Reviews: Yamaha MT120, Ensoniq DP/4 and 4 More

Electronic Musician

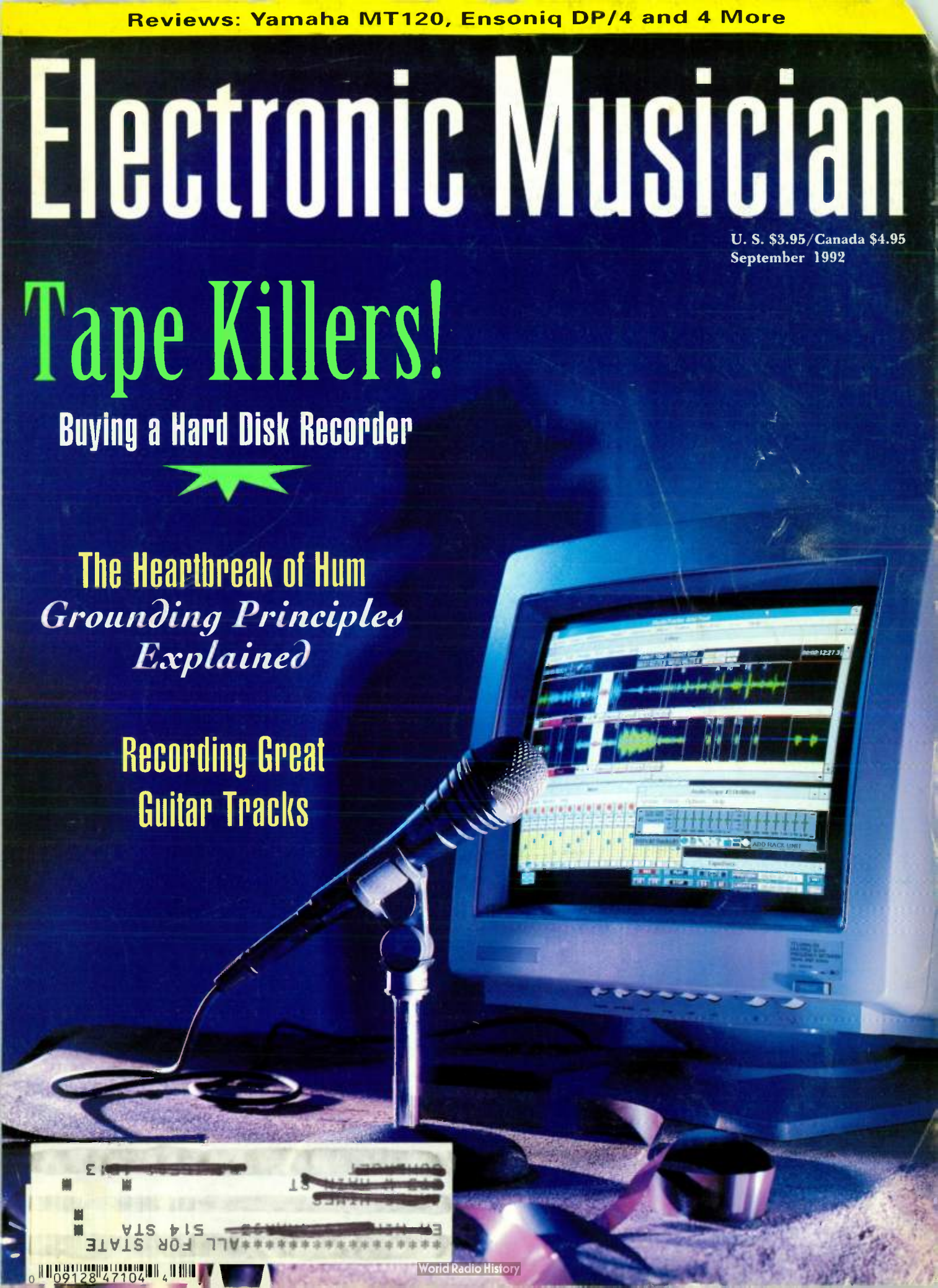
U. S. $3.95/Canada $4.95
September 1992

Tape Killers!

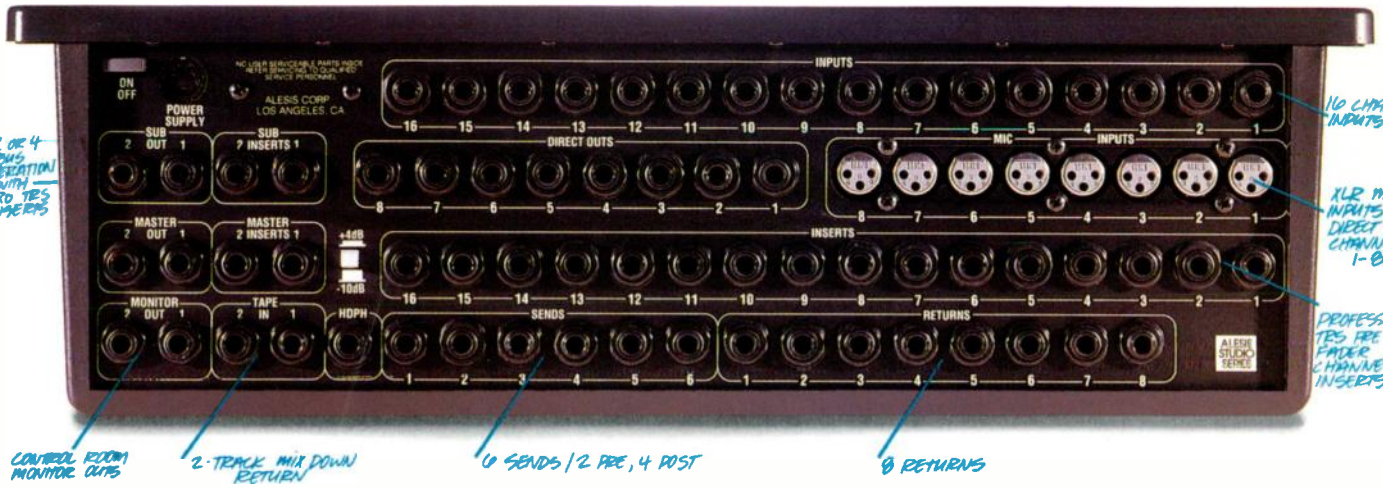
Buying a Hard Disk Recorder

The Heartbreak of Hum
Grounding Principles Explained

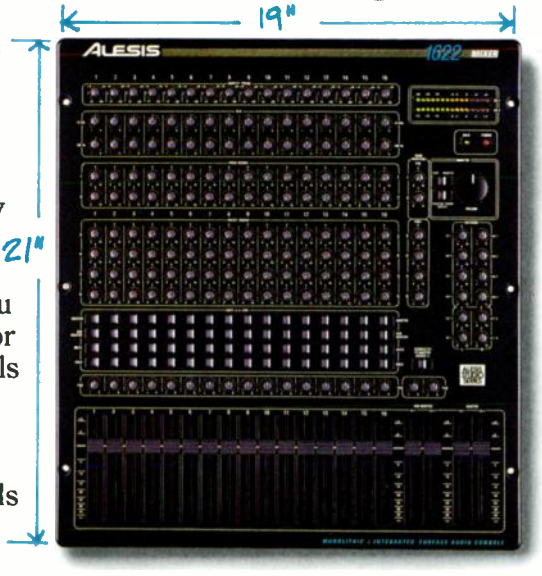
Recording Great Guitar Tracks



16 Channels, 4 Busses, 6 Sends, 8 Returns, 20 True Inserts. $899



Flexibility is the horsepower behind any professional recording mixer. You need all the channels, sends, returns and inserts you can get your hands on in the heat of a mix. Check out these front and rear panel shots of the Alesis 1622 and you'll see professional features that make other mixers pale by comparison.



To suit your tracking needs you can set up for 2 bus/2 master or 4 bus operation. All 16 channels have 6 sends: 2 pre-fader for your choice of dual mono or stereo monitoring and 4 post-fader for effects. Use all 6 sends for effects-heavy mixdowns or set up three separate monitor mixes plus 4 effects for a live recording. And the 8 returns handle any combination of stereo or mono sources.

Every channel and all 4 busses feature professional TRS inserts for individual processors.

And they're true pre-fader inserts so you can change levels without disturbing critical effects settings. Master outputs are switchable +4 or -10 to drive pro or semi-pro mixdown decks, and channels 1 through 8 feature XLR mic inputs and direct outs. There's even a headphone output for convenience.

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Flexibility, superb audio, unbeatable price. Ultimate value. See your Alesis dealer for a demo and start mixing today.

**Keyboard Magazine July '90*

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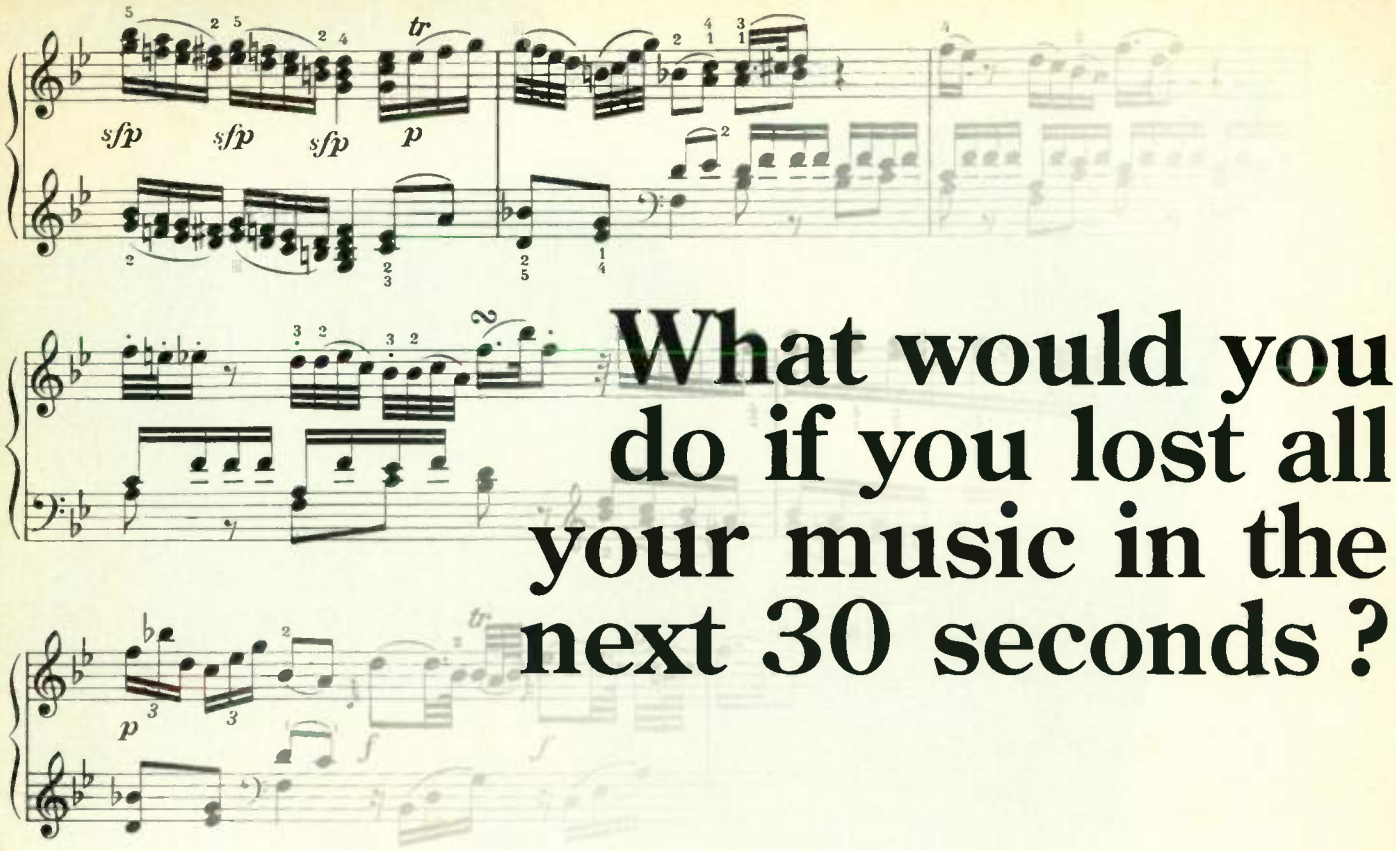
ALESIS STUDIO ELECTRONICS



