note On and Note Off commands. Turning *off* the MEP4's filter function—letting these KX76 commands through to the DX—slaves the sub-system back to the main MIDI system. Either way, the DX7 is *always* sent patch change data, and passes it on to its slaves via its MIDI Thru port. When it acts as a master, the DX (not the KX76) sends its slaves Note On and Note Off commands. Since these commands can only be sent from the DX's MIDI Out port, it's necessary to *merge* the MIDI data from the DX7's Thru port and its Out port, using the J.L. Cooper MIDI Blender. To avoid a build-up of MIDI delays, I inserted a Thru box between the MIDI Blender and the slave TX modules.

Modules 1 through 6, the remainder



TODD KAPLAN

David Rosenthal

of the TX816 rack, are MIDIed together by the rack's internal Thru box and slaved to the KX76 via processor 1 in the first MEP4. Since it is easier to use a DX7 to program and edit the TX modules' sounds, I switch A/B box #1 to B to send data to the rack from the DX7 system.

A few times during the show I need to play just one synthesizer, independent of the MIDI chain created for that part of the song. I set the appropriate MEP4 processor to filter out the Note On and Note Off commands but allow program change data through. Thus, the slave synthesizer is set up to be played from its own keyboard, and is independent from the

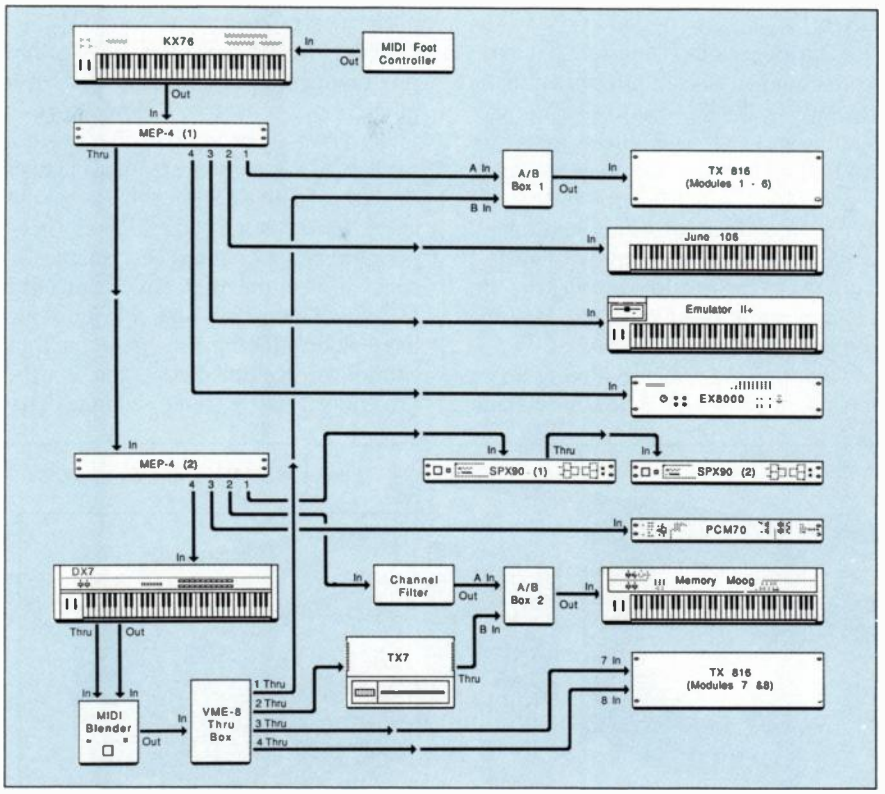


Fig. 1 *MIDI wiring diagram for Rosenthal keyboards*

KX76.

During countless hours in rehearsals, I programmed all of this information into the MEP4s, the KX76, and all of the slave synths and outboard effects, and now everything happens instantly on stage at the touch of a single button on the KX76. With the Ibanez MIDI foot controller, I can even change programs with my feet! I now have the freedom on stage to concentrate more on performing. Isn't that the way it's supposed to be?

Before we get to the mixing board, let's take a quick look at how the volumes of all the synthesizers are controlled.

Every instrument I use on stage has programmable volume, accessed over MIDI controller number 7. However, from time to time there is a part that needs a swell, a fadeout, or some manual changes in volume. The KX76 has two programmable MIDI volume pedals. These can be programmed to control the volumes of some or all of the MIDI slaves. Since the Memory Moog Plus and the Juno 106 have older MIDI implementations, they cannot read volume pedal data. For the Juno 106, I use a stereo volume pedal between its audio outputs and my mixer. The Memory Moog Plus has its own programmable non-MIDI volume pedal.

Thanks to MIDI and programmable volume, I can do all of my own mixing live. My on-stage mixing board is the Carvin MX-1688 (16 × 8 × 2). It functions basically as a sub-mixer. From it I send a complete stereo sub-mix (including signal processing) to the house console. I use the mixer mainly to set pan positions and effect send levels for each of the synths. Once I have all of my faders set, I don't need to touch it at all during the show.

With eight sub-groups, it's easy to have independent control over the master stage volume, which can be changed without affecting the house mix or the monitor send level. Sub-groups 1 and 2 are left and right sends to my monitoring rig (more on that in a minute), sub-groups 3 and 4 are left and right sends to the house, and sub-groups 5 and 6 are left and right sends to the band's monitoring system.

Sub-groups 7 and 8, the left and right sends to my strobe tuner, are merged together by a "Y" connector because the strobe tuner only has one input jack. The effects returns are not routed onto this bus because the presence of effects makes it difficult for the tuner to read pitch accurately; with this setup I can tune everything at soundcheck quickly, without individually muting all of my effects.

Last, but certainly not least, is the on-stage amplification system. Since the entire mix is stereo, I need to hear myself in stereo and with a flat response so that I hear exactly what is going out to the house.

My two Turbosound TMS-4 cabinets make great keyboard monitors. They are powered by two Carvin DC-800 power amps and a two-way stereo crossover. Although this system sounds great in almost every hall, occasionally I need to compensate for some horrible acoustics. For these situations I have two stereo 31-band graphic EQs patched in before my power amps.

All of my AC power is constantly monitored through a PS-1 surge protector (made by Linear Digital) that protects the equipment from power surges, and keeps the power "clean" as well. Front panel LEDs let me know (*before* my equipment is turned on) if there is a problem with the power in any hall.

And what if something goes wrong?

I have multiple memory backups for everything. Whenever possible, I store backup copies in two different media (some devices can store data on floppy disks as well as cassettes and cartridges). For the few devices that don't have this feature, I use good old fashioned pen and paper.

I also use a Macintosh Plus for data backup. Combined with Opcode's Librarian programs, I can store the internal memory of almost any MIDI device. Even the MEP4's data can be stored in Opcode's bulk storage librarian program. Still, regardless of how many precautions

"During rehearsals, I (pre-) programmed all of this information . . . now everything happens instantly on stage at the touch of a single button"

are taken, there is *always* the risk of equipment failure, and with a rig of this size on the road, I always have to be prepared for anything.

I hope this "tour" of my keyboard rig will give you some ideas for designing your own rig. Keep in mind that what works for one person doesn't always work for another. A little bit of experimenting will tell you what works best for you. Always make sure that your setup is an extension of your creativity, and never lose sight of what you are trying to achieve.

Happy rigging!

David Rosenthal has played keyboards for 19 years, most recently with Cyndi Lauper's 1986-87 world tour (appearing in numerous TV shows and music videos); and previously with Rainbow (three LPs, two world tours); Little Steven (Voice of America tour); Ritchie Blackmore; Roger Glover; Joe Lynn Turner, Jean Beauvoir, Rick Derringer, Aldo Nova, and Myles Goodwin. A Berklee graduate, he is now a studio musician.

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For more memory, we doubled the on-board single voices to 64. We also added 32 internal performance memories to the II. So you can store voice position data with function (or what we now call performance) parameter data.

We've also greatly expanded the new DX7II's data storage capacity. In two ways.

First, with the new RAM4 cartridges. One of these will store the DX7II's total memory including 64 voices and 32 performance combinations, or 63 micro-tunings.

Second, with the DX7IIFD's built-in 3.5″ disk drive. One 3.5″ disk equals the storage capacity of 40 RAM4 cartridges. So you can

ng, we were listening.

have a massive voice, performance, micro-tuning and fractional scaling library ready for virtually instant use and access. And a MIDI data recorder for recording and storing external MIDI equipment information.

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And an all-new FM tone generator system gives the DX7IIFD and DX7IID greatly improved fidelity.

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The Ins and Outs of Program Change

BY GEORGE DANOVA

Oh, that wonderful MIDI parameter, the Program Change message; it can make life *so* much easier. Punch up a program on your master keyboard, and *zap*, not only does the synthesizer change patches—but MIDI sends out commands that tell any expander modules or MIDI signal processors to change programs along with your master. You can take this idea even further, and pre-program all your synths' Program Changes into a sequencer; as the song plays, program numbers for all associated MIDI devices change in perfect time with the tunes, so all you need to do is to make sure the individual sounds and effects suit each other. And for special effects systems, MIDI Program Change is a dream come true. Guitarists can use a footswitch that does nothing but send out MIDI Program Change commands, and change all the settings on a batch of processors with a simple tap of the footswitch. While this all sounds simple in theory, in reality matters are not quite as simple as they might appear. Even accomplishing this primary task of matching voices to each other and to outboard effects is neither simple nor speedy, and unless you study a little of what's happening along your MIDI cables, you might find it difficult to use Program Change commands to your best advantage. This article is intended to alert you to some of the problems involved in using Program Change commands, and provide some helpful tips as well.

George DaNova grew up reading Craig Anderton works, from the early days through Home Recording for Musicians. *Anderton-inspired projects now comprise much of George's home recording studio. He studied Electronic Music Composition at Montreal's Concordia and McGill Universities and holds a B.F.A.: a "Bachelor of Followers of Anderton."*

> **"But all clear cut this isn't, and unless you study a little of what's happening along your MIDI cables, you may not enjoy this feature one bit"**

ARRANGING THE PROGRAMS

Once all the programs for a particular section of a song have been perfected, we must assign each one to the desired program number so that calling up a particular program calls up the desired sound. Usually this involves swapping programs around in memory; here is where a good librarian program can really help speed up the swapping process. However, while MIDI implements 128 different programs, not all equipment handles 128 programs, nor are they necessarily sequentially numbered from 1 to 128. Equipment that handles a lesser number of programs—say, 99, 64, 32, etc.—usually incorporates a *wraparound* feature that resets the program count to one after reaching the limit of memory.

For instance, calling up voice *40* from a Yamaha DX100 would change a synthesizer with 32 memory locations to program *8* (40 minus 32). The reverse also holds true: if your controller cannot *send* as many Program Change options as a slave unit can receive, it's impossible to call up the higher numbered programs from that controller. Try telling a Korg DW-8000 (64 selections) to dial up program 117. No go; you'll have to do this manually on the slave's panel, which isn't too inconvenient—as long as you don't have to do it live.

CONFUSING? IT GETS WORSE

Another problem is the different ways manufacturers count. MIDI counts Program Changes as 0000 0000 to 0111 1111 (0 to 127), but a front panel may display 1 to 128, 11 to 88, or something equally unrelated. Korg and some Roland products, among others, store two-digit program numbers where the first digit represents a Bank and the second digit indicates a particular sound. With this system, the first three programs would not be labelled 1, 2, and 3, but 11, 12, and 13 (which stand for Bank 1, Sound 1; Bank 1, Sound 2; and so forth). So calling up program number 1 on a Yamaha synth would call up program 11 on a Korg DW. Program 99 would correspond to 53 (Bank 5, Sound 3) on the DW. Why?

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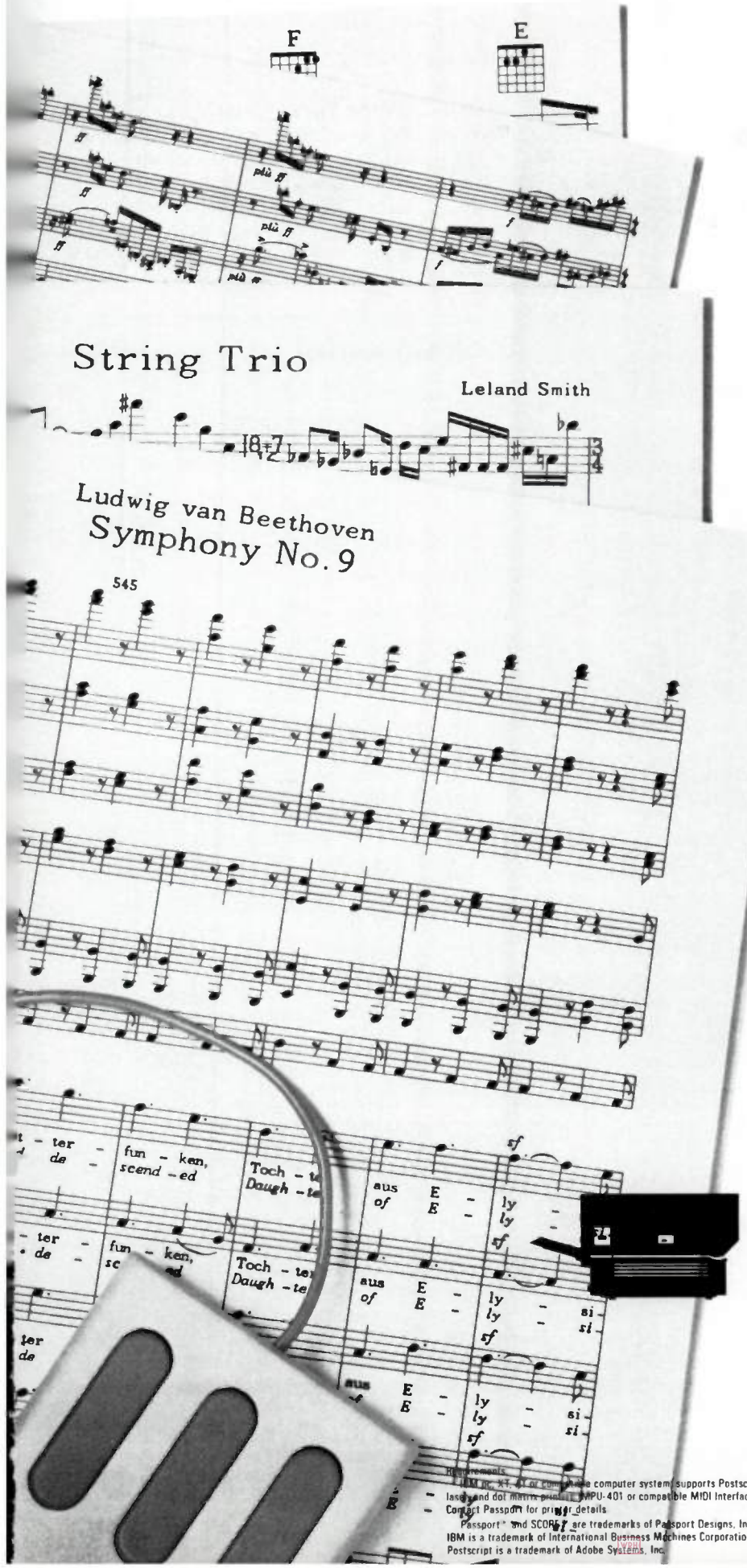

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Because the DW has 64 programs, so 99 wraps around past 64, thus bringing us back to (99-64=35) program 35. Remember, though, the DW doesn't number programs sequentially, but according to bank/program numbers; so program 35 ends up being called 53 (Bank 5, Program 3). Calling up patch 53 on the Yamaha synth calls up DW program number 75—pretty weird. To overcome this problem, I've made myself a "look-up chart," (see **Fig. 1**) listing the corresponding program numbers of these two systems (including wraparounds). I always keep it handy around the studio, and I *don't* leave home without it.

> **"My original number 50 got lost in the translation"**

Turning It Off

When you are experimenting with programs, sequences, and effects on different equipment, you don't always want all your gear jumping around from one program to another every time you call up a new program on the master. Especially if you are perfecting a sound on a slave, you want to keep it from receiving a Program Change command that would call up a different program, since this would erase any editing you had done since the sound was last saved. Fortunately, most units that *receive* Program Change commands can also be set to *ignore* these commands. This way, the slaves will still *play* in response to note data from the master keyboard, but not follow program changes from the master. If you cannot turn off Program Change, then simply change the MIDI channel on which the slave is receiving to one that's different from the MIDI channel on which the master controller is transmitting. While the slave will no longer receive MIDI data, if you're editing a program it's easier to change channels than it is to cut the power or pull out the MIDI cable.

With some equipment, eliminating Program Change communication can be a little more complicated. MIDI signal processors such as the Roland SDE-2500 and Yamaha SPX90 include a Program Change function that lets you "map" incoming Program Change requests to any internal program (in other words, you can specify that calling up, say, program 2 on the master would cause the SPX90 to call up program 12, or whatever other program number you had selected). On some machines, to turn this function off yet still receive note data and other MIDI data, you may have to program the effect to switch to memory location 0 (no change) for each and every one of the incoming program numbers. This can be a long and tedious process, and explains why some companies have little trouble selling little boxes that do things like filter out Program Change commands.

Look-up Chart

A	B	A	B	A	B	A	B	A	B
1	11	25	41	49	71	73	21	97	51
2	12	26	42	50	72	74	22	98	52
3	13	27	43	51	73	75	23	99	53
4	14	28	44	52	74	76	24	100	54
5	15	29	45	53	75	77	25	101	55
6	16	30	46	54	76	78	26	102	56
7	17	31	47	55	77	79	27	103	57
8	18	32	48	56	78	80	28	104	58
9	21	33	51	57	81	81	31	105	61
10	22	34	52	58	82	82	32	106	62
11	23	35	53	59	83	83	33	107	63
12	24	36	54	60	84	84	34	108	64
13	25	37	55	61	85	85	35	109	65
14	26	38	56	62	86	86	36	110	66
15	27	39	57	63	87	87	37	111	67
16	28	40	58	64	88	88	38	112	68
17	31	41	61	65	11	89	41	113	71
18	32	42	62	66	12	90	42	114	72
19	33	43	63	67	13	91	43	115	73
20	34	44	64	68	14	92	44	116	74
21	35	45	65	69	15	93	45	117	75
22	36	46	66	70	16	94	46	118	76
23	37	47	67	71	17	95	47	119	77
24	38	48	68	72	18	96	48	120	78
								121	81
								122	82
								123	83
								124	84
								125	85
								126	86
								127	87
								128	88

A = Sequential numbering
B = Bank/Program numbering

Fig. 1 *Look-up chart for corresponding program numbers*

Where They Wind Up

Too much flexibility can be confusing too. Just as the SPX90 lets you map *incoming* Program Change messages, the Yamaha PF80 electronic piano *sends* a mappable program number when any of its ten voices is called up. Hook these two machines together and the redundancy may baffle you as it did me for a while. I called up voice 5 on the piano, and it sent a pre-programmed "change to 50" message to all my equipment; but no "50" showed up anywhere. Some units changed to 72 and the multi-effect displayed 31 (its previously pre-programmed memory location for receiving a "change to 50" request). My original number 50 got totally lost in the translation.

It is also worth mentioning that you can halt the MIDI daisy chain so that a unit will *receive*, but not *send*, Program

Change messages. I use a Korg EX800, for instance, as the first of two slaves. Using its MIDI *Out* instead of *Thru* keeps received Program Change messages from going beyond that unit. Other units, like the Yamaha PF80 with its built-in *MIDI merger* (MIDI data mixer), let you cut or continue the chain at the flick of a switch.

> **"With some equipment, eliminating Program Change communication can be a little more complicated"**

MIDI Merge On turns a MIDI Out into a MIDI Thru; while this is a useful feature, you must pay attention to how the switch is set, since in the Off mode, nothing will come out the MIDI Thru. Read the MIDI Implementation chart for your slaves to find the setting where they *respond to* Program Change messages, but don't *send* them.

Pseudo-Automated Mixdown

Many current synthesizers support a "MIDI Volume Control" feature accessed over MIDI controller number 7. However, older synthesizers that don't have this function can still do stepped level changes via Program Change commands. Copy a patch into as many different memory locations as there are levels needed, and vary the level of each patch. Call up the patch with the appropriate level at the appropriate time from a sequencer, and there you have it—simple automated mixdown. The only caution is to insert these Program Change commands during spaces in the music; changing programs while an instrument is playing can cause audible glitches.

As MIDI continues to expand and new and exciting features appear, things sometimes get a little tricky. Remote program changing can be great to take advantage of—just don't allow it to take advantage of you. EM

You've heard stories of how sequencers can simplify pre-production and recording, add tracks to your tape recorder, and generally improve your life. But before you run out and buy one of these marvels, you'd better know what to look for.

Buying Your First Sequencer

BY JEFF BURGER

Just as electronic music has become an integral part of today's multimedia productions, sequencers have become an indispensable tool for MIDI musicians. More and more, sequencers serve as the brains of the operation in both composition and performance by controlling synths, samplers, and drum machines—even signal processors and lighting. Along the way, grumblings about musicians being replaced by machines have more or less given way to kudos for sequencers as productivity tools.

Just as every musician's needs are different, no one sequencer does everything right and has every feature. The overview that follows is not designed to tell you which sequencer to buy—there are too many variables involved for us to get that specific. Rather, we've included a list of basic features and options; decide which are most important to you, and use that knowledge to help you find a sequencer that matches your music.

THE BASICS: STAND-ALONE VS. COMPUTER-BASED

The modern sequencer weds computer technology to multi-track tape recording concepts without the disadvantages of recording on magnetic tape. Not only is there no tape to stretch or wear out, but relocation of any point in a composition is instantaneous—forget about the time wasted by rewinding and fast forwarding tape. Editing can be extremely precise; sections of music can be cut (removed), pasted (added elsewhere in a composition), copied, and otherwise manipulated much more easily than with tape and you don't have to destroy the original.

Perhaps the biggest decision you'll have to make is whether to go with a dedicated, *stand-alone* sequencer or a computer running sequencing software. A stand-alone sequencer is a small box (**Figs. 1** and **2**) that performs only one function: sequencing. The main advantage of a dedicated unit is compactness, reasonable price (you don't pay for anything you don't need) and, if built well, road-worthiness. Computers tend to be a bit more costly and are usually less transportable, but they offer a larger "window" on your sequencing data (**Fig. 3**) since data is usually displayed on a TV-like monitor instead of the LCD found on dedicated types. You can also choose from a variety of sequencing programs, and of course, computers can do a lot

Fig. 1 *At $595, the Yamaha QX5 is an 8-track, 16-channel stand-alone sequencer with cassette interface for mass storage.*

Fig. 2 *Roland's MC-500 ($1,395) features a built-in disk drive and can hold 40,000 notes.*

more than just sequence.

Whether stand-alone or computer-based, MIDI sequencers at their lowest level are simple MIDI recorder/players, recording *data* received from a MIDI-generating device (such as a keyboard, MIDI guitar controller, MIDI drum controller, etc.) and sending it on playback to one or more MIDI devices (**Fig. 4**). Like tape machines, most models today work on a multi-track basis. You can think of tracks as running in parallel, like the lanes on a freeway. Each track's MIDI output is transmitted on a given MIDI *channel*; one track might play a bass synthesizer on one MIDI channel, while another track plays chords on an instrument set to receive on a different channel.

Tracks and Channels

It's important to understand the difference between *tracks* and MIDI *channels*. The track contains the MIDI performance itself, while the channel determines the routing of the performance to various external devices. Generally, the number of tracks you need equals the number of simultaneous (musical) lines, monophonic or polyphonic, that you want to play. Although you might think this implies that each track must therefore feed its own instrument, this is not always the case; *multi-timbral* synths, when fed MIDI data, can play more than one sound over more than one channel at a time. For example, with an eight-voice multi-timbral MIDI instrument you could assign *each* voice to *one* monophonic line that is played over *one* MIDI channel (great for adding percussive parts). Or, you might assign more than one voice to a channel to allow for polyphony; for example, one option would be to assign the voices so that four voices each play monophonic lines over their own MIDI channels, while the remaining four voices play polyphonic parts over one MIDI channel.

There is not always a one-to-one correspondence between tracks and channels. For example, you could score MIDI drum parts right from a synth keyboard and assign one drum sound per track, but then route all these different tracks to the single channel on which the drum machine is receiving.

One type of sequencer design employs a limited number of tracks but allows for unlimited bouncing capabilities. With these sequencers, tracks can contain more than one channel worth of data, so you'll end up with multiple channels of data recorded on (typically) two or four tracks. As a rule, though, this cost-cutting approach reduces flexibility and is not optimum for editing and other changes. While bouncing is a desirable feature, don't rely on it as a substitute for a reasonable number of tracks.

Why You Sometimes Need To Record On More Than One Track At A Time

Some sequencers can only record one track at a time, but you may find it valuable to record more than one track simultaneously. For example, a split keyboard might send out left- and right-hand parts on two different MIDI channels, recorded on separate tracks. Guitar controllers often transmit data for each string over their own channels, which means that you'll need to be able to record six channels at a time. There's also the increasing potential for recording jams between MIDI musicians (each transmitting on a different channel), as well as downloading multi-track/multi-channel songs from other sequencers. (Many performers use a computer-based sequencer for composition and studio work before transferring the work to a dedicated stand-alone sequencer to withstand the abuses of live performance.) These applications also require each track to be able to record information coming in on different MIDI channels.

"Grumblings about musicians being replaced by machines have more or less given way to kudos for sequencers as productivity tools"

We're Not Thru Yet

In simple applications, recording involves playing on one master synthesizer. As you play on the synthesizer not only do you send data into the sequencer, you also control the sound generators inside the synth. But what happens if you are using a soundless master keyboard to trigger a bunch of rack-mount slave units? In this case, the data appearing at the sequencer's MIDI In port needs to be "echoed" at the MIDI Out port so that the slave units can receive MIDI data. Some sequencers have a *hardware* MIDI Thru that will fire the slave as the master plays, but this usually requires tedious re-patching between MIDI Thru and MIDI Out just to audition the track you just recorded. A far better solution is to have the *software* switch the master's MIDI Out to act as a MIDI Thru on the individual tracks. A feature like this is generally called "MIDI Thru" or "MIDI Echo" in the sequencer's roster of options.

Real Time vs. Step Recording

Real time recording is the process of performing tracks live into the sequencer. This process can be made easier by slowing down the tempo while recording (yes, you can create dazzling 32nd note runs!) and speeding it back up for playback. Tracks can be perfected further by using *quantization* (i.e. moving the notes you played to the closest timing value you specify; also called auto-correction). Some quantization schemes move the entire note and preserve its original duration; others move only the note-on (which changes the duration), and still others can actually quantize both the note-on and note-off events, preferably independently of one another. (If you plan to dump the sequences into a notation or transcription program, this last feature is crucial or you'll get written passages Frank Zappa wouldn't touch.) Some systems quantize while recording, and others quantize after the fact as an editing function.

Step recording is the process of recording each individual event (Note-On, Note-Off, etc.) manually, typically by specifying a rhythmic value on the sequencer and playing one or more notes on the MIDI controller. While passages with rigid timing are easy to enter via step entry, only those comfortable with the ins and outs of written notation or those lacking dexterity should attempt to enter more complex compositions in step mode.

The best choice is to have a choice. The optimum sequencer would have both modes, so each can be employed for what it does best. For example, you might want to play the bulk of a piece in real time, but switch over to step recording to enter cascading 16th note arpeggios.

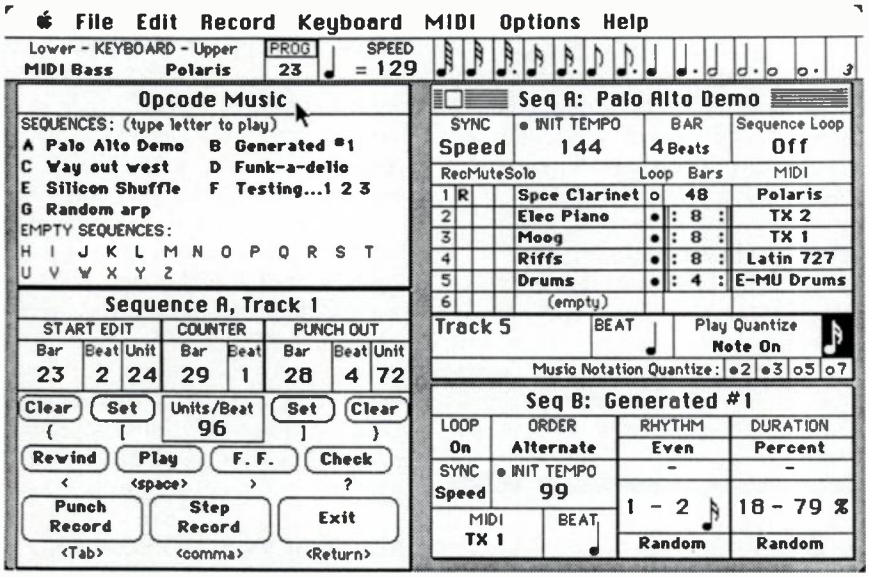

Fig. 3 *A computer-based sequencer, such as Opcode Systems' Sequencer 2.5 for the Mac, displays multiple sequencer parameters simultaneously on the computer's screen.*

Lengths and Loops

Track length is determined in different ways on various models. Many systems require the musician to specify the track length beforehand and stops recording after reaching that point. Other systems allow you to play as long a line as you wish, terminating either at the point when you hit the STOP button/footswitch or at the last note played before the STOP command.

Some systems force each track in a given section (a section is like a verse; we'll describe sections more fully in a bit) to be of the same length. Consider a passage that has eight bars of unique chord changes on one track parallel to another track which repeats a one-bar bass ostinato. With a forced-track-length sequencer, you would have to manually play the one-bar line eight times. Other brands have the provision for a section to have tracks of independent lengths, with the shorter tracks looping (i.e. repeating over and over) automatically at their own endpoints for the duration of the longest track. If that looping doesn't happen automatically, it would be wise to look for the ability to append a track to itself end-on-end within a section.

The last aspect of looping to consider is whether entire sections (like our eight-bar example) loop while you're working on them, as most drum machine patterns do. If so, some products will let you continue recording on subsequent passes. What you play will either be added as an overdub on the same track or replace the previous take with a new one.