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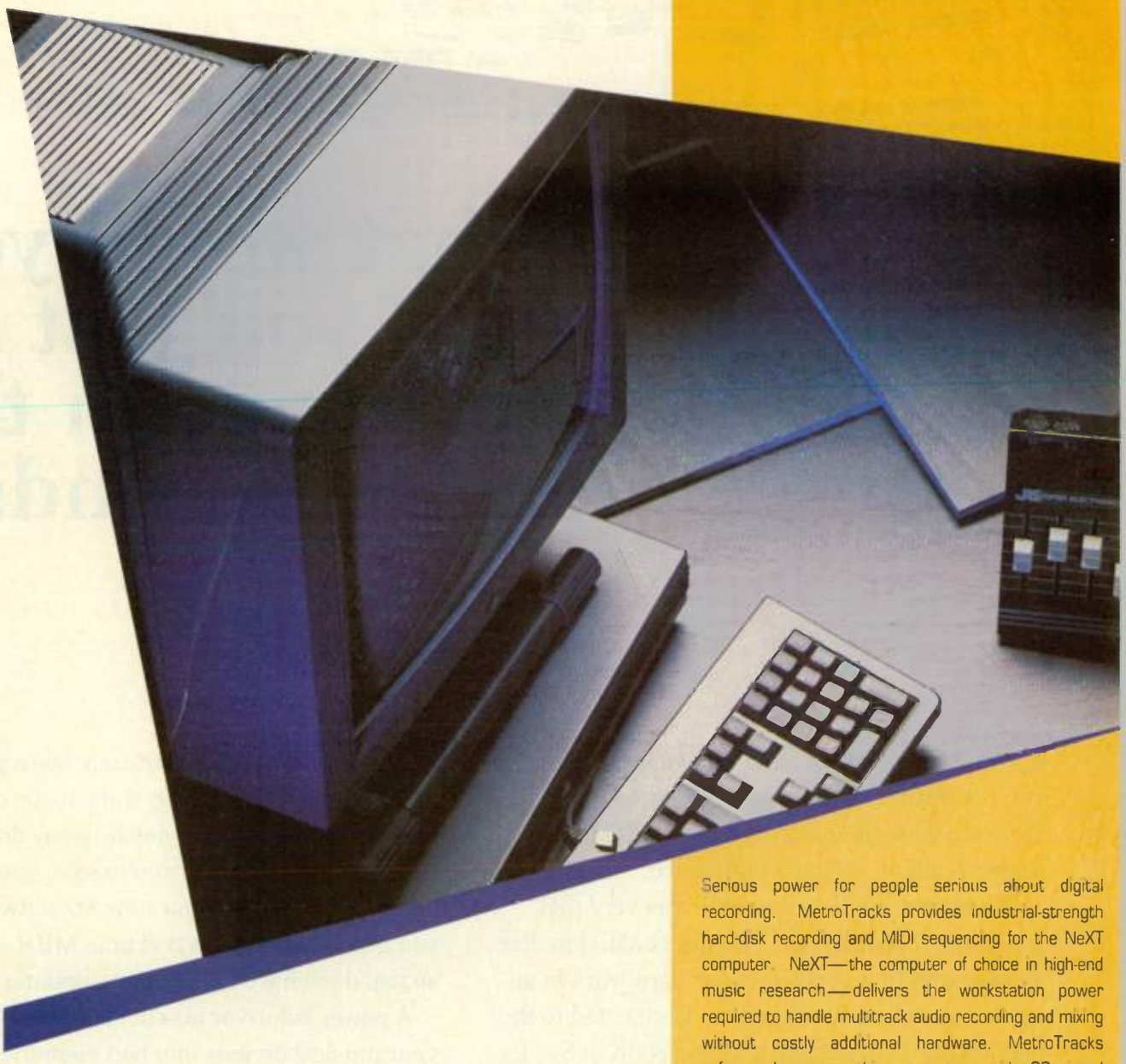

Serious power for people serious about digital recording. MetroTracks provides industrial-strength hard-disk recording and MIDI sequencing for the NeXT computer. NeXT—the computer of choice in high-end music research—delivers the workstation power required to handle multitrack audio recording and mixing without costly additional hardware. MetroTracks software harnesses this power to provide 32 virtual audio and MIDI tracks—up to 8 available simultaneously.

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Robert Poor, NeXT Computer, Inc.

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SEPTEMBER 1992 VOL. 8, NO. 9 · AN ACT III PUBLICATION

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Cover: Photo by Stan Musilek. Special thanks to Spectral Synthesis and AKG.

Going Digital

To disk or to tape,
that is the question.

ANNE HAMERSKY

Though the Bard never pondered the particulars of multitrack digital recording, today's electronic musicians confront this difficult question on a regular basis. With the world moving inexorably toward digital, what's the most appropriate medium for digital recording? Do you invest your hard-earned money in digital tape recorders, or in computer-based hard-disk recording systems?

For many individuals, the answer is neither. Analog recording is, and will continue to be, a viable option for years to come. The recorders are much less expensive than digital recording systems, in terms of initial investment. Analog recording products and technologies are mature, and their sound quality has been the standard for decades. In addition, analog tape is standardized and interchangeable.

Throwing logic to the wind, however, the lure of digital is undeniably strong. You just can't ignore the lure of multiple tracks of CD-quality audio, noiseless bouncing, and sample-level editing resolution. Plus, there will come a time when analog recorders are viewed the way we currently see Victrolas.

Assuming you decide to go digital, what factors should you consider? If you're concerned with fidelity, digital tape and hard-disk recorders are inherently equivalent. Either system's analog-to-digital (A/D) and digital-to-analog (D/A) converters will make a difference, but "bits is bits."

If you want the precision and flexibility of MIDI sequencer-like cut-and-paste editing, hard-disk systems are the only choice. Similarly, if editing speed is important, nothing beats the immediacy of random-access audio. On the other hand, the editing power of hard-disk systems can make them more complicated to work with than simple tape recorders.

If you need compatibility with other studios, digital tape recorders have a slight edge, because studios are more comfortable working with tape and, as a result, will probably invest in more tape systems. However, a great deal more standards work needs to be done for tape and hard-disk systems. Several competing tape standards are being introduced, and the computer world still lacks a standard cross-platform, multitrack digital audio file format.

Finally, in the all-important price category, the new digital tape systems cost less at the moment—primarily because of the expensive peripherals required to run hard disk-based systems—but that may change over time. Computers, hard disks, backup systems, and other random-access system peripherals are rapidly falling in price and may one day surpass the price/performance ratio of digital tape recorders.

In the end, no system is the best choice for all applications or all musicians. Each option has pluses and minuses that make it better- or less-suited to your needs. The ideal system would combine the convenience of tape with the editing power of disk-based digital audio.

Unfortunately, no single product fulfills those requirements, so many musicians probably will purchase one of each to get the best of both worlds. It's not cheap, but with a combination system you can record the raw tracks to either system, edit them on the disk-based system, and store them on tape. And with two systems from which to choose, you greatly increase your odds of having a file or tape format you can share with others.

Regardless of the format (or formats) you choose, once you make the leap to digital, there will be no turning back.

Bob O'Donnell

Electronic Musician

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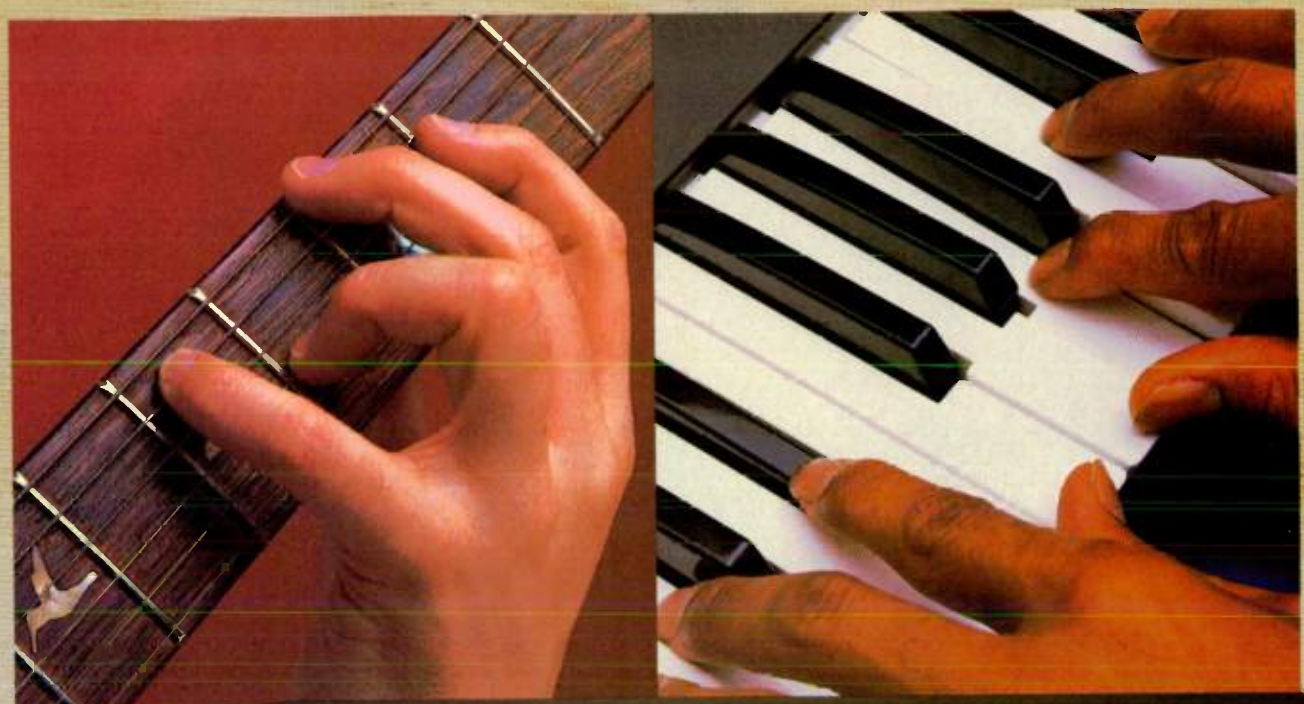

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LETTERS

DON'T PUSH IT

Every time I read **EM**, I think, "You're still my favorite magazine, but you're pushing it."

I love "What's New," "The Technology Page," "Reviews," and features like "The Software Design Process" (April 1992 "Computer Musician"). I also like the ads—seriously! I believe the essence of **EM** should be All-That's-New. You guys can sort through esoteric computer, electronics, music journals, and the piles of literature that manufacturers send you and distill it down to nice, interesting articles about All-That's-New. You can try stuff out and tell us how it really works. I also love "Letters." Some very knowledgeable readers with ultra-technoid backgrounds provide interesting clarifications, corrections, and deep insights. But best of all, the smart-ass tone of some of these letters is hilarious.

Now for my complaints. First, if you must do so many beginners' articles, please sprinkle them with some interesting, little-known facts, so we "veterans" can pick up a few things. However, I still believe books such as those offered by Mix Bookshelf are great resources for beginners, while the magazine should concentrate on All-That's-New. Second, the difference between **EM** Meters that go from 1 to 10 by increments of 1 and those that go from 1 to 5 by increments of ½ is that the former are more intuitive. Bring back the old meters that reserve "11" for universe-shattering technological revolutions. Third, the **EM** Guides, unlike the reviews, don't really tell us anything. For one thing, no author really knows all four major computer platforms inside out. You offer some stats with a little interpretation but no truly helpful information on which we can base major purchase decisions. Next time you do an **EM** Guide to Sequencers, do it only on Atari sequencers. I will happily wait four issues for the **EM** Guide to Mac sequencers (my platform) and will undoubtedly read the Atari Guide with interest, too.

Thanks for publishing **EM**. It's my favorite magazine, but quit pushing it!

James Hober
Los Angeles, CA

James—Thanks for the comments. **EM** *always has been and will continue to be an equipment magazine dedicated to telling you about new products, new technologies, and how to use it all for the purpose of making music. We slant most of our articles and reviews toward readers with intermediate- and advanced-level knowledge of high-tech music tools, but found there was (and continues to be) a crying need for introductory material for the growing audience of newcomers, hence our "From the Top" beginner's column.*

We changed the meters system because we felt the 11-point system was softer on the products than we wanted to be. Too many mediocre products were receiving 7s and 8s. When we changed to a 5-point system, the same reviewers were willing to give 2s and 2½s. Mathematically that doesn't compute, but psychologically it does.

Finally, **EM***'s guides are not intended to be the final word on a particular subject. Our goal is to inform you of all the available choices, the important points of differentiation, and in so doing, limit your choices to those that fit your needs and budget. We support that with a wide variety of reviews, though obviously we can't review everything. What we can do, however, is point you in the right direction.—Bob O'D*

TAKING CONTROL

I'm writing in response to Chris Meyer's cover feature about taking control of your home studio ("Beating the System," July 1992).

I fully expected to gain insight on this tangled, lovely place I call my MIDI studio. What I need is a Thomas Brothers guide to the heart of MIDI City, but what I got was a Rand McNally world atlas, complete with all the fancy colors (the cover photo) and cartographers credits (manufacturer/advertiser strokes at the end of the article).

It wasn't a total waste of my time. I learned that I have no less than the 59 products mentioned to tell me where to *begin* looking, which in some ways only serves to further confuse me, the average MIDIot. I also learned that, if I'm to look to **EM** for help, I'll have to buy the sixteen back issues mentioned in the article, coming to approximately $75. I think that would pay for several books available on the subject(s), offering me far more than the scant four pages worth of editorial and whopping two diagrams you devoted.

My guess is that you won't print this in your letters column, since I usually only see favorable responses there (or *helpful* tips from other readers).

Bill Amstutz
Palo Alto, CA

Chris Meyer responds: *I'll readily admit to having failed to write "How to Solve All of The World's MIDI Control Problems" (with step-by-step instructions) in one article, even though* **EM** *gave Steve Oppenheimer and me more space than normally allotted. As you point out, it would take several books or sixteen magazine installments to go over all of the intimate details and potential variations that exist in the land of MIDI control.*

The imperfect alternatives were to not even try, take up the entire issue (which other readers probably wouldn't have appreciated), focus on just one part of the puzzle (which the sixteen back issues referenced already did to some degree), or give a wide overview and as many pointers as possible to examples of equipment that may help you gain control over your studio. I apologize for not coming up with easy answers that would work for everyone, but I want to emphasize that all of the things mentioned are possible and rewarding. I also bet that if you (and other readers) give **EM** *specific feedback on what areas you want explored in more detail, they'll follow up this world atlas with more specific neighborhood maps.*

As far as the so-called manufacturer/advertiser strokes at the end of the article, I have to let you in on a secret: I asked that they be

DAVE EMBER

included because I wanted to personally thank them for loaning me their equipment and time in helping paint as broad and accurate an overview as possible.

A VIABLE APPLE

As a relatively new subscriber to EM, I read with unbelief the reply you gave to a John R. Majka concerning the Apple IIGS ("Letters," July 1992). I found your reply beneath the level of responsible journalism.

To pass on an unsubstantiated rumor that the Apple IIGS line will be discontinued in October lowers you to the level of the tabloids. In fact, rumors of the discontinuation of the Apple II line have been circulated, in error, for years. The source of these rumors has always been outside of the Apple II group, and the rumors are obviously untrue. However, if you would simply investigate the level of profit coming into Apple Computer, from the continued sale of Apple IIe, IIc, and IIGS computers, you would reach the conclusion that Apple is not about to discontinue the line when annual profits in the millions of dollars are still available.

If there is no "serious" music software for the Apple II, it is largely because of less than professional journalists spreading rumors of the computer's imminent demise. But then, are not Pyware and Passport Designs serious music software companies? I own Pyware's *Music Writer* and Passport's *Master Tracks Jr.* for the IIGS, and neither package looks less than serious to me.

Your function as a highly visible member of the electronic music community is to encourage development of as many lines of practical music software and hardware as you can, not discourage it. As an Apple II user and programmer for over ten of its fifteen years, I assure you, development of practical music software for the Apple II line is definitely possible.

Apple II computers must again borrow the familiar line from Mark Twain, "The rumors of my death are greatly exaggerated."