The Good, The Bad, and The Ugly

Even the best players make mistakes, sometimes flubbing a single note in an otherwise perfect take. The same real time and step mode concepts apply to cleaning up the clams. The real time solution entails punch-in/punch-out, which can happen either manually or automatically. In manual mode, punching resembles the procedure used on a multi-track deck and a footswitch is often desirable. Many sequencers automatically punch in and out according to very specific times that you program so you can concentrate on *playing* instead of punching in the proper cracks. Step-editing can be pretty vicious if you have to work "blind" (in other words, there's no readout of where you are in the track). However, if a display is provided you can tell where you are in a sea of events, and you can also access and edit all kinds of information besides notes: velocity, aftertouch, program changes, performance controls, and more. Sometimes you need not even play the notes you want to change; with graphics-intensive computers, you can often make any changes necessary right on the

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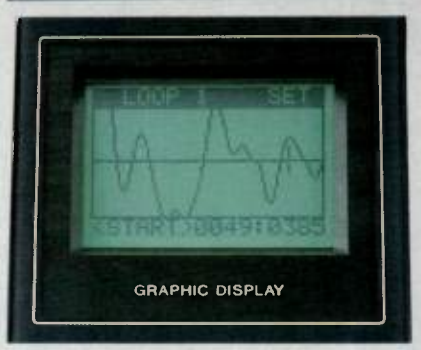

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computer screen itself. Some programs will display what you've played in standard musical notation, and you can delete and add notes at will right on the screen.

Editing falls into three levels: *single events, global*, or *regional*. This translates to editing one event at a time, all events in a track or sequence, or just those events that fall within a specified range. In addition, some units provide the advanced feature of *scaling* certain types of information. For example, all the velocity (dynamics) values within a given range of events might be scaled from low to high to create a crescendo. Another possibility would be to decrease the overall level of a track by scaling all the velocity values to, say, half of their existing values.

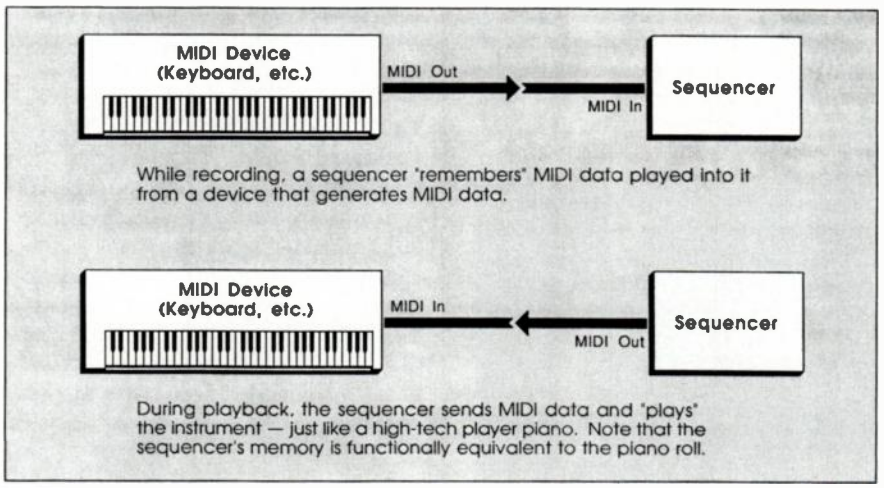

Fig. 4 *Concept of the MIDI recorder/player*

Other Track-Oriented Features

The ability to manipulate existing tracks is one of the best reasons to get into sequencing. Features like editing, copying, and transposition can make life a lot simpler. Let's say you want to double an existing track an octave up. With most sequencers it takes only a few seconds to copy one track onto another and transpose the new track up 12 semitones. Another common practice is to copy a track and set the identical tracks to send on two different MIDI channels to two different instruments, and thus attain a layering effect without changing the receive channel on the instruments themselves. Copying also provides a way of making a safety track before editing or re-recording an already reasonably good track. And since the sequencer is very much like a studio-in-a-box, it pays to have features like *solo* and *mute*. Mute temporarily silences individual tracks, while solo selects a single track without having to mute all the others.

Tracks vs. Songs

The other major difference between tape and sequencing is the relocation of tracks in time. (No, we're not talking science fiction here, although a decade or two ago it might have been.) When sequencing first lumbered onto the scene, songs had to be built from start to finish just like with a tape deck—tracks were the length of the song. It wasn't long until the "song section" approach was adopted from drum machine technology: building a series of parallel tracks (such as bass/chords/melody) for a given song section like a verse, then doing the same for other sections such as chorus, intro, and bridge. "Song mode" assembles a list of these sections and tells the sequencer's microprocessor to reuse existing passages in a given order. This allows changing the composition's entire arrangement with a few keystrokes. Common song-oriented features include commands for inserting, deleting and transposing entire sections. Some sequencers also provide for specifying how many times a section will loop rather than having to enter each repetition.

In many ways, song mode provides an easy answer to creating songs because you're working with recording smaller, more manageable passages that are then re-used as necessary and many forms of music (especially pop) are sectional in nature (A-B-A-B-C-D formula). The inherent problem involves recording lines that cross sectional boundaries, where you want orchestration or a lead to sustain across the "crack" between, say, a verse and a chorus. Some newer breeds of sequencers are beginning to address this by allowing individual tracks to be "chained" or "linked" in song mode while others retain their individuality.

The other popular way of solving the "between-the-cracks" problem ignores the idea of chaining and simply allows the user to place individual tracks so they start at any given point in the composition, using the copy function to duplicate tracks that occur in more than one place. Yet another approach is to allow many sequences to play in parallel, where one sequence "calls" another sequence. As shown in **Fig. 5**, Sequence A calls Sequence B at a particular point and Sequence B starts playing. However, A doesn't *stop* playing just because it has called B, so any part played on A that extends past the point when B is called will still be heard.

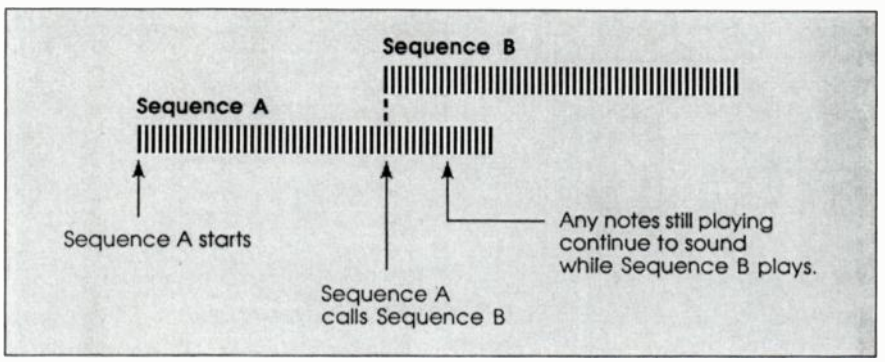

Fig. 5 *Overlapping song sequences*

Synchronization

It is often desirable to synchronize the playback of two MIDI devices (such as a sequencer and a drum machine) so that they advance though a song with their rhythms electronically locked together. Most MIDI products today synchronize

to one another using "MIDI clock": a stream of software timing messages transmitted 24 times per quarter-note into the MIDI data stream. That is, the master device sends a pulse every 1/96th note that tells the slave device to step forward by one 1/96th note.

With the simplest form of MIDI sync, it is necessary to start at the beginning of a song or passage in order for two devices to begin playing back at the same time and sync properly; the start point serves as a common reference from which both counters advance. A more advanced MIDI implementation would include *MIDI Song Position Pointer*, which correlates the current position in a sequence to the number of 16th notes between that point and the beginning of the sequence. When a device transmits the Song Position Pointer message to a device that can receive this message, the receiver auto-locates to the position specified by the transmitter. MIDI Song Position Pointer is crucial if you plan to be able to start anywhere in the song and/or take full advantage of SMPTE-to-MIDI conversion (but that's another story).

Finally, consider whether or not you want to sync the sequencer's playback to tape (if you don't now, you probably will someday!). With this ability you can add the sequencer's tracks to the number of tape tracks you already have available. Since MIDI clock data cannot be recorded directly onto tape, separate tape sync jacks are required which allow you to lay down a stream of clock pulses on a track of tape and retrieve them to sync the sequencer for additional passes. However, if the sequencer of your dreams doesn't have tape sync, all is not lost. There are little black boxes out there (aren't there always?) that can convert MIDI sync to tape sync and back.

Checking The Specs

Evaluating a manufacturer's specs often reveals hidden implications—especially concerning memory capacity. For example, literature might claim that a product can store 8,200 events. Since it takes at least two events to create every note (a MIDI Note-On event and a MIDI Note-Off event), the example product only holds 4,100 notes. Also, notes are only part of the MIDI data that can be recorded by most sequencers—performance controls like aftertouch, pedals, pitch bend, and modulation controls can eat up lots of memory.

Another consideration is that re-use of existing data—a copied track or section employed repeatedly in song mode—typically takes little or no additional memory beyond that used by the original track. At that point the question of capacity extends to how many positions are available in the song arrangement. Check out too whether the sequencer can store more than one song in memory at once, especially if you're playing live.

While we're on the subject, consider how a sequencer stores its data on external media and weigh that against your needs. If you plan to use sequencers extensively in a live situation, you need either a boatload of internal memory or quick retrieval from something like a floppy disk, RAM cartridge, or both. As a rule, data cassettes are the cheapest, yet slowest and least reliable, form of storage. RAM cartridges are the fastest and most expensive while floppy disks are perhaps the best compromise between speed, convenience, and price.

User Interface

Features alone do not a great sequencer make. As machines and software become more complex, the user interface—the

processes a human has to go through to communicate with the machine—becomes increasingly more important. Creativity is the name of the game and if a sequencer takes you through too many changes or requires you to be a computer genius to make the simplest music, something's wrong—sequencing is not a difficult process, given the right tool. As a general rule of thumb, with stand-alone sequencers the fewer the buttons (the latest

> **"Features alone do not a great sequencer make . . . if a sequencer takes you through too many changes or requires you to be a computer genius to make the simplest music, something's wrong"**

trend) the more steps are involved in performing a given task since each button must perform multiple functions (which means multiple keystrokes, multiple commands, and multiple seconds of time).

With computer-based sequencers, there are other criteria. Many musicians find using a mouse more intuitive than having to type in commands from a keyboard, yet those who are experienced with sequencers often find typing commands saves time. As a result, even mouse-oriented sequencers usually allow for mouse commands to be duplicated by keystroke combinations.

Fortunately, most sequencers these days are of pretty good quality; standards continue to improve. As a result, it's often the details that make one sequencer more useful than another to a given musician. For players with good instrumental technique, perhaps the ability to get tracks down quickly will be most important; for

Sequencer Goodies

Sometimes the less-used functions can be the most important for musicians with unique requirements or preferences. Here are some additional sequencer features that you just might find crucial to your sequencing dreams.

Track shift: This lets you advance or delay tracks by very small amounts—typically 1/96th note either way. One use is to tune out timing delays, or to let you create different "feels" (a track that is a little ahead of the beat gives a very different feel compared to one that is a bit behind the beat). Larger shifts can give synchro-sonic (rhythmically timed) echo effects, slapback echoes, and other delay effects.

Notation program compatibility: The task of writing a good notation program is just as difficult as writing a good sequencer, so many manufacturers just do one or the other. A new trend is to be able to take files created on a sequencer, export them to a notation program, and use the notation program with the previously created files. This is a particular boon to notation programs that do not support real time recording.

More than 16 tracks: Why, might you ask, include more than 16 tracks when you can only send over 16 MIDI channels anyway? There's a good reason: the extra tracks can serve as "scratchpad" tracks. Now you can record, say, eight different takes of that lead solo, compare them, and bounce the parts you want over to one master track. Or lay down all your drum parts on different tracks, optimize each track, then bounce the tracks together into one "kit."

Programmable tempo changes: You can radically change the feel of a song by, say, pushing the verse by one extra beat per minute or laying back the chorus by one extra beat per minute—but you can't if your sequencer forces you to do an entire composition in one tempo. Even better, some sequencers let you specify a beginning tempo, ending tempo, and the number of measures over which the time will increase or decrease.

Naming tracks and songs: Being able to name tracks and songs can really help cut down on confusion. The more letters the better; a label of "bass" says a lot less than "Bass—OB-8 Patch ABC6."

Software filters: Often times, you'll want to remove particular data from a track—individual notes, pitch bends, aftertouch, and so on. The more varied the filters, the more easily you can manipulate the data contained in tracks.

Program change: Most sequencers let you imbed program change commands in a track that automatically call up different synth patches as the sequence is playing.

Memory space indicators: Sometimes it's helpful to know how much memory is available in the computer, or how much memory a particular track or sequence uses up.

Channelization: This takes the signal coming into the sequencer's MIDI In and re-transmits it over the channel of your choice. This is of principal interest to owners of the original DX7, which only transmitted on Channel 1; with a channelization feature, you can leave your DX7 hooked up as is and use the computer to change its MIDI signal to any one of the available 16 channels.

Track protect: This safety feature lets you protect individual sequencer tracks to prevent accidental erasure.

System exclusive storage: This lets you record patch data and individual control settings (not just overall program changes) from synthesizers so that calling up a sequence can also transfer pertinent sound data from the computer into the synthesizers. In some cases this function also provides some of the attributes of a patch librarian, albeit with less sophistication than dedicated patch librarian software.

Music generation/modification: How would that piece of music sound played backwards? Or with the lowest notes substituted for the highest notes? Or how about creating a random two-bar melody line? More programs are starting to include functions that let you modify music according to some algorithm (created either by the machine or by you).

Keyboard sequence calling: This feature lets you call up sequences by typing keys on the computer keyboard. One application is for live performance, since you can "improvise" with the actual elements of the tune if you want to extend or shorten the lengths of particular sections.

Of course, no one sequencer will necessarily have all these features. But if any of them seem like they might be useful to you, check that any sequencer under consideration supports them.

—Craig Anderton

composers who have less instrumental virtuosity but a keen interest in building arrangements, the ability to micro-surgically edit existing tracks might be crucial. Still others—music educators, for example—will be most interested in whether a program can print out data in standard music notation (not all sequencers do by any means).

If the above confuses rather than enlightens you, relax. Grab some demos, catch any product clinics at your local major music store, read the reviews in **EM**, and send away for—and carefully compare—the literature provided by sequencer manufacturers. This will give you an idea about what each manufacturer feels is most appealing about their particular product, and also give you a chance to see which products implement which features.

Sequencers can really make the music-making process more fun; good luck with finding the one that works best for you. **EM**

Jeff Burger *began composing in electronic music in 1970 and has been programming computers since 1979. His credentials include album, commercial, video and technical writing work. He is currently president of Jeff Burger Creative Technologies, dedicated to all aspects of technology in the arts.*

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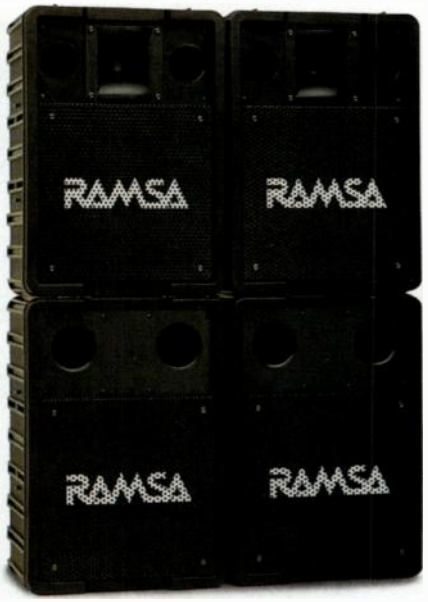

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DAVID TORN:

Re-Igniting the Fuse of Fusion

Contradiction time: he uses MIDI extensively, but doesn't believe in MIDI guitar controllers. He employs massive amounts of technology in pursuit of a highly personalized and humanized guitar sound. And in the structured, song-oriented musical climate of today, he finds his muse in instrumental improvisation. Then again, maybe contradiction is part of being an electronic guitarist in the late 1980s.

PETER HIRSCHFELD

BY JOHN DILIBERTO

Like fighting fire with fire, guitarist David Torn uses technology as a reaction to technology. This improvising musician eschews factory synth sounds and expressionless interfaces; only the subtlest and most controllable of sound-shaping devices need apply. David Torn is a guitarist of the future, biding his time in the present, but weaned on the great guitarists of the '60s: Jimi Hendrix, Duane Allman, Jeff Beck and Jimmy Page, improvising into infinity, solos unbounded by time. That's the ethos that the 34-year-old Torn grew up with, and improvisation forms a shifting cornerstone for his music.

But Torn isn't a curator of past traditions. He has taken those roots, hooked them up to signal processors and MIDI controllers, and propelled them into a style that merges visceral intensity with soaring atmospherics.

Torn is upping the ante for state-of-the art guitar playing in the post-electronic era. He's essayed heady, funk improvisations with The Everyman Band, introspective duets with percussionist Geoffrey Gordon on Best Laid Plans *(ECM) and on his latest,* Cloud About Mercury *(ECM), he and an all-star group consisting of Bill Bruford, Tony Levin, and Mark Isham engage in fragile melodies and firestorm improvisations.*

The guitar has been Torn's passion since his early teens when he began playing flamenco on an acoustic, but it wasn't long before he switched to electric and by age 17 he already had an extensive history of acid-rock bar bands. Succumbing to the too-much-too-soon syndrome, he quit the music scene for a while and took a lengthy hiatus, traveling around the world to sort out his life and study various musical forms.

Inspired by The Mahavishnu Orchestra, he returned to active playing and experimented with space rock, progressive pop with vocals, and jazz; studied briefly with Pat Martino and John Abercrombie; and took an abortive fling at the Berklee School of Music, known as spawning grounds for mega-note guitarists.

In the late '70s he began playing with The Everyman Band. They had been Lou Reed's back-up group during the Coney Island Baby *and* Street Hassle *era and were about to embark on a tour with world music/jazz trumpeter Don Cherry. That tour led to a contract with ECM Records, resulting in two Everyman Band albums,* Everyman Band *and* Without Warning, *followed by the solo Torn recordings.*

*Torn is an adventurer and plays with minimal synthesist David Borden (*Anatidae, *Cunieform Records), the heady jazz saxophonist Jan Garbarek (*It's OK to Listen to the Gray Voice, *ECM) and the moody rock singer/organizer David Sylvian.*

Cloud About Mercury *is a masterful technological understatement. Despite the electronics—Torn's processed guitar; Bruford's Simmons drums and MIDIed Yamaha DX21; Tony Levin playing the Chapman Stick and synthesizer bass; and Mark Isham playing trumpet and synthesizer—the electronics are the last thing you notice. Instead, you hear the intuitive interplay, the quiet listening and the perfect placement of sound in space, all embroidered by Torn's ricochet improvisations and guitar loops.*

While Torn has gathered an impressive electronic arsenal, and is designing a new signal processing controller called "Mickey X," he dislikes guitar synthesizer technology because he wants to avoid the "generic" synthesizer sound. Torn's own sound is immediately recognizable: melodically squealing feedback, long languid sustains, the appropriate speed-demon flourish and a tonal palette that shifts with kaleidoscopic intensity.

Torn talks about "arrogant ambience," intuitive playing, and improvisation with a purist's zeal, but it's tempered by his exuberance and almost loony demeanor. He rushes into the interview room at ECM Records' New York office with a lopsided grin emerging under shaggy, long brown hair, wearing a black-on-silk paisley shirt that Japan/Dali's Car bassist Mick Karn gave him. "It's my haircut band shirt," laughs Torn.

He had just returned from a European tour with Bruford, Isham and Mick Karn replacing Levin on bass, and was ecstatic about the music they played.

EM: *You called your music "arrogant ambient music?"*
DT: "Arrogant ambient music," right. Like, the background is as important as the foreground. There's this feeling of space that makes the connection with ambient music, but there's something a little nasty about it. Something a little snarly.
EM: *You did a tour with the* Cloud About Mercury *group?*
DT: We just toured for the first time in Germany. We only did eight dates or so, the last of which—the sort of cap on the tour—was the First International Frankfurt Art Rock Festival. I'm really happy about this group; I hope that it can continue. Of course, I hope that the record does well, that's natural, but the tour was fantastic. I had fun. You're not supposed to have fun on tours; you're supposed to be working too hard and you're supposed to have political infighting in the band and all this rot but we just really did incredibly well.

The group was slightly different; we had the original bass player in the group, Mick Karn, who is a very odd bass player.
EM: *A very active bass player. . . .*
DT: Yes, he has his own sound. He's very much into the repetitive bass player role but the lines that he chooses to create and repeat are very different from anybody else's. They're very snaky. He was originally the bass player in the group before Tony (Levin) came to do the record, then for scheduling reasons Tony couldn't do this tour and then for scheduling reasons Mick could, so this is how we're going to continue, I think.
EM: *Will you be coming over to the States?*
DT: We're thinking that maybe we could do a small tour in the fall. I certainly hope so.

This is a different kind of band. I'm actually sort of the fake leader of the group. It's basically my music, my concept, but everybody seems to fit very well into it; I don't have to affect this sort of semi-fascistic leader approach. The band isn't people you would normally expect to see together. I like that a lot.
EM: *I think it's interesting that as a child of the '60s, you played flamenco guitar at 13.*
DT: That's how it started. At the time my mom bought me a guitar with S&H Green Stamps and my parents sent me to a guitar school to learn flamenco. I didn't have the self-discipline to stay in that style, so I gave up.
EM: *So when did you pick up electric guitar?*
DT: Almost immediately after that. I had

John Dilberto *is the producer of* Totally Wired: Artists in Electronic Sound, *a weekly program on electronic music produced for Pennsylvania Public Radio Associates and broadcast on public radio stations across the United States.*

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about $150 and I bought a Fender Mustang and a little Fender Champ amp and started going crazy. Completely. Guitarists were very much in the forefront of my generation's cultural consciousness at that time.

EM: *You now use a Steinberger guitar.*

DT: Yeah, only. Outside of my Supro steel guitar and my homemade stuff, I use Steinberger guitars.

EM: *You made one comment that I thought was really interesting, where you talked about the development of your style as a reaction against the technology that was becoming available.*

DT: I had this small inheritance in the middle of the '70s, when everybody was getting some kind of a synth, and the first guitar synths came out—I had already been doing a lot of strange things to the guitar: tapping, scraping, all the post-Sonny Sharrock stuff or Derek Bailey kinds of things, but to electric guitar in a rock context. Anyway I blew the whole inheritance on an ARP Avatar guitar synthesizer which I got completely burned on. I don't know what—naivete or something—made me think that it would just work. It didn't function well and I spent thousands of dollars—at that time the only large amount of money that I would see for a while—and I blew it. A year later I went to sell it and got $250.

Then my wife and I were broke again and I started looking at all the technology and all the major rock stars. When you're a musician sometimes you get into this kind of bitterness thing, which is easy to do especially considering the industrialization of music and what a large business it's become. I'd get really ugly about all these guys who had incredible amounts of equipment in incredible dollar figures and just massive capabilities, but didn't necessarily do anything with them. I was also bitter about how the media would overblow the importance of the technology in making the sound when in fact most of these people didn't seem to me to be doing anything with it.

So I decided that I should develop as much sound quality as possible from my hands. I would do what I could do with my guitar and amp and whatever was around: a volume pedal, a cheap little echo pedal, whatever. I discovered some pretty strange little techniques that have lasted with me into my more conservative mode.

EM: *I talk to many musicians who have a lot of technology behind their music and I've come to a realization that most of the best music is done with the least complex technology pushed to its limits, and not the $200,000 digital workstation.*

DT: That might be an oversimplification, but essentially that's the place that I came to. I was obsessed. I was driven to find something different. I was tired of hearing people say "You sound just like Allan Holdsworth."

When I started to look at technology and see what I could do, I think that I acquired a real healthy view of how to actually use the stuff. I think I got the ability to look into a piece of gear and turn it into a musical instrument in its own right, and not see it as something that's just enhancing the process. You shouldn't rely on technology and let it overtake what you're doing. Of course I do rely on it, but it's like I rely on a guitar. In a way I view myself as less of a guitarist than a multi-instrumentalist. If I go out with just a guitar and an amp, or just a guitar, I don't feel that comfortable. It's not my whole arsenal of instruments. If I have a looping delay and some weird digital reverb and some harmonizers, now I feel that I can use it like it's an instrument, it's not just some extra added crap on the sound.

EM: *Speaking of Holdsworth, have you seen him recently with his SynthAxe? I think he does some nice things with it. I think it's some of the best guitar synthesizer music I've heard.*

"I'd get really ugly about all these guys who had incredible amounts of equipment in incredible dollar figures and just massive capabilities, but didn't necessarily do anything with them"

DT: I think so too. My negative reaction is that even something as developed as the SynthAxe does not have the subtle nuance that a guitar does, and while I like what Allan has done with it—he has been able to develop a completely personal voice on his instrument—the synths themselves seem incapable of producing all the subtleties that Allan puts into his guitar playing.

Personally, I really couldn't make the SynthAxe go. I felt so completely emasculated. I experienced the ultimate guitarist's nightmare: I was at one of these NAMM show demos in somebody's suite in a hotel, waiting in line with five other guitar players. Allan picks it up and goes dweedly dwee in an amazing way. Tom picks it up and goes plunk, glitch, plunk, glitch. I felt like such a jerk. Amazing!

I did try the Stepp guitar recently, which is a bit more guitar-like than the SynthAxe. That functioned kind of well. I think that the next year or two will bring all kinds of other technologies to translate guitar talk into synth talk, but I've got my own path mapped out here.

In fact, I've cut my own path into MIDI. I use it to control MIDI-capable effects devices, and I think that I'm going to go into the manufacturing realm now because I had an idea, design engineers heard about it, they think it's really good . . . I shouldn't talk about it too much because it's, well, proprietary. But it's exciting.

EM: *One of the aspects of your style relates to the mid-'60s generation that influenced you—Pete Townsend, Jeff Beck, Hendrix—that was the first group of guitarists, outside of avant-garde circles, to introduce noise.*

DT: Definitely. Noise doesn't always have to be there, you know, but rather than noise for noise's sake it seems like one useful part of an electric guitar out of control. But for me it shouldn't really be totally out-of-control; you should still have a handle on it. If sax players can overblow, then the out-of-control, distorted, feeding-back guitar sound is similarly acceptable.

EM: *How did the The Everyman Band get together? I was surprised reading the biography that it had something to do with Don Cherry.*

DT: I was playing in a regionally, barely successful art/rock/jazz/weird band called ZoBo Funn Band in Ithaca, New York, and had been doing it for years. The Everyman Band had been playing with Lou Reed for six or seven years before I ran into them. They were Lou Reed's band on the records from *Coney Island Baby* to *Street Hassle,* and they just saw me play somewhere. I didn't think anything would ever come of it, but they liked me and then I think we played together once. One day Bruce Yaw, the bass player, called me and said "We'd like you to come on this tour with Don Cherry 'cause we are Don Cherry's Band and we're going to have this tour and Frank Serafine can't make it and if you could come for two weeks maybe Don will ask you to stay for the rest," which he did. I didn't know any of the music. Learning the music with Don was incredible, an absolutely incredibly strange but wonderful experience.

EM: *Was that the* Brown Rice *period?*

DT: It was just post-*Brown Rice*, yeah. Don's a really important musician for me in that he has a pretty amazing reservoir of knowledge that he's twisted to his own device. That says a lot to me. He would encourage me or us to basically express something personal.

EM: *I was thinking, while listening to the album, that there was a sound that you got that was a lot like the dou'ssn gouni sound. (A dou'ssn gouni, pronounced "doo-zen goony," is a gourd-based four- to six-string instrument from Mali generally used for ostinato parts—Ed.)*

DT: Oh, yeah. In fact that's an instrument that I built inspired by what I've learned about the dou'ssn gouni from Don. Basically it's a really unbelievably ugly acoustic guitar that I built koto bridges for. Has no frets in it. Sits flat in my lap. If you saw it you'd probably puke. It's got a huge hole knocked out of the back with a hammer; the hole goes over my knee. Actually this was nice in Frankfurt because I was able to show Don this guitar and say "Hey. This was inspired by the way you approach the dou'ssn gouni and what you showed me about it, you know its ability to be bass, guitar, rhythm instrument, ostinato type, funky sounding."

EM: Snapping The Hollow Reed *sounds very Asian.*

DT: It's very strange actually. Originally the title was *When Bamboo Breaks Inside My Head* and I changed it because I thought that was a little unsubtle. It came from a dream that I had. This is very strange. This will never again be repeated in public and I don't know if I should do it now.

I've had these series of dreams where —this is quite strange; now anybody who

hears this will know how psychotic I truly am—I sometimes get woken up by the sound of a reed, or it's almost like a piece of bamboo snapping. It's very strange. It's a physical sensation but it's something that I almost hear from outside myself. It's almost like wood breaking somewhere at the bottom of the base of my brain somehow. But that's too physical. It's not really that physical. It's like a sound I'm hearing outside of myself. It's so loud that it wakes me up, and is actually an amazingly pleasurable experience, physically. I don't know what it is. It's just some bizarro thing that happens to me and I got that ostinato thing in my head directly after one of those very amazingly pleasurable powerful experiences. I finalized it the following day. That piece was sitting around for years waiting to be done in the right kind of context soundwise.

EM: *It's interesting that that's the only cut where Isham plays synthesizer, right?*

DT: Yeah. But I don't know if you'd notice where he plays the synth—I could've mixed it better. Live, we did some duet stuff where Mark used the synth a lot more. Isham's synth playing is only in little places on that cut; I really wanted to hear Mark play trumpet and processed trumpet because he's an amazing player and we have a really good communication thing between us. *Cloud About Mercury* is about improvising, it's about listening, and it's about the fact that in rock music this should not die.

EM: *It's interesting you feel that way because I think we're among the few who grew up with a generation of rock that was improvised.*

DT: I'll tell you, man, I don't think it's true that there's no more interest for that kind of music. I think that there are a lot of potential listeners. You know rock doesn't have to be like superficial music all the time. The thing about rock is that it can be sort of wild and fun but kinda formalized....

EM: *You look back. I was thinking about* The Allman Brothers Live at the Fillmore *record. Remember how popular that was? Everyone had that record. Yet that record was out there in terms of improvisation. No one could ever do that record today and have that same sort of impact.*

DT: Well, I mean, not to harp on the great things of the past, but Jimi Hendrix. I mean his stuff was out! Out! He was different *and* he was immensely popular. I can't believe that (a) that music couldn't move forward into the future and change,

and (b) that there aren't the listeners there for it. You know, I'm trying hard not to express any bitterness about it but I believe that the industry of music and the industry of music-related radio—the actual big business side of it—has squashed this stuff because it's not controllable; not because it threatens anything politically or not because it directly threatens the size of anyone's wallet, but because it can't be categorized all that easily. When you've got people improvising and trying to be different from one another then it just seems like it would be a much more difficult job to sell it; it can't be categorized, generically, in bins.

I don't believe that a harder-edged improvising music and music that's different from the industrial standards can't be popular. I just don't believe it. I refuse...I turn people on to Jon Hassell and they say "Why have I never heard anything like this before?" And the background noise in my mind says "You expect to hear this guy on the radio? What's wrong with you? Naive?" I think that the industry of music sells the listener short, that it's incredibly condescending. It may not be malicious and it may not be purposeful; maybe it only reflects the A & R people's own tastes. I don't know. God, how did I get into this?

EM: *I'll let you out because that's a whole conversation in and of itself.*

DT: Actually it's more than a conversation. It's a life. It's a bunch of peoples' lives.

EM: *What made you quit music for a few years?*

David Torn's Equipment

Trans-tremolo, a whammy bar for which Torn did design consulting, transposes all strings on his Steinberger equally—just like the pitch bend wheel on a synthesizer. He runs the guitar output through a TC compressor from Denmark, Roland volume pedals, Pearce guitar amps, and Carver power amps. His outboard effects include an ADA Pitch Traq Harmonizer and Lexicon PCM42 that has been modified by Gary Hall to have four times the expanded memory, giving Torn up to 20 seconds of delay for looping. His Lexicon PCM70 digital effects processor is used as either reverb or with six separate delay lines in which each program contains at least 40 parameters that Torn can control in real time, using the Yamaha MCS-1 and attached pedal controllers.

"On *The Delicate Code*," explains Torn, "the six delay lines are resonating certain notes that I'm changing through MIDI using the Yamaha MIDI Control Station. I program the PCM70 so I have the pedals controlling different MIDI parameters—like reverb time, volume, or resonant chords—for different presets. I'm using three pedals, two data sliders, a pitch wheel, and a modulation wheel (the sliders and wheels are on the Yamaha MIDI Control Station). I'll route effect volume to a momentary switch so when the switch is up there's no effect signal and when it's down I'll get a +12 dB volume increase, so I can turn it off and on rhythmically with my foot." He mixes it all through a Rane SM26 mixer.

Some of his less auspicious instruments are a Supro steel guitar, and a homemade koto, constructed out of a Crestwood acoustic guitar with the frets removed and koto bridges made of spatulas. And one of his more auspicious instruments is an E-mu Emax acquired shortly after this interview was held.

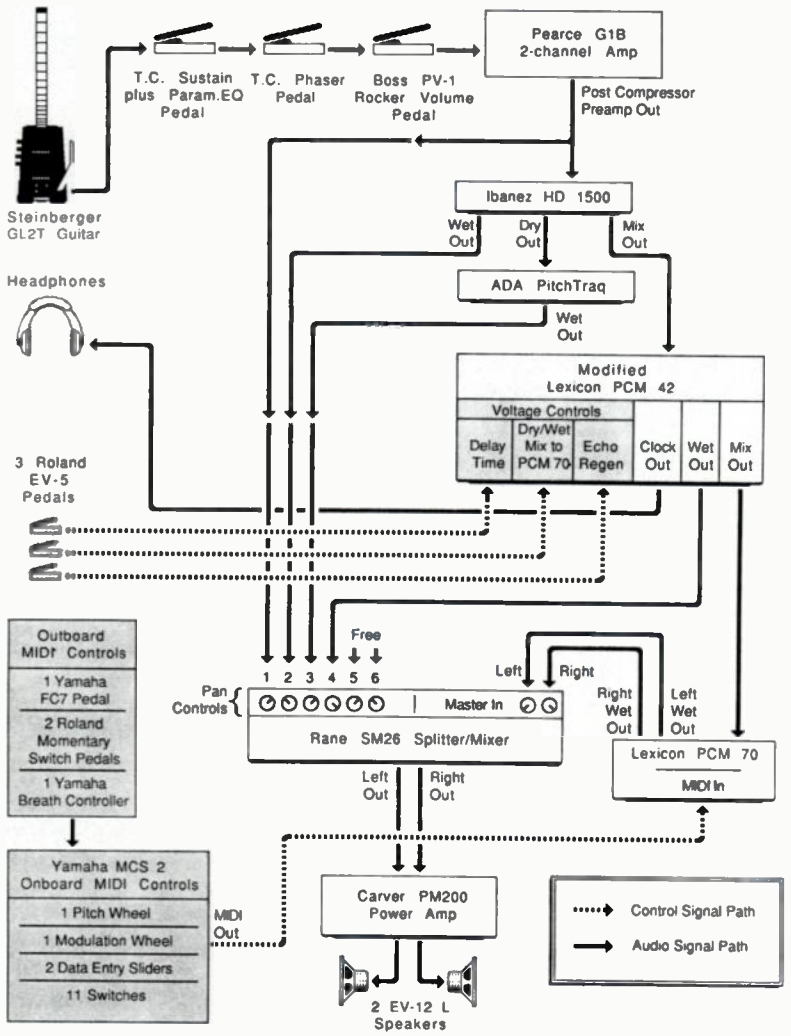

Fig. 1 *Audio MIDI Setup*

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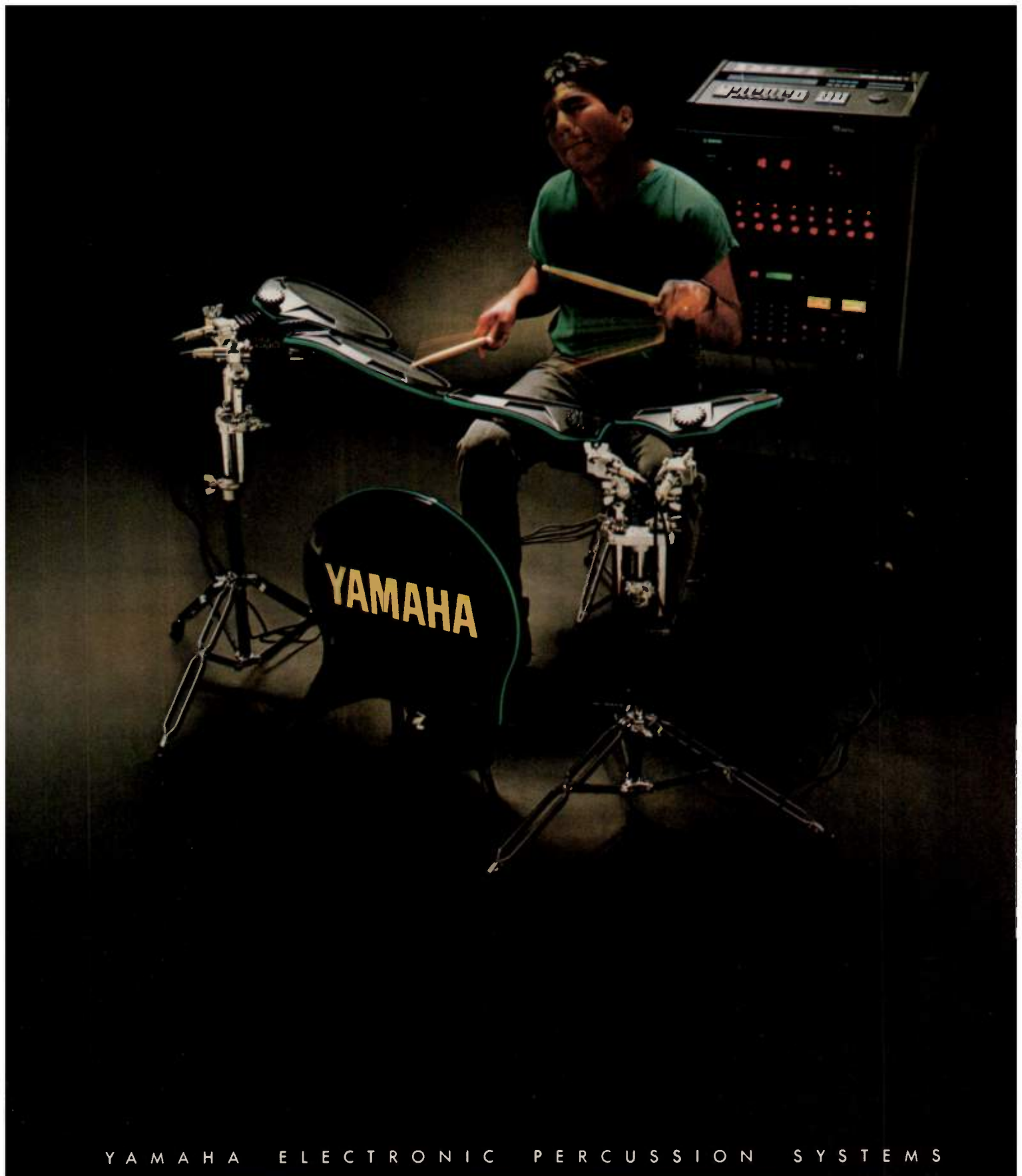

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DT: There was so much going on at that time in the '60s. There were so many musicians. It was hard to find your own direction and I also felt at that time I had a lot of social kinds of problems. I felt a lot of pressure being on stage that I couldn't accept. I was young. I was playing with rock bands where the guys were ten, 12 years older than me and I was the front man and singing. When I was 17, I got to the point where I was overtaken by "life in the fast lane" and decided that it had to do with the music thing—playing music—and I had to just stop, cool out, go away, which I did. I became like your typical ex-middle class world gypsy. I just kind of left; left the school system when I was 15. Basically bombed around the world. Spent a long time in India during that period, in the late '60s, early '70s. Just to realign and see what I wanted to do because things seemed so confused then. I was certainly one of the most confused.

EM: *And The Mahavishnu Orchestra brought you back into the fold?*

DT: To a large degree, yeah. I was knocked out by not only McLaughlin's music, but his presence. It was a real theatrical, dramatic, rock kind of presence. It had something. That music still stands as a landmark, unfortunately mostly for musicians, but it's still a landmark.

EM: Best Laid Plans *was almost entirely improvised.*

DT: It was improvised, yeah, but there were real distinct concepts behind the whole thing and each of the individual pieces to a certain degree. I wanted an almost drone feeling. Almost. That's why the drums are tuned differently for each piece and that's why Geoffrey (Gordon) is using this tiny little synth pad. I didn't want to over-organize. I wanted to do something really improvised but I wanted the overall sound to have a certain shape, which it did for me. I like that record; it's definitely not songs. It has the quality of something that's outside of style, outside of any formatted style. I think because of that, that record's going to last. And Manfred Eicher was very inspirational in the studio.

EM: *How so?*

DT: Just the kind of support and direction he was able to give in that particular situation. How to choose one cut from three. That wild feeling you get when the producer—who you've got a lot of respect for on an aesthetic level—is behind the glass waving his arms like a complete and utter madman, screaming "Go on! Go ahead!" That kind of odd stuff. I don't know, people don't talk about Manfred like that too much.

EM: *You use Lexicon's PCM42 and PCM70.*

DT: The PCM42 is a digital delay that was modified for me by Gary Hall, at Martin Audio in New York, who was the original designer of the PCM42 circuitry architecture. It's modified to offer almost 21 seconds of delay and/or looping time. That's its only modification right now; I use the PCM42 mostly for looping effects.

The PCM70 is an amazingly powerful, completely addressable MIDI-equipped digital reverb/series of six digital delay lines that can give different digital reverb architectures. Each of the delay lines can have a selectable resonant frequency. It can actually create a note with transient attacks, which creates the drum sound on *The Delicate Code*. It doesn't say on the record, but *The Delicate Code* is actually a guitar solo. The drum sound is basically a loop: I looped a bunch of noises into the PCM42 driving the PCM70 to make these pitched string kind of sounds. And I'm changing the pitches of them through MIDI which is one of the powers of the PCM70, and the way I have my setup, I have a bunch of pedals for the PCM70

plus pitch wheels, data sliders, that are all programmable according to the program that I'm using in the PCM70.

EM: *Although you use a lot of effects, I suspect that you're a physical kind of player.*

DT: Actually, the pedal thing has made me very stationary, but I still have to move. I have a tendency to get over-intellectual and end up being one of those guitarists staring down at the instrument, so I try to listen really hard and move with whatever I'm playing or somebody else is playing in order to break that terrible intellectual spell. I like to be able to forget that there's some kind of a distinction between body and instrument, you know.

EM: *When you're improvising, are you thinking about where you're headed with your improvisation or are you just going with the music that's surrounding you at the moment?*

DT: It's complex because there are a lot of elements involved. There are times when I want to push the thing in a certain direction and will willfully do so or try to. There are times when I'm just listening and responding to the way it is, as it is, and how the music goes from there is its own life. Actually, those are probably the times that create the best music—when there's not too much force involved. This is a bit of a cliche, but I think it's kind of true that the best improvisational situations use intellect, but some normal analytical part of intellect becomes suspended. Actually, I'm not really sure what happens. That's kind of the answer. I don't know what it is.

EM: *Do you find that as you add this technology, that it's adding distracting elements that you have to stop and think about?*

DT: Yes, but once the piece of gear becomes integrated as a part of the musical instrument setup, it's no different for me than thinking about a scale or a proper chord or a part I want to reach, or to use the whammy bar, or to change the tone on the guitar or not. With the electric guitar, you're starting with something that's already electric. I have to think about the treble and the bass and the volume and whether to use the volume pedal or turn the distortion a little harder edged. I can see that there might be a point where I could get overburdened by adding too many elements or worse, allowing the technology to become non-interactive in real time, like pre-programmed effects, and jump from one to the other digitally: zero, one, zero, one, zero, one—no room for that human feeling of breath. Then I can see it could be out of control but the way I am doing it

David Torn Discography

AS A LEADER

Cloud About Mercury (ECM #1322; released April '87; dist. by PolyGram Classics). With Mark Isham, Tony Levin, and Bill Bruford.

Best Laid Plans (ECM #1284; released October '85; dist. by PolyGram Classics). With Geoffrey Gordon.

WITH GROUPS

***It's Okay to Listen to the Gray Voice*, Jan Garbarek Group** (ECM #1295; released September '85; dist. by PolyGram Classics). With Jan Garbarek, Eberhard Weber, Michael DiPasqua.

***Without Warning*, Everyman Band** (ECM #1290; released November '85; dist. by PolyGram Classics). With Marty Fogel, Bruce Yaw, Michael Suchorsky.

***Everyman Band*, Everyman Band** (ECM #1234; released October '82; dist. by PolyGram Classics). With Marty Fogel, Bruce Yaw, Michael Suchorsky.

WITH OTHERS

***Sura*, Mark Nuseef** (CMP #21; released March '83; dist. by NMDS). With Mark Nausheef, Marcus Stockhausen, Joachiom Kuhn, Trilok Gurtu, and Kamalesh Maitra.

***Anatidae*, David Borden** (Cuneiform, Rune 4; released January '86; dist. by JEM). With David Borden, Less Thimmig, David Van Tieghem, Nurit Tilles, Rebecca Armstrong, Chip Smith, and Edmund Niemann.

David Torn will also be featured on upcoming albums by David Sylvian and Mark Isham.

now is fine.

EM: *So these looping effects are real time processes the way you're using them?*

DT: Yeah, definitely. Which means there's this element of utter randomness. There are times when I'll try to use a similar loop in the same place in a piece because it worked once but it's never really the same, you know. I could get pretty good at repeating the same loop over and over again, but I don't like that idea so much.

Technology-wise, the things that appeal to me are like these little practical things, like Roland makes these wonderful momentary and on/off switches that lock together. They're great for the road; instead of having all these loose switches all over the place—I can't put together a pedal board because I always change everything from one week to the next—I have these pedals that lock together. I love that, and stuff like rack mount cases where you can put a drawer in it, and you can keep all your cables in the drawer.

On the big side of things I haven't seen anything that really knocked me out, outside of the new Simmons drum kit and the Simmons MIDI programmable mixer. They seemed very, very hip. The Stepp guitar is interesting. Nothing has struck me as highly revolutionary except for the price coming down on samplers. My next big purchase is going to be the Emax.

EM: *I'm surprised you haven't done a one-man band sort of performance.*

DT: I am. I started doing it a few months ago. It's difficult because what I want to do requires a lot from the equipment standpoint and maybe I'll be able to do that in the next few months. But I have been playing solo. It's kind of interesting. I can't tell you if it's good or not; I don't know what it's like. It might be real boring.

EM: *Is that what we were talking about earlier—the arrogant ambience?*

DT: More arrogant ambience stuff, you know. It's different for me because I only started to do it. It's real different when you don't have players to react to. You have to react to and develop your own randomness. And I've been doing the shows completely improvised. I have certain conceptual areas to work in: playing steel guitar, playing electric guitar, playing electronics, playing a little of that fake koto dou'ssn gouni type thing. It's like a little Frippertronics show but my version. It's fun. Tom likes it. EM

Sure, you've used quantization—but have you used it in the most effective way possible? Or maybe you don't even use quantization at all because it makes your music sound too mechanical. In either case, here's the story on . . .

Making Quantization Work for You

BY CRAIG ANDERTON

Just about every sequencer on the market has provisions to *quantize* (also called *"autocorrect"*) tracks—to "round off" notes to the nearest specified rhythmic value. For example, if you choose to quantize a track to eighth notes, then a note played slightly behind or ahead of the eighth note will be repositioned to land *exactly on* the eighth note (Fig. 1). Most sequencers (and drum machines) let you specify quantization, typically from quarter notes up through 32nd notes (some offer even finer resolution). Many sequencers add their own little touches that help make quantization a creative tool, not just something that corrects timing problems.

But while quantization can help clean up sloppy keyboard technique, it can also make your music sound mechanical. And you can run into problems if you quantize to the wrong value—for example, a part with 16th notes quantized to eighth notes will (in addition to altering the feel drastically) "stick" notes together (Fig. 2). Fortunately, almost all undesirable side effects can be avoided if you know how to use quantization, as illustrated in the following tips.

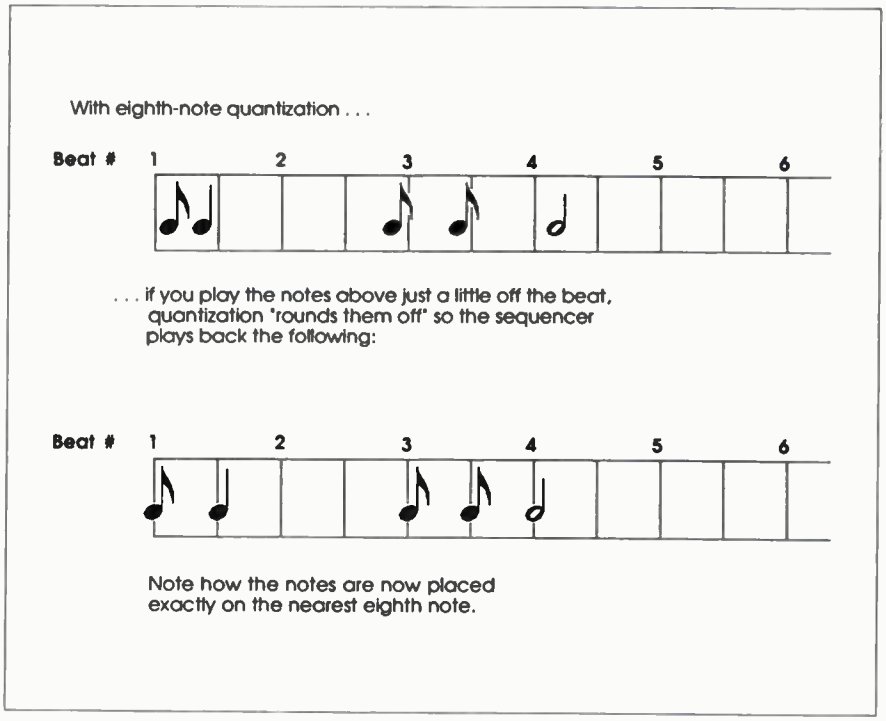

Fig. 1 *How quantization aids rhythmic accuracy*

In Search Of Non-Destructive Quantization

With most sequencers, you record a part first and then quantize it. But what if, on playback, you don't like the effects of quantization, or you selected an inappropriate value? In many cases, the software will let you easily recall the original track so that you can try again. However, this must be done before doing any recording or other activity that writes data into memory (playback is okay, though). Listen to a track *all the way through* after trying a particular quantization value, since certain parts of the track might not work with the value necessary to clean up other parts of the track. Better yet, if the software allows, restrict quantization to only those measures or sections where you truly need quantization.

Even if your sequencer permanently alters a track when quantizing, you can

Craig Anderton has appeared on eight albums and written several books, including MIDI For Musicians.

still simulate non-destructive editing: bounce the track to an open track and do all your experimenting on the bounced track. If you blow matters totally, just erase the bounced track, bounce the original over, and try again.

> **"Many sequencers add their own little touches that help make quantization a creative tool, not just something that corrects timing problems"**

My least favorite kind of sequencer forces you to decide how you're going to quantize a track *before* you start playing, and then corrects as you record; if you play a great part but the quantization is wrong, you're stuck with the part. To solve this problem, record all your tracks with *no* quantization (or the finest resolution possible). Then, to quantize a track, play it back over the sequencer's MIDI Out (mute the other tracks so that only the track to be quantized appears at MIDI Out). Plug a MIDI cord from MIDI Out to MIDI In, set the sequencer to record on an open track, and select the desired amount of quantization. The unquantized data at the MIDI Out goes through the cord back into the MIDI In, and becomes quantized during the recording process. If the quantization doesn't work, erase the quantized/bounced track, choose a new value, and try again.

Default Time

Those just discovering quantization often wonder what value to choose when recording various sequenced parts. My initial quantization preference for drum machines is 16th notes. Eighth notes don't allow for sufficiently complex patterns, and 32nd-note quantization requires very accurate playing—if you're just a little bit off, you might find your beat placed on the wrong 32nd note.

Bass parts usually get eighth note

quantization, as do initial kick drum and snare parts if I'm overdubbing drum parts into a sequencer. Keyboard comping usually rates 16th notes, and MIDI guitar synth parts always start out with no auto-

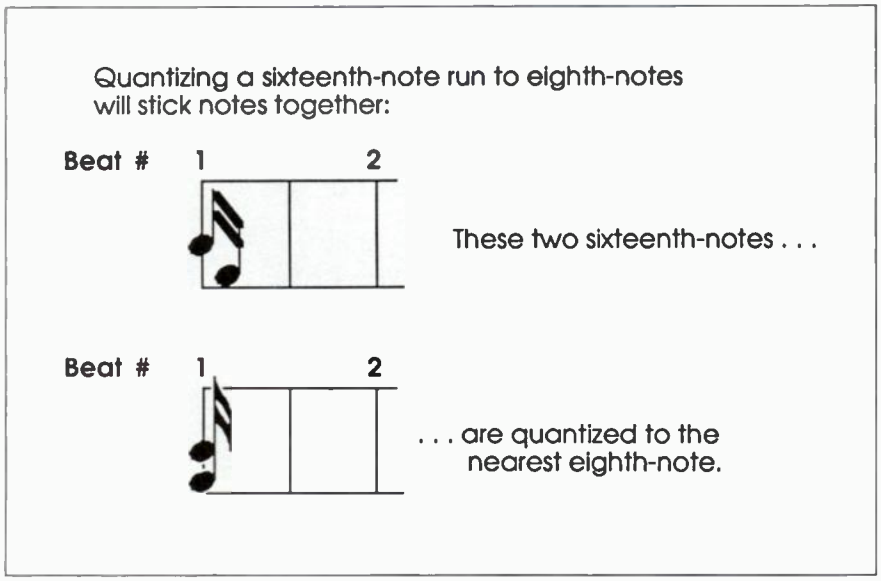

Fig. 2 *Improper quantization can sometimes "stick" notes together*

correction at all (see below).

Multiple Quantizations On A Single Track

You can mix quantization values on a single track if your sequencer can cut (erase) and paste (bounce) parts of tracks. For example, suppose you're recording a keyboard part that faithfully follows the rhythm up to a particular non-rhythmic verse, so you want to switch from quantized to real time recording. To do this, record the keyboard part on track A with quantization turned off. Now bounce that track over to track B. On track A, cut out the non-rhythmic part, and on track B, cut out everything *except* the non-rhythmic part. Now quantize track A as desired, but leave track B alone. Then bounce track B and track A together, and presto—a single track with both quantized and unquantized sections. This technique is particularly useful when you need to integrate triplets into a non-triplet-oriented track.

Quantizing Midi Guitar Synth Parts

Proficiency in the art of cut and paste, as well as bouncing, is vital when quantizing guitar parts. Strumming the strings produces effects that just don't happen with typical keyboard playing; but if you quantize, you lose that magic since all the notes of a chord come crashing down at the same time. I generally bounce individual *sections* of an unquantized guitar sequence that need to be quantized over to another track (note that sections of this new track may be as short as a measure or two), cut the part from the original track, quantize the new track in one pass, then bounce the two tracks back together again.

In many cases, though, if your playing is "close enough" it's best to forget about quantizing, and simply edit individual notes that don't fall where you want them (assuming that your sequencer supports individual note editing).

Flavors Of Quantization

Not all sequencers quantize in the same manner. Some quantize just the attack of a note; others also quantize the duration. Some programs let you do one, the other, or both—definitely the most flexible way to go. I find attack quantization most useful; quantizing duration often sounds unnatural (not always a bad thing, of course).

Beyond Quantization

Now that you've quantized your track, it's time for some individual note editing to get a better feel. As Jim Johnson pointed out in his article "Humanizing Sequences" (February '87 EM), adding subtle variations can greatly improve the feel of a track. Go ahead, slip that snare hit a few milliseconds, or "strum" the notes of a piano chord by starting the attacks at slightly different times.

Advanced programs will even let you do tricks, such as quantize only those notes that fall outside an acceptable range of quantization (for example, if you specify a ten-clock pulse "window" around a particular beat, then events that occur more than ten clock pulses away from that beat will be quantized, but events within ten clock pulses of the beat will remain as recorded). This helps you keep a good "feel" and still trap the most significant timing errors. Some programs let you delay or advance tracks, or quantize only notes within certain pitch ranges. Adjusting these parameters can really add a new dimension to a part.

"If you quantize (MIDI guitar parts), you lose that magic since all the notes of a chord come crashing down at the same time"

Quantization can also work for you as a compositional aid. What would that part sound like quantized to triplets? It's easy to find out. Looking for a random rhythm program to give you some ideas for unusual rhythmic grooves? You don't necessarily need a brand new piece of computer software—simply record your hands running up and down the keyboard a few times, play that track back through a MIDI drum machine, and experiment with different types of quantization. You can even try bouncing that track twice—quantized once to triplets and once to, say, 16th notes. The polyrhythmic interplay can be very inspirational.

These are just some ideas. Find out what a program can do, and *experiment*. Proper use of quantization can make the difference between a great-sounding sequence and one that's just so-so. EM

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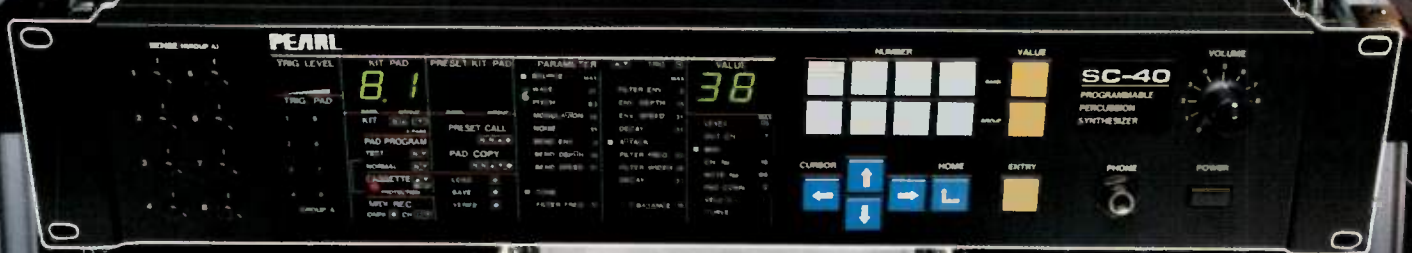

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If you don't have a split-keyboard option on your synth but do have an MPU-401, you can emulate that function with a clever programming technique.

Programming the MPU-401 MIDI Interface

BY LES PENNER

To connect a personal computer to a musical instrument via MIDI, there has to be a MIDI interface between the two. One of the most popular of these, and the *de facto* standard for the IBM PC, is the Roland MPU-401—a unit flattered by several compatible competitors. A number of commercial programs, performing many of the usual MIDI automations, are written with the MPU-401 in mind. But commercial software can be expensive and even so may not fill everyone's needs. Because of this, and because writing programs helps us explore and understand our equipment, a lot of us like to write our own software.

The MPU-401 is an "intelligent" interface that contains its own microcomputer and memory. The "intelligent" part of the MPU-401 unburdens your personal computer from such routine tasks as keeping track of Note On duration and filtering out unwanted MIDI messages. The MPU-401's manual is a very complete "reference," but is difficult to use as a programmer's guide. Writing the simple program here, I spent as much effort learning the ins and outs of the MPU as I did on the actual programming. I offer the program, therefore, not only for its own utility, but because it illustrates the basics of communicating with and programming the MPU-401. Once you understand these basics, writing other useful programs should be much easier. Still, you will have to study the Roland manual very carefully to gain a good understanding of the MPU's enormous capabilities, and you should also have a good understanding of the MIDI protocol. Craig Anderton's *MIDI For Musicians* from Amsco Press is a good source for this information (available from most music stores, or by mail order from: Mix Bookshelf, 2608 Ninth St., Berkeley, CA 94710; ☎ 415 / 843-7901—call or write for free catalog).

I call the program "Poor Man's Split." It automatically switches between patches in your synthesizer so keys below a particular "split key" (which you can program) play one patch, and keys above it play another. This "pseudo-split" allows synthesizers that normally play only one voice at a time to emulate the more expensive duo-timbral synthesizers (see sidebar). The program simply monitors the keyboard and sends MIDI codes to change the synthesizer's patches according to which notes are played. Of course, both voices can't actually sound simultaneously, but moving between the two keyboard halves creates some interesting effects. I wrote the program for the Roland Alpha Juno-2 synthesizer, but it should work equally well with any MIDI instrument.

I wrote Poor Man's Split in BASIC because so many of us are familiar with that language. Actually, interpreted BASIC runs quite slowly and the delays are noticeable. This is tolerable for programs like patch librarians that don't run in real time but not for programs that depend on response speed. Poor Man's Split runs best when compiled under IBM's BASIC Compiler or Microsoft's QuickBASIC. Without a compiler, the response will be slow, but you can still learn a lot about programming your MPU-401 from Poor Man's Split.