Tom A. Gibson
Wichita, KS

Tom–Development of music software for the Apple II line is definitely possible, but unfortunately at this point it's not financially practical. As a result, while some of the companies I contacted still sell Apple II software, all have dropped active development. They all also heard rumors of its demise. Nevertheless, I sympathize with your desire to see more advanced products appear for your platform.–Bob O'D

CANVASSING IN ICELAND

Recently, EM ran an excellent review describing the function and uses of Roland's Sound Canvas (June 1992). On page 102, the article mentions the possibility of using Controllers 16 and 17 to affect parameters such as filter cutoff and LFO rate and depth (by some special Micro Edit feature). I could not find any indication about this in the SC manual. Would you send me a few lines about how to make these controllers operative?

I have been using the SC now for a few months to develop arrangements of Icelandic folk tunes for the production of a sing-along tape. I got some good results, although I could not make much use of the strings sound in spite of lots of parameter editing. I am also missing good bass drums and some of the most common looped percussion sounds (a drum roll, snare roll, tambourine tremolo, etc.). Are there any ways to compensate for these shortcomings?

Elias Davidsson
Reykjavik, Iceland

Marvin Sanders, Roland keyboard product manager, responds: *Elias, go to the back of your Sound Canvas manual, at the end of the MIDI implementation section, just before the MIDI implementation chart. The section titled "Micro Edit" explains the procedure for using controllers to affect certain parameters not available in the "regular" editing menus. To do the type of thing mentioned in your letter, explore the second section of "Micro Edit" about modifying parameters that can be set for each part. It will be easier if you make sure that your Sound Canvas is displaying part 1 on the LCD before you start. Then just follow the instructions as listed.*

The most important part of the process is step 4, where you'll find the specific parameter to which you want to assign a controller, matching its address in the MIDI implementation to the one shown on the SC-55 screen. For filter cutoff and LFO rates or depths, press the Mute button until you see "01>>40 21 40: 40" on the LCD; this starts the section of addresses that can be affected in real time. (In the manual, these addresses are toward the end of the MIDI imple-

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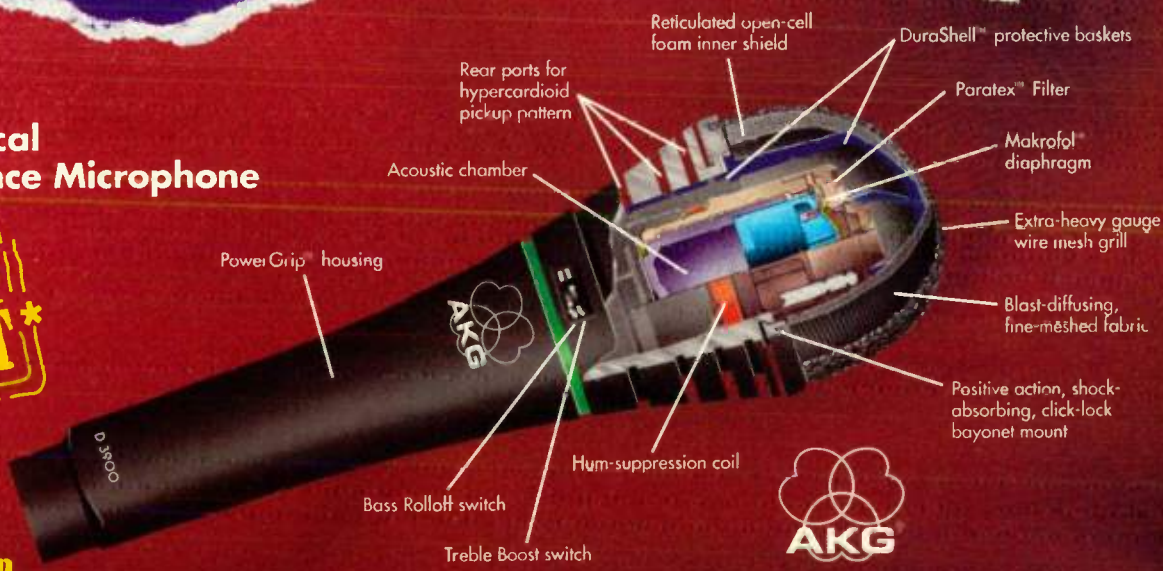

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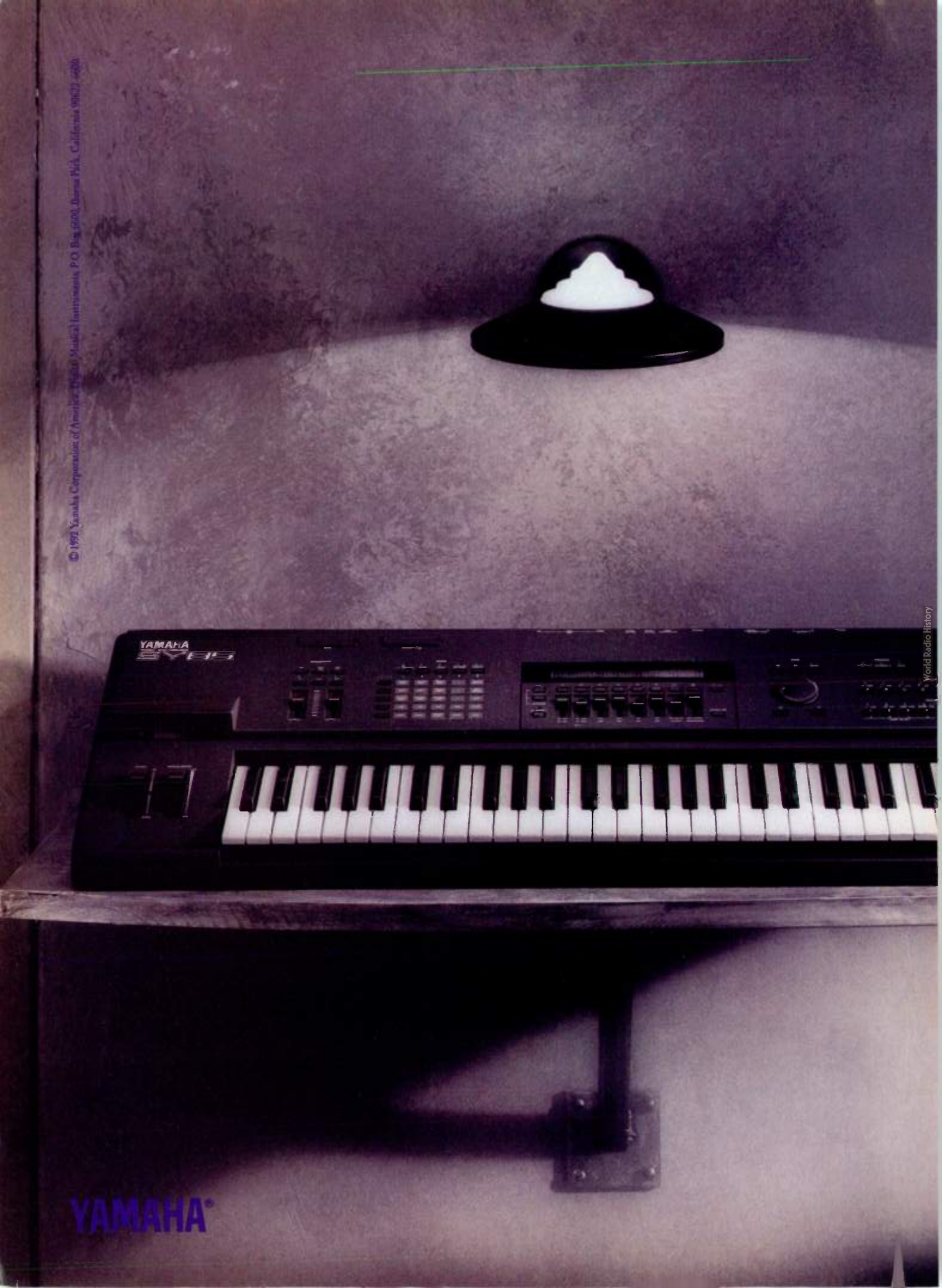

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President's Classified Section. We're looking for a Ford F-L 3 or C-L-3 "Hummped" plane. If you have one for sale, call Greg Mackie direct on our toll-free line.

mentation section titled "Patch Parameters." Wherever an address in the manual has an "n," this simply signifies a variable that will appear on your Sound Canvas LCD as the Part number.) There are two identical groups of parameters here, with those listed as "CC1..." affected by controller 16, and those listed as "CC2..." by controller 17.

Call up the parameter (address) you want, use the Part buttons to access the desired part, then use the Instrument buttons to assign a value that acts as a kind of "depth," allowing the controller to affect that parameter only as much as you see fit. Now you can do real-time filter sweeps, as well as LFO rate or depth changes, on any of your Sound Canvas sounds. For example:

01>>40 21 41: 7F for controller 16 to affect filter cutoff of Part 1;

01>>40 21 55: 7F for controller 17 to affect LFO1 TVF depth of Part 1.

You can do many more things in the Micro Edit mode, even enable channel or poly-aftertouch.

Regarding your request for looped percussion sounds, I think you'll find that the drum sounds in the Sound Canvas respond well to sequenced rolls, programmed in step time on your sequencer. You'll avoid the common "machine gun" effect by maintaining careful control over your velocity, generally trying to set up some type of "harder-softer" pattern for each successive note.

ERROR LOG

April 1992, "DigiTech The Vocalist," pp. 103-109: The term "Harmonizer" is a registered trademark of Eventide Inc. and was incorrectly used in reference to The Vocalist's pitch-shifting and harmony-creation capabilities.

August 1992, "Command Centers," pp. 40-45: We inadvertently omitted the ART Phantom series and DOD 822, 1222, and 1642 mixers from our chart.

Address correspondence to "Letters," Electronic Musician, 6400 Hollis St. #12, Emeryville, CA 94608. Published letters may be edited for space and clarity.

Corrections to articles are listed at the end of "Letters." We compile these published corrections annually; to receive a copy, send an SASE to "Error Log Listing" at the above address.

Marantz PMD 700 DAT recorder

processing unit, *MacMix Lite* software, the Dyaxis hardware remote controller, and disk utility software (*Disk Express II, Disk Utilities*, and *SAM Virus Clinic*). *MacMix Lite* provides non-destructive waveform editing and mixing and supports the hardware controller. The remote controller features transport keys, a scrub wheel, a set of programmable soft keys, and buttons for controlling zooming, audition options, and edit markers. Digital I/O formats include AES/EBU, S/PDIF-2, PCM-601, Yamaha Cascade, and more. Dyaxis Lite can use a variety of SCSI storage formats, including hard disk, magneto-optical, and data DAT backup. The system supports all SMPTE formats (LTC and VITC), and an optional time-code generator/reader is available. All audio specs are identical to the Dyaxis I; the manufacturer claims overall system frequency response of 5 Hz to 20 kHz (±0.5 dB), THD+N greater than 82 dB below maximum operating level (20 Hz to 20 kHz), and s/n ratio of greater than 90 dB. Dyaxis Lite can be upgraded to a Dyaxis I for approximately $4,400 plus the price of a Mac IIsi or better computer. The upgrade adds a 760 MB (640 MB formatted) external hard drive, a NuBus-based Dyaxis DSP card, and *MacMix* software that supports the DSP card's added features (including EQ, time scaling, and sampling frequency conversion).

Studer ReVox America, Inc.
1425 Elm Hill Pike
Nashville, TN 37210
tel. (615) 254-5651

Marantz is shipping the **PMD700 portable stereo DAT recorder** ($2,500). The 4 × 2.5 × 8.5-inch machine, which weighs under three pounds, uses 1-bit Sigma-Delta A/D conversion (at 48 kHz) and D/A conversion (at 48, 44.1, and 32 kHz). It offers S/PDIF and AES/EBU digital I/O, balanced mic and line inputs, and unbalanced line I/O. Other features include ABS time code, Start ID editing and renumbering, and a built-in auto-limiter. The PMD700 does not implement SCMS copy protection.

Marantz Professional Products
700 North Commerce
Aurora, IL 60504
tel. (708) 820-4800

SOFTWARE

Mystic Software's ***MusicWorks 1.2*** ($99) is a PC-based, 256-track sequencer with both event list and piano-roll editing.

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Electronic Musician
May 1992 Issue

"The SP offers ambitious programmers the potential for creating new signature sounds. Particularly considering its low price, expandability and first-rate storage and loading capabilities, the SP gives a musician more than just an introduction to sampling. With the SP, Peavey moves the flexible-architecture philosophy to new frontiers."

EQ Magazine
February 1992 Issue

The DPM® SP/SX sampling system is a phenomenal value. Costing thousands less than comparable units from our competitors, and hundreds less than most low end systems, the SP/SX combination represents the most powerful, yet affordable, full-featured 16-bit sampling system on the market today!

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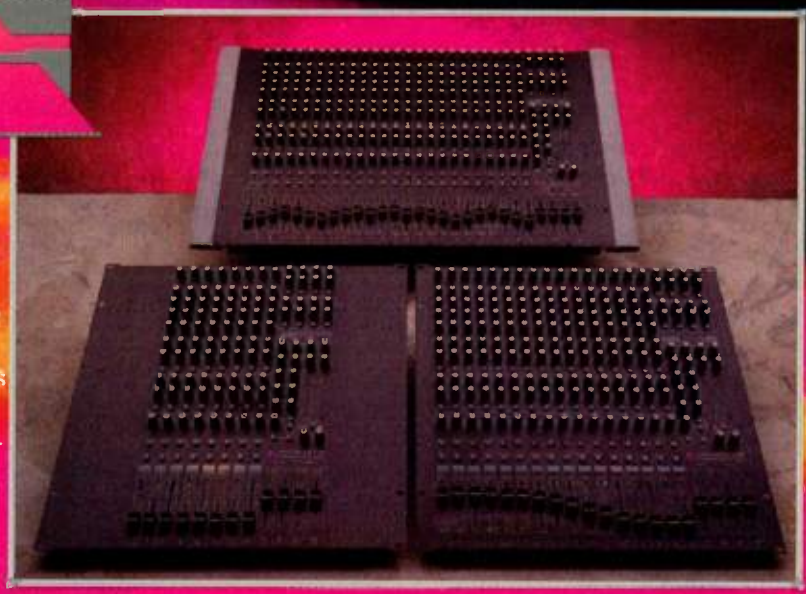
A.R.T. SHATTERS THE PRICE OF PROFESSIONAL MIXING TECHNOLOGY!!!