Les Penner is an electrical engineer for Standard Microsystems in Hauppauge, NY, working in the design and development of digital integrated circuits and subsystems for computers. His 12-year-old daughter Judith is the keyboard musician in the family; Les does the programming as a hobby.

THE MPU-401

Programming the MPU-401 can be divided into two tasks. The first is the general one of establishing a software interface to send commands and data between the host computer and the MPU-401. The second—unique to the function performed by the program—is to cause the hardware to send and receive the specific commands and data to perform the desired job. There are routines in Poor Man's Split that interface the computer to the MPU-401 and can be re-used in your own programs. Only the sequences of commands and data have to be different to write a program that performs a different job.

LET'S SHAKE HANDS

Lines 40 to 130 of the program establish the protocol. The MPU-401 transfers its information through "ports," pathways into and out of a peripheral device. They have unique "addresses" that are usually determined by wiring or switch settings. When the computer wants to talk to a peripheral it puts the address of one of its ports on the address bus. The computer also signals the peripheral whether the data is to be transferred into or out of the port. When the peripheral recognizes that its port address has been selected, it sends or accepts data accordingly. The 16 ports reserved for the MPU-401 are 330 hex to 33F hex. The MPU-401 recognizes two types of information: commands and data. It sends and receives data through its Dataport (330 hex). It

receives commands and sends status through its Comport/Statport (331 hex). To communicate with the MPU-401, the computer must address the appropriate port and then send or read the data. This process requires that "handshaking" take place. The computer may want to send information but the MPU-401 may be busy doing something else. Conversely, the MPU-401 may want to communicate with the computer but the computer might not be ready. To be sure that both ends of the communication path are paying attention at the right time, a sequence of events called "handshaking" is used. This involves sending signals between the MPU-401 and the computer telling each other when it is ready to send or receive information. The Statport puts out two bits which are capable of telling .he computer that it is ready to receive or ready to send data. The computer must monitor these signals to be sure that the MPU-401 is ready. The "masks" established in lines 80 and 90 of PMSPLIT.BAS allow the program to look only at the appropriate bits of the Statport.

There is another aspect to the "handshaking." Whenever a command is sent, the MPU-401 tells the computer that it has accepted the command and is ready for another by returning an "Acknowledge" byte on the Dataport. The host must be programmed to look for it. This is done in line 580 of the program.

```
10  'PMSPLIT.BAS   "POOR MAN'S SPLIT",  BY LES PENNER,  12/21/86
20  'PERFORMS KEYBOARD SPLIT OF A MIDI SYNTHESIZER USING MPU-401 INTERFACE
30  DEFINT A-Z
40  '########## NEXT EIGHT LINES ARE  MPU-401 CODES
50  DATAPORT      =&H330    ' MPU-401 DATA PORT
60  STATPORT      =&H331    ' MPU-401 STATUS PORT
70  COMPORT       =&H331    ' MPU-401 COMMAND PORT
80  DSR.MASK      =&H80     ' DATA-SEND-READY MASK
90  DRR.MASK      =&H40     ' DATA-RECEIVE-READY MASK
100 ACK           =&HFE     ' ACKNOWLEDGE
110 RST           =&HFF     ' MPU-401 RESET
120 DISM          =&HBB     ' DATA IN STOP MODE
130 WTSD          =&HD0     ' WANT TO SEND DATA
140 '######### NEXT TWO LINES ARE MIDI CODES
150 NOTE.ON.OFF   =&H90     ' MIDI NOTE ON/OFF CODE FOR CHANNEL 0
160 CHANGEPATCH   =&HC0     ' MIDI CHANGE PATCH CODE
170 '######################## MAIN PROGRAM
180 CLS: LOCATE 10,1
190 INPUT "ENTER THE KEY NUMBER FOR THE SPLIT... ",SPLITKEY
200 INPUT "ENTER THE PATCH NUMBER FOR THE UPPER SECTION... ",HIPATCH
210 INPUT "ENTER THE PATCH NUMBER FOR THE LOWER SECTION... ",LOPATCH
220 PRINT "READY TO PLAY.  PRESS <CTRL> BREAK TO TERMINATE..."
230 COMMAND=RST: GOSUB 520  ' SEND RESET COMMAND
240 COMMAND=DISM: GOSUB 520 ' SEND DATA-IN-STOP-MODE
250 CONTINUE=1
260 WHILE CONTINUE=1: GOSUB 450   ' GET A BYTE FROM  MPU-401
270     IF INDATA=NOTE.ON.OFF THEN GOSUB 450 'IF IT IS &H90 THEN GET ANOTHER
280     NOTE=INDATA: GOSUB 450      ' GET ANOTHER BYTE FROM  MPU-401
290     VELOCITY=INDATA       ' THIS IS THE VELOCITY (VOLUME) BYTE - NOT USED
300     IF NOTE>= SPLITKEY THEN NEWRANGE=1 ELSE NEWRANGE=0 ' 1=UPPER, 0=LOWER
310     IF ((NEWRANGE=1) AND (OLDRANGE=0)) THEN RANGE=HIPATCH
320        GOSUB 650 'CHANGE FROM LOWER TO UPPER PATCH
330     IF ((NEWRANGE=0) AND (OLDRANGE=1)) THEN RANGE=LOPATCH
340        GOSUB 650 'CHANGE FROM UPPER TO LOWER PATCH
350     OLDRANGE=NEWRANGE
360 WEND
370 END
380 '######################## ROUTINE TO SEND DATA TO  MPU-401
390 STATUS=&HFF
400 WHILE NOT((STATUS AND DRR.MASK)=0)  ' READ STATUS PORT UNTIL DRR IS 0
410     STATUS=INP(STATPORT)
420 WEND
430 OUT DATAPORT, OUTDATA     ' THEN SEND DATA TO THE DATA PORT
440 RETURN
450 '########################### ROUTINE TO GET DATA FROM  MPU-401
460 STATUS=&HFF
470 WHILE NOT((STATUS AND DSR.MASK)=0)  ' READ STATUS PORT UNTIL DSR IS 0
480     STATUS=INP(STATPORT)
490 WEND
500 INDATA=INP(DATAPORT)     ' THEN READ DATA FROM THE DATA PORT
510 RETURN
520 '######################## ROUTINE TO SEND A COMMAND TO  MPU-401
530 STATUS=&HFF: INDATA=&HFF: W=&HFF
540 WHILE NOT((STATUS AND DRR.MASK)=0)  ' READ STATUS PORT UNTIL DRR=0
550     STATUS=INP(STATPORT)
560 WEND
570 OUT COMPORT,COMMAND       ' THEN SEND THE COMMAND TO THE COMPORT
580 WHILE NOT(INDATA=ACK)     ' START LOOKING FOR ACKNOWLEDGE FROM  MPU-401
590     WHILE NOT((W AND DSR.MASK)=0) 'READ STATUS PORT UNTIL DSR=0
600        W=INP(STATPORT)  ' READ THE STATUS PORT BYTE
610     WEND
620     GOSUB 450             ' GET THE DATA BYTE TO SEE IF IT IS ACK
630 WEND
640 RETURN
650 '################## ROUTINE TO SWITCH TO PATCHES
660 COMMAND=WTSD: GOSUB 520         ' SEND WANT-TO-SEND-DATA COMMAND
670 OUTDATA=CHANGEPATCH: GOSUB 380 ' NOW SEND THE MIDI CODE TO CHANGE PATCH
680 OUTDATA=RANGE: GOSUB 380        ' SEND THE DATA BYTE FOR THE NEW PATCH
690 RETURN
```

Program listing

CHANGING MODES

The MPU-401 can be put into several different modes of operation. Two of the most common are Play and Record. In these modes, the unit will send and receive MIDI note data from the computer but each MIDI Note On/Off command is preceded by a byte with a timing count that tells the MPU-401 how long to wait before sending the note data to the instrument. In this program however, the MPU-401 does not operate in the Play or Record modes. Instead, the MPU monitors the data while in the DATA-IN-STOP-MODE (DISM). It is placed in that mode by issuing the DISM command in line 240. This eliminates the usual timing byte and only communicates the actual MIDI note data making it easier in lines 260 through 290 to read them.

In addition, when we want to send the MIDI commands to change the patch, we must first tell the MPU-401 that we want to send a MIDI control code rather than Note On/Off information. This is done by issuing the WANT-TO-SEND-DATA (WTSD) command in line 660.

THE MAIN PROGRAM

The main program is contained in lines 170 to 370. First the program asks you to enter the MIDI number of the key that determines where the split will occur. (Middle C is 60 decimal, and each half tone one number higher or lower.) Next, the program asks you to enter the two patch numbers the synth will use. These will, of course, be different on each. Remember that you are entering a decimal number into the computer at this point, but *internally* the synthesizer may number its patches in hex, octal or some other base system, or with real values different from those on its front panel. You should be able to discover the answer from the MIDI implementation section of your manual; you may have to resort to trial and error as I did. Good luck.

The program then sends a reset (line 230) and a DISM command (line 240) to the MPU-401. In line 260 it begins reading data in an endless loop. The data from the instrument will either be in pairs—a note number followed by a velocity (loudness) byte—or a pair preceded by a MIDI Note On/Off byte which may be from 90 hex to 9F hex depending on the MIDI channel used. This program

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Synthesizer Terminology

Confused by crypto-synthic terms like "split-keyboard" and "monophonic?" Embarrassed at parties by uncertainty over the difference between "multi-timbral" and "duo-timbral?" Don't be dismayed. MIDI and synthesizer terminology is confusing but not impossible to learn.

Mononphonic and ***polyphonic*** are terms created prior to the implementation of MIDI that describe one parameter of the sound-generating capabilities of a synthesizer: i.e. the number of voices one can simultaneously play on the synthesizer. Monophonic synths can play only one voice at a time and are largely extinct. Polyphonic instruments can play many—usually six, eight or 16—voices at once.

Multi-timbral synthesizers, necessarily polyphonic, are those that can receive MIDI note data (from a sequencer for instance) over a separate MIDI channel for *each* of their voices. These voices can each have a different timbre so that MIDI can simultaneously play different types of sounds. Some multi-timbral machines also have an audio output for each voice, so when they are driven this way by a multi-channel MIDI signal, each voice will go out on its own MIDI channel *and* its own audio out.

Duo-timbral is a term that describes the "split-keyboard" synthesizers that "Poor Man's Split" emulates. These machines not only allow a player to divide the keyboard into two sections and play a different timbre from each section, but also will receive MIDI note data over two (and only two) separate MIDI channels at once.

For more information see "DataBank" in this issue.

is simplified and recognizes channel 1 (90 hex) but you can change line 150 or even make the channel number a user selected variable like the split-key and patch numbers. In lines 300 through 340 the program determines if a new patch number needs to be sent and, if required, sends it.

That's the whole program. Enter it carefully. You don't need to enter any of the remarks after the apostrophes but don't omit lines like 140 entirely or the GOSUB line numbers will be wrong. Be careful to distinguish between zeros and the letter "O." If your computer does not run IBM BASIC or Microsoft GWBASIC, you may have to modify the program to suit your particular computer. Save the program to disk as "PMSPLIT.BAS."

Run the program and, after answering the three questions, you are ready to play. You should hear the first patch when playing above the split-key and the second when playing below it. If you run the program under the BASIC interpreter, there may be noticeable delays in the time to switch patches especially when playing chords. If you have a BASIC compiler you should compile the program for faster operation.

What To Do Next

Here are some other programming suggestions you can try. A MIDI instrument will send out patch change information when a new patch is selected. Try modifying Poor Man's Split so you can choose the patches by simply selecting them at the synthesizer. Try writing a simple program that reads the MPU-401 ROM version and revision. Read the manual regarding commands AC hex and AD hex to do that. Try writing a program that lets you dump your instrument's patch memory to a disk file and restore it. You have to study how your instrument implements that function from its manual. Or try writing a program to play a song by sending the MIDI Note On/Off sequences directly from the program to the synthesizer. You'll find it's not very difficult but very rewarding to hear the notes played back to you from your own program.

If you program in other languages like Pascal or C, you can translate these routines into your favorite language.

Here is one last hint for the beginner: the MPU-401 can be put into a UART Mode by issuing command 3F hex. This disables its "intelligence" completely and simply transfers codes directly between the host computer and the MIDI instrument exactly as they are issued. This mode can be very useful when learning how to communicate via MIDI. Happy programming. EM

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Still struggling with a synth that doesn't store enough patches to get you through a song, much less a set? Help is on the way.

Secrets of Memory Expansion

BY C.R. FISCHER

One of the most common modifications performed on synthesizers, sequencers, computers, and drum machines is expanding their program storage memory. While data cartridges and patch librarian programs may eventually make this modification obsolete, there is still enough older equipment around to keep technicians busily upgrading memory for quite some time.

Interestingly; though, this type of work really isn't hard to do yourself. While some folks have made money by doing installations or putting together kits and selling them for user installation, increasing the memory capacity of a microprocessor-based synthesizer or rhythm box is not that difficult. With some soldering chops, careful workmanship, and an understanding of such digital basics as the operation of generic RAM, almost anyone can increase their equipment's memory.

THE RANDOM ACCESS MEMORY

Virtually every microprocessor-based device needs RAM (Random Access Memory), since this type of memory can be altered by the user. The term "Random Access" comes from the fact that some older forms of memory could only be addressed sequentially (serial access), but RAM has the important advantage of being able to access any of its memory locations in any order desired. Computerized musical instruments use RAM to store patches, rhythm patterns, sequences, and any other form of data that the user programs.

There are two basic types of RAM. *Dynamic RAM* is fast and inexpensive, but must be continuously accessed (refreshed) by the microprocessor to prevent the data inside it from disappearing. It is therefore useless in applications needing battery backup, since backing up all the support circuitry needed to refresh the RAM would draw lots of current. *Static RAM,* on the other hand, will preserve data as long as power is maintained. By using a type of IC manufacturing process known as CMOS, the power drain is so minimal a tiny battery can keep the data alive for over a year; long-

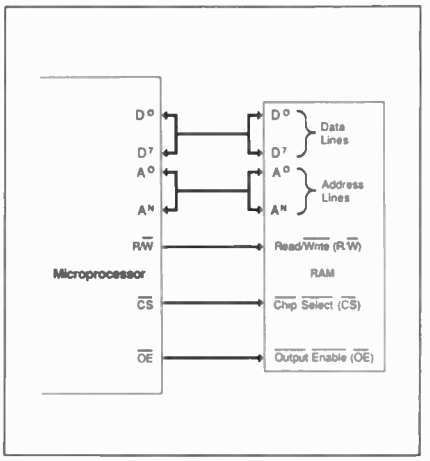

Fig. 1 *Connections used between a microprocessor and Random Access Memory.*

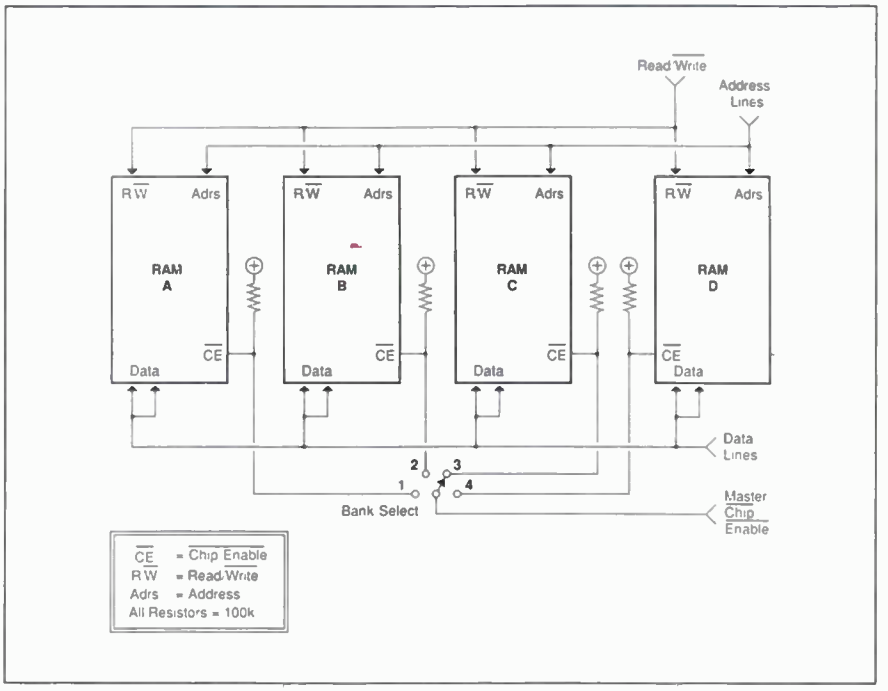

Fig. 2 *Memory capacity can be expanded by placing RAM chips in parallel and enabling individual ICs.*

C.R. Fischer has written for several magazines (including Modern Electronics *and* Radio-Electronics*) and runs Mescal Music, a custom electronics design service. He also plays synthesizer for* The Caste, *a San Francisco East Bay gang of musical troublemakers.*

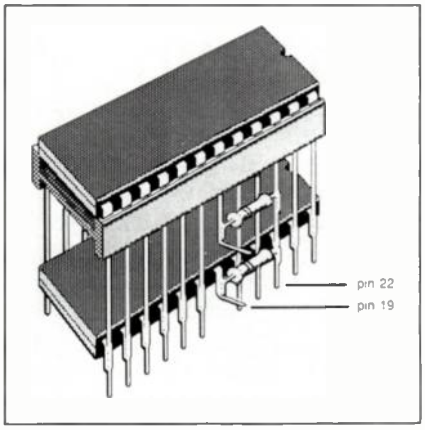

Fig. 3 *"RAM Sandwich" Pull-up resistors are soldered between pins 19 and 22 of each IC. Both pins 19 are bent up.*

life lithium batteries can keep the data intact for five years or more.

Fig. 1 shows how RAM connects up to a generic, microprocessor-controlled device. The *Data* lines carry information to be stored or retrieved. The *Address* lines are always inputs; the data on these lines specify the location in RAM where information is to be stored or retrieved. There are also a couple of logic inputs that determine the RAM's operational mode. *R/W* stands for Read/Write, meaning that you can either "write" data to a chip (e.g. save a voice patch) or "read" data from it (to the keyboard, so it can be played). Another important function is the *Chip Enable* (CE) input (also called *Chip Select*, or CS, input; we will use the two terms interchangeably). The CE allows us to expand our memory past a single chip by placing more ICs in parallel with the first chip, and using the CE to turn on a specific RAM. Thus, the data, address, and logic lines feed two or more RAMs, but data is only written in, or read from *one* of the RAMs. In many CMOS RAMs, disabling the IC places it in a *micropower mode* to reduce power consumption to an absolute minimum. In addition, some RAMs also have an *Output Enable* pin; this is similar to the CE input but affects only the *outputs* of an IC and determines whether or not they are active.

Note that some of the pin names have a bar above them, like $\overline{CS}$. This designates the type of logic that turns on the input. If there's no bar, the pin responds to *positive* logic—that is, a logic high voltage (usually +5 Volts) initiates the function. A bar indicates that the pin responds to *negative* logic—a logic low voltage (usually ground) initiates the function.

If we expand our RAM as described above to include more than one chip, these chips share their output lines. To avoid interaction among the outputs, it is imperative that only one device be activated at any one time. To accomplish this, a *memory decoder* is necessary to keep one and only one RAM enabled at any given time. See **Fig. 2**, where four RAMs share all inputs and outputs except for their individual $\overline{CE}$ inputs. The mechanical rotary switch selects a specific IC, and the master $\overline{CE}$ input allows the computer to control the selected RAM. The resistors ensure that any IC not selected is turned off. (Remember, with a negative logic input, a logic high voltage turns the IC *off*; these resistors are called *pull-up resistors* because they pull the input up to a positive voltage. The resistors are large enough, however, that they become "transparent" to the circuit if a signal goes *directly* into the $\overline{CE}$ input.) An added benefit of this design is that disabling the chips puts them into a micropower mode where a battery can easily supply the tiny (often under 100 μA)

current necessary to keep the data intact.

Now that we understand how RAM works, we will explore two ways of expanding memory without major surgery. The simpler method involves soldering a second RAM atop the original IC and selecting between the two with a toggle or slide switch. The other method involves removing the original RAM from their sockets, and running a short cable to a small circuit board that can contain a much larger amount of RAM than available in the original design.

RAM SANDWICH

If your instrument uses one or two RAM chips in its design, and you'd be content to only double its present capacity, there is a fairly simple fix that works well. This works best with older instruments such as the Roland DR-55, Promars, JP-4, and PAiA Programmable Drum Set. In spite of the limited memory increase this project offers, it is easy and inexpensive.

The general idea is to remove the original IC from its socket and solder a new socket on top of the IC; solder all socket pins to their corresponding IC pins *except* for the $\overline{CE}$ lines (discussed earlier). Each $\overline{CE}$ line connects to the positive supply via a 100k resistor, and a switch selects between the two CE lines. Therefore, the switch selects between the two banks of memory, and the pull-up resistors keep the disabled chip off.

Fig. 3 shows a drawing of the "RAM sandwich," and **Fig. 4** shows the schematic. Since we will be soldering directly to the pins of CMOS ICs, guard against damage from static electricity during assembly and installation by using a grounded-tip soldering iron. To ensure that all

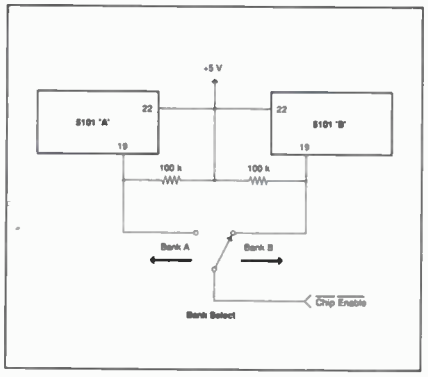

Fig. 4 *This illustration shows the components that must be added to double the capacity of a circuit using 5101 RAMs. All other pins on the 5101 must be wired in parallel for the circuit to operate.*

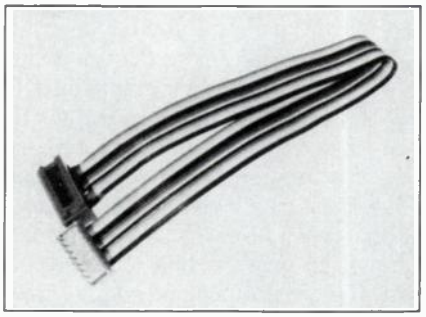

Fig. 5 *The DIP jumper can be used to extend connections from the original IC socket to a new board that holds more memory than the previous RAM.*

the pins of our chips are at the same potential as the iron, I plug the chip into a solderless breadboard and jumper all pins to the ground bus, and then run a wire from this "board ground" to the ground screw on the AC outlet into which I plug my iron. It's also important to let each connection cool thoroughly before moving on to the next connection, as heat can easily damage static RAM. I've performed this operation with these precautions three or four times and had no problems. However, the single time I didn't observe these precautions, I wasn't nearly as fortunate.

Fig. 4 shows a pair of 5101 memory chips, an early 256×4 CMOS RAM that was used in the instruments mentioned above. You can use other ICs by substituting the proper pin numbers for the ones shown.

Start by preparing the breadboard. First add a ground lead from the board to the ground screw on your AC outlet. Next, use a pair of pliers to carefully bend out pin 19 (the $\overline{CE}$ pin) of the IC you removed from the instrument. Insert an IC socket into the breadboard (this helps prevent the iron from accidentally burning the breadboard during subsequent operations), then insert the chip into the breadboard and solder a 100k ¼W resistor between pins 19 and 22.

Place the socket for the new chip atop the original IC. If you have the space in the instrument, use a wirewrapping socket. Although a regular low-profile socket is neater and will allow the sandwich to be placed in a smaller vertical space, the larger wirewrapping socket will make soldering easier for those with less than perfect soldering chops. Set the socket on top of the chip and carefully align the pins to avoid inadvertent shorts. Finally, solder a second 100k resistor between pins 19 and 22 of the socket and bend pin 19 out just as you did with the RAM chip.

Now plug the second IC into the socket on top of the original IC; this completes assembly and you are now ready for installation. *Begin by making sure your device is turned off and unplugged from the AC line.* To install the sandwich, drill a hole in the instrument case and mount an SPDT toggle switch in a convenient location. Next, solder a wire to pin 19 of the RAM socket in your instrument and connect the other end of the wire to the switch's center pole. Install the sandwich assembly into the instrument's RAM socket, making sure the IC pins are properly oriented. Keep one hand on a grounded surface of your instrument as you remove the sandwich from the breadboard to prevent static damage. The final step in installation is to run two wires from the remaining switch lugs to the bent-out $\overline{CE}$ pins on the sandwich.

Now carefully examine your handiwork to see that the sandwich has been properly installed and that there are no bent IC pins, bits of wire, or blobs of solder loitering about to cause mischief down the road. Power up your instrument, and it should have twice its previous memory, with the two "banks" selected by the switch. In general, problems with this type of modification will come either from shorts due to poor soldering on the sandwich assembly, or static damage to one or both RAMS due to sloppy installation. CMOS chips are much more rugged than they were ten or 15 years ago, but is still possible to blow things up with a lack of care or patience.

ADDING AN EXPANSION BOARD

While the sandwich works great in smaller instruments, stacking more than two ICs atop another is *not* recommended. To cram more memory than that into an existing space, it is usually easier to remove the present RAM, build a small circuit board, and jumper the circuit board connections over to the RAM socket. While building an entire memory board may sound like a feat for an electronics engineer, a couple of factors make the task a whole lot easier.

First, all RAM chips manufactured these days pretty much conform to the generic design in **Fig. 1**. The biggest difference between a 2K RAM and an 8K RAM is two additional address inputs needed to access the extra bits in the

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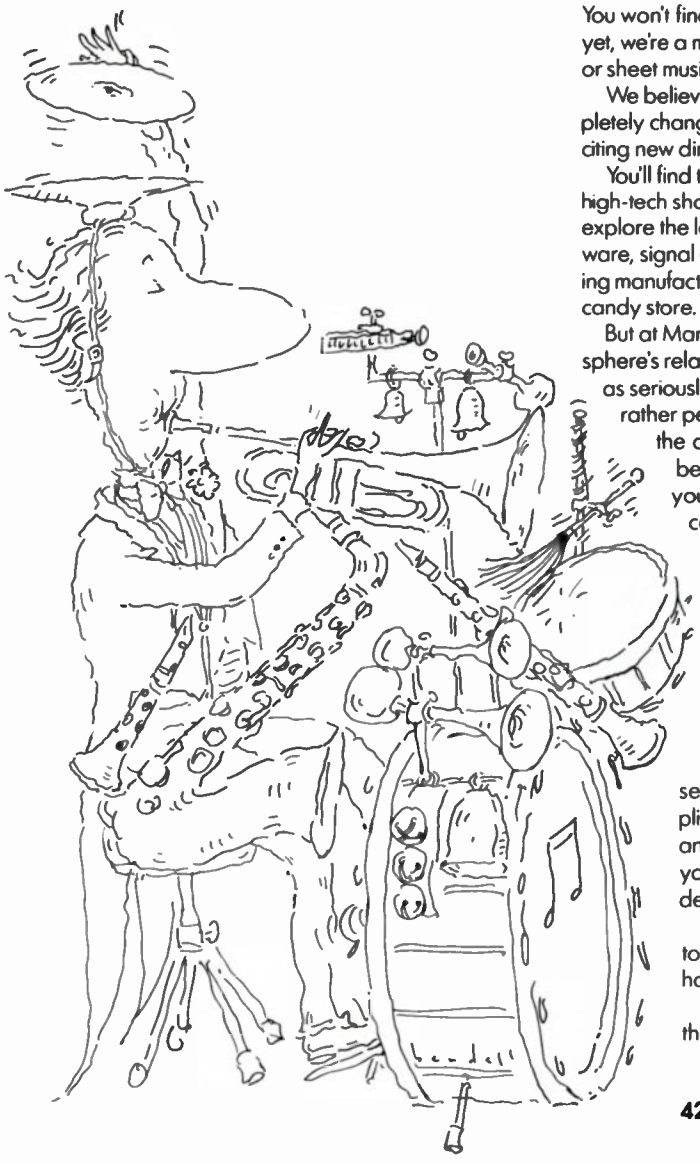

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larger memory. All we have to do is provide a simple decoding circuit for these two pins, and connect all of the lines from the original RAM to the new circuit.

Then there's the question of how to attach some 24 or more wires from the instrument's RAM socket over to the new board. A clever answer is a little gadget known as a "DIP jumper" (**Fig. 5**). This little gem has a flat multipin cable with a connector that matches an everyday DIP socket so there is no soldering to the original electronics, no sloppy bundles of wire, and you have vastly fewer opportunities for mistakes. The DIP jumper is one of the hippest means I've found to expand older equipment without resorting to major vandalism.

We have two options in designing our expander board. The first involves placing several smaller RAMs in parallel and using a decoder circuit as in **Fig. 2**. The other is to step up to a larger chip with the same capacity as several smaller chips. The second option will save you the time of wiring the RAM, the decoder, and all the extra connections, as well as

Pin No.	6116 2K RAM	6264 8K RAM
1)	A7 (Address)	—
2)	A6	A12
3)	A5	A7
4)	A4	A6
5)	A3	A5
6)	A2	A4
7)	A1	A3
8)	A0	A2
9)	D1 (DATA)	A1
10)	D2	A0
11)	D3	D1
12)	GND	D2
13)	D4	D3
14)	D5	GND
15)	D6	D4
16)	D7	D5
17)	D8	D6
18)	$\overline{CS}$ (Chip Select)	D7
19)	A10	D8
20)	$\overline{OE}$ (Output Enable)	$\overline{CS}$
21)	R/$\overline{W}$ (Read/Write)	A10
22)	A9	$\overline{OE}$
23)	A8	A11
24)	Vcc	A9
25)	—	A8
26)	—	CS
27)	—	R/$\overline{W}$
28)	—	Vcc

Fig. 6 *Pin Number Comparisons*

reduce opportunities for wiring errors; this will more than make up for the few extra bucks that larger chips cost. It is my firm belief that the best solution is the one with the least time spent under the hood.

Choose ICs to match the ones in your device, and that are *at least* as fast as the original RAM. If in doubt, get a copy of the service manual or call the service department. Get the data sheets for the RAM in your instrument and replacements, make up a chart of the pinouts of both types of ICs, and match pins for both. **Fig. 6** compares the pinout of a 2K 6116 RAM and a 6264 8K RAM. For example, pin 1 of the 6116 is address line 7 (A7); on the larger 8K 6264, A7 is found on pin 3. As we go through the list, we see that the 6264 has three pins that the 6116 lacks: two added address inputs, and an extra Chip Select input at pin 26 that responds to positive logic (in other words, a logical high voltage selects the chip). Since the CS function was not used on the 6116, we tie this pin high so that the chip selection is controlled by the $\overline{CS}$ input at pin 20, just like the 6116 is controlled by the $\overline{CS}$ input at pin 18.