THE PHANTOM

PROFESSIONAL SERIES CONSOLE

Every once in a while a product comes to market that offers a brilliancy in design that seems beyond human engineering. The Phantom Series consoles offer the performance and features of mixing boards costing thousands of dollars more. They are rugged enough to take the pounding of steady live use. They are also so transparent and utterly free of noise that they are the first choice for precision multitrack recording! From a four track home studio to 32 channel digital, the Phantom consoles offer a level of performance that is inspiring. A.R.T. has taken the fidelity of world class recording mixers and made the technology available in a professional console that is as silent as its' name implies. Production unit will vary slightly from photo.

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- FULL CHANNEL SOLOING
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- SWITCHABLE MONITOR METERING
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keyboard is velocity and channel aftertouch-sensitive and has four merging MIDI Ins and four independent Outs. Eight separate zones can be defined, and each of the four sliders and two wheels can be programmed to serve any one of eight functions per zone. A programmable triple footswitch defaults to sustain, sostenuto, and soft pedal functions. The Z-One internal memory holds 64 user presets and can be augmented via the RAM card slot.

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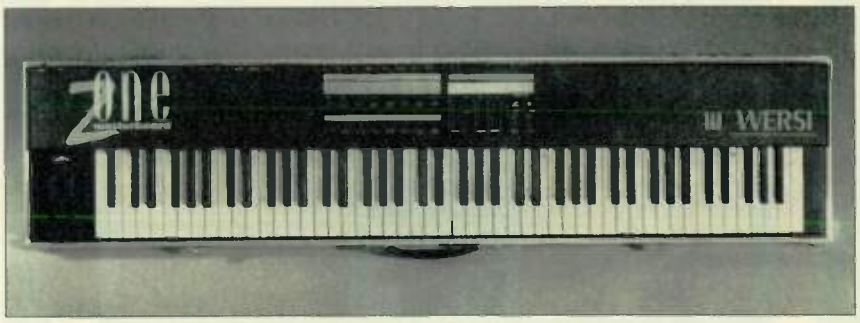

Wersi Z-One Masterboard MIDI controller

MIXERS

Ross Systems introduced four consoles in their new RCS series: The 8-channel **RCS802** ($600), the 12-channel **RCS1202** ($800), the 16-channel **RCS1602** ($1,000), and the 24-channel **RCS2402** ($1,250). The 8-channel version is a 9U rack-mount unit, while the other models are tabletop units. Optimized for sound reinforcement and keyboard mixing, the RCS series also can service home studios. All models feature insert jacks on all channels, balanced XLR outputs, 3-band EQ (with center frequencies of 80 Hz, 1.8 kHz, and 12 kHz), one selectable (with internal jumper) pre/post-EQ monitor send, two aux sends (one of which is selectable pre/post fader), a PFL switch, +48V phantom power, and -10 dB RCA (stereo) tape outs.

Ross RCS series mixers

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Fort Worth, TX 76102
tel. (817) 336-5114

EFFECTS PROCESSORS

Roland augmented its BOSS line of effects with two new effects pedals. The

Progress Report

Hard disks get smaller, and neural nets get bigger. What's a mother to do?

By Gary Hall

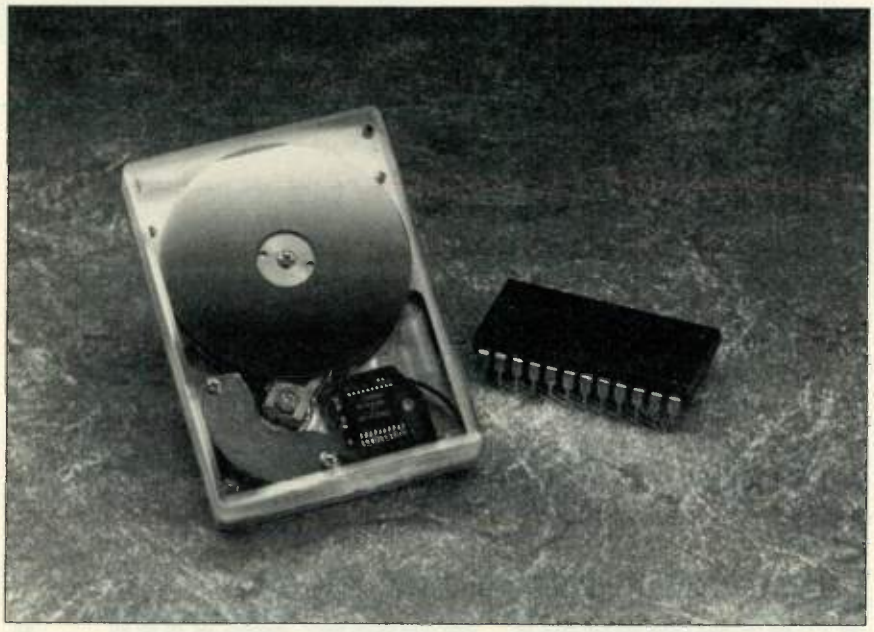

FIG. 1: The Hewlett-Packard Kittyhawk 20 MB hard disk is a mere 1.3 inches in diameter.

Part of the pleasure of technology forecasting is keeping track of your hits and misses. Being on the money is great, but I like it better when I'm off the mark by a small margin. That's because my error is most likely to be on the conservative side.

Consider the case of hard-disk sizes. When I wrote of shrinking hard disks ("Technology Page," November 1991), I spoke in hushed tones of the computer industry's plans to introduce 1.8-inch drives over the following eighteen months or so.

Somebody over at Hewlett-Packard probably got a chuckle when they read my musings, because they already were working to leap-frog the competition in the size arena. While most of the major manufacturers are announcing their 1.8-inch drives, HP recently lifted the veil from their 1.3-inch, 20 MB micro-drive, dubbed the Kittyhawk.

The Kittyhawk pushes the envelope in just about every aspect of hard-disk design. Its thin-film heads are 30 percent smaller than the tiniest heads in production today, and the glass substrates for the disk are many times harder than more conventional aluminum platters.

The new micro-drive also is a micro-monument to corporate cooperation, with AT&T and Philips-Signetics supplying controller chips in innovative sub-compact packages. My previous column on the subject compared tiny hard-disk drives and wristwatches, so it seems a bit ironic that HP has contracted with Citizen of Japan, one of the world's largest makers of watches, to manufacture the Kittyhawk. It stands to reason, though; the challenge of making these drives is the precision assembly of tiny mechanisms in a mass-production context.

For all the Kittyhawk's impressive technology, the other drive manufacturers are not necessarily quaking in their boots. For one thing, HP still has to get these tiny wonders into production; evaluation models are available today, with volume production scheduled for this autumn.

Also, the Kittyhawk's 20 MB capacity is far too small for most conventional applications of hard disks. Hewlett-Packard is betting that the Kittyhawk will stake out a substantial role in sub-notebook computers, pen-based systems, digital imaging devices, and hand-held data-collection devices, where the competition at these storage capacities is Flash RAM—currently a much more expensive option.

Meanwhile, progress is also impressive in the 2.5-inch and 1.8-inch categories. Capacities in the range of 65 MB are becoming available in the 1.8-inch size, with one supplier promising 85 MB later this year. New 2.5-inch drives (such as FWB's Pocket Hammer) are starting to tip over the 200 MB mark. That's a lot of storage for something the size of a pack of cigarettes.

There also is excitement afoot in the neural network game, and the recent big news is the neural-network retina from Synaptics, Inc., of San Jose, California. The cast of characters alone is enough to spur speculation of awesome technology breakthroughs. The company founders are Federico Faggin, the inventor of the microprocessor, and Carver Mead, who wrote the standard texts on VLSI design and created the first silicon compiler to automate the details of chip layout.

Now these two seem to be out to create a new kind of machine intelligence that they believe will be as revolutionary as the digital microprocessor. Their

product line (indeed their whole thrust of development) is very large-scale, analog neural networks designed to learn by recognizing patterns based on previous examples, rather than a set of rules. (For more information on the subject, see "Computer Musician: Neural Networks," in the January 1991 issue of **EM**.)

The neural retina chip receives images directly, like a CCD video camera (which uses a solid-state device for image pick-up instead of a picture tube), and has been trained to recognize images based on examples it has been shown. This is a straight biological model, emulating what scientists now know about the processing of visual information in the eye and visual cortex.

Right now, the neural retina is being used for character recognition. Its first user, Verifone of Redwood City, California, says it has given them a two-generation edge in their check-verification systems. That's an impressive endorsement for technology this new.

Of course, Mead and Faggin are not planning to spend the rest of their careers developing ways to chase bad checks. It is their belief that neural networks of this type will usher in an era of super-smart machines that recognize speech and handwriting as easily as today's computers read a mouse and keyboard. Maybe I'll finally get that DWIM (Do What I Meant) key I've been asking for.

Others are not so sure, pointing out that it's a big step from reading printed characters to, for example, driving a car. They also claim there's no convincing evidence that the success of neural networks on a relatively simple problem will translate into solving tantalizing but thorny problems such as speech recognition. Synaptics emphasizes that these developments will take many years.

As I write this, I'm packing my bags for two weeks in Tokyo, attending the AES Japan convention. I'll also be meeting with engineers from some big manufacturers, and I hope to bring back tales of the latest wares from the fabulous Far East. Until then, keep those propellers twirling.

EM *contributing editor* **Gary Hall** *has a crease in his seat from being at the cutting edge. His latest project is converting his entire record collection into the frequency domain.*

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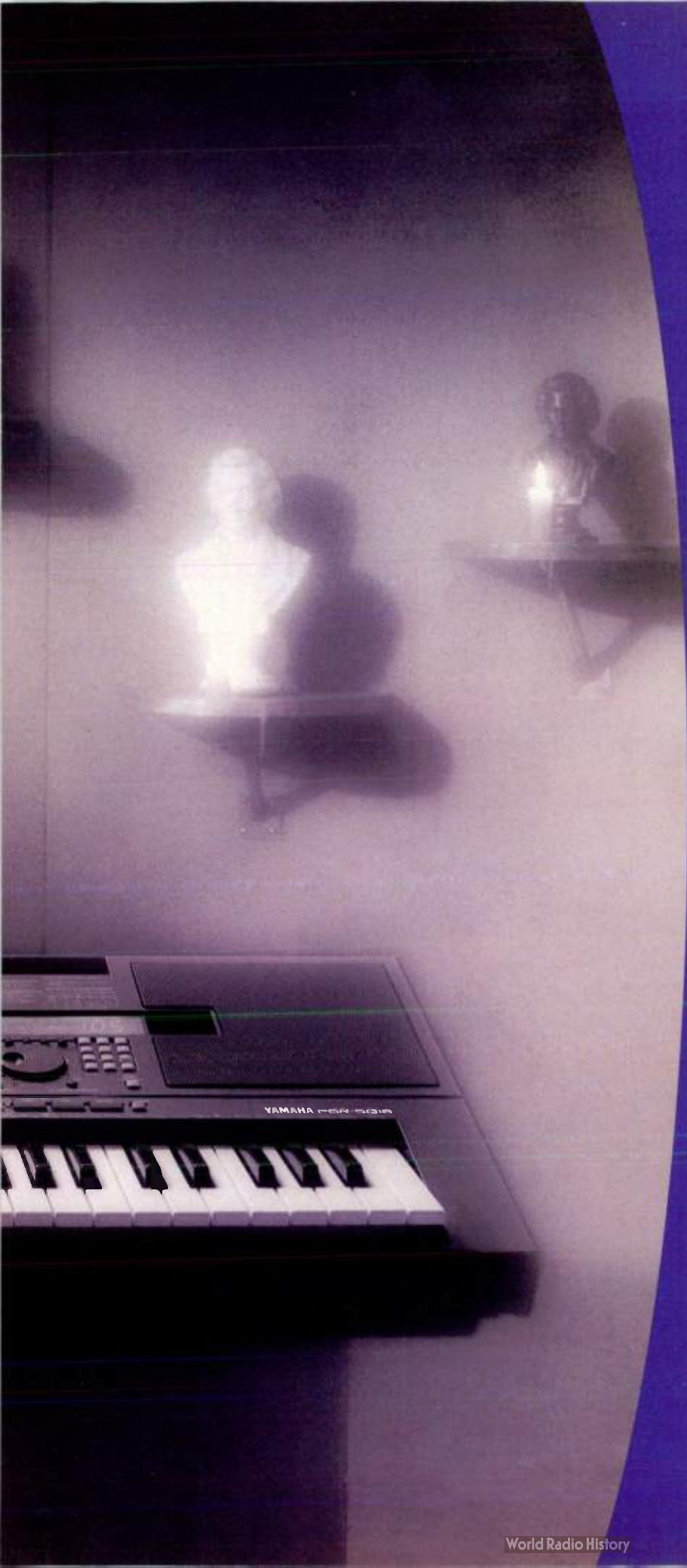

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▲

PSR-SQ16.

On Solid Ground

PART ONE

If your studio is haunted by things that go hum in the night, pay closer attention to the principles of grounding.

By Neal Brighton and Steve Oppenheimer

Even the most talented recordist must plan carefully in order to survive the vagaries of fickle fate. An alarm system and a good insurance policy protect your studio against thieves and natural disasters. Secure (and perhaps a bit smug) in the knowledge that your guard is up, you may be quite literally shocked to discover that your projects, your precious gear, and perhaps your life could be at serious risk from a dreaded disease: bad grounding.

Most studio professionals have an encyclopedic collection of horror stories about the wages of electrical sin. At best, improper grounding causes unholy noise in the audio system, immediately labeling your recordings as amateurish or even unlistenable. Often, sensitive equipment displays mysterious behavior and requires unexpected pilgrimages to the repair shop. In the worst case, poor grounding could lead to electrocution or fire. Fortunately, the problem can be cured if you diagnose it in time and treat it promptly.

A properly wired and grounded system starts with the AC lines. But you also must consider your audio cables, whether your lines are balanced or unbalanced, what type of connectors or adapters you've used, and so on. We have a lot of ground to cover, so we've divided the discussion into two parts. In Part 1, we'll review the potentially hair-raising fundamentals of AC grounding, including both house and equipment-chassis grounding. Next month, we'll examine sane wiring schemes and rack-mounting strategies and establish a troubleshooting procedure for minimizing sonic mayhem.