The last step in our design is to add a switch to let us select among the bigger chip's four 2K banks. Use a 4-position rotary switch and a simple diode/resistor decoding matrix in the name of simplicity (**Fig. 7**). In computer circles, this type of decoder is known as a "hard switch" as it utilizes a hardware scheme. While using a "soft" switch (software commands) is more desirable, especially if the switching can be done by MIDI command, it would require rewriting at least a portion of the microprocessor's operating system. Unless you are madly in love with machine language, resign yourself to turning a knob once in a while.

Note that the battery shown in **Fig. 7** ideally should mount on the memory board so that it can be removed for troubleshooting without losing data. When the system power supply is turned off, relay RY1 puts the RAM in a low power mode: the relay contacts open, and R3 pulls the $\overline{CS}$ pin high, putting the chip to sleep. When the system is turned on again, the relay contacts close, and the RAM can once more be controlled directly from the microprocessor. Use a relay with as low a coil current as you can find to reduce drain on your system's power supply. By modifying this design slightly, a clever hacker could turn this circuit into an interface to plug commercial RAM cartridges directly into the address/data lines of the system microprocessor.

A few precautions to remember:

✓ When selecting the chips for your board, pay attention to their active logic levels to avoid potential horror stories. For example, most RAM CE inputs are inverting (i.e. CE). However, the 6264 RAM has both active high (CE) and low ($\overline{CE}$) inputs so that the chip can easily interface with individual circuit requirements. The logic on the expansion chip must match the logic on the original chip, or your synth will write all the time *except* when the "write" button is held down—a prospect too horrible to contemplate! Fortunately, most RAMS are pretty much the same these days.

✓ Be sure the new RAM is at least as fast as the chips it replaces. Data sheets will specify the speed in nanoseconds (billionths of a second).

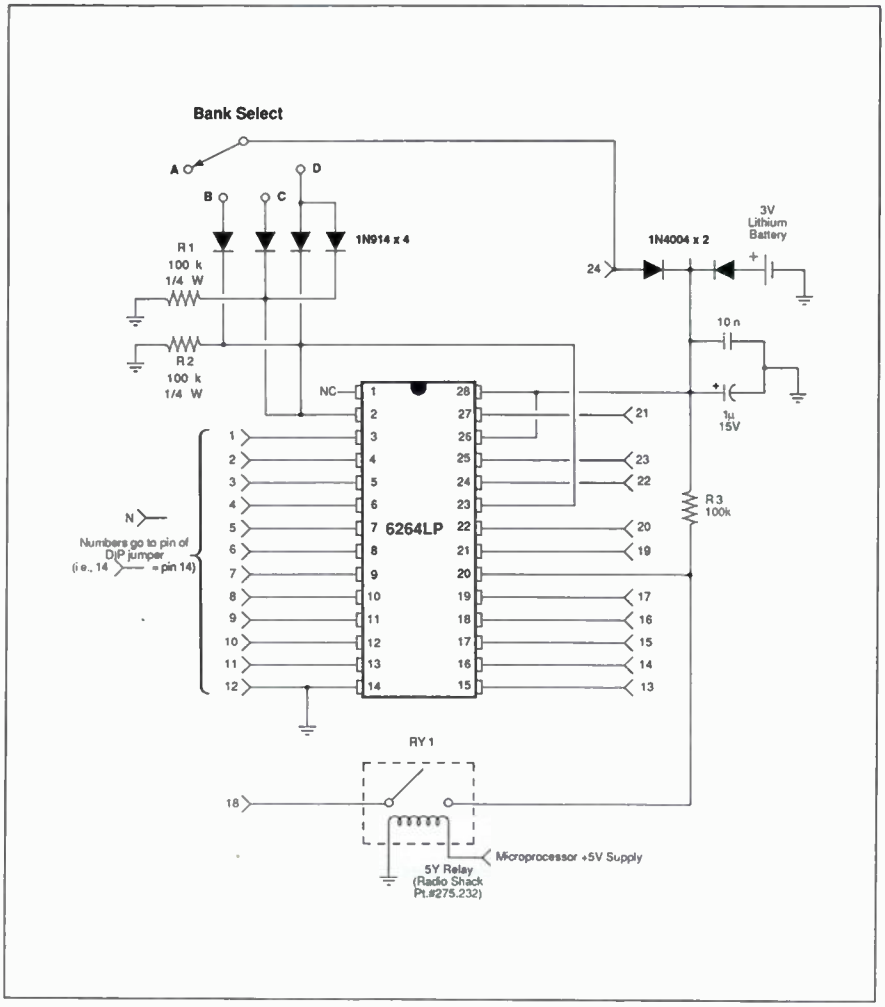


Fig. 7 *Completer schematic of an 8K expander board using a single RAM chip.*

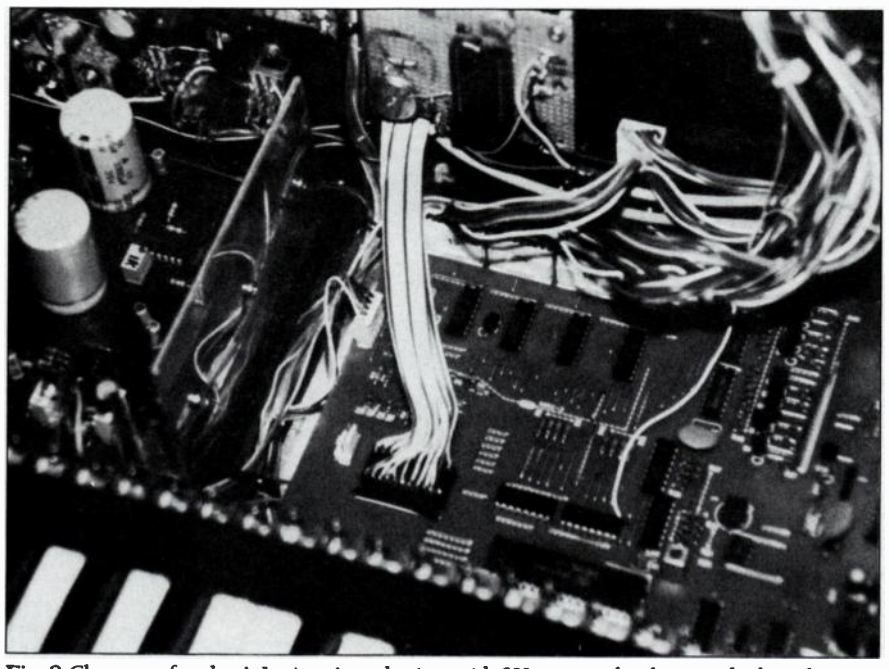


Fig. 8 *Close-up of author's Jupiter 4 synthesizer with 2K memory bank expander board (at top center of picture).*

✓ For longest battery life and minimum power consumption, be sure that the chips are "LP" (Low Power) CMOS versions. A suffix or prefix usually indicates this.

✓ Since the address and data lines of microprocessors change states at high frequencies, keep wiring short, neat, and as far as possible from the audio sections of musical instruments. In addition, the small gauge wiring in a DIP jumper may not carry enough current in some designs. If noise or instability seems to be a problem, tie 22 Ga. solid copper wires directly to the power supply and ground return.

✓ If you are going beyond quadrupling the capacity of your system's memory, be sure to consider current requirements. While CMOS RAMs have very low power consumption, you *can* add enough to cause problems with the system power supplies. With a large expansion, it might be wise to consider a separate power supply for the memory.

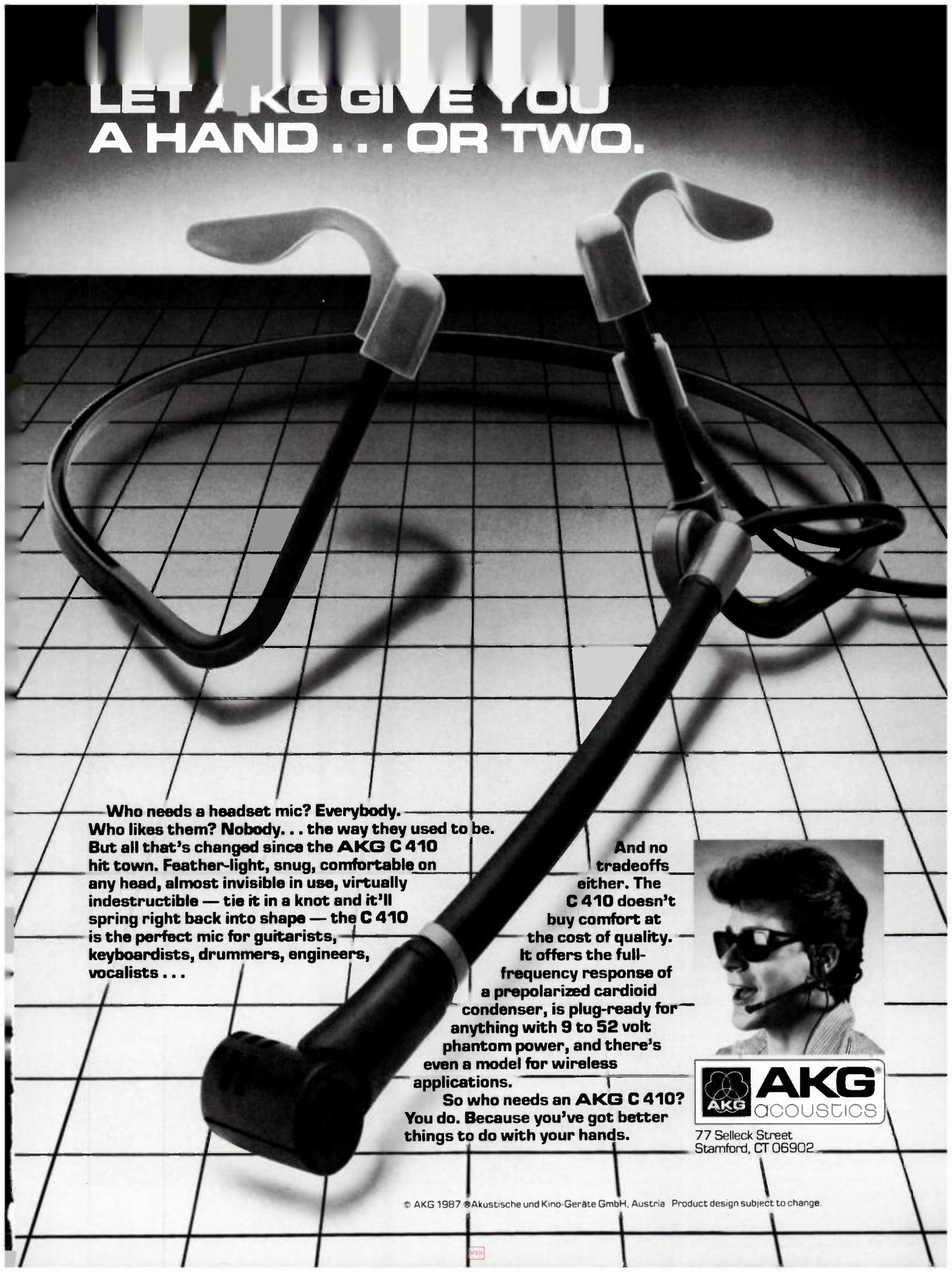
✓ Make sure the memory board has a minimum of a 1 µF, 15V tantalum and a 10 nF ceramic disc connected from the positive supply voltage to ground for proper power supply bypassing. These capacitors should be mounted as close to the IC pins as possible.

To show what can be done with a minimum of trouble, **Fig. 8** is a photograph of my expanded Roland JP-4 polyphonic synthesizer. When the JP-4 came out back in 1979, it had a mere eight user programs. Eventually, I added a RAM sandwich like the one in **Fig. 3**. When that became inadequate, I swapped it for a 2K RAM board with a 6116 CMOS RAM. This holds 64 programs, and has been in place for over a year and a half with no problems.

In the wilderness of used instruments, you can find some great sounding axes for low prices due to limited memory capacity (among other things). By using the guidelines here, it shouldn't be hard to make these instruments into hard-working contributors to society once again. Remember—when working on factory gear, the two most important things to have are patience and a full set of documentation.

Acknowledgments: I would like to thank Aries Electronics, Inc. and the Richard L. Renner Company, Inc. for their help in providing the photographs of the DIP jumper in Fig. 5. In addition, I would like to thank Mrs. Janet Fischer for the photo in Fig. 8.

LET AKG GIVE YOU A HAND . . . OR TWO.



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Answers to your questions about the ESQ-1, Mirage, Drumtraks, JX-3P, M88, QX1, diskettes, CZ-230S, Fender tube amps, and Radio Shack chemicals.

Questions and Answers

BY ALAN GARY CAMPBELL

Many of the instrument updates described this month involve only software (more correctly, *firmware*) changes contained in replacement EPROMs/PROMs/ROMs. Changing ROMs is a basic DIY service skill. It's easy, but you have to get it right, or you'll destroy the ROMs—so let's begin by describing the proper procedure.

Note: To prevent possible damage from static electricity, avoid excessive handling of ROMs. Keep the ICs in their protective packing material prior to installation. Reuse the packing material to store new ROMs.

TIPS ON CHANGING ROMS

ROMS are big multi-pin ICs that (for the ones you can readily change, anyway) fit in receptacles called *sockets*. You have to remove the old ROM from the socket and insert the new one, without bending or breaking any pins; and you must also make sure that the new one isn't installed *backwards*. Before removing the old ROM, make a diagram showing the correct direction of installation; most ROMS have an orientation notch on one end, and pin 1 is often indicated by an indentation or a dot (see **Fig. 1**).

Use a miniature flat-blade screwdriver and pry up each corner *gently*, a little at a time, until the old ROM is free; (see **Fig. 2**). Work slowly and carefully; if you pry up too much on one corner, you'll bend the pins on the opposite side. Don't try to pull the ROM out with your fingers—the socket will "let go" all at once, and you'll bend or break a lot of pins, and probably stick some in your finger. Ouch.

Alan Gary Campbell is owner of Musitech,™ a consulting firm specializing in electronic music product design.

Before you install the new ROM, you may need to "form" the leads slightly: take a pair of needle-nose pliers and gently bend each of the two rows of pins toward the center line (longitudinal axis) of the IC, until all the pins are aligned with the holes in the socket. Then, carefully place the ROM, with the *proper orientation*, in the socket. Check to see that all the pins mate properly with the respective socket holes. Gently push the ROM into place until it "seats." Take care not to apply excess or off-center force, or you might break a pin or fold it under the chip. Double-check the ROM for correct installation before power-up.

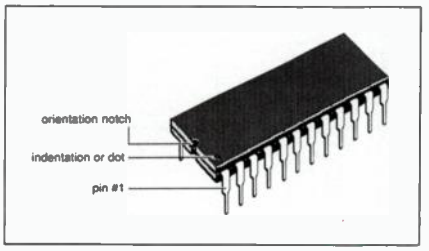

Fig. 1 *Typical physical form for an IC*

MORE QUESTIONS

Q. *What does the new Version 2.0 software for the Ensoniq ESQ-1* do? *The dealer where I purchased the ESQ-1 says that it fixes some bugs in the operating system, but I have Version 1.7, and it seems to work fine.*

A. Version 2.0 does fix several bugs, including the notorious system crash that can occur when going into Sequence Record, Save, Merge, or Erase mode when there is very little sequencer memory left. It also adds some new features, including the ability to send and receive MIDI Song Select commands as well as Sequence Select commands (there are now five MIDI enable modes to accommodate this). Additionally, the System Exclusive messages have been amended to allow external MIDI devices to simulate ESQ-1 panel-button presses.

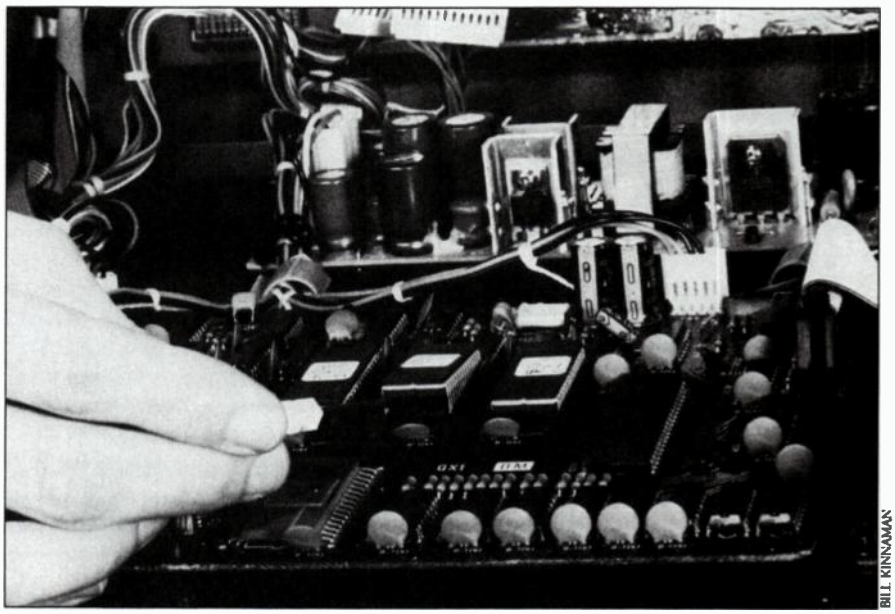

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Fig. 2 *Removing an EPROM*

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*There's always an exception or two, isn't there? The Ensoniq Sequencer Expander Cartridge and Input Sampling Filter can't be used with the Mirage-DSK. However, the cartridges can be used with the Mirage Digital Multi-Sampler ($1195 US).

For more information write: Department E.
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Version 2.0 is a two-ROM set, available at no charge from Ensoniq dealers and service centers (however, Ensoniq recommends that the dealer/service center charge $20 for the installation, since the keyboard must be removed to replace the ROMs and that takes a little while).

Q. *What brand of diskette should I use with my Ensoniq Mirage? I've heard rumors that Verbatim diskettes are not reliable with it, which seems kind of odd since Verbatim has a reputation for making high-quality disks.*

A. Ensoniq's Service Department reports that they experienced some early compatibility problems with Verbatim diskettes; but I've used them with the Mirage, infrequently, without any problems—and you're right, Verbatim does make high-quality products. Ensoniq recommends Maxell and Sony diskettes, the most commonly available brands; both are high quality. Sony disks are often the less expensive of the two (and Sony *did* invent the 3.5-inch format), though Maxell disks are more often carried by local retailers. For the best diskette prices, check the ads in *Computer Shopper* magazine.

Q. *I've heard that you can upgrade the MIDI functions of the Sequential Circuits Drumtraks. Is this a service center retrofit, or what? What new functions are provided by the upgrade, and how much should I expect to pay for it?*

A. The ROM-only upgrade is called the Model 400 05 Software Option, SCI Part No. 869. It comes with the three-page installation guide *How to Update the Drumtraks' Software*, Part No. TN400-1, which gives *very* thorough, step-by-step instructions on how to handle, replace, and test the new ROM—DIY *heaven*. It also includes the 29-page *Model 400 Drumtraks: MIDIguide*, that reviews the functions of version 04, explains the new functions of version 05, and gives complete MIDI implementations for both.

Version 05 adds numerous features, for example: individual tunings can be programmed directly from an external MIDI keyboard, eliminating the need to perform "tuning overdubs"; alternately, drum tuning and volume can be programmed using pitch bend and mod wheels; MIDI Mode can be selected from the front panel; songs can be started from any step in Build Mode; patterns can be restarted via MIDI Sequence Start commands (no need to send a Stop command first); Clock In and Clock Out can be used during recording; MIDI Clock Out is enabled when Ext Clock In is enabled; external MIDI Drum Key data can be enabled/disabled; etc.

The upgrade's suggested list is $50, plus installation. This should take under 30 minutes (including a precautionary cassette save of the existing patterns), so expect to pay around $75 to $100.

Q. *I understand there is a software update for the Roland JX-3P that adds new MIDI functions. What functions does it add, and how is it installed?*

Q. *I have a Roland JX-3P with a PG200 Programmer. Lately it has been having tuning problems. I can set it to reference pitch and after about 15 or 20 minutes the pitch will vary slightly. This is not an individual key problem, but rather a pitch variation across the entire keyboard. Any suggestions?*

A. The new JX-3P software, Part No. MID-ROM (suggested list $49.95), is a single-PROM upgrade that allows the instrument to respond to MIDI velocity information: an external velocity-sensing MIDI controller can affect the peak amplitude and filter cutoff (the JX-3P keyboard is disabled in this mode). Additionally, you can select MIDI reception on channel 1 or 3. To access the new functions: with the power off, press and hold Patch Change Button 7, and power up the unit. To return to normal operation, turn the unit off and then on again.

To install the PROM, remove the JX-3P top panel, dismount the main circuit board, and slide it back to expose the PROM location. Remove the old PROM and install the new one, with pin 26 bent out at 90 degrees. Tack solder a jumper wire between pin 26 of the PROM and pin 26 of the nearby CPU (an 8031 or 8051); that's it.

With regard to tuning drift, the JX-3P is a hybrid synth: DCOs and digitally generated LFO waveforms drive analog VCFs and VCAs, controlled by digital envelope generators. The DCO frequencies are derived from a master system clock, using programmable counters under microprocessor control. DCOs are inherently frequency-stable, since if the master clock were allowed to drift, the instrument would not function.

Therefore, the tuning drift is most likely caused by a thermally dependent offset voltage in the Bender Interface, Analog Multiplex, or A/D Converter circuit, or in the ±15V analog power supplies; refer to the "JX-3P (PG-200) Service

Notes." To locate the defective component(s), check critical circuit points with a DVM and compare the voltage levels with theoretical operating values, or with measurements taken while the instrument is first turned on and still cold. While this is not necessarily a difficult repair, it is not recommended for the novice. It's too easy to allow a DVM probe tip to slip and short out something; the ICs are not socketed (except for the system ROM), which complicates replacement. **Caution:** the PG-200 Programmer attaches to the top panel of the JX-3P via magnetic "feet" that produce a magnetic field strong enough to scramble data stored on data cassettes and diskettes, if these media are placed in close proximity to the bottom of the PG-200.

Q. *A saleperson told me that there is a new ROM for the Wersi M88 controller that "swaps" the Upper/Lower Split channel assignments. In other words, you used to get MIDI channel 1 on the bottom, and channel 2 on the top; now it's the other way around. This seems like a pretty trivial change for a ROM upgrade. Is that all it does?*

A. No. The new ROM, Version 2, also implements an altered keyboard velocity response curve where the upper range of velocity values can be produced without striking the keys as forcefully as before. Wersi changed the velocity curve for those players who desired a lighter "feel" for the keyboard; but the new curve does rather negate the very characteristic that many players liked most on the unit. Clearly, this is a matter of personal preference.

The new ROM is available from Wersi dealers as a warranty update. Note that the M88 can still be ordered with the old ROM installed.

Q. *I have an older QX1 that I purchased when the unit first came out. Can it be updated to provide the new functions incorporated on later units?*

Q. *The tape sync on my QX1 is the pits—it rarely ever works. There's supposed to be an update to fix it, but the dealer doesn't know anything about it.*

Q. *What kind of diskettes am I supposed to use with my QX1? The manual simply says to use "double-sided, double-density diskettes," but I've had trouble with some brands.*

Q. *I've had two of the MIDI Output jacks go dead on my QX1, at different times. The service center where I took the gear for repair reported that, each time, a cracked solder joint was to blame. I take very good care of my QX1, it's not handled roughly. Why the problem?*

Q. *A technician told me that there is a test disk available for the QX1. What functions does the disk provide, and can an individual purchase one? I take my QX1 on the road a* lot, *and I'd like to be able to test the QX1 myself, as a preventive measure.*

A. The QX1 ROM enhancement, described in the March '86 *Aftertouch*, adds all the new job commands incorporated in the later models; it comes with complete documentation, including new manuals. The Version 6 software described in that issue has been superseded (it had some minor bugs) by Version 7, Yamaha part ID: *QX1 V7 KIT*. Version 7 is available from Yamaha dealers and service centers as an extra-cost option. It's strictly a ROM upgrade; no hardware modifications are required (the most difficult part is installing the self-adhesive panel overlay listing the updated job commands—it's hard to get it on straight!). Yamaha doesn't publish suggested list prices; they leave that up to the dealer. But, based on parts costs and average labor rates, the upgrade will probably run in the $100 to $150 range, installed. Note that if your QX1 has old software, you can upgrade it to *Version 4* as a warranty update. This does not provide the new job commands, but does alleviate some bugs in the earlier ROMs.

"The last four CZ-230S presets actually access RAM locations, and you can send new patch data to these via MIDI"

The Tape Sync update is standard on recent QX1s, and is provided by Yamaha Authorized Service Centers as a warranty update for older units, whether the QX1 in question is still under warranty or not. Since the update isn't written up in any technical bulletin that I know of, here's how you do it: open the QX1, disconnect the appropriate cables, and remove the DM board. In the Tape Sync Out section (refer to the QX1 schematic), desolder and remove the 330 Ohm, ¼W resistor that forms the last element of the filter network at the output (pin 5) of IC44; replace it with a 1k value. This raises the output level from -12 dBm to -5 dBm. In the Tape Sync In section, desolder and remove the two 6n8 (0.0068 μF) poly capacitors in the input filter network that drives IC47 (pin 3), and replace each with a 1.0 μF 50V radial electrolytic. This lowers the input high-pass filter's cutoff frequency by a factor of 150. Reassemble and test the unit. If this mod does't correct your tape sync difficulties, then the problem is probably not the QX1. (If you're wondering why I didn't give component designator numbers for the parts to be changed, well, Yamaha doesn't number the passive components on their schematics. Hey, there are only a couple *hundred* parts on the board, after all. What's a little thing like *part numbers!*)

With regard to QX1 diskettes, Yamaha Product Manager Mark Koenig reports that he has been using common double-sided, double-density, soft-sectored, unformatted, *96* TPI diskettes (as used with the IBM PC XT) since the introduction of the QX1, with no problems. But, he advises using only good-quality diskettes (e.g., Verbatim or Maxell)—no generics. Note: that preformatted IBM PC *AT* type disks are not compatible with the QX1.

Concerning the MIDI jacks, the frame that supports the jacks allows some "play" in the vertical direction such that, after installation, some jacks may "float" slightly above the board, suspended by their soldered leads. A plug and cable attached to a "floating" jack can apply considerable torque to the leads, cracking the associated solder joints and causing an open circuit. To solve this problem, remove the jack board, desolder the jacks (preferably with a desoldering station), press each jack firmly to the board, and resolder. A "reversed" clothespin can be used to hold the jacks in place while resoldering; see **Fig. 3**. (Note that the end of the frame nearest the Tape Sync Out jack is not attached to the board, and must be clamped or held in place, or the clothespin will spread apart the frame and PC board.) Whether a service center would treat this as an in-warranty or out-of-warranty repair is probably a matter that would have to be decided on an individual basis.