PHOTOGRAPH BY PETER DIGGS

ONE LEG TO STAND ON

It's important to determine whether you have a clean power source. You must know if there is anything else drawing power from the same AC circuit as your equipment.

If you don't already know which circuit breakers control which outlets and lights in your building, take a few minutes to find out. Get a few radios or lamps, plug them into every wall socket in the house (including the outlet(s) where your equipment is plugged in), and turn them on. (Make sure your computer and music gear are turned off.) Find the breaker panel, throw the breaker for each circuit, and see what stays on and what goes out. Write down which outlets and lights are controlled by each breaker.

The best news would be that your equipment is the only thing on its circuit. The worst news would be that half

It's important to make sure that safety grounds are connected, as they protect you in the event of a short circuit between the chassis and the hot line. Should a short circuit occur inside the equipment, the current will pass through the safety ground to earth, and not through whoever touches the equipment. (Remember, electrons always take the easiest path to ground.) This need for a safety ground also is a strong argument against the use of 3-prong-to-2-prong AC ground lifters (a.k.a. AC plug adapters), which defeat the third-prong safety ground.

If you have older gear with 2-conductor AC connectors, you could have a shock hazard between the chassis of the device and the chassis of, say, a mic. (Newer UL-approved, 2-conductor gear should be okay, but take precautions anyway.) A microphone case is grounded through the cable shield to the mixer or preamp, so if the latter is properly grounded, the mic should be safe. However, if an older device such as a tube-based guitar amp or a powered mixer uses a poorly grounded, 2-conductor power cord, you might become the easiest path to ground, which could give you a hot time in the old town. Microphones with properly wired, balanced XLR connectors don't pose much of a problem, as the two main conductors carry signals that are 180 degrees out of phase, and the shield does not carry a signal.

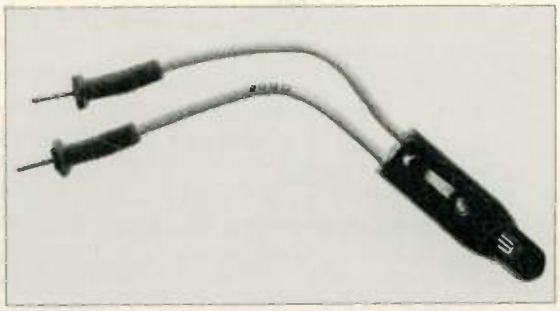

FIG. 3: Neon circuit-testers use a neon bulb to determine whether an outlet or piece of equipment is properly wired.

To test the ground connection of a mic, use a neon circuit-tester (see **Fig. 3**)

POWER TO THE PEOPLE

Regardless of where your local electric company gets its juice, the AC power reaches your house by way of two 117-volt hot wires (at a frequency of 60 Hz, ± 0.01%), each carrying a signal that is 180 degrees out of phase with the other. In reality, the AC signal fluctuates above and below 117 volts, depending on the demand for electricity on your local network at any point during the day.

You also have a neutral wire and a ground wire. The neutral wire is grounded to earth at the local utility pole's step-down transformer. At the service point where the power line enters the house, the neutral wire is grounded again.

The ground wire is a conductor brought in from the service point to provide a safety ground for the chassis of anything plugged into the outlet. It normally is connected to the building's cold-water system, assuming you have copper water pipes and not plastic. If the entire house has plastic pipes, a six-foot copper rod may be driven into the ground to create a true earth ground. The ground wire normally is at the same potential as the neutral, but not always. There is sometimes a current in the neutral wire, which is why it should never be connected to the ground wire.

All the wires meet in a metal box with fuses or circuit breakers. From this box, the power is divided into two main strips, or legs, which run down the left and right side of the box. Each leg consists of one 117 VAC hot line that shares a common neutral wire. Each of these legs is then divided into 15-, 20-, or 25-amp circuits that run to different parts of the house. At the bottom of the breaker box, you usually find a strip that connects all the grounds from the different circuits to the main ground wire.

For heavy-duty appliances such as an electric stove, both hot legs are used to create a 240-volt line. In industrial areas, several different three-phase wiring schemes are commonly used, including both 240-volt and 480-volt systems. Some systems also provide 208 VAC and 277 VAC legs for motors and fluorescent lights. If you plan on hooking into these systems, you should have a qualified electrician do it for you.

Most modern electrical boxes have circuit breakers rather than fuses. The circuit breakers are designed to protect the electrical system from overloads. If the current drawn from a circuit exceeds the maximum value of the breaker, the breaker trips and shuts down the power to that circuit. This safety feature prevents the circuit from overheating and causing damage to equipment, or even starting a fire.

In a properly wired, polarized 2-prong outlet, the left (long) prong is neutral, the right is hot, and the mounting screw is ground. In a 3-prong outlet, the third (cylindrical) prong is ground. The wiring in buildings varies depending on local building codes, but most conform to a more or less universal color code for the different wires. Normally, white is used for the neutral, ground is green, and hot is anything but white or green, with black being the most widely used color.

If you recognize this scheme as being similar to unbalanced audio connections, go to the head of the class. In both cases, a hot signal in one conductor is accompanied by a neutral signal in the other conductor. In balanced connections, two hot signals that are 180 degrees out of phase with each other are carried in two conductors while the neutral signal is carried in a third conductor. This eliminates any noise induced by external electromagnetic radiation from devices such as electric guitars, which appears in all conductors at the same phase. In England, the AC power system is balanced, which is why British studios are generally more hum-free than their American counterparts. Unfortunately, American electrical codes do not provide for balanced AC power lines.

THE EXCITEMENT IS ONLY BEGINNING.

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"The DP/4 is capable of so many sound permutations that it's almost like a new instrument."
NICK BATZDORF, *Home & Studio Recording*

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SQ-1 PLUS 32 Voice Personal Music Studio


SD-1 32 Voice Music Production Synthesizer


KS-32 Weighted Action MIDI Studio


SQ-R PLUS 32 Voice Synthesizer Module

or high-impedance AC voltmeter, and *without touching both chassis at the same time with your body*, place one lead on the amp or mixer chassis in question and the other lead on the mic chassis. (For added safety, use a clip to attach a lead to the amp chassis, instead of hand-holding the lead. Put one hand in your pocket so your arm can't become a path to ground.) If you find even a few volts difference, you could have a serious problem. First, try reversing the amp's AC plug in the outlet, or if the amp has a ground-reverse switch, try flipping that. If these remedies don't work, try plugging the amp into a different outlet on the same circuit. If nothing helps, don't use the amp; any alternative beats electrocution.

A GREAT LEAP FORWARD

Well, that about covers the fundamentals of your electrical system. If you have tested your outlets and, with help from your friendly local electrician, corrected any faulty conditions, your studio has come a giant leap closer to electrical sanity. Next month, we'll turn our attention to discovering and correcting ground loops and other wiring conditions that make your studio gear hum and your ears burn.

WARNING

It is most important to keep in mind that when it comes to AC wiring, government and insurance underwriters' electrical codes take precedence over anything suggested here. These rules and regulations, which vary in different regions, are designed for safety, and safety always comes first. If you are unsure of what you're doing, call a professional electrician.

(The authors would like to thank Alan Gary Campbell, Chris Meyer, Kevin Kaiser, Larry Oppenheimer, and Charlie Bolois.)

Neal Brighton *is an independent producer/engineer and co-owner of Sound and Vision studios in San Francisco. A Buddhist seer once told* **EM** *managing editor* **Steve O.** *that his purpose in this incarnation was to learn about power. He never understood until now.*

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Address _____

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State *Zip* *Phone*

Mail to: ENSONIQ, Department E-30
155 Great Valley Parkway, Malvern, PA 19355

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THE TECHNOLOGY THAT PERFORMS

Tape Killers

The EM Guide to Hard-Disk Recorders

BY PAUL D. LEHRMAN

Hard disk-based audio systems are proliferating like rampant fungi. Every week it seems that another manufacturer announces a recording or editing system that promises to revolutionize the way we capture and mold sound.

Unfortunately, these promises make many musicians feel like test subjects in an experimental world. The wealth of features that differentiate hard-disk systems makes it difficult to sort out the important ones. Potential buyers often are confused about which systems are best for specific tasks and the actual cost of buying and running a system.

Purchase decisions can be simplified by defining your needs. For example, if CD mastering is your goal, fancy signal processing is not essential. However, a selection of reverbs and modulation effects is very important for film sound design. In addition, music editors desire time compression and expansion, so that audio can be

Photography by Stan Musilek

Korg's SoundLink combines digital audio recording and MIDI sequencing.

tated by the software. This number can be infinite, although most systems set a limit.

ANALOG AND DIGITAL I/O

Analog inputs and outputs are either balanced (XLR or three-conductor 1/4-inch connectors) or unbalanced (two-conductor 1/4-inch jacks).

Digital inputs and outputs also fall into two categories. One is AES/EBU (sometimes called AES/EBU professional), which uses XLR connectors and operates within a specified voltage range. The other is S/PDIF, which in our chart also includes IEC-958, CP-340 Type II, and AES/EBU consumer.

S/PDIF formats essentially are compatible with each other, although there are minor differences between some of the types. Connections are RCA and/or optical, operating at a voltage range lower than AES/EBU. Both types are stereo; one connector handles signals for two channels. Some systems use proprietary digital I/O schemes, and are only compatible with equipment from the same manufacturer.

SAMPLING RATES

Some systems allow sampling only at one or more fixed rates, while others provide a continuous range of sampling frequencies. Some of the sampling rates may look unfamiliar. For instance, 44.056 and 47.952 are "pull-down" versions of the standard 44.1 kHz and 48 kHz rates and are referenced to video signals running at 29.97 frames per second.

TIME CODE SUPPORTED

For work with audio and video tape, computer animations, multimedia presentations, and even other hard-disk systems, time-code synchronization is

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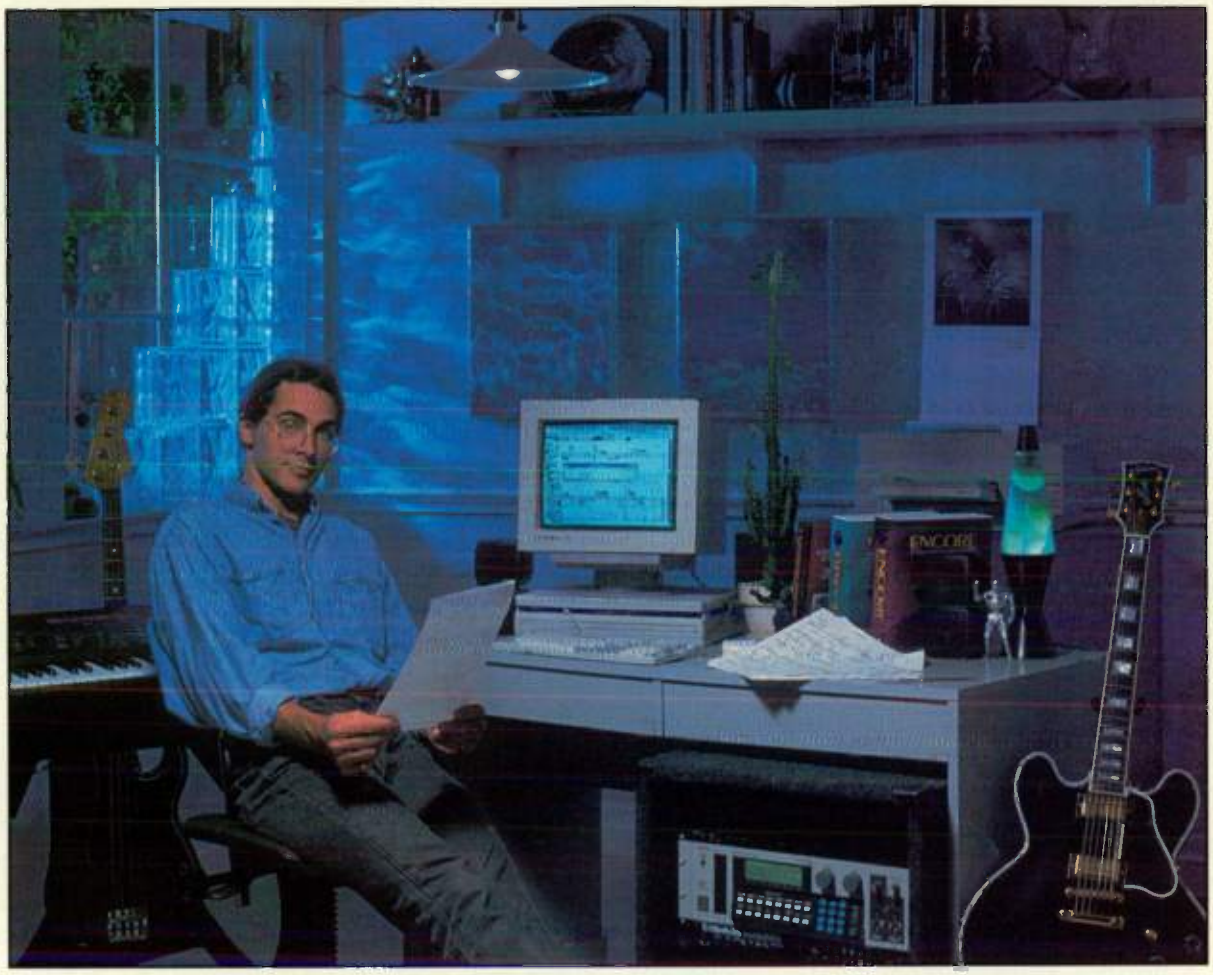

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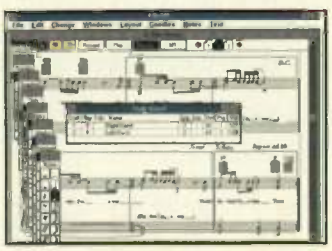

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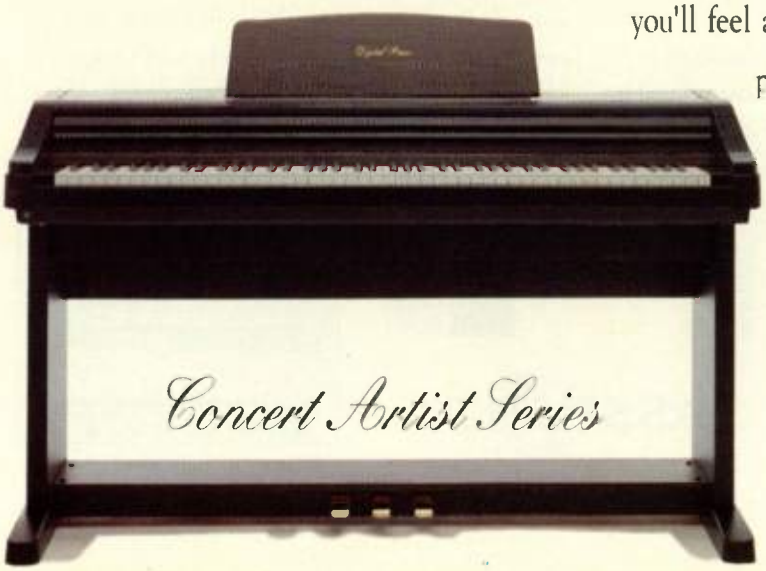

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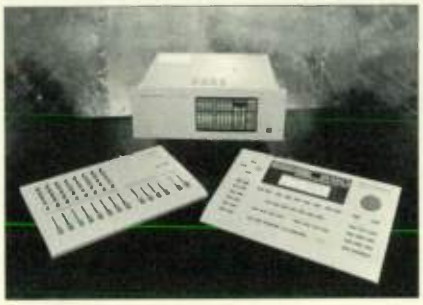
Compton, California 90220



Roland DM-80 with optional remote controller and fader unit.

essential. SMPTE is standard, longitudinally recorded time code and is carried as an audio signal. VITC is Vertical Interval Time Code, which is exclusive to the video medium and runs through a video input. MIDI Time Code (MTC) is accessed via a MIDI cable.