The QX1 Diagnostic Test Disk (Yamaha part ID: *QX1 TEST DISK*, $10) provides tests for the ROM, RAM, Disk Read/Write,

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- ❑ Advanced Song Chain Screens
- ❑ Mixing and Unmixing of Tracks
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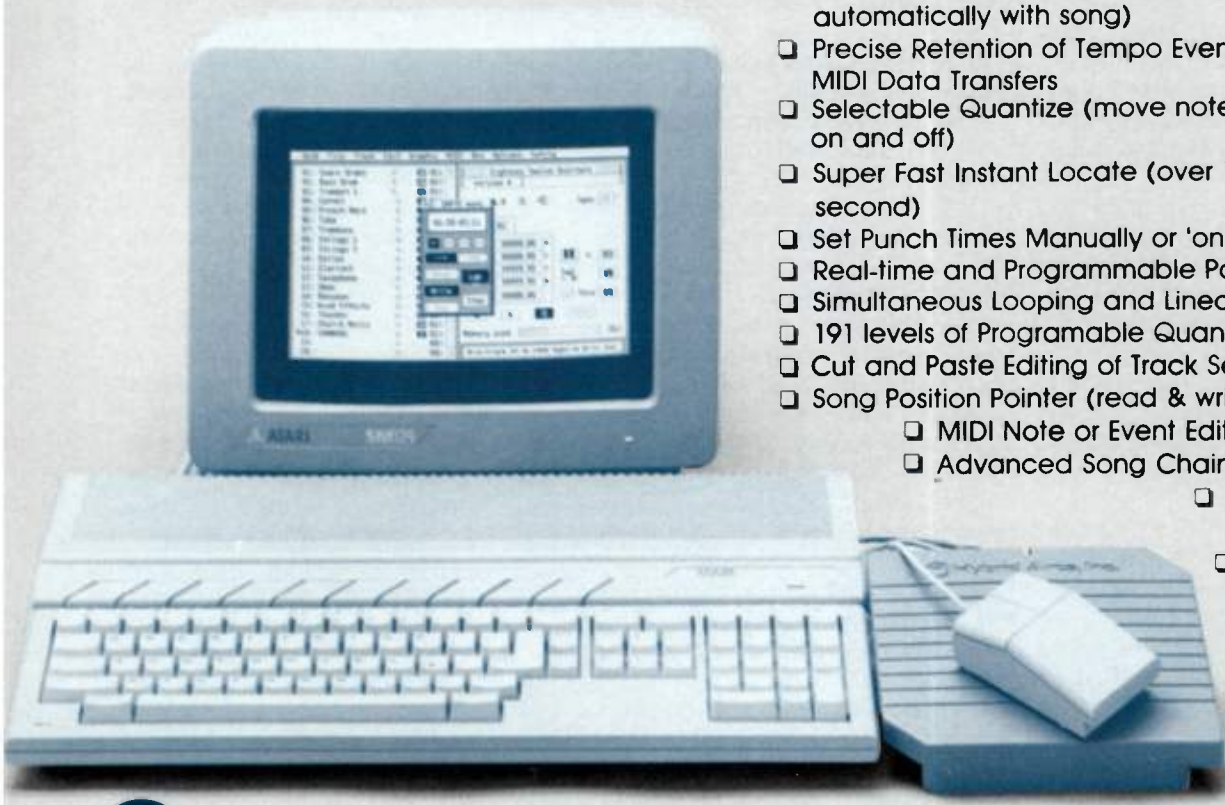

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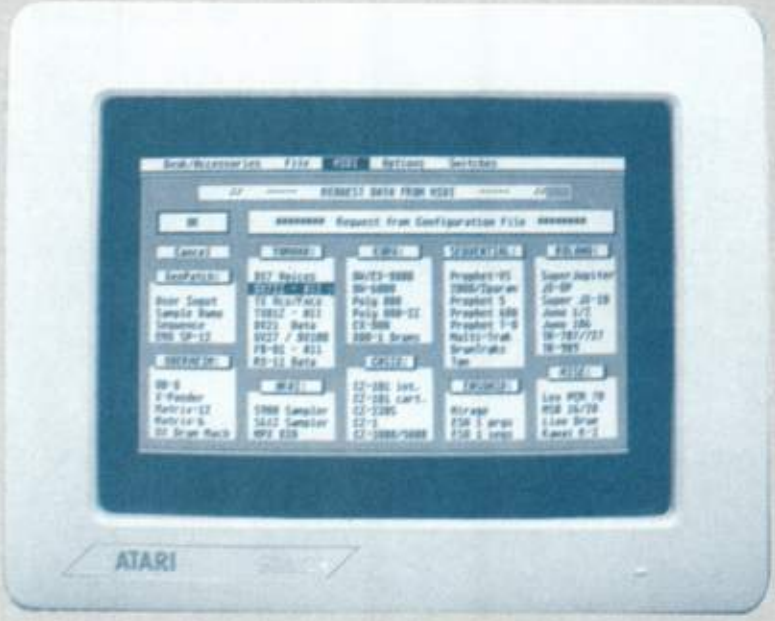

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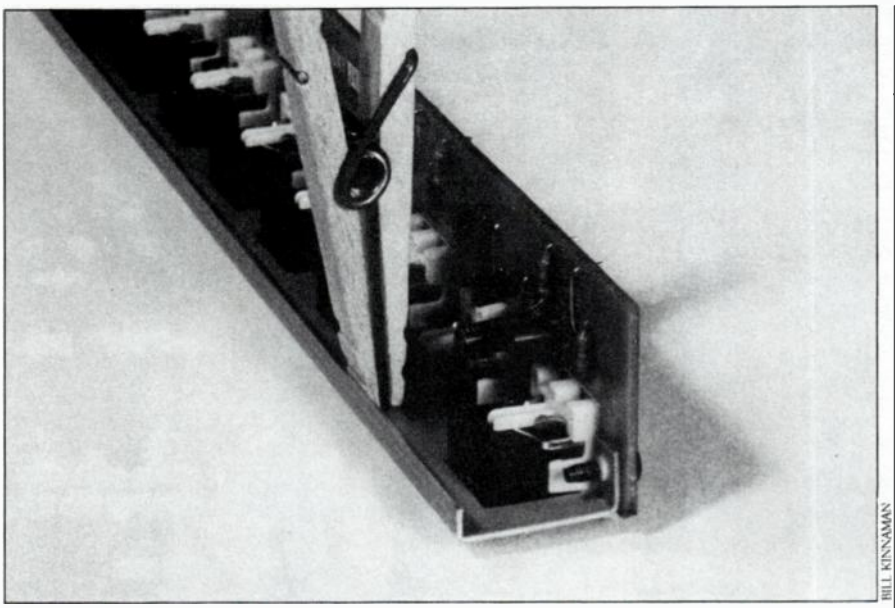

Fig. 3 *Repairing QX1 MIDI Jacks*

and LSI functions, to augment the tests contained in the QX1 ROMs. It can be ordered through Yamaha dealers and service centers. You'll need a QX1 Service Manual, too, since it describes how to use the Test Disk.

Q. *I own an old 1976 Fender Twin Reverb amp that needs a transformer which I was told is no longer made. Any suggestions on how I could get it fixed?*

A. The Twin Reverb amplifier incorporates an AC line transformer *and* an output transformer. The output transformer is the one most likely to fail, since it can be damaged by a shorted output tube—a common problem. To check for a suitable replacement, you'll have to determine which of the two is defective, and find out the exact model name, model number, and serial number of the amplifier—the date of purchase or manufacture is not very helpful when specifying parts. It's likely that the transformer is still available from Fender; they stock an incredibly large number of parts, and occasionally even go so far as to put back into production frequently requested obsolete parts. You can order Fender parts through your local Fender dealer or service center, or from a national supplier such as Music Dealer Service (4700 West Fullerton, Chicago, IL 60639) or Magic Music Machine (1207 Howard Street, San Francisco, CA 94103). If the part is truly no longer available, you might be able to find a used one through Operation Help in this magazine. For more information on obtaining service or parts, see "Obtaining EM Service" (January '86), and "DIY Service" (August '86)—**EM** back issues are available for $3.50 from Electronic Musician, 2608 Ninth St., Berkeley, CA 94710.

Q. *I've heard you can change the presets in the Casio CZ-230S. How do you do it?*

Q. *The CZ-compatible adapter that you recommended in the March* Letters *section doesn't work well with my CZ-230S. It seems to be a pretty loose fit, and the unit keeps wanting to turn itself off. Is there any way to fix this?*

Q. *Will any of the mods in "CZ Mods" (August '86* **EM***) work with my CZ-230S? I especially could use the octave transpose switch.*

A. The last four CZ-230S presets (numbers 96, 97, 98 and 99) actually access RAM locations, and you can send new patch data to these locations via MIDI. Any CZ-compatible patch librarian can send to the number 96 location; this is where the 230S puts patches targeted to the "Edit Buffer," which it doesn't have. Some more advanced CZ librarians, such as the Hybrid Arts *CZ Android* (for the Atari ST) and Opcode *Midimac CZ Patch Librarian* (for the Apple Macintosh), can also send to the other three locations. Given magazine lead times, by the time you read this, additional patch librarians will no doubt provide this feature. The CZ-230S can also *send* patch data to a librarian via MIDI.

CZ synths have their DC power jacks recessed behind an oversized hole in the case. Casio adapter plugs have a stepped shape (**Fig. 4**) to match the diameter of the hole; this precisely centers the plug in the jack. The Radio Shack Part No. 277-1026 adapter I recommended has a slightly stubby plug with a standard shape, and the CZ-230S DC power jack is recessed farther back than the jacks on the CZ-101 and CZ-1000 (the units that I tested the adapter with), which results in a poor fit. Replacing the adapter plug with Radio Shack Part No. 274-1569 plug provides a better fit (make sure the polarity is right if you solder this yourself), but not as good as that of a Casio adapter—you might also try installing a "ring" of plastic or vinyl tubing over the plug barrel. You can avoid this problem altogether by installing the MIDI Power Cable mod described in "CZ Mods."

All of the "CZ Mods" can be installed in the 230S. Its internal construction is a little different from that of the 101/1000, but adapting the installation procedures shouldn't be too difficult. Also, most of the programming techniques described in "CZ Secrets" (March '86 **EM**) apply to patches sent to the 230S.

An aside: if you have a second MIDI

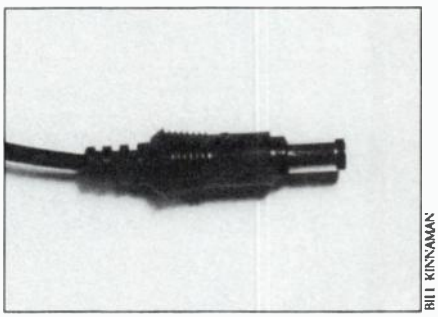

Fig. 4 *Casio-type Stepped Adapter Plug*

synth with pitch bend capability, or a control device such as the Yamaha MCS2, you can transpose by octaves (or other intervals) without a hardware modification. Connect the synth or control device's MIDI Out to the CZ's MIDI In; set the CZ Pitch Bend Depth to "12"; move the pitch bend wheel on the synth or control device all the way forward or back (depending on whether you want to transpose up or down) and hold it there, then disconnect the MIDI cable (or change the receive channel). You can reconnect the cable (or change back the channel) without un-transposing the CZ, as long you don't move the wheel (you don't want the CZ to receive the pitch bend wheel "return to zero" data). This technique works with the CZs and quite a few other synths.

Q. *Are Radio Shack electronics chemicals any good? I wouldn't want to use anything that might harm my equipment.*

A. Radio Shack's *TV Tuner & Control Cleaner & Lubricant* (Part No. 64-2315), *Dust Remover Spray* (64-2325), *Rosin Flux Remover* (64-2324), *Cleaner/Degreaser* (64-2322), *Color TV Tuner Cleaner* (64-2320), *Component Cooler* (64-2321), *Silicone Sealer/Cement* (64-2314), and *Heat Sink Compound* (276-1372), are just as good as similar products from GC Electronics, Tech Spray, Chemtronics, Rawn, Miller-Stephenson, etc. Actually, only a few companies manufacture electronics chemicals; they then package them for other vendors. You pay more per ounce for chemicals when you buy them in the smaller, consumer-sized packages—but a small amount may be all that you need.

> **"Fender stocks an incredibly large number of parts, and occasionally will even put back into production frequently requested obsolete parts"**

Of course, you should follow proper safety and usage precautions for electronics chemicals. For example: Flux Remover can deform plastics and irritate the skin and mucous membranes; Color TV Tuner Cleaner contains mild abrasives and should not be used on pots or relays—just on tuners. See "Service Clinic" in the June, 1987 issue of EM for a thorough discussion of chemical safety.

In closing, note that Maartists, Inc. (383 Broadway, Jackson, KY 41339; ☎ 606 / 666-5915) has released back-lit LCD display retrofits for both the DX7 *and* the TX7 (called the *Backlight DX7* and *Backlight TX7*, respectively—catchy, huh?). These are unplug/unscrew/replace-type components suitable for doing-it-yourself and list for $59 each. Now you can call up the wrong program and see the name, too!

EM

Wherein the author goes in search among analog ancestors for the perfect string and the ultimate resonance.

The Lost Art of Synthesis

BY JIM JOHNSON

With all the hoopla surrounding the latest generation of samplers, synthesis—especially analog synthesis—is a lower priority in the minds of many electronic musicians. This is really a shame, because analog synthesis techniques have reached new peaks in the last few years, mostly due to the advent of advanced modulation routing schemes that provide at least some of the flexibility found in ancient modular synthesizers.

Instruments like the Sequential Prophet VS, Oberheim Xpander and Matrix, and Ensoniq ESQ1 all use the same basic sound generating and control concepts as their modular ancestors, but include, as well, the advantages of new technology such as touch sensitivity, programmability and computer-generated "control voltages." These instruments are just as versatile and expressive as any purely digital synth.

I bought an ESQ1, and after a few months wanted to really put it through its paces. The DX7, I reasoned, pretty much made its reputation with its imitations of acoustic instruments, and rightly so. Since above-average modulation capabilities are needed to produce the variations in tone, pitch and loudness in natural instrument sounds, this is a good test of a synth's capabilities. So I decided to take a shot at some serious imitative synthesis on the ESQ1, using its extensive capabilities to recreate the timbral complexity of natural instruments as closely as possible.

*In between writing, learning to program the Atari ST for music, programming the ESQ1, and writing software for Dr. T, **Jim Johnson** occasionally finds time to eat and sleep. His original musical goal was to become a renowned Dixieland trumpet player; he modified his aspirations when his high school bought a PAiA modular synthesizer.*

First, The Acoustic Facts

Years earlier I'd collected a stack of notes on acoustic facts about musical instruments: where natural instrument resonances occur (formant frequencies), envelope times and other characteristics that differentiate various instruments. I decided to dig up these tidbits, and this turned out to be the best idea I'd had in a long while.

The acoustics texts and journals provided some facts that apply very directly to imitative synthesis. Here, for instance is a collection of miscellaneous facts about the timbre of bowed string instruments that I dug out of the references listed at the end of this article.

✓ The fundamental waveshape of a string bowed near either end is a sawtooth, and approaches a triangle as the bow is moved to the center of the string. As bow pressure *decreases*, a sawtooth appears one octave above the fundamental; this is also present during the attack phase, when the bow first makes contact with the string.

✓ String instruments have a strong resonance centered approximately a fifth above their lowest note. This resonance tends to produce something called a *wolf note*, which is a rough and generally unpleasant tone that causes some notes to seem an octave higher than they really are. Well-made instruments don't exhibit wolf notes, but this resonance still has a noticeable effect on the timbre.

✓ In addition to the low frequency peak, string instruments display a very jagged and irregular frequency spectrum, with peaks separated by anywhere from 100 to 500 Hz.

✓ For the violin, cello, and bass violin, attack and decay times are both about 140 ms, 300 ms, and 500 ms respectively. String envelopes also have a low frequency noise component caused by bow slippage. Armed with this information and a good working knowledge of your synth's resources, it's possible to create some outstanding string sounds.

How Simulating....

Most of the processes mentioned above can be duplicated using the current crop of high-end synthesizers, though the methods might not be obvious in all cases. The bow *pressure octave change* is easy to simulate if your oscillators have independent VCAs. Use a combination of velocity, envelope, and aftertouch modulation on each VCA to bring in the octave at the beginning of the note (i.e. low velocity and pressure), with more fundamental coming in at high velocity and pressure. This is the key to simulating an expressive bowing sound. With Oberheim's Matrix 6, you can duplicate the variation of the string's waveshape with bow placement using the variable sawtooth/triangle waveform. The wolf tone is a little less obvious, but easy enough once you know the trick. I developed a technique on an old Octave Cat synthesizer that works well on modern hybrid instruments like the Xpander and ESQ1. You can create the resonance using a fixed frequency oscillator synced to an oscillator tracking normally to the keyboard, as in **Fig. 1** where OSC2 syncs to OSC1. To understand how this works, think back to how a typical "swept sync" patch works. Swept sync sounds often have a vowel-like quality due to the "moving formant," a sort of distorted resonance centered at the frequency of the swept oscillator. Turning off the keyboard and control modulation to oscillator 2 and tuning it to a given frequency causes it to generate a fixed distorted formant at that frequency. Most good synths allow you to turn off keyboard tracking on at least one oscillator; on the ESQ1 this is

	OCT=	SEMI=	FINE=	WAVE=	MOD#1	DEPTH	MOD#2	DEPTH
OSC1	0	0	0	SAW	LF01	1	LFO2	1
OSC2	-1	5	0	NOISE3	KBD2	-63	*OFF*	0
OSC3	1	0	0	SAW	LFO1	1	LFO3	1

	LEVEL=	OUTPUT=	MOD#1	DEPTH	MOD#2	DEPTH
DCA1	5	ON	ENV1	58	VEL	18
DCA2	12	ON	ENV2	36	ENV3	11
DCA3	8	ON	ENV3	36	VEL2	-20

	FREQ=	Q=	KEYBD=	MOD#1	DEPTH	MOD#2	DEPTH
FILTER	39	0	34	*OFF*	0	VEL2	4

	ENV4=	PAN=	MOD=	DEPTH
DCA4	63	9	*OFF*	0

	FREQ=	RESET=	HUMAN=	WAV=	L1=	DELAY=	L2=	MOD=
LFO1	21	ON	ON	TRI	0	30	1	WHEEL
LFO2	7	ON	ON	NOI	11	35	1	*OFF*
LFO3	45	ON	ON	NOI	14	12	0	LFO1

	L1=	L2=	L3=	LV=	T1V=	T1=	T2=	T3=	T4=	TK=
ENV1	16	63	63	36	16	13	12	12	42	10
ENV2	12	63	10	47	0	6	14	46	31	36
ENV3	63	41	23	0	0	0	29	53	33	12
ENV4	57	63	52	0	23	21	24	36	14	56

	SYNC=	AM=	MONO=	GLIDE=	VC=	ENV=	OSC=	CYC=
MODES	ON	OFF	OFF	8	OFF	OFF	OFF	OFF

Fig.1 *ESQ Violin Patch Listing*

done by setting KBD2 modulation depth to -63. Notes afflicted by the wolf note appear to sound an octave higher than they are. In my experience the best way to achieve the wolf note effect is to manually tune the fixed oscillator an octave and a fifth above the instrument's lowest note. This tone is usually too strong in character to use as the basis for a sound by itself, but judicious mixing with the sawtooth from the master oscillator yields a string waveform that has a hint of extra character in the region of the wolf tone. This technique can simulate formants in many natural or unnatural sounds.

The jagged frequency response typical of strings can't be directly duplicated on most current synths, because nobody's putting programmable filter banks or parametric EQs on their instruments. Outboard EQs will do just as well in most cases, as long as they are parametric; the spacing of the peaks is too regular on a graphic EQ. Bob Moog once described a method of simulating string response using a spring reverb stuffed with fiberglass, which might be a good way to get some use out of the older technology.

ENVELOPES

Most synthesists by now recognize that accurate and dynamic envelopes are the key to good imitative synthesis. Complex envelope generators like those found on the synths mentioned above give much better control over transients than did the old ADSRs, but they also require more programming effort to get the most out of them. The overall amplitude envelope of a sound is not too tough to figure out from theory, but the envelopes for pitch and tone color (oscillator frequency and filter frequency/waveform mix) are not as simple, and require plenty of listening and head scratching to perfect. Be careful, at this stage, to take into account the effects of other envelopes and mod sources on any particular aspect of the sound.

Of course, this theoretical approach won't give you the perfect violin sound by itself; it only serves as a starting point. After generating some kind of crude approximation working from theory, it's a good idea to save the patch and come back to it later for further refinement by ear. When doing this, forget about the reasons behind your initial settings and concentrate on the sound. Don't try to perfect the patch in one session, but come back to it a few times over the course of a week or so, if you can afford the time. Save copies of your intermediate patches as you progress, as it's easy to get off on a tangent and end up with a sound that's nothing like what you had in mind (which can also have its advantages).

Good programming is essential to duplicating instrument sounds, but does not by itself do the job; playing technique is also critical in simulating acoustic instruments. Even a sampled instrument can sound like a cheap organ if it's played like a cheap organ, so take some time to learn your new instrument before recording or performing. Listen to recordings of the real thing, learn typical note patterns, check out some books on orchestration to get an idea of the limitations of natural instruments, maybe even spring for some tickets to the symphony. The more you know about sounds the better your synth playing will be, so get away from your MIDI orchestra for a while and learn a little about what musicians did before the computer age. Your audiences will love you for it.

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Strawn, John. "Orchestral Instruments: Analysis of Performed Transitions." *Journal of the Audio Engineering Society,* November 1986. Contains useful data on instrument envelopes and how they vary with performance technique.

Tired of tripping over cables, or switching MIDI cords? Need a place to put your disks? If you're drowning in a sea of wires and clutter, the following may inspire some solutions.

Workplace Design in the Studio

Fig. 1 *Amco racks*

BY FRANK SERAFINE

How sound designers handle the technical aspects of creating sound effects and music for film/video projects is well documented, but a fundamental issue—workspace organization—has received little attention. Yet, the finest audio and video equipment is practically unusable if not properly organized, and even the most sophisticated studio must be operated by, and accommodating to, human beings.

The time-consuming patching of sound sources and effects, as well as the difficulties inherent in accessing literally tens of thousands of sounds, make organization crucially important to our work at Serafine FX (a further incentive to efficiency are the tight deadlines usually encountered in this line of work). And, any creative work that fills long uninterrupted hours is best done in an ergonomically suitable environment. Having been fortunate enough to be able to design my workplace from scratch, with the assistance of my associate, Rick Schwartz and

Frank Serafine *is a composer and sound designer whose credits include* Star Trek, Poltergeist, Short Circuit, Tron, Brainstorm *and* The Day After. *In addition, Frank has composed music for clients including Fox Broadcasting, Chrysler, Mercedes Benz, and Chevron/National Geographic. Most recently he has co-produced and performed on Ravi Shankar's new release on Private Music,* Tanamana. *Serafine FX Studio offers state-of-the-art equipment using professional audio, video and MIDI technologies.*

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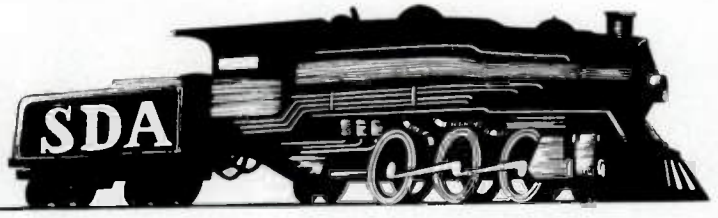

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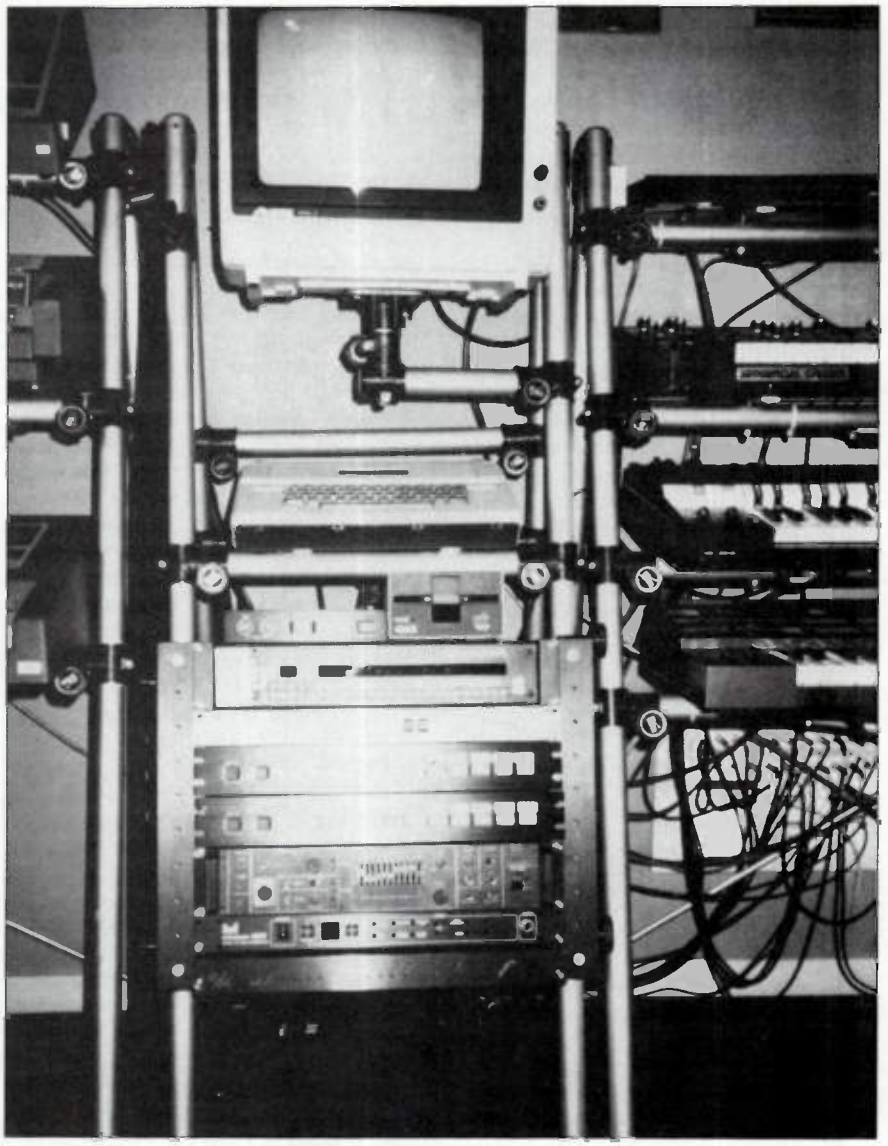

Fig. 3 *Monitor atop rotating pedestal*

Fig. 2 *Diskus storage boxes*

also Stuart Taylor (as well as several equipment manufacturers), I feel that I have been able to satisfy both requirements. Here are some of the things I learned in the process.

FORM FOLLOWS FUNCTION

My primary goal in studio layout is to have *form follow function.* Everything at Serafine FX has a specific purpose; nothing is duplicated. Outboard gear and instrument choices are made carefully to eliminate redundancy. Multi-purpose signal processors have been avoided in favor of those that perform their single intended function to the highest level, and synthesizers are chosen to provide sounds unique to themselves. The multi-track format is 16-track, as MIDI and tape synchronization enable the use of virtual

tracks (i.e. computer-controlled tracks of live electronic instruments that synchronize to tape). The ability to bring back, say, ten tracks of drums live into the mix negates the need for more tracks of tape. Fewer tape tracks can mean a somewhat smaller tape machine, which helps save space.

A good analogy for my concept of a clean, uncluttered workspace is the lifestyle of the Shakers, who lead simple lives little changed since pioneer days. On a visit to a Shaker community in upstate New York, I found that the sparse functionality of their existence paralleled my desire for the same in my work. If it seems ludicrous to compare a people who shun all aspects of technology to the design of a room that uses high technology to create sounds for the visual media . . . well, the basic idea is there.

In keeping with this philosophy, the studio is clearly divided into different functional sections which not only organizes the work process but also simplifies wiring and keeps cable runs as short as possible. All the musical instruments are on the left side; all tape machines, outboard gear and other production related devices are on the right; and for real time button-punching and viewing, the mixing board and Novabeam projector (a large-screen video monitoring system) are in the center. The focus of the entire room is the front wall, which contains the audio and video monitors. As this is primarily a direct line studio (i.e. virtually everything is recorded direct, without miking), there are no tracking rooms; everything takes place in the control room.

The rear wall incorporates two large windows. After years of working in the dungeons that most studios resemble, I realized that an important part of any good enclosed space, whatever its intended use, is natural light. That, combined with the wall and carpet color choices (violet, grey, and black respectively) avoids the disorientation of the standard studio "eternal day," and makes the overall environment much more conducive to lengthy, sustained work.

The right wall of the studio is lined with Amco racks (**Fig. 1**) that conform to the standard 19-inch wide format. These house tape machines, signal processors, a dedicated voice-synthesizing computer, and "disappearing" software drawers. As more hardware comes in, the drawers that formerly held software are being

pulled out, and the disks stored in a novel arrangement on the other side of the room.

The left wall setup has several unusual features, many of which were developed in conjunction with Ultimate Support, a company that has been very helpful in this aspect of my studio design. Basically, as the room was evolving, I would send them photos of problem areas and then work out solutions with their help. The entire left side of the studio is lined with Ultimate Support keyboard stands. One of the first projects was to find a way to house all the software being forced out of the racks on the other side. What we did was create a rack system for disks (using Diskus storage boxes) right next to the Emulators (**Fig. 2**), where they are most needed anyway. Using standard keyboard mounting hardware, we added a space for the disks right onto the existing stands.

To help with visibility, light strips, from the local hardware store, were hidden under the crossbars of the stands above each keyboard to illuminate the surface area. The next problem was that of having a video monitor accessible from any keyboard at any angle. The solution was a custom rotating, extending monitor pedestal (**Fig. 3**). This places the screen right over the Apple II used for the patch library but enables it to be moved and viewed from any of the keyboard playing positions. Being able to see the monitor from any angle has solved an annoying problem; besides, not having to twist to see the main monitor while playing probably saves thousands in chiropractor bills. . . .

The recent appearance of rack mount synthesizers posed another problem: how to integrate these into an existing keyboard setup rather than bring in another rack mount to take up space and destroy the aesthetic symmetry of the room.

The solution is a 19-inch rack addition to the standard keyboard stands. It takes up no extra space, bolts directly to the tubes of the stand, and allows instant access to rack mount modules. Now rack gear and standard keyboards are spatially, as well as electrically, compatible.

Signal Routing and Wiring

All of the keyboard wiring has been concealed behind black panels between the stands, to maintain the clean appearance, and a JL Cooper 16/20 MIDI switchbox

keeps the MIDI connections neat. Any combination of instruments on any MIDI channel is instantly available without repatching or having a maze of interconnecting cables.

On a more musical level, the keyboards are organized and networked through the Axxess Mapper which performs the equivalent function of a number of smaller MIDI accessories. The sequencing is controlled with a Macintosh Plus—a computer with a suitably small "footprint."

In the center of the room is a Tascam M-16 24-track mixing board. Directly in front of the board is the projection video screen, flanked by flush-mounted audio monitors. This provides the necessary direct line-of-sight and audio signal path to someone sitting at the board. The space between the mixing board and the screen is a sitting area whose floor is slightly lower than the studio's—sort of a "sunken living room" style. Here I keep a couch so clients may view the work in a partially secluded area.

To the right of the board is the one-inch, 16-track tape machine (Tascam MS-16). This is next to the Amco racks, which house the ATR-60, a ¼-inch, 2-track tape machine with center time code.

To the left of the mixing board is the remote console with controls for several of the machines. Remote controls are vital for maximizing efficiency in the studio—they save steps and time when numerous devices must be harmoniously coordinated. My studio builder, Joe Callaghan, built the remote console from wood and formica, installed the remote control switching devices, and made it mobile. Therefore, from different areas of the room I can simultaneously control: all tape transport functions for both machines, the function selects for the 16-track, the BTX Shadow SMPTE reader system, the ¾-inch video machines I use for visuals, my sound effects library which I keep on Betamax format (hooked to a PCM adapter), and the Macintosh.

Smaller studios can also benefit from the same philosophy of an uncluttered and well-organized workspace; the main point is to maximize your efficiency so that, regardless of your individual setup, it operates at the highest possible level of productivity. Using your equipment should not be a frustrating experience and it needn't be with a compact, intelligently laid-out facility. Studio layout cannot be overestimated in its importance to the creative process. The right hardware for the job facilitates proper layout, and attention to uncluttered aesthetics provides an environment in which you can concentrate. With the modular functionality of stand systems and careful planning in the room design, we've been able to create a workspace that is truly an everyday pleasure.

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EM

—from page 24, FIRST TAKE

crisp. The gated reverb programs are a mix of common studio effects, and five of the programs have tails after the gate—this avoids the need to use a second reverb for ambience simulation. It's hard to match gated-reverb presets to source material, but the Midiverb II provides a well-considered selection that should be quite useful in home studios. The reverse reverb programs are excellent; some even include extra-long "decays" (attacks?), blooms, and other effects normally associated with high-end processors.

The chorus programs are lush and liquid-sounding, and include various modulation and panning effects that make a Rhodes patch (or the real thing) sound positively *celestial;* two of the chorus programs also include a moderately fast tremolo. Three of the flange programs reset the modulation cycle by triggering off the input level, which sounds really great with drum machines and percussive synth timbres.

The effects programs include a stereo two-tap delay, an autopanned three-tap delay, a multitap reverb, a single-pan super-multitap delay (hundreds of taps crossing the stereo field!), a "frozen flange," two excellent stereo ambience generators, and three echo programs that sound like an expensive digital delay.