CONTROL SYNC

Control sync (i.e., digital sampling-rate synchronization) is essential for digital systems that offer more than two tracks because the AES/EBU and S/PDIF standards cannot synchronize multiple data streams directly. If you attempt to combine two or more digital sources without some form of hard sync between them, audible clicks, distortion, and dropouts often result. A separate clock signal must be used to reference all of the sample-rate clocks in the system.

Although various types of synchronization exist, we've charted the three most common. *Video drive* is derived from a video signal and is often referred to as "house sync." *Word clock* commonly is used among video synchronizers and is derived from a video signal or sampling clock. *Superclock* is a new type of sync that is a multiple of a sampling-rate clock.

EDL IMPORT/EXPORT

If a system imports and/or exports Edit Decision Lists from other audio or video systems, audio editing cues can be automatically enacted. As with computer-assisted video editing, the presence of an accurate EDL can speed up (and simplify) audio manipulations.

SAMPLE RATE CONVERSION

A system that converts files recorded at one sample rate to another can be handy. For instance, mixes recorded onto a consumer DAT machine at 48

EM GUIDE TO HARD-DISK RECORDERS

Manufacturer/Model	Type	Minimum Computer Required	Number of Tracks (Simultaneous/Virtual)	Analog I/O (Type: Ins/Outs)	Digital I/O (Type: Ins/Outs)	Sampling Rates (kHz)
Akai DD1000 Optical Disk Recorder, version 2.3	turnkey with computer option	Mac SE30 or above, 4 MB RAM, System 7.0	2 Stereo/300	XLR: 2/4	AES/EBU, S/PDIF: 1/2	32, 44.056, 44.1, 48
Akai S1100, version 2.0	turnkey	n/a	2/0	XLR and 1/4": 2/2	optional	44.1, 48
AKG Acoustics DSE 7000/210	turnkey	n/a	2/8	XLR: 2/4	n/a	32
Anatek Radar	turnkey	n/a	24/0	1/4": 24/24	AES/EBU, S/PDIF: 2/2	32, 44.1, 48
Digidesign Audiomedia II	computer-based	Mac II	2/0	RCA: 2/2	S/PDIF: 1/1	44.1, 48
Digidesign Pro Tools	computer-based	Mac II	4/64	XLR: 4/4	AES/EBU, S/PDIF:2/2	44.1, 48
Digidesign Sound Tools II	computer-based	Mac II	2/2	XLR: 4/4	AES/EBU, S/PDIF: 2/2	44.1, 48
Digital Audio Labs The Card D System	computer-based	IBM 80386, 16 MHz	2/0	RCA: 2/2	S/PDIF:1/1	32, 44.1 ,48
Digital Expressions Soft Splice	computer-based	Mac Plus, 1 MB	4/unlimited	n/a	AES/EBU, S/PDIF: 2/2	32, 44.1, 48
Korg SoundLink	turnkey	n/a	8/8	XLR: 8/10	AES/EBU, S/PDIF: 2/2	44.1, 48
Mark of the Unicorn Digital Performer/Waveboard	computer-based	Mac II, 8 MB RAM	2/unlimited	n/a	AES/EBU, S/PDIF: 2/2	32, 44.1, 48
Micro Technology Unlimited Micro Sound	turnkey/ computer-based	IBM compatible, 80386, 33 MHz	2/38	mini-plugs or XLR: 4/4	AES/EBU, S/PDIF:2/2	variable 8 to 48
Otari DDR-10	turnkey	n/a	2/0	XLR: 2/2	AES/EBU, S/PDIF:2/2	32, 44.056, 44.1, 48
Otari PD-464	computer-based	Mac IIsi	64/unlimited	XLR: 64/64	AES/EBU, S/PDIF: 64/64	32, 44.056, 44.1, 48
Plasmec ADAS-ST	computer-based	Atari 520ST	2/0	1/4": 2/2	S/PDIF: 2/2	44.1, 48
RasterOps Media Time	computer-based	Mac II, 4 MB RAM, System 6.05 or greater	2/0	1/4": 2/2	n/a	44.1
Roland DM-80	turnkey	n/a	8/100 per track	Balanced RTS : 8/8	AES/EBU, S/PDIF: 2/1	32, 44.1, 48
Sonic Solutions SS-110 Expanded Sonic Station (sample configuration)	computer-based	Mac IIci, 8 MB RAM, 1 GB sound disk	12/64	XLR: 2/2	AES/IEC: 4/4	44.056, 44.1 47.952, 48
Sonic Solutions SS-117 Sonic Station (sample configuration)	computer-based	Mac IIsi, 8 MB RAM,800 MB sound disk	8/64	optional	AES/IEC: 2/2	44.056, 44.1 47.952, 48
Spectral Synthesis Audio Engine	turnkey	n/a	16/256	RCA, XLR:16/16	AES/EBU, S/PDIF: 16/16	32, 44.1, 48
Spectral Synthesis Digital Studio	computer-based	IBM 80386, 25 MHz	10/256	RCA, XLR: 4/2	AES/EBU, S/PDIF: 2/2	32, 44.1, 48
Studer Dyaxis I	computer-based	Mac IIsi, internal 105 MB hard drive	2/unlimited	XLR: 2/2	S/PDIF: 1/1	24, 32, 44.056, 44.1, 48
Studer Dyaxis II	computer-based	Mac IIci, color monitor	8/unlimited	XLR: 4/4	AES/EBU, S/PDIF: 2/2	32, 44.056, 44.1, 48
Studer Dyaxis Lite	turnkey	Mac Classic II, internal 105 MB hard drive	2/unlimited	XLR: 2/2	S/PDIF: 1/1	24, 32, 44.056, 44.1, 48
SunRize Industries Studio 16/AD1012	computer-based	Amiga 2000 or 3000	1/4	RCA: 1/1	n/a	variable 7.58 to 81
SunRize Industries Studio 16/AD516	computer-based	Amiga 2000 or 3000	2/8	RCA: 1/1	n/a	variable 5.5 to 48
Turtle Beach Systems 56K Digital Recording System	computer-based	80286 IBM PC, 12 MHz	2/4	n/a	AES/EBU, S/PDIF:2/2	32, 44.1, 48
WaveFrame 400	computer-based	80486 with 4 MB RAM	8/200+	XLR: 8/8	SDIF: 16/16	variable 32 to 48
WaveFrame 401	turnkey	n/a	8/200+	XLR: 8/8	S/PDIF: 2/2	44.1
WaveFrame 1000	computer-based	80486 with 4 MB RAM	8/200+	XLR: 2-16/8-16	AES/EBU, S/PDIF: 32/32	variable 42 to 48

LIST OF MANUFACTURERS

Akai Professional
1316 E. Lancaster Ave.
Fort Worth, TX 76102
tel. (817) 336-5114

AKG Acoustics, Inc.
1525 Alvarado St.
San Leandro, CA 94577
tel. (510) 351-3500

Anatek
400 Brooksbank Ave.
North Vancouver,BC V7J 1G9
tel. (604) 980-6850

Digidesign
1360 Willow Rd., Suite 101
Menlo Park, CA 94025
tel. (415) 688-0600

Digital Audio Labs
6311 Wayzata Blvd., Suite 200
St. Louis Pk, MN 55416
tel. (612) 559-6104

Digital Expressions
14150 NE 20th St., Suite 362
Bellevue, WA 98007
tel. (206) 389-9895

Korg Professional Audio
89 Frost St.
Westbury, NY 11590
tel. (516) 333-9100

Mark of the Unicorn
222 Third St.
Cambridge, MA 02142
tel. (617) 576-2760

Micro Technology Unlimited
PO Box 21061
Raleigh, NC 27619-1061
tel. (919) 870-0344

Time Code Supported	Control Sync	EDL Import/ Export	Sample Rate Conversion	Digital Signal Processing	Dedicated Controls	Retail Price (Price with minimum computer)
MTC, SMPTE	video drive, word clock	yes	yes	time compression/expansion	included	$14,995
SMPTE	n/a	no	no	time compression/expansion	included	$6,649
n/a	n/a	no	no	n/a	included	$27,950
MTC, SMPTE	video drive, word clock	no	no	n/a	included	$16,000
MTC, SMPTE	n/a	no	yes	dynamics processing, EQ, pitch shift, time compression/expansion	optional	$1,295 ($5,200)
MTC, SMPTE, VITC	superclock	no	no	chorus, delay, EQ	optional	$5,995 ($10,000)
MTC, SMPTE, VITC	superclock	no	yes	dynamics processing, EQ, pitch shift, time compression/expansion	optional	$3,495 ($7,500)
n/a	n/a	no	no	n/a	n/a	$1,045-$1,340 ($2,340)
SMPTE	n/a	no	yes	dynamics processing, EQ	n/a	$2,995 ($5,000)
MTC, SMPTE, VITC	word clock	no	yes	EQ, reverb, time compression/expansion	included	$37,000
MTC, SMPTE, VITC	word clock	yes	no	n/a	optional	$2,390 ($7,000)
MTC, SMPTE	n/a	no	yes	pitch shift, time compression/expansion	n/a	$3,690 ($7,795 for turnkey model)
MTC, SMPTE	superclock, video drive, word clock	no	yes	EQ, time compression/expansion	included	$19,990
SMPTE, VITC	superclock, video drive, word clock	yes	no	pitch shift, time compression/expansion	optional	$32,000 ($35,000)
MTC, SMPTE	word clock	no	no	n/a	n/a	$1,595 ($1,995)
n/a	n/a	no	yes	EQ, dynamics processing, pitch shift, time compression/expansion	n/a	$1,995 ($3,995)
MTC, SMPTE, VITC, EBU	video drive	no	yes	EQ	optional	$9,995 (4-track version, $6,995)
SMPTE	video drive, word clock	no	no	EQ	n/a	$19,000 sound disk included ($22,000)
SMPTE	n/a	no	nos	EQ	n/a	$7,345 sound disk included ($10,400)
SMPTE	superclock, video drive, word clock	no	yes	chorus, delay, EQ, reverb, time compression/expansion	optional	$38,435
SMPTE	superclock, video drive, word clock	no	yes	time compression/expansion	optional	$12,930 ($14,995)
SMPTE, VITC	video drive, word clock	no	yes	EQ, time compression/expansion	optional	$11,900 ($15,900)
SMPTE, VITC	video drive, word clock	no	yes	EQ, time compression/expansion	n/a	$28,950 ($36,000)
SMPTE, VITC	video drive, word clock	no	no	n/a	included	$9,950 (sold only with computer)
SMPTE	n/a	yes	yes	chorus, delay, echo, flange	n/a	$595 ($2,200)
SMPTE	n/a	yes	yes	chorus, delay, echo, flange, time compression/expansion	n/a	$1,495 ($3,100)
MTC, SMPTE	word clock	no	yes	EQ, time compression/expansion	optional	$1,495 ($2,495)
SMPTE, VITC	video drive, word clock	yes	no	EQ, time compression/expansion	optional	$25,700 ($29,060)
MTC, SMPTE, VITC	video drive, word clock	yes	no	EQ	optional	$14,995
SMPTE, VITC	video drive, word clock	yes	yes	EQ, reverb, time compression/expansion	optional	$36,150 ($39,510)

Otari, Inc.
387 Vintage Park Dr.
Foster City, CA 94404
tel. (415) 341-5900

Plasmec (Digital I/O)
2554 Lincoln Blvd., Suite 122
Marina del Rey, CA 90201
tel. (310) 398-3993

RasterOps
2500 Walsh Ave.
Santa Clara, CA 95051
tel. (408) 562-4200

Roland Corporation
7200 Dominion Circle
Los Angeles, CA 90040
tel. (213) 685-5141

Sonic Solutions
1891 E. Francisco Blvd.
San Rafael, CA 94901
tel. (415) 485-4800

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

Studer ReVox America, Inc.
1425 Elm Hill Pike
Nashville, TN 37210
tel. (615) 254-5651

SunRize Industries
2959 S. Winchester Blvd., Suite 204
Campbell, CA 95008
tel. (408) 374-4962

Turtle Beach Systems
PO Box 5074
York, PA 17405
tel. (717) 843-6916

WaveFrame Corp.
4730 Woodman Ave., #405
Sherman Oaks, CA 91423
tel. (818) 981-9235

• TAPE KILLERS

kHz can be converted to 44.1 kHz for CD mastering.

DIGITAL SIGNAL PROCESSING

This category includes a variety of features that various systems may offer. Among the most useful are: scrubbing, or listening to a short piece of a file backward and forward to find edit points (similar to rocking a tape reel);

WaveFrame 1000 PC-based production system.

pitch shift (transposing a sound for an effect or to match another sound's pitch); time compression/expansion (changing a sound's length without altering its pitch to fit a particular time segment); and other associated tools such as reverb, equalization, and delay.

DEDICATED CONTROLS

Computer keyboards and mice are not the most appropriate controls for editing and mixing audio. To facilitate "conventional" operation, some manufacturers offer dedicated faders and tape recorder-style transport controls. Depending on the manufacturer, these controls are either included with the unit, offered as a system option, or available from a third-party vendor.

POWERING DOWN

We hope this guide helps you sort through the morass of competing and confusing claims that comprise the hard-disk audio marketplace. Obviously, budget imposes a major effect on what you get, but try to keep something besides dollars in mind. Think hard about your needs, both for the work you're doing today, and what may happen tomorrow.

Paul D. Lehrman *is a composer, author, and teacher, and is on the executive board of the MIDI Manufacturers Association. His first digital audio system was an Apple II BASIC program that played a square wave at different pitches. He still thinks that was pretty cool.*

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card! Wave Shaping (Korg's exclusive process for modifying waveforms) yields super-realistic acoustic instrument sounds and original sounds nothing else can. A 7,000 note, 16-track sequencer adds more versatility.

01/WFD The "pumped up" 01/W. All of the incredible sounds and power of the 01/W. Plus a built-in

disk drive that lets you store programs, combinations, sequences and sysex data. Flex your creativity with an expanded 48,000 note, 16-track sequencer. Like the 01/W, it includes two Stereo Dynamic Digital Multi-Effect Processors with 47 effects and real-time control.

01/W Pro The Pro starts with all of the sounds and music-making power of the 01/WFD. Add an extended 76-note keyboard and an expanded 10 Meg PCM memory featuring 256 multi-sounds and 129 drum and percussion sounds. A 48,000 note, 16-track sequencer includes advanced editing functions. Import and export sequences in the Standard MIDI File format.

And, like the 01/WFD, it can even be used as a MIDI data filer.

01/W ProX The most evolved 01/W. Features an 88-note weighted action keyboard that makes the ProX an ideal Master MIDI Controller. And you get the full complement of the 01/W Pro's sounds, sequencing power and storage capability.

01R/W A perfect MIDI module. All the sounds and features that have made the 01/W the leader in music workstations. Plus a 7,000 note, 16-track sequencer with sophisticated editing control. Receives on 16 independent MIDI channels. MIDI overflow. Four polyphonic outputs. The ultimate open-ended system in a compact two rack space.

03R/W The affordable and compact MIDI module for fast, easy access to many of the great 01/W sounds. 32 voices, 128 General MIDI ROM programs, plus 100 user-programmable Programs and Combinations. Program and PCM card slots that use 2 Meg PCM cards. Compatible with Korg's RE-1 Remote Editor.

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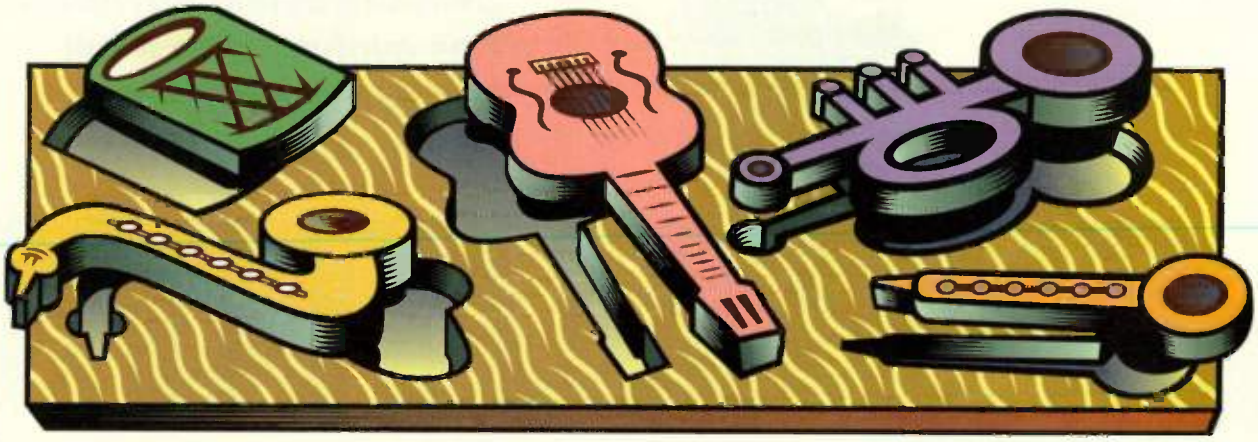
For more information, write to: Korg U.S.A., 89 Frost St., Westbury, NY 11590 ©1992 Korg U.S.A.

By Paul D. Lehrman

GENERATING GENERAL MIDI



PETER HOEY

General MIDI scores may prove to be a big new market for composers.

Distributing music on tape or CD offers an often overlooked benefit: They are universal formats that everyone can play. Unfortunately, there has been no MIDI equivalent. Sure, the introduction of Standard MIDI Files several years ago eased the process of sharing sequences, but a truly universal format that produces similar sonic results on different MIDI setups wasn't available until the introduction of General MIDI (GM).

GM standardizes program, drum note, and continuous controller assignments for synthesizers. For example, Program 36 always calls up Fretless Bass, and MIDI Note 39 on

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Los Angeles, CA
(213) 477-1945

Ace Music Center
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(305) 891-6201

YRS MIDI Systems
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Richard Audio
Montreal, PQ
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Soundware
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Creative Software
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And Music
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(0611) 928 050

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channel 10 always plays a hand clap. (For more on the nuts and bolts of General MIDI, see "MIDI For the Masses" in the August 1991 EM.) The benefit of this standardization is that pieces of music created for General MIDI purposes, known as GM scores, sound essentially the same when played on any General MIDI device.

COMMERCIAL MUSIC

The commercial implications of this development are significant. Instead of worrying about patch and note assignments, non-musicians can buy a GM score and play it back on a GM device without any tweaking. GM provides video producers, commercial directors, broadcasters, multimedia producers, and others with a flexible new musical resource.

Conceptually, GM scores are similar to existing music libraries, but there's an important twist: They are interactive. Users with only minimal knowledge of music can edit the files' length, tempo, and orchestration to customize them for their particular applications.

GM also has great potential in music education and the home market, where amateur musicians can fool around with pre-recorded music in creative ways. With a large installed base of GM synths in homes and schools, publishers should be eager to supply GM-based interactive software to supplement instruction in music theory, orchestration, ear training, and performance using a "Music Minus One" approach.

Above all, General MIDI represents exciting new opportunities for electronic composers of all persuasions. However, all is not necessarily harmonious in GM Land. You must consider several things if you intend to create GM scores.

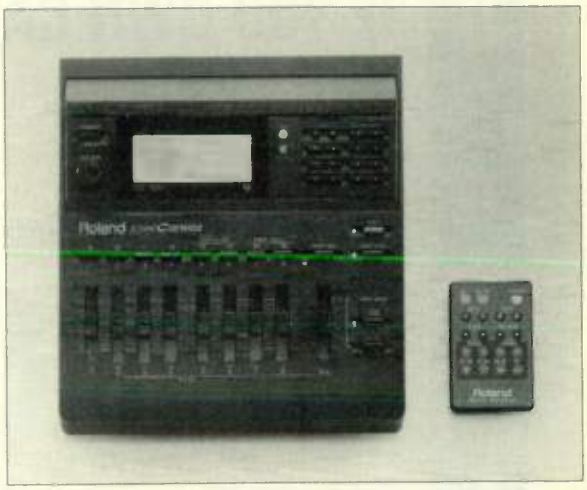
CAN WE COMPOSE?

Given the specificity of the rules, one would think that composing a GM score is easy. Buy a GM synth, write music for it, and it'll sound good on any GM system, right? Well, if it were really that easy, this would be a very short article.

Like MIDI after its introduction, General MIDI is taking a while to settle in. The official "General MIDI System Level 1" document (available for $7 from the International MIDI Association, 5316 W. 57th St., Los Angeles, CA 90056; tel. [310] 649-6434) is only eight pages long, and many aspects of GM are not completely resolved. The MIDI Manufacturer's Association (MMA) and Japanese MIDI Standards Committee (JMSC) are considering writing new, more specific documents, both in the definition of how the hardware should behave (relative levels and envelope speeds of individual sounds being among the chief concerns), and in the score-creating process.

But in the meantime, composers have already discovered that there are substantial variations in the way different GM devices handle data. Consequently, a large part of the GM composer's job is to make sure his or her music sounds good on *all* GM devices and in all possible contexts.

The currently available GM devices include the Roland SC-55 Sound Canvas (reviewed in the June 1992 EM) and its brethren (the SCC-1 PC plug-in card, SC-155 module, and JV-30 keyboard, among others), the Korg 03R/W (reviewed in the July 1992 EM), the Yamaha TG100, and Turtle Beach's MultiSound PC audio card (reviewed in the August 1992 EM), which uses E-mu's Proteus/1 technology. In addition, a specialized version of the E-mu Proteus/1 chip set will be used in several upcoming MPC sound cards.



Roland's Sound Canvas has become a *de facto* reference standard for composing General MIDI scores. The SC-155 model, shown here, adds eight faders to the original package.

FOLLOWING THE RULES

In order to prepare a GM score, you must know the rules. The first rule is to follow the Sound Set, which specifies the Program Change numbers that bring up particular sounds, and the Percussion Map, which assigns individual percussion instruments to 47 notes.

After that, you need to think about how many notes a device can play simultaneously. The minimum polyphony requirement is 24 notes; however, manufacturers may reserve eight of these notes for percussion, so sometimes only sixteen pitched notes are available. The more conservative you are with notes, the better the chance that your music will sound good on all GM devices.

You can use all MIDI channels except channel 10 for pitched sounds, and each one can have a different timbre. Voices are dynamically allocated in the hardware, so you needn't worry about how many voices are playing on any *one* channel as long as the combined total is less than 16 or 24. Channel 10 is reserved for percussion, in accordance with the Percussion Map. You can have five octaves of tom-toms (melodic toms are Program Number 118), but not on channel 10.

Velocity sensitivity as well as Channel and Polyphonic Pressure (Aftertouch) are supported. Controllers that are supported include Modulation (1), Volume (7), Pan (10), Expression (11), and Sustain (64). Expression and Volume have more or less equivalent effects. In general practice, Volume is considered more suitable for initial level settings and fader-like moves, while Expression is for crescendos and diminuendos. The difference is subtle, and it isn't even discussed in the current GM document.

Pan works differently from one synth to another. Some synths let you move a note across the stereo field in real time while it is sounding, while others use the command to determine the placement of the *next* note on the channel. Some synths also allow you to pan the drums on channel 10, while others fix their individual positions.

Pitch Bend is supported, with an assumed range of +/- 2 semitones. You can change the range using Registered Parameter 0: Send Controller 100 with a value of zero, followed by Controller

101 with a value of zero, followed by Controller 6 (Data Entry) with the value of the desired range in semitones. Maximum Pitch Bend ranges are *not* specified, so you may run into trouble if you want a value of 24 and the device playing the file only bends a maximum of one octave (twelve semitones).

Finally, GM instruments support the Reset All Controllers (121) and All Notes Off (123) messages, which should be used at the end of a sequence to make sure the device is properly set up for the next file it will play.

BREAKING THE RULES

Sticking strictly to the guidelines in the Level 1 document is no guarantee that your scores will sound good on all GM devices. Different instruments lack or add certain features that affect the final performance.

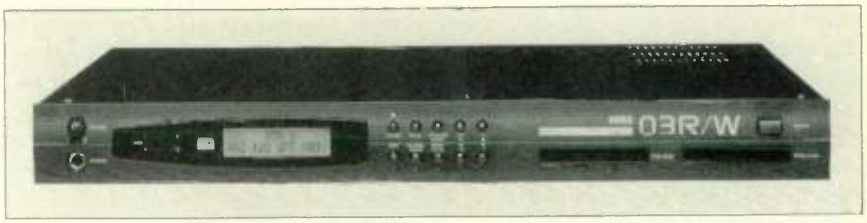
For example, while all GM patches are *supposed* to be musically equivalent across devices, in practice some are more equivalent than others. "'French Horn' is pretty reliable," says Paul Potyen, who is supervising the production of a library of GM sequences for Opcode Systems and The Music Annex. "But 'Goblins' [Number 102] is a different matter. It's always best to err on the conservative side."

At the moment, most GM composers use the Roland Sound Canvas as their benchmark instrument. It's easy to use, it sounds good and—probably most important—it was the first GM device on the market. The Sound Canvas and related synths follow Roland's GS format, a superset of General MIDI. GS adds a number of extra instruments to the Percussion Map and extra "variation" patches to the basic Sound Set, which are accessed using the MIDI Bank Select command (Controller 0). GS also offers effects send controls on each channel for the unit's built-in effects. In addition, GS uses Controllers 98 and 99 in conjunction with Controller 6 (Data Entry) to adjust drum tuning, pan, level, and reverb send for each drum sound.

A few other GM instrument manufacturers used the Sound Canvas' sounds as a template to design their devices, but that doesn't mean all modules sound exactly the same. Also, the more you tweak your files to sound good on the Sound Canvas, it's more likely that they won't translate well to other devices.

Specifically, the Bank Select message might be ignored, in which case the specified variation patch will not be called up. This message might even take the device out of GM mode, in which case the entire instrument reconfigures itself with utterly unpredictable results. The extra percussion notes may do nothing, or they may trigger completely different sounds than those you intended, like a lion's roar instead of a triangle.

Effects are not part of the GM document, so manufacturers are free to do them their own way. Unfortunately, this leads to some difficulty. For example, the effects on the Korg 03R/W are structured completely differently than those in the Sound Canvas. Roland's effects sends are set with Controllers 91 and 93; Korg's are adjustable only with SysEx commands. E-mu's Proteus chip set has no effects at all. Preliminary versions of Yamaha's TG100 module respond to some of the same controllers as the Sound Canvas, but it's unclear how similar the responses will be when the final version comes out. The bottom line is: Don't depend on effects because they may not be there.



Korg's 03R/W offers most of the basic synthesis features of the 01/W in a GM module.

MPC OR NOT MPC

There's another can of worms to contend with if your scores are going to be used in an MPC (Multimedia Personal Computer) environment. Although the MPC specification mentions the General MIDI Program and Percussion Maps, it is not GM-compatible. The minimum polyphony for the base MPC spec is six pitched voices (multitimbral on MIDI channels 13 to 15), plus two percussion voices on channel 16, for a total of eight simultaneous notes. An extended MPC MIDI spec is much closer to General MIDI, except that it only uses channels 1 through 10. These schemes accommodate two types of MPC sound modules and cards.

Consequently, an MPC-compatible GM score must be two scores in one: Channels 1 to 10 contain the regular version, while channels 13 to 15 contain a stripped-down version of the material on channels 1 to 9 and channel 16 is a two-voice version of the drum part on channel 10. According to Philip Lui of Music Pen, a company that produces GM and MPC versions of public domain music, "Base MPC arrangements must capture the essence of a piece in four channels [13 to 16]. It's a tough decision, and you have to make your best aesthetic judgement."

What about channels 11 and 12? According to Andy Muson, director of the Music Data division of Passport Designs, "If you really want to use those channels in a General MIDI file to fill out an orchestration, you can do so. But keep in mind that in some situations [i.e., MPC] those parts may not play, so make sure they aren't terribly important."

PREPARING A GM SCORE

Nothing in the Level 1 document dictates how a GM file should be structured, but some guidelines are beginning to emerge from necessity and common sense.

"Don't push machines to the limit of their polyphony," says Muson. "All the synths are supposed to have the same polyphonic capabilities, but they steal voices in different ways, and some get sluggish when you get near the limit. Be careful about durations of notes—if you leave your pinky down too long on a key, even if you can't hear it, you'll eat up voices."

Use as few controllers as you can, and cancel all controllers at the end of each file. Set Sustain and Mod Wheel to 0, Controllers 91 and 93 (if you're using them) to 0, and Pitch Bend to 64 (or 0 if your sequencer deals in positive and negative values). According to the GM document, Volume should be reset to 100, not 127. Rob Scott, who composes for Passport, also advises that you make sure all your sounds' envelopes are finished before you reset the Volume at the end of a sequence, or you may encounter an unwelcome leftover.

Initializing all of these parameters at the *beginning* of every track also is a good idea. The composer of the previously played file may not have initialized the controllers at the end of the file. You also should use the "General MIDI On" command defined in the GM document. This is a six-byte Universal System Exclusive message intended for the beginning of every file to ensure the receiving device is in General MIDI mode.

Pepper your files with lots of labels. Users want to know about instrument names, beginnings of verses and choruses, and other hit points so they can edit or re-orchestrate the music. The Standard MIDI File spec provides no fewer than seven different ways to insert text into a file or track. No two sequencers use the same combination of track names, cue points, markers, lyrics, etc., so include labels and cues in several different formats to make sure they can be read. Make the information as complete as possible. Putting the channel number, patch number, and instrument name at the beginning of each track will endear you to many a confused user.

Be sure that the first notes of each section of a sequence do not start *before* the downbeat of that section. If a Note On occurs even one clock pulse before the beginning of a measure, and the user wants to start playing the file at that measure or move the section that begins there, the pick-up note(s) will be lost.

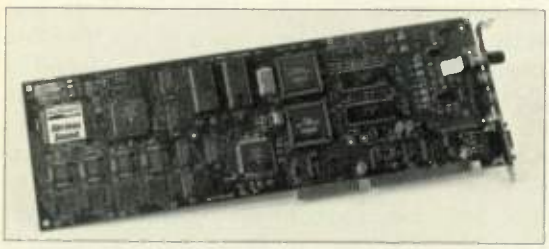
Above all, play your files on as many different GM modules as possible to ensure that they sound acceptable.

Yamaha's TG100 is the latest entry to the GM sound-module marketplace.

According to Gray Fowler, who prepares files for Voyetra, "It's the opposite of what MIDI composers are used to—playing the tune and then tweaking it to sound good on a particular synth. You have to take the player-piano approach; make it so simple that if you play the bass line on a glockenspiel, it still sounds okay."

DECISIONS, DECISIONS

Some GM scoring problems don't have easy solutions. A number of GM practitioners advocate a "setup bar" at the beginning of every sequence to give devices time to receive Program Changes and reset controllers. Although this may help to avoid glitches and small timing errors in the case of slow-responding synths, it creates two serious problems. Looping a sequence smoothly without a break becomes impossible, and there always is a delay after starting a file, which is unacceptable in many situations.



Turtle Beach's MultiSound is a PC-compatible sound card that supports General MIDI.

One compromise is to use a very short, fast setup bar. A time signature of 1/8 at 300 bpm would result in a delay of only a tenth of a second. If there is a one- or two-note pick-up at the beginning of the sequence, make the first bar only as long as the pick-up notes, and use the opportunity to set up programs and controllers on all of the tracks while the pick-up is playing. Make the last measure the same number of notes *shorter* than a full bar, so the sequence can loop smoothly. (Don't forget to remove any extra empty bars at the end of the sequence, so your user doesn't encounter any mysterious pauses when looping.)

Inserting Program Changes in the middle of tracks is another sticky issue. Because you are restricted to fifteen instrumental tracks (or fewer to be MPC-compatible), it is tempting to vary the orchestration with Program Changes. "If you're doing symphonic music," says Jim Romeo of Romeo Music International, a firm specializing in classical and big band sequence files, "and you have five string choirs, each of which must have short attack, long attack, and pizz, that's fifteen channels right there, unless you can change programs as it plays."

But Program Changes can cause some problems for the user. "For one thing," continues Romeo, "Program Changes in the tracks get in the way of editing for people who want to re-orchestrate." Say you want to change a string part to a flute sound, and you change the program at the beginning of the sequence. If there's a change to long-attack strings in the middle of the piece, your flute will suddenly turn back into a string section.

Most professional sequencers have a program "chasing" feature; when you start playing in the middle of a song, the sequencer checks to make sure that the right patch is playing on each track. However, MIDI File playback engines may not be that smart. A user who starts playing a file at a location after a Program Change has occurred might find the wrong instruments playing.

For similar reasons, tempo changes should be used carefully. A gradual accelerando over a whole sequence can create a sense of excitement, but if a user moves or removes sections, he or she ends up with seemingly random shifts in tempo.

Voice prioritization is another important issue. The GM document assumes that voices will be allocated democratically among the different MIDI channels, but that's not always the case, especially in older instruments that are re-programmed for GM compatibility. Notes on channel 10 often get first priority, followed by channel 1 and the rest in ascending order. Unless drums are the most important aspect of a piece, it may be wise to keep percussion tracks relatively simple so they don't steal voices from other sounds. The most complex or important parts should be on channel 1, and less important ones on subsequent channels.

Other file structure decisions must be based on your projected market. For instructional purposes, Romeo often puts the left and right hands of a piano piece or the four parts of a Bach fugue on different tracks, even if they're on the same channel. He also likes to put individual drums on their own tracks, so that users can change the sound of the snare drum if they wish.

Finally, there's the question of Type 0 (single-track, multichannel) versus Type 1 (multitrack) Standard MIDI Files. Type 0 files are a lot easier to use in multimedia and other extra-musical applications, but they provide no way to edit individual parts. Type 1 files allow the user to change orchestrations and other elements. Fortunately, because MIDI Files are small, you often can include two versions on one disk. If disk space is tight, make a judgement call based on the needs of your intended audience.

LIMITATION OR LIBERATION?

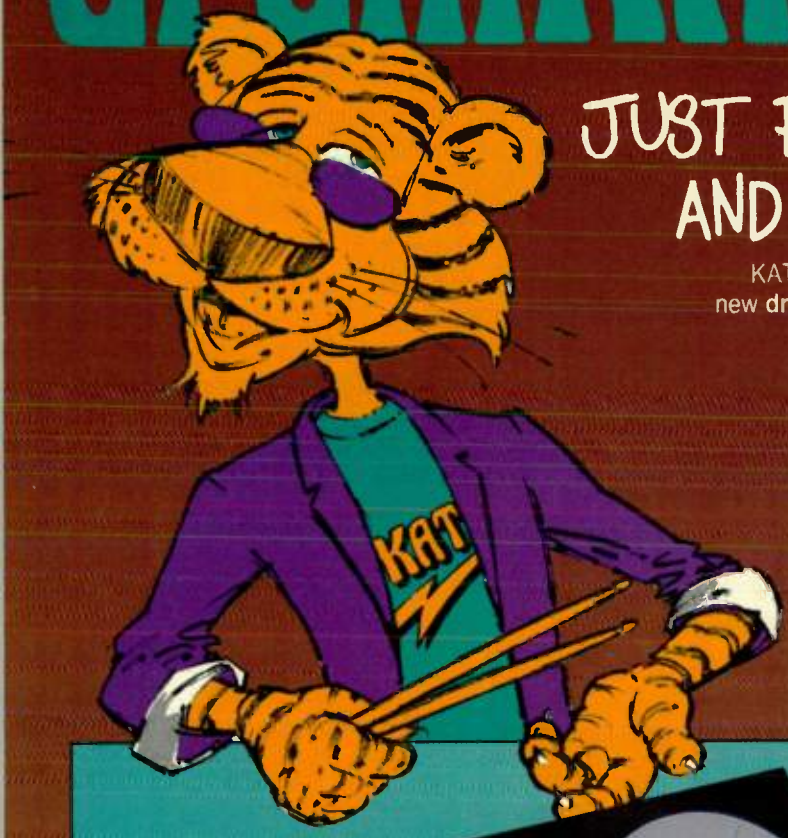
All these warnings might make it seem that writing GM scores involves one compromise after another. But working within such a tight context actually can be a highly creative, even liberating experience. With only half a dozen electric guitar or brass sounds to choose from, you spend a lot less time looking for the right sound and a lot more time making music. I accepted the limitations of GM's sounds far more readily than I thought I would. Once that happened, I found myself composing music faster than ever before, and it was music I was still happy with a week later.

Working in a conventional MIDI studio is like writing for an infinitely large and varied orchestra, but working with General MIDI is like writing for a resident chamber group: You know who your players are and what they can do, and your goal is reduced to getting the best out of them. Although it may not be as totally wild and nouveau as what you can accomplish with a rack of Wavestations and S-770s, the music that today's General MIDI tools can make is pretty darn good. Now it's up to us to demonstrate how good it is to the rest of the world.

(Along with the many people who were quoted in the article, the author wishes to thank Roy Smith at Turtle Beach Softworks and Bryan Lanser at E-mu Systems.)

Paul D. Lehrman *is a composer, author, and teacher. He likes General MIDI. He really, really does.*

drumKAT EZ



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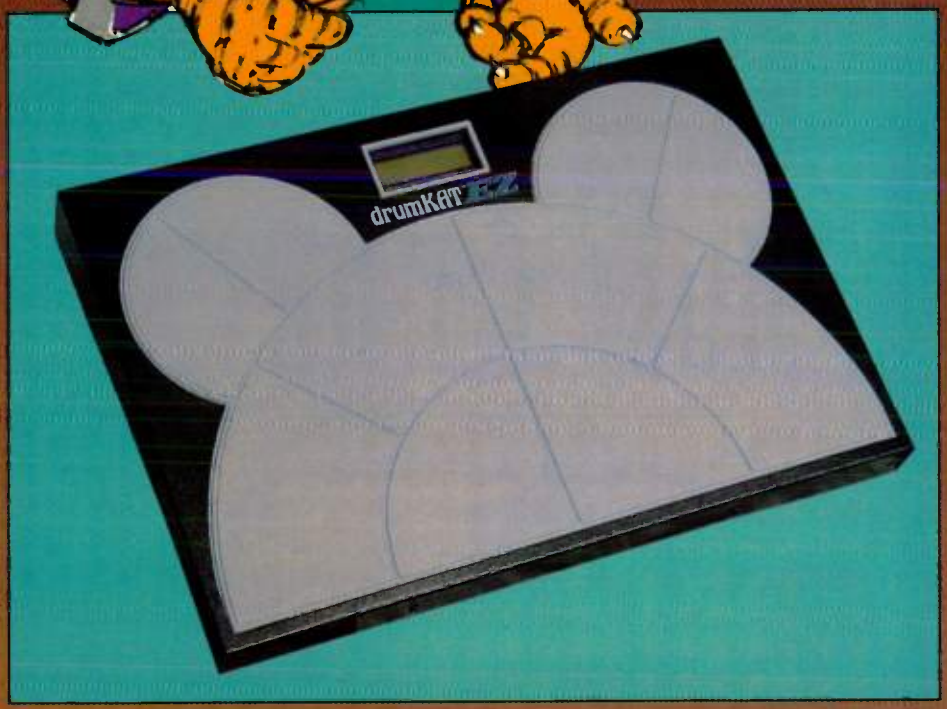

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Live theater productions can now use MIDI Show Control to automate everything from sound effects to hydraulic lifts.

DENNIS IRWIN

The SHOW Must Go On

by Michael Brown

Live theater is unique among the performing arts. In film or video production, the director can yell "Cut!" if something goes wrong. If technical difficulties interfere with a live concert performance, the band can cut the song short and chat with the audience while the sound or lighting engineers work on the problem.

Technical trouble during a live theater performance spells disaster because the actors can't break character or ad lib while the problem is solved. In order to avoid these headaches, theater sets and lighting systems

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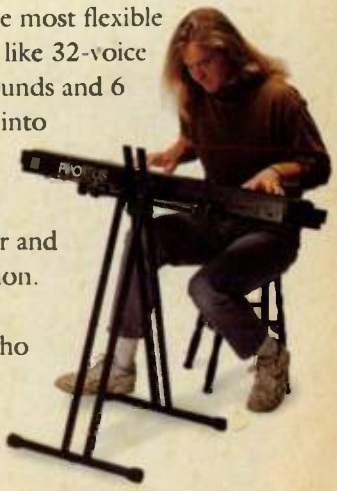

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have remained relatively simple. However, audiences have grown accustomed to big-budget movies with flashy special effects, and theatrical producers are struggling to bring in the paying public.

Among other things, adding flash to productions means placing the various aspects of live theater—lighting, sets, sound, and so on—under computer control. In their quest for an automation scheme, the designers of sound and lighting systems took a lesson from the music industry and embraced MIDI. But the existing