I can certainly recommend Midiverb II. It sets new standards of sonic excellence for preset digital reverbs—what will they come up with next? A word to the wise, though: audition a preset processor firsthand, before you buy. Evaluating presets is a subjective matter, and even the best equipment won't be of much value to you if you don't like the sounds that it offers.

During the course of the review, I also had a chance to evaluate the *MPX* MIDI program change transmitter ("Patch Transmitter"), a 1 × 3 × 6-inch, 9-ounce, plastic "remote control" with a keypad on top and a MIDI Out jack on one end, powered by four AA batteries (included).

> **"Midiverb II . . . sets new standards of sonic excellence for preset digital reverbs"**

The MPX is simple to use: to set the transmit channel, press the "Channel" button, and enter a two-digit number from 01 to 16 (entering "00" instructs the MPX to transmit on all channels). To send a program change, just enter the appropriate number, from 00 to 99. This provides a nice, fast way to key in program numbers, and of course works great with the Midiverb II, but there's no way to send program change numbers greater than 99, and no way to automatically increment/decrement through the numbers. The keypad requires a firm, centered touch to operate, and works better with the MPX resting on a flat surface, rather than in a hand-held position.

The MPX is certainly valuable in a studio control room, where FX are remote from the console—and probably more convenient than a program-change footswitch. Yet, it seems that to maximize its utility, Alesis should upgrade the unit to provide all 128 program change numbers. —*Alan Gary Campbell*

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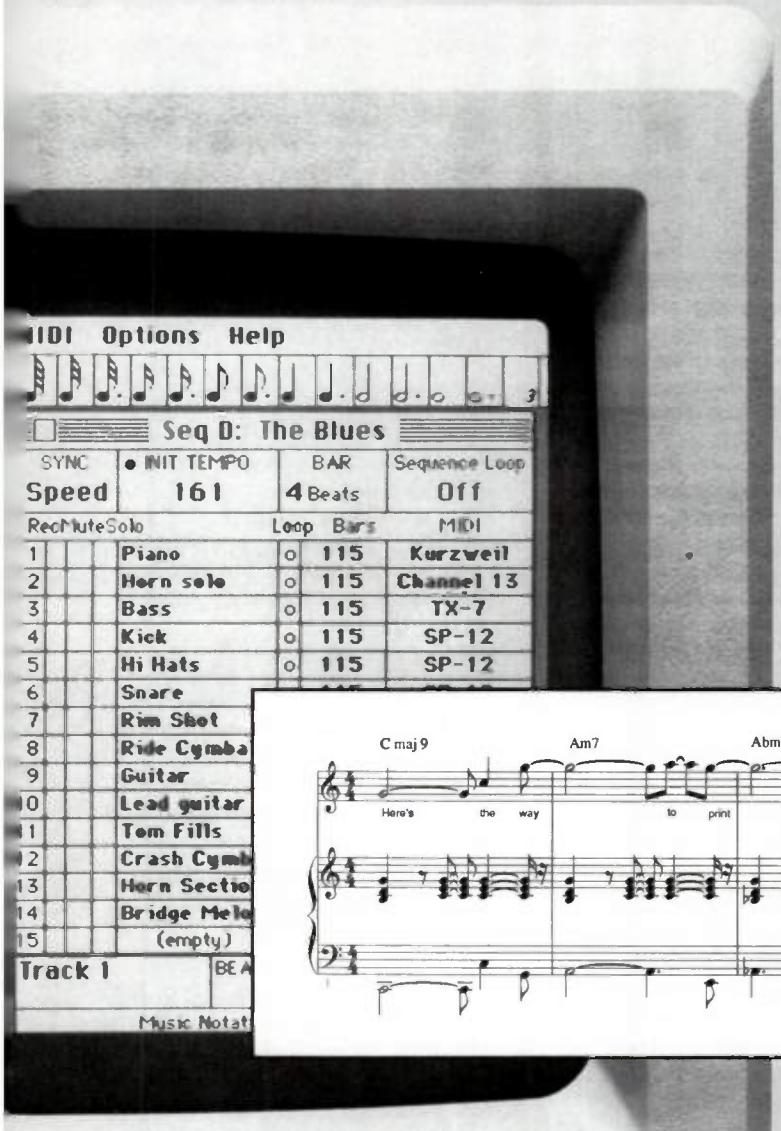

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Do you feel needlessly tied to an outdated technology? Does your mic stand make you look old? *Try* this *headset on for size.*

The Isomax Headset Microphone

BY KIRK AUSTIN

In thinking about the state of the performing art today, one thing stands out in terms of technology: the microphone. Tremendous advances have been made in instruments like the electric guitar and the keyboard synthesizer, but the microphone has remained pretty much the same since it was first utilized. As Miles Davis pointed out in a PBS documentary recently, the idea of a singer or musician directing all that energy into a stationary microphone sitting on a metal stand is *old*; it just doesn't match the breakneck pace of the rest of music technology.

KRELL SCIENCE

Now, I tend to visualize the ultimate technology as one where the mechanics of a thing are invisible. This is probably due to my excessive exposure to science fiction films—like *Forbidden Planet*, where the Krell civilization had grown "beyond the need for instrumentalities." Anyway, I think the goal is to simply have just the artists on a stage with nothing visible between them and the audience. The trick to all of this is that in order to reach an audience of even modest proportions we have to use things like amplifiers, speakers, and (you guessed it) microphones.

Time has already changed the way that amplifiers and speakers function. From the very late '70s and early '80s—where huge Marshall stacks were used as much for stage scenery as they were for sound reinforcement—we've come to the modern stage setup: amplifiers placed offstage and speaker systems "flown" above the stage in an effort to make them invisible. While this does not mean that every band is moving in this direction (I think there will always be heavy guitar bands *imposing* the hell out of us with stacks of amplifiers and speakers), it does point the way towards something different, a new approach.

THE ULTIMATE HAIRDO

I guess the ultimate microphone would be some sort of surgical implant, a laser perhaps, or infrared detection system. But, in lieu of some unforseen new breakthrough, I realize we'll have to settle for the best idea so far: the microphone worn by the likes of Howard Jones, Laurie Anderson, The Thompson Twins, etc. You've seen it, the one that looks like a headset microphone, but somehow doesn't mess up anybody's hairdo. It's different from the headset microphones that people like Shure have been making for years in that it doesn't have that structural piece that goes over the top of your head. Instead, it hooks over your ears and is held together by a thin piece around the back of your head.

It's so simple that it's evaded designers for years. Once I knew it existed, I had to track down this mysterious piece of hardware, so at a Howard Jones concert about a year ago, I managed to ask one of his sound people where he got his microphone. The fellow informed me that it came from a company called The Hardware House in England, and that it used a microphone capsule made by a company called Countryman. Well, I don't get over to England quite as often as I would like to, so I put that little shopping trip on hold for a while.

But I knew there was something familiar about the name Countryman. It was back in the late '60s that I first heard about a company called Countryman Associates. They made a device for professional recording studios called a Phase Shifter. In case you don't remember, in the early '70s the phase shifter was popularized by MXR (whatever happened to them?) (*MXR, late of Rochester, NY, went out of business about three years ago. As reported in the Dec. '86* EM, *repair and replacement of MXR products is being handled by Kelsey-Pape Engineering, 18 Wilmer St., Rochester, NY 14607 ☎ 716 / 271-1990*—Ed.) The MXR Phase Shifter came in a small footswitch box sold mostly to guitar players. It was really an attempt to duplicate the sound of a rotating speaker (like the Leslie) by using electronics instead of mechanical devices. Now, the phase shifter didn't really sound like a rotating speaker, but it had a sound of its own that was pretty nice, so MXR sold an awful lot of them. It wasn't until a few years later that bucket-brigade integrated circuits came along, and with them the low-cost flanger. This spelled the demise of the phase shifter, and its retreat into history.

Anyway, Carl Countryman is produc-

Product Summary

Product Name: Isomax Headset Microphone
Pro Net Price: $235 (VTM Power Supply $74.85)
Manufacturer: Countryman Associates
Address: 417 Stanford Ave., Redwood City, CA 94063 ☎ 415 / 364-9988

Kirk Austin designed one of the first standalone MIDI keyboard controllers. He is employed as an assembly language programmer for an industrial controls company and creates much software for the Mac. In addition to writing for EM, *he also contributes to several Macintosh magazines.*

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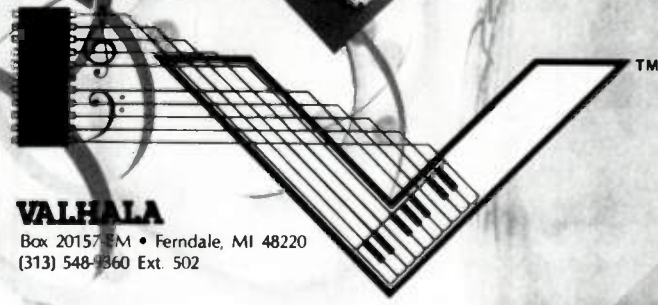

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ing microphones now, and really great microphones at that. It was his tiny capsule Howard Jones used on that night in Oakland. So, I tracked down Countryman Associates, who are now located in Redwood City, just south of San Francisco. I spoke with Carl Countryman on the phone and he said that there had been so much interest in the headset configuration made by Hardware House that he had decided to start manufacturing an adjustable model himself. That way, anyone could just buy one of these things and adjust it to fit the size and shape of their own particular head.

"It's a *big* help to not have to worry about mic stands"

The Sound Stands By Itself

Needless to say, I got one—and I really love it. Since I play both guitar and keyboards it's a *big* help to be able to wear this mic and not have to worry about microphone stands anymore. As far as the quality of the sound goes, I find it to be excellent. In comparing it to a Shure SM58 (which was my previous vocal mic) the Countryman is much clearer and open sounding without being harsh on the high end, and the response seems very smooth throughout the vocal range. I've tried the mic myself and listened to a couple of other singers use it as well. I have the same reaction in every case.

So far I've only played one *live* performance with this mic, and found it to perform well under pressure, as long as I remembered I was connected to a cord. I managed a great deal of movement that would have been impossible using a mic stand. Fortunately, the Countryman has an on/off switch built into the cord that clips onto my belt so I can turn it off between songs. You'll find this absolutely necessary when, for instance, you feel a sneeze coming on.

One warning, however: I did sometimes forget I was miked and say something that wasn't necessarily meant for the audience. I was fortunate to escape without injury, but for those of you who play in more earthy venues than I do, remember: forewarned is forearmed. EM

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The SDR1000 looks like just the tool for a small studio owner buying a first reverb, or an established studio seeking additional processing devices. But does it deliver what it promises?

Ibanez SDR1000 Stereo Digital Reverb

BY SCOTT MCGREGOR MOORE

Ibanez, not known so far for marketing highly complex digital effects, has launched the Ibanez SDR1000 Stereo Digital Reverb with a splash. Their promotion flaunts the SDR's low ($899) list price, user-friendliness, and ability to create two simultaneous reverb simulations. But does it live up to those expectations? Let's look at what it does and how it sounds.

LOOKING AT THE OUTSIDE

The SDR1000 comes dressed in a handsome black single-space rack mount. On the left side of the front panel reside the only knobs—a pair for mixing dry and effect signals, and a concentric pair for setting the two input levels. Two seven-segment LED displays help adjust those levels. Moving to the right, the user-friendliness literally starts to shine. An eight-digit, fluorescent blue display and 19 LED function keys act as prompts during editing and communicate the status of each parameter. For example, while in a given program, hit the "edit" key and a LED will flash in every parameter key that can be edited in the "mode" you selected. Pressing one of these keys freezes its LED on and illuminates its present value in the data display. Pushing the large "+" and "-" keys will adjust this value to your liking.

Scott McGregor Moore is a Toronto-based synthesist and singer/songwriter. He produces and engineers his own work, as well as doing original projects with PM, Kurt Swinghammer and the all-electronic group, Radio Silence. He believes music really is "aural sculpture."

Product Summary

Product: SDR1000
Type: Stereo Digital Reverb
Price: $899
Internals: 16-bit processor, 30 presets, 70 programmable patches, four-band EQ, MIDI
Manufacturer: Ibanez
Distributor: (West) Chesbro Music Co., 3221 Producer Way, Pomona, CA 91746-3916 ☎ 714 / 594-1076. (East) Hoshino (USA) Inc., 1726 Winchester Rd. Bensalem, PA 19020 ☎ 215 / 638-8670.

Pressing the "edit" key will toggle the sound back and forth between the original program and the edited version—a very friendly feature.

The rear panel includes stereo unbalanced inputs and outputs, conveniently implemented with both phone and RCA jacks. A level switch selects between line-level input (+4 dBm) and instrument-level input (-20 dBV). Next are a "hold" jack (it only functions with "natural" reverb settings), an "effect on/off" jack (that does not cut off the tail end of the reverb) and "memory up & down" jacks. These all accept standard, mono phone plugs. A six-pin DIN jack accepts the optional Ibanez IFC60 Intelligent Foot Controller (for those with smart toes who want to call up specific program numbers).

Finally we come to those happily inevitable MIDI jacks—"In" and "Thru." The SDR works in Omni mode (receives data from all channels) or Poly (receives data on any one of the 16 MIDI channels).

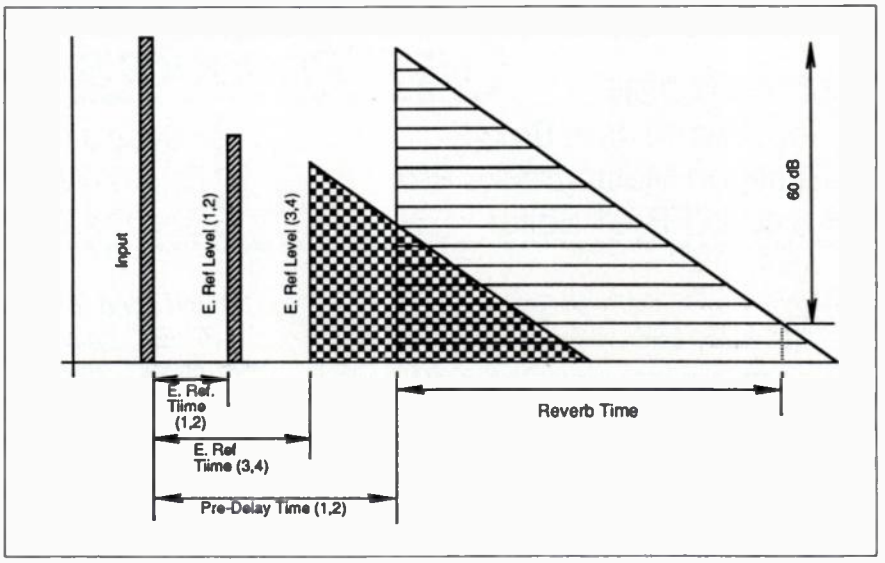
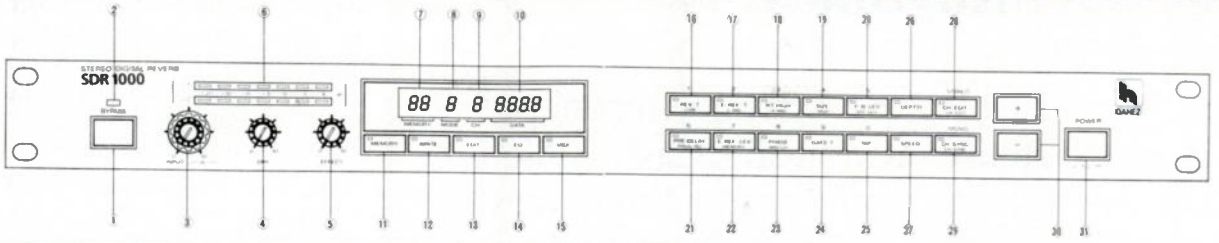


Fig. 1 *SDR1000 adjustable reverb components*



Key To Front Panel:

1. Bypass Switch
2. Bypass LED
3. Input Level
4. Dry Level
5. Effect Level
6. Input Level LEDS
7. Memory Display
8. Mode Display
9. Channel Display
10. Data Display
11. Memory Key
12. Write Key
13. Edit Key
14. EQ Key
15. MIDI Key
16. Reverb Time Key
17. Early Reflection Time Key
18. Reverb Time High Frequency
19. Size Key
20. Feedback Level Key

Each of the SDR1000's 100 memory locations (30 factory presets and 70 user presets) can be assigned to one *or more* MIDI program numbers (from 0 to 127). This primitive form of "mapping" is a logical and very practical arrangement that will be appreciated especially by stage performers.

Unfortunately, program change is as deep as the MIDI implementation goes; the SDR1000 does not let you adjust internal parameters or dump the memories via MIDI.

Moving Inside

The SDR's heart is a high-speed 16-bit digital signal processor featuring eight modes: the expected hall, room, gated and reverse reverb effects as well as the pleasantly surprising stereo panning and dual, multi-tap delay effects. There is also a mode called "dual reverb," which prompts the question: can the SDR1000 really function as two totally independent reverb units? Well. . . yes and no. You *can* create two discrete mono reverbs, but only with both channels set to one of the "plate reverb" simulations. You cannot use, for example, a gated reverb on your snare drum and a large hall reverb on the backing vocals simultaneously. Nor can you use the auto panning or delay modes at the same time as a reverberation set-

ting. Since we have to make do with only one reverb simulation in "dual reverb" mode, the plate is a good choice for this machine because it provides the highest number of adjustable parameters.

So what parameters can you adjust on the SDR1000? In hall and room modes: reverb time, pre-delay time, room size, reverb time high frequency rolloff, early reflection time and early reflection level. In plate mode, early reflection time (3,4) and early reflection level (3,4) are added to the list—Ibanez's approach here to early reflections needs some explanation.

With this feature, the Ibanez designers are simulating first: the more distinct, primary reflections of a sound (slapback); second: a cluster of secondary reflections; and third: the complex wash of reflections called reverberation.

In **Fig. 1**, the straight vertical line, *Early Reflection (1,2)*—where the (1,2) refers to channels 1 and 2 of the SDR1000—is the slapback component. Each channel is separately adjustable for stereo enhancement or, in "dual reverb" mode, independence.

The darker triangle represents the second component, *Early Reflection (3,4)*, that appears in plate, gated and reverse modes. [Note that the (3,4) refers to channels 3 and 4; these "channels" do not really exist but simply identify the second components of Early Reflection whose sound actually appears in the outputs of channels 1 and 2.] Early Reflection (3,4) is what Ibanez calls a "Sub-Reverb" component that decays much like the main reverb sound. In fact it is a second, parallel reverberation—with the "early reflection time" being the same as what many other digital reverbs refer to as pre-delay time, and the "early reflection level" being the ratio (0% to 99.2%) of the reverb level to the level of the input signal. If this sounds confusing, your ears will help you get a grip on these parameters as soon as you get some "hands on" time with the device. In any case, the feature can practically be ignored if you simply set the early reflection levels to zero. These early reflection parameters can also be adjusted for more experimental, unnatural settings or simple slapback effects. The two separately controllable channels here are the feature that will let you stretch and mold the sound to fit your own ideas.

Fig. 2 demonstrates how all the early reflection parameters are also available in "gated reverb" mode. The diagram illus-

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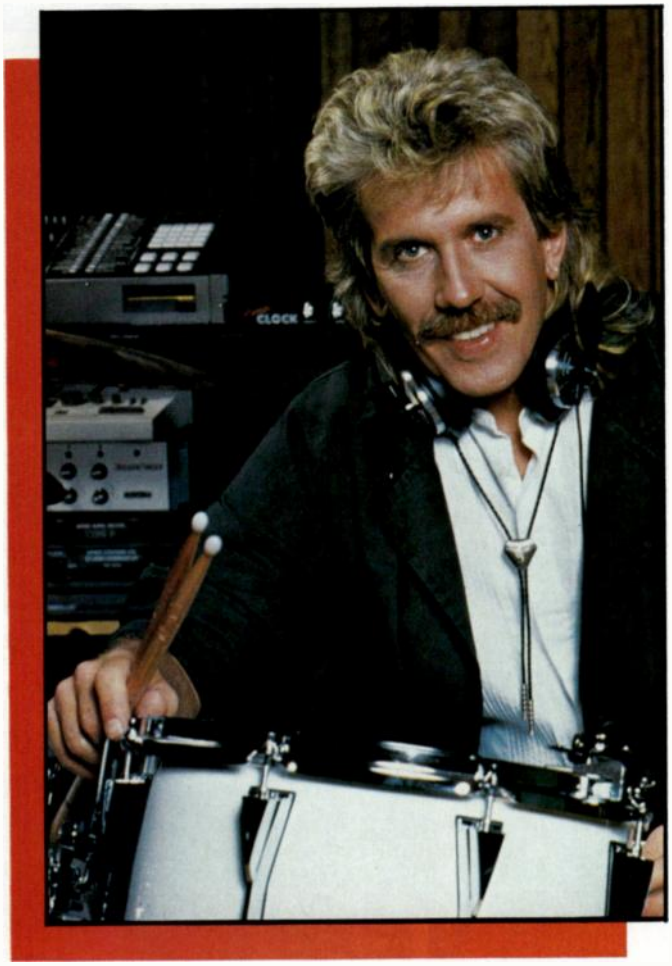
Ask Craig Krampf.



Craig Krampf is one of the busiest session drummers in Los Angeles. He has worked with such artists as Steve Perry, Little Richard, Kim Carnes, Santana, Jane Wiedlin, The Motels, Dwight Twilley. Craig is also a Grammy winner for Best Original Score as co-writer of "Where The Heart Is" in "Flashdance".

"A drummer in today's recording and performing environment must be prepared for anything – playing, programming, triggering, sampling, syncing – and also the unexpected as it occurs."

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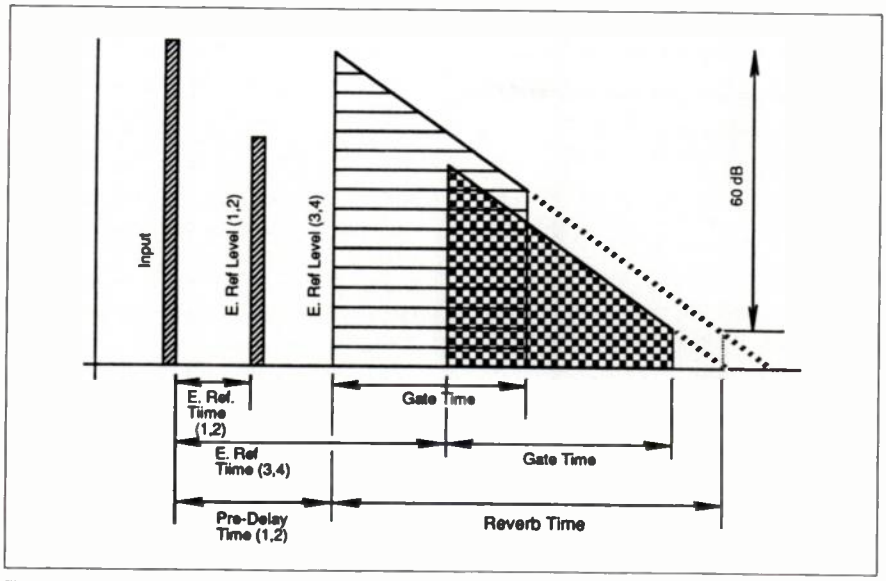

Fig. 2 *SDR1000 adjustable components for gated reverb*

trates how to introduce a long early reflection time (3,4) to simulate the room response to a gated reverb effect. In reverse reverb mode the Early Reflection (3,4) components are also reversed. Each of the four early reflection components may easily be switched in and out of phase by pressing the "phase" key.

NON-REVERB MODES

"Dual delay" mode really does supply two independent channels of digital delay, whether the input is mono or stereo. This means that with a mono signal, you can create some great ping-pong stereo echoes by adding a pre-delay time to just one channel. Unfortunately the pre-delay can only be set to a maximum of 255 milliseconds, so the maximum delay time usable for a balanced ping-pong effect is only 510 milliseconds. I wish Ibanez had designed this mode to maximize the SDR1000's maximum delay time of just over one second, and that the pre-delay could be set to a full 500 milliseconds.

The other adjustable parameters in this mode are: feedback level (in and out of phase), delay time high frequency roll-off, assignments (up to 20 individual taps are available in each channel—each equally dividing the delay time setting), and early reflection time (1,2) (this can be used as a "floating tap" whose timing is independent of that of the taps, and is independent in each channel).

The last mode is "auto-panning," which (no prizes for guessing) automatically pans the stereo outputs between channel 1 and channel 2. You can control the panning speed from 0.1 to 20 Hz pan cycles per second, the panning depth from 0% to 100%, and add a pre-delay time of up to 255 milliseconds. The panning cannot be synched or controlled by any outside devices, but is still a very userful handy feature. Both the "dual delay" and the "auto-panning" make you wish you had two or more SDR1000's, and at its low price it is quite possible for a small studio to swing it. It would certainly complement effects processors by other manufacturers as well.

MORE?

Have I left anything out? I certainly have. In all eight modes you can adjust a four-band (100 Hz, 400 Hz, 1.6 kHz and 6.4 kHz) graphic equalizer (EQ) whose settings are memorized for each program preset and independent in each channel. As with the "parameter edit" function, you can compare your newly edited EQ setting with the original setting by toggling back and forth with the "EQ" key. Hidden in the EQ section is the programmable "effects level" key—a great asset for live performance. If you want to set up sounds with identical parameters in both channels, press the "channel sync" key and the parameter being edited will "track" exactly in the other channel. Copying presets to other locations is also a simple matter.

A final friendly feature of the SDR1000 is that on powering up, the machine automatically returns to exactly the condition in which it was powered down—even if you were in "edit," "EQ" or "MIDI"

function.

CHECKING OUT THE SOUND

If you watch your input LEDs, and adjust your levels appropriately, what you *won't* hear from the SDR1000 is noise or distortion. The effect bandwidth is 20 Hz to 10 kHz and the dynamic range 90 dB. Like synthesizers or guitars, every reverb has its own unique sound and different folks are going to have different opinions as to what sounds good. I like warm, spacious sound and the SDR1000 delivers that to me. I compare its sound to the very smooth Roland SRV-2000 digital reverb with just a touch more graininess in the tail end. There is a hint of the metallic sound I've heard in some other digital reverbs, but this is not irritating because it can be tamed if you like.

The factory presets are not uniformly great, but I'm sure you will find a number of them to which you'll return again and again, even after creating your own favorites. These presets are all listed on a handy plastic card along with diagrams of each mode's sound components, a simplified operation guide, adjustable parameter chart and a table for aligning delay time with tempo. This "quick reference" card is a thoughtful addition to the manual. The manual itself is clearly written, without the all-too-common awkward language of a poor translation. Only a couple of areas are confusing and there are lots of useful charts and diagrams. I give extra points to the chapter titled "Getting Started With Your Own Creations," which encourages experimentation by leading you through a hands-on tour of the eight modes and their parameters.

CONCLUSIONS

The SDR1000 wins my praise as a very cost-efficient reverb unit—both friendly and obedient. It gives you real control over creating your own fine-tuned reverberations and can instantly change from delay to panner at the touch of a key or a program button on your MIDI synth. My criticisms throughout this review tend to come from wanting that Little Bit More that would make the SDR a more perfect machine. To that list, I would add a wish for one or two hundred more milliseconds of gate time (presently 300 milliseconds maximum) and a key to adjust reverberation "diffusion."

In the final analysis, it looks to me like Ibanez has a winner in the low budget, high tech stakes. How did they pull off this new coup? My research confirmed rumors that the SDR1000 was produced with the help of Sony. I hope this partnership continues and leads to more excellent and affordable products in the future. EM

The SDR1000+ Arrives

One of the best features of software-based devices is their suitability for updates, and Ibanez has taken the SDR1000 one step further with The SDR1000 Turbo 1 update kit.

Updates for existing units are handled through authorized Ibanez dealers; the update's list price is $100. Dealers have the option of selling new units either as standard SDR1000s or with the update installed, in which case the unit is sold as an SDR1000+.

New features include 100 factory programs (most of which have been tweaked for better sound and are arranged in a more logical layout) and 100 user locations. The reverb level can now be controlled in real time via MIDI.

There are also two new modes. In mode eight, channel one produces a plate-like "general purpose" reverb sound, while channel two produces gated reverb. In mode nine, channel one produces reverb and channel two produces a tapped delay with a total of one second of delay available. A special *Cascade* mode goes along with these two new modes that can put the channel one and channel two effects in series. Finally, there's a convenience feature—the EQ flat key—that enables comparisons between the equalized and non-equalized sounds.

With these updates, the SDR1000 will keep present owners happy and probably add a few new fans as well. If you already own an SDR1000, it's well worth checking out what this update can do for your sound.

—*Craig Anderton*

Wanna use all those mic inputs?

One of the oldest and largest specialists in computer and printer interfaces, Applied Creative Technology Inc. brings its analog and digital expertise to the recording and music industry with their new DB8 Console Interface.

If you have a mixing console with mic inputs, our DB8 will open up worlds of new potential for you. The DB8 converts high-impedance instrument or effects box outputs to low-impedance balanced mic-level signals, without coloration or loss of dynamics. And it gives you eight channels of this conversion in an economically priced rack-mounted unit.

You'll be surprised at how much you can do with it!

With instruments like keyboards, guitars, synthesizers, samplers and drum machines, you can feed each individual voice or sound output channel into the mic inputs of your console. In addition to faithfully maintaining the original sound quality of your instruments, the DB8 frees you to be more creative and get better first generation recordings. You'll be able to mix, EQ, add effects, and spatially manipulate each voice, instrument or sound during recording, just as if you were mixing a bunch of live mic's. Plus, since the DB8 converts your instrument signals into mic-type signals, the cables between the DB8 and your console can be as long as any mic cable, which means you can locate your instruments anywhere you want—again without signal degradation or any increase in noise.

With effects boxes like digital delays and signal processors, the DB8 lets you feed their output channels into your console's mic inputs, giving you the ability to individually EQ, pan, filter and further effect them. This beats the heck out of a console's simple "effects return" which gives you little or no control.

In one take you'll be able to independently mix, EQ and position all instrument sounds and the effects processor versions of these sounds. Imagine the creative power this will give you!

The DB8 is built using today's technology for today's instruments and consoles. Each low noise (S/N >93db) highly isolated channel (>100db) has a standard quarter-inch phone jack input and a 3-pin male XLR output. To further maintain the integrity of your original instrument sounds, its frequency response is razor flat from 10HZ to 25KHZ ±0.2db and its harmonic distortion is less than .008%. It's even protected against phantom powered mic inputs, and has an LED overload indicator for each channel in the unlikely event any input signal approaches its +10.5db max input level.

To quote one user: "It's a dream come true!".

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Until we setup a dealer in your city, you can buy DB8's direct from the factory for only $399 each, which is 20% off the retail price. You can even put 'em on your Discovery, Visa, Mastercard or American Express! Call our toll free number now!

BY ROBERT CARLBERG

Send albums, tapes, CDs or music videos to Robert Carlberg, PO Box 16211, Seattle, WA 98116. The opinions expressed herein are not necessarily shared by the management or any other intelligent life-form. When ordering, tell them you saw it in Electronic Musician!

Pat Sheedy, *Projectiles* (World Records 1-335). One of the advantages of composing on computer is that you can "rehearse the band" until all the parts sound right, but even then you're not stuck with the computer voices. Patrick L. Sheedy, Jr., for instance, replaced many of the prearranged parts with live musicians playing bass, drums, guitar, keyboards, etc. The result is a debut that is remarkably polished without sounding mechanical or "programmed." The drum programs (which *are* mechanical) could benefit from a bit more "live feel," and Sheedy's writing is a little too intentionally mainstream for my eccentric tastes, but his singing is well-controlled within its range and the production is, of course, flawless. $8 from Polytech Project, 107 E. Foxdale Road, Milwaukee, WI 53211.

Wendy Carlos, *Beauty in the Beast* (Audion SYN200). Wendy Carlos has remained one of the major innovators of electronic music, a fact unfortunately overshadowed by her success as a classical interpreter. *Beauty in the Beast* reports back from her recent brush-cutting forays into alternate tuning systems, including Balinese, Tibetan, Indian, African and a few she made up herself. Throughout she uses GDS and Synergy digital voices of extraordinary richness based on, but in most cases surpassing, traditional instruments from the above areas. I'll go out on a limb here: *Beauty in the Beast* will definitely become a landmark album, pointing to directions music will take in years to come. With Carlos, it's not much of a gamble.

Robert Carlberg used to buy records based on an unusual name, strange instruments, or long tracks. Although not always successful, he discovered a lot of interesting music this way. Now, as a reviewer he gets a lot of unfamiliar music in the mail, allowing him to explore new territory almost every day. "If only it paid enough to live on," he laments.

Giles Reaves, *Wunjo* (MCA 5819). "Giles Reaves," the promo blurb says, "may be the only musician living in Nashville who has not had a lifelong affair with country music." *Wunjo* is glamorous 3-D digital electronic music in the Private Music style, utilizing a Macintosh computer with Total Music software driving a DX816, Matrix-6 and Akai S900 sampler. Without any drums, it tends toward more orchestral than rock arrangements, though for the debut of a 25-year-old prodigy it is wonderfully mature. As with Carlos, I ran out and bought the CD with my own money halfway through listening to the album I received for free.

Synergy, *Computer Experiments, Volume 1* (Audion SYN104). Randomness in music can be quite useful to composers, but deadly to machines. Almost without exception, electronic music that has used random voltage generators (Douglas Leedy, Conrad Schnitzler, David Behrman) has been tedious and boring without some ameliorating human factor. Larry Fast seems to have found a way out of the morass. Using a PAiA random voltage generation program called "Pink Tunes," Fast slows the pace way down, limits the range of the pitches, varies the durations, and overdubs several passes of rich Prophet voices. The end result is only slightly less satisfying than other new age minimalist keyboard zone-outs.

Synergy, *Metropolitan Suite* (Audion SYN-204). Fast's first newly composed album in five years shows he's used the time productively. *Metropolitan Suite* was all composed on Apple II (see April EM) and dumped direct-to-digital through a DX7/TX216 (among others). The strongest composing and most restrained voicing he's ever put his name on continue to make this *the* month for me to buy the CD version halfway through listening to the album.

Ian Tescee, *Continua* (Startsong 4KAF/RN). Tescee's follow-up to his smashing debut *Io* is, if anything, even more smashing. Using analog and digital synthesizers (immaculately programmed), digital drums and guitar, Tescee extends *Io*'s mix of gently atmospheric clouds of sound melding into driving rock tunes, showing a natural mastery of both. Startsong, 3218 E. LaSalle, Colorado Springs, CO 80909.

Ravi Shankar, *Tana Mana* (Private Music 2016-2-P). Shankar combines traditional North Indian sitar and tabla, with Private Music's contemplative electronic music. The synthesis works. Guests include two of Shankar's sons, collaborator Ashish Khan, Al Kooper, George Harrison, Patrick O'Hearn and marimba-player Ray Cooper. Ravi is even credited with synthesizer.

Chuck Jonkey, *India* (JM 103; cassette). Glendale guitarist Jonkey's two abiding interests are South American music and North Indian

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OberView©
Oberheim, A Division of ECC Development Corporation July/August 1987

What Have We Done For You Lately?

DPX-1 New Features

We didn't think it was enough that the DPX-1 was the first and only Digital Sample Player that could play samples from more than one machine. Playing samples from the E-II, Prophet 2000 and Mirage gave the DPX-1 the largest library of sounds, but that wasn't enough. We wanted more and figured you would too. We wanted a machine that could grow in the same direction as your music was growing. With the rate new music equipment comes out, you'd think that most manufacturers would like you to buy a new synth every two weeks, and throw away your old ones.

Well, Oberheim has always thought that it is worth our while to protect your investment. We've been doing extensive factory updates for many, many years to keep our units as current as possible.

The DPX-1 Digital Sample Player was actually designed with future upgrades in mind. The engineering department has been pounding the keys right off their terminals! Revision 1.3 software released in April adds disk back up capability, support for eight individual output option and compatibility with the CD-ROM from Optical Media. And this month sees the announcement of new software with support for Akai S900, interface to Oberheim's new Hard Disk and more!

AKAI S900 SUPPORT

The compact, rack-mount DPX-1 can now read disks containing sampled sounds from the Akai S900, as well as those from the E-2, Prophet 2000 and Mirage! This addition provides you with access to many more of the best sampled sounds around! And since the DPX-1 is a sample player, you don't have to spend long, frustrating hours using expensive studio gear to get world-class samples. Just plug in a disk and go!

The DPX-1 still uses the MIDI ports to read and transmit samples in the **MIDI Sample Dump Standard**. So if you're working with other sampling devices that support this protocol, the DPX-1 can communicate with them also. In this way, the instrument can act as sort of a universal translator for sampled sounds!

DISK BACK-UP FOR FASTER LOADING

The new software can store sounds into Oberheim-format 3-1/2" disks for more comprehensive storage and faster load times. Here's how it works: when a disk is loaded in, the DPX-1 translates the sound to it's own internal 12-bit linear format. This format can not only be stored onto blank disks, but all the settings are also stored with it such as which preset is currently being used, current MIDI channel, controller status, fine tuning, and all the extended function settings. That way you can set up a disk so that when it loads, it is already on the right channel. Disks can do all the dirty work for you on stage while you're worrying about more important things - like playing.

(Continued on Page 2)

DPX-1 New Features

(Continued from Page 1)

Oberheim format disks don't require specially formatted disks and they're more reliable because the DPX-1 is reading a disk it created. Perhaps the biggest advantage is that the Oberheim disks load from 20% to 40% faster than the original disks and the ability to back up valuable disks for archiving.

CD-ROM

With an optional hardware upgrade the DPX-1 now interfaces with the CDS3 CD-ROM System™ from Optical Media putting thousands of sounds at your fingertips in seconds. The CD-ROM player has two volumes of sound available each with over 500 Emulator II disks for immediate access. This totals over 8,000 samples! These sounds have been gathered from the best musicians all over the world and represent virtually every category of music and effects imaginable. For more information on the CD Player and ROM's contact Optical Media at 485 Alberto Way, Los Gatos, CA 95030, (408) 395-4332.

OberView

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Los Angeles, CA 90064
(213) 479-4948
Editor: Beth Menze
Written by: Jeff Burger

SCSI HARD DISK

Oberheim is unveiling it's new rack-mount 20 megabyte SCSI hard drive for the DXP-1. The device is designed to be secured in the same rack as the main unit and is vibration-mounted. The main advantage is improved speed (about 3 seconds - 8 times faster than loading from floppy) and the elimination of disk swapping. The hard drive stores about 20 full disks worth of Oberheim-format samples and can be written and re-written to by the user. Many pros have taken to rack-mounting many of DPX-1's for performance and they'll be happy to know that up to seven DPX-1's can be daisy chained together to a single hard disk. The Hard Disk is sold separately.

INDIVIDUAL OUTPUTS

The DPX-1's original software supported the mono audio output that comes on the back of the unit. Now, the instrument's software can route individual voices to the optional eight outputs. The allocation of which voices go to the respective outputs matches the configuration saved to disk on the original instrument. The biggest advantage for the individual outs is apparent when using multi-timbral disks such as a drum kit, where each sound is assigned to a specific output. Each instrument can then be mixed and processed independently.

MIDI MODE 4

The DPX-1 now can now operate in a special mode which can be set on the Prophet 2000. In this mode, each of the 16 internal samples are assigned to each of the 16 corresponding MIDI channels. The main advantage to this mode is apparent when using multi-timbral sounds with different sequencer tracks. While normal MIDI operations have sounds correspond to a range of notes, Mode 4 can use samples independently which might normally overlap and conflict in other modes.

There's more to come. Even with all these additions, the DPX-1 still has room for plenty of software upgrades, so... What have we done for you lately?

UPGRADE POLICY

All new DPX-1's are being shipped from the factory with the latest software revision available on the date of shipment. If you own a unit with older software you can get a software update to Version 1.3 for a nominal fee through your local Authorized Oberheim Service Center. The hardware kit for CD-ROM and individual outputs is an option regardless of when you purchase your unit, as is the kit for the SCSI port to talk to the hard drive. These hardware kits are also available through your Authorized Oberheim Dealer and/or Service Center. After all, not everybody needs every option, so why pay for it if you're not going to use it? On the other hand, Oberheim is behind you all the way when it comes to supporting your changing musical needs!

Meet the People –

CUSTOMER SERVICE

Behind every effective company is a team of professionals who burn the midnight oil to keep the machinery of business running smoothly. We wanted you to have a chance to meet the guys in our Customer Service Department - the people you talk to when you call the Oberheim factory for advice and service questions.

David "Bert" Bertovic has been Customer Service Manager for Oberheim - ECC since the company's rebirth two years ago. Before that he held the same position for two years with the original Oberheim company after starting as a synthesizer test technician is August of 1981. Like many people, he came to work for a musical instrument manufacturer as a result of several jobs working in music stores. Being an active musician, Bert often has difficulty finding time for his other hobbies which include golf, racquetball, photography and adding to his collections of bad jokes. (For example, he claims to be working on book entitled "The Musician's Guide To Aerobic Drinking".)

Customer Service Hours

On Daylight Savings Time Customer Service hours in your time zone are:

Pacific Zone
1:00 pm to 4:00 pm

Mountain Zone
2:00 pm to 5:00 pm

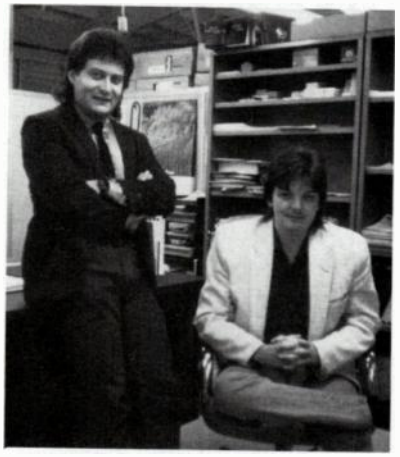
Central Zone
3:00 pm to 6:00 pm

Eastern Zone
4:00 pm to 7:00 pm

Co-worker Bob Bentrup has been a Customer Service Representative with Oberheim for the last year and a half. Bob came to us from one of our Authorized Service Centers where he was a service manager for two and a half years. Before that his former band Excalibur earned the distinction of being the opening act for a Tubes tour. While Bob spends most his spare time on his music, he shares Bert's interest in golf and claims to jog 8 miles a day. The difference, of course, is that Bob runs along with his wife while Bert is trailing with the ladies in the lead (just kidding, Bert)!

It's no small coincidence that both Bert and Bob follow their musical passions in their off hours. They're not some circuit-heads wearing lab coats and Oberheim isn't just a job - *music is their life.* It's because they're both active in songwriting, studio work and their own home studios that they are best qualified to help Oberheim customers solve their problems. "Over the last 2 years, the actual interfacing problems are by far the greatest number of calls we get. We own other manufacturers' equipment in addition to Oberheim equipment. We face the same problems they do," says Bert.

While Bert and Bob wear several different hats, the most important part of their job is taking the 50 to 60 consumer calls every afternoon (they average about 1 cigarette each per call)! "With the majority of them," Bob says, "somebody has made a mistake, hasn't pushed the right button or they simply haven't read their owners' manual - operator error.



"Bert" Bertovic (left) and Bob Bentrup (right) of Customer Service Department.

People should also shop around. There's a lot of guys who buy an instrument and then find out it doesn't do what they want it to do, regardless of the manufacturer. There's no substitute for buying from a dealer who is willing to help educate the customers because even the most conscientious of manufacturers can only do so much."

Here are a few tips for getting the most from Customer Service. First, call between 1 p.m. and 4 p.m. PST, preferably during the middle of the week (the call load gets really heavy on Monday and Friday due to weekend gigging). Secondly, check for bad cables and read the documentation for all the products being used. Third, write down the specific steps of how a problem occurred. "It takes two to tango," Bert says. "We want to supply as much support as possible and the more customers can help us, the more we can help them. The whole idea behind service is that we work together with the customer and together we solve the problem. We rely on their willingness and ability to participate." *(Continued on Page 4)*

CUSTOMER SERVICE

(Contunied from Page 3)

"When you have a repair problem, you have to let us know as much as possible," Bert laughs. "Several years ago, I got a call from a customer on the East Coast with some very strange problems and I felt they were serious enough to warrant sending the unit directly to the factory. When we got the box in and opened it up, I noticed this really foul smell. When the technician opened it up, the entire circuit board was encrusted with this liquid that had dried. From a previous experience I was led to believe that this was not champaign or beer! I called the customer and asked him point blank if he had any pets at home and he said he had a cat. I said, 'do you think that possibly your cat could have urinated into your machine' and he said 'yeah'. Our lead technician took it out in the parking lot and scrubbed it down with alcohol and hosed it off with a garden hose! We got it working as a result of communicating with the customer, but the bill was quite high due to the circumstances. Needless to say the cat did not fair as well!"

Staying calm in the face of a service problem is the other key to getting the most from Customer Service. "Everybody has service problems, whether you're microwave broke down or your roller skates need a grease job," Bert says. "Because we're a major manufacturer distributing in 30 countries worldwide we handle a number of requests all at the same time. Sometimes we have to say, 'I know you're in a hurry, but we're on your side and that's why we're taking this call.' It's easier to help people who remain calm and can discuss the problem intelligently."

The reason for having Customer Service hours for only part of the day is not due to all night parties, wine, women and song (...they wish!...). "Some people we talk to on the phone may have a simple problem we can handle during that call," Bert explains. "Unfortunately 50% to 60% of our phone calls require some sort of follow-up, whether a mailing or a call back is required. They may need a MIDI document sent out or require more information we have to get from engineering." Bert also writes the majority of Oberheim owners' manuals and works on the premise that the better the manual is, the fewer calls people will have to make to the factory.

Another form of Customer Service involves monitoring our Authorized Service Centers and distributor network very closely. We provide extensive detailed documentation for any engineering change or software update. Our philosophy is that the more information that is available at the local level, the better off the customer's going to be.

All in all, Bert and Bob are proud of the job they do. They're very conscientious in their constant drive toward increased efficiency. Bert says, "We appreciate comments and suggestions. We're getting fewer calls for fewer reasons and that's rewarding." It's a pleasure to have both of them at Oberheim. Keep up the good work, fellas! (And we hope Bert gains on those ladies!)

OberView

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11650 W. Olympic Blvd.
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—from page 120, RELEASED & REVIEWED

music, which he combines in a geographical goulash he calls "Latindian." Sitar and tablas cause "Indian" to be the dominant flavor, but DX7, bass and exotic percussion make the music, like Batish's, a joyful, tuneful rock fusion. $10 from Jonkey Enterprises, 663 West California Avenue, Glendale, CA 91203.

Ancient Future, *Quiet Fire* (Narada 61012). This quartet (guitars, flutes, cello, piano/misc.) consolidates a lot of influences: Segovia to Windham Hill; Balinese to North Indian; Hubert Laws to Roger Kellaway. Leader Matthew Montfort's synthesis of styles and sounds isn't superficial—he plucks the essential musicality of several traditions without discounting them. I hesitate to shackle this beautiful world fusion music with a "new age instrumental" label, but that's probably where it'll be found.

Piero Milesi, *The Nuclear Observatory of Mr. Nanof* (Cuneiform Rune 7). Soundtrack work from 34-year-old Italian keyboardist Milesi. It is strange neo-classical music on digital synthesizer, sometimes with string quartet accompaniment, sometimes with kettle or snare drums, sometimes solo overdubbed. Milesi's compositions often use short repeating figures almost like Penguin Cafe Orchestra, though his sound is more orchestral and his unfolding is more leisurely. It slides gracefully into the cracks between several musical pigeonholes. Cuneiform Records, PO Box 6517, Wheaton, MD 20906.

Kenia, *Initial Thrill* (Zebra 5967). Slick bilingual FM jazz from a smoky-voiced balladeer in the fashion of Sade, with superstar studio-jazz backing.

Gregory Alan Taylor, *Interregnum* (cassette). For his third tape, Taylor has programmed a lot of unique Oriental drum and koto sounds, shimmery Enoesque backdrops and some intricate flute-like solo voices. He arranges these into diaphanous open-structured compositions which sound like they ought to be playing outdoors across some large open square. $7 postpaid from 602 Russell Street, Madison, WI 53704.

Jan Jarvlepp/John Winiarz, *Chronogrammes* (J&W 861; cassette). Contemporary classical music from McGill University's Electronic Music Studio. Winiarz's side presents two 15-minute pieces—one for flute & guitar and one for microtonal pianos—both pretty theoretical. Jarvlepp's four pieces are more user friendly, played on harpsichord, treated cello and two for carillon (church bells). $10 (U.S.) postpaid from Studio Fonoto Productions, PO Box 1204, Station B, Montreal, Quebec, Canada H3B 3K9.

PFS, *Illustrative Problems* (Cuneiform Rune 6). Vaguely Henry Cow-like jazz-rock featuring the piano and thundering synthesizer of Scott Brazieal and the squawky sax of Herb Diamant. The music ranges from fast unison playing to ragtime to abstract collaging with tape loops. Cuneiform Records, PO Box 6517, Wheaton, MD 20906.

Andrew White, *Conversations* (Sona Gaia 148). *Conversations* is basically a folk guitar record, although White also plays zither, tamboura and bells, and guests play bass, trumpet, viola and piano. Another fine example of new acoustic music. White has lived all over—New Zealand, India, England, the U.S.—and it shows in his influences.

Ken Wiley, *Visage* (Passport 88020). Wiley's a French hornist—that is, he plays French horn, not that he's French. Actually, Wiley is from L.A., and his first solo album fleshed out by some of L.A.'s finest studio musicians including Jimmy Johnson, Grant Geissman, Ralph Humphrey, Dave Loeb and about ten others. It's gentle new agey fusion jazz spotlighting the unique tonalities of Wiley's instrument.

Martin Kornberger & Volker Kuhn, *Embrace* (Syn 030; cassette). T. Dreamish duets using sequencer, drum machine, keyboard washes and some Froese-like guitar. For a style so heavily identified with one group, Kornberger & Kuhn make it sound surprising-

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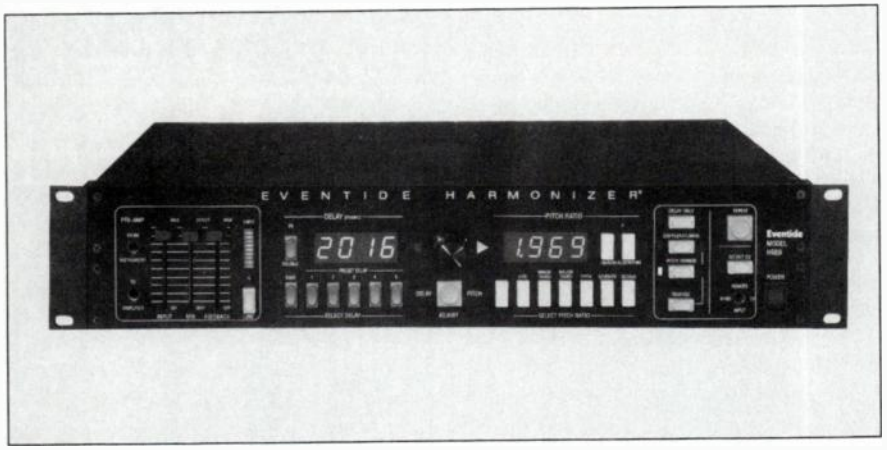
Bloom: A term that refers to the subjective impression of how a reverberent sound develops over time; so-called because of the way a flower subtly develops over time into a full flowering.

Chiff: The characteristic white noise component present at the beginning of tones generated by a pipe organ.

Controller: A device that operates synthesizer electronics (i.e. keyboard, guitar with appropriate interface, MIDI-capable saxophone, etc.). Also, a device that operates some specific parameter of a synthesizer (i.e. modulation wheel, pitch bender, ribbon controller, etc.).

International Parts Specification Standard: A system of specifying electronic parts' values used throughout the world and in EM. This standard avoids the unnecessary use of zeros, decimal points, and stating Ohms (Ω) or Farads (F) when implicitly understood. For example:

USA	Int'l
1.5 kΩ	1k5
2.2 MΩ	2M2
10μF	10μ
0.01μF	10n
3300pf	3n3
0.0022μF	2n2
10pF	10p



Eventide H969 Harmonizer®

Harmonizer: A term, trademarked by Eventide, to describe their series of pitch-shifting signal processors. These processors take an input signal and generate a parallel harmony line, typically adjustable over a range of plus-or-minus one octave. Similar products by other companies are called Pitch Transposers, Pitch Trackers, Harmony Synthesizers, etc.

Library program: Also called *patch library program* or *patch librarian*. This type of computer program stores synthesizer patch data, typically as a collection of many patches, and allows for rearrangement of their order within the computer. Often different patches can be merged to create sets of patches greater than the number that can be held by the synthesizer. Once a set of patches has been arranged, it can be loaded into the synthesizer virtually instantaneously. Other groups of patches may then be loaded in as required.

where:

k = kilo = 10^3 Ohms
M = Mega = 10^6 Ohms
μ = micro = 10^{-6} Farads
n = nano = 10^{-9} Farads
p = pico = 10^{-12} Farads

Therefore, 100 nF is equivalent to 0.1 μF; and 20 nF equals 0.02 μF. Be *sure* when ordering parts based on construction articles in this magazine that you understand the difference between, say, a 20 nF cap and a 20 μF capacitor. Don't expect a parts clerk to know what a nanofarad is.

MIDI controller: A controller (see above) that outputs MIDI information.

Mono mode: This MIDI mode assigns each voice (sound-generating element) of a synthesizer, drum machine, etc. to a single MIDI channel. Thus, each voice can play an independent part according to the data being sent to it over its own MIDI channel.

Omni mode: A MIDI mode in which a MIDI receiver will react to, and attempt to play, MIDI data appearing on any of the 16 MIDI channels.

Poly mode: A MIDI mode where the receiving MIDI device listens for data on only one of the 16 available MIDI channels.

Polyphonic: Capable of playing many different notes at once, each with its own articulation (the articulation characteristics are often the same for each note).

Polyphonic pressure sensitivity: The ability of a keyboard to provide individual pressure (aftertouch) data for each note played.

Polytonic: Capable of playing many notes at once. Each note is not necessarily capable of individual articulation.

Pro net price: A retail price, set by the manufacturer, that is in theory not subject to discounting as are many list prices.

PCM adapter: Pulse Code Modulation adapter. A unit that converts audio signals into digital data in a form that is stored on the video tracks of a video tape recorder. This provides high quality digital recording with the aid of a common VCR.

Quantization: The division of a continuous (analog) event (such as a pot rotation or audio signal) into a finite number of steps. For example, a mercury thermometer displays a continuous process of temperature variation, yet the markings that indicate temperature are usually quantized into one-degree steps. Computers, which can only handle a finite range of numbers, quantize continuous analog inputs into a specific number of steps (up to 256 for an 8-bit machine, up to 65,536 for a 16-bit machine). Also, samplers measure signal amplitude thousands of times a second, and reconstruct a sound from that quantized data.

RAM: Acronym for Random Access Memory. Data in a RAM IC can be recalled at

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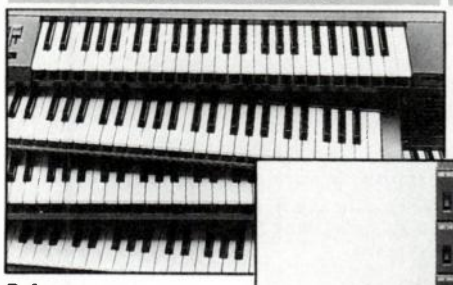

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After - 63 lbs.

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V. Savage, Milford, PA

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will, and new data can be written in over old data. Most RAM is volatile, and loses its data when power is interrupted.

Real time: That which is perceived at the same time at which it is caused.

ROM: Acronym for Read-Only Memory; an unchangeable program usually permanently written into an IC's memory. Data stored in a ROM IC can only be recalled; unlike RAM, new data cannot be written in over old data.

Multi-timbral: A multiple-voice device that can operate in MIDI Mono mode, and offers the additional advantage of being able to assign an individual timbre (as well as MIDI channel number) to each voice.

Multi-timbral synthesizer: An instrument that can provide a unique timbre (bass, violin, trumpet, etc.) for each voice in the synthesizer, as well as assign each voice its own MIDI channel. Thus, multi-timbral instruments can play independent melody lines, each with a different timbre, when driven by a multi-track MIDI sequencer.

Voice: The basic sound-generating element of a synthesizer. It typically consists of one or more oscillators (VCOs or DCOs), a filter (VCF or DCW), amplifier (VCA or DCA), and envelope generators to control the filter and amplifier. In a polyphonic synthesizer, there must be one voice available for each note you want to play. EM

—from page 125, RELEASED & REVIEWED

ly like their own. Syntape, c/o Rudiger Lorenz, Binger Strasse 6, D-6507 Ingelheim, West Germany.

Nightcrawlers, *Particle Mist* (cassette). The Nightcrawlers have been kicking around the indy electronic music scene for about six or seven years now, expanding and elaborating on T. Dream's style of improvised electronic "happenings." The latest tape offers two 30-minute slices: the first as grave and dark as you please, the flip a bit more animated with sequencers, pianistic voices and lighter, varied textures. Peter Gulch, 1493 Greenwood Avenue, Camden, NJ 08103.

Art Simon, *The Din and the Throng* (cassette). Simon takes the DX7 (and Casio SK-1) into abstract music with a lot of noisy banging that sounds like extended ring-modulated garbage can lids. Electric guitar, glass bottle percussion and some prepared tapes keep the variety level high, though there isn't any of it you'd expect to hear on the radio any time soon. $6.50 from Swinging Axe Productions, PO Box 3741, Northridge, CA 91323.

William Bent, *Sirius Lullabye* (WEB-110; cassette). Bill Bent's music is a fairly old-fashioned mix of early electronic music trademarks: gentle soloing over ostinado backing, that sort of thing. The main thing you notice about the tape, though, is that he almost always uses the same solo voice, which perhaps he thinks sounds like a solo violin. But everyone I played the tape for thought it sounded like a cat being tortured. $8.98 from Bentsounds, 151 Brighton Avenue, San Francisco, CA 94112.

Chafe, Jaffe & Schottstaedt, *Dinosaur Music* (CCRMA CD). Computer music from Stanford University's Center for Computer Research in Music and Acoustics, source of such previous direct-to-digital productions as Michael McNabb's *Computer Music* and the sampler *Digital Domain*. The disc allows us finally to hear David Jaffe's full 20-minute "Silicon Valley Breakdown" excerpted on *Domain*, as well as three pieces (24-min.) by fellow *Domainite*, William Schottstaedt. Cellist Chris Chafe rounds out the disc with a 9½-minute piece for cello and computer. All five compositions are semi-random computer music, mostly slow and non-frantic, showing off the clarity and dynamics of full digital production. CCRMA, Stanford University Music Department, Stanford, CA 94305-3076.

Loren Nerell, *Point of Arrival* (LAN 001, cassette). Synthesist Nerell has two distinct but related styles: fast churning rhythms reminiscent of Gamelan music and broad gauzy drones, which he alternates and sometimes combines. Steve Roach and Richard Burmer provide additional keyboards—and presumably play them, too. $7 from 5716 Belen Street, Long Beach, CA 90815.

Patrice DeVincentis, *Dichotomy* (Jazzical 86017). A Bill Rhodes protege, playing virtuosic instrumental keyboard music on analog synthesizers over LinnDrum. DeVincentis is skilled, though the pieces don't leave much of a mental residue. $8 from 1004 Jersey Avenue, Union Beach, NJ 07735.

Stephen Dankner, *Techno-Romantic* (cassette). *Techno-Romantic* consists of two long suites, both on one side of the tape. The first is a "Suite for Kurzweil 250" triggered by a Macintosh with Mark of the Unicorn Performer and Jim Miller's Personal Composer software. It sounds like Zappa's Synclavier work (with better voicing), full of jarring, unplayable intervals and undanceable rhythms. The second is a virtuoso solo piano suite, drawing on ragtime, contemporary classical and new age mood music. $8 from 708 Hesper Avenue, Metairie, LA 70005.

Gen Ken Montgomery, *Greatest Hits* (De Fabriek 9). One of America's most radical experimenters, and Conrad Schnitzler's greatest supporters, reports back from his travels in Germany with this musical postcard. It's very characteristic of the recent scene in Berlin, with lots of self-triggered synthesizer patterns, in odd voices, with eccentric editing. The "Berliners" are favorably depicted, and Ken himself has never sounded better. $15 with unique hand-done covers, from 118 East 4th Street #11, New York, NY 10003.

Ashwin Batish, *Sitar Power* (Batish Records 6001). Dynamic instrumental rock and roll performed on sitar, tabla, bass, guitar, DX9 and E-mu Drumulator. The cover boldly states "Contains the hit tunes . . ." which is maybe a bit premature but certainly not exaggerated. Fusion this triumphant is never anachronistic—this guy cooks! Batish Records, 1310 Mission Street, Santa Cruz, CA 95060.

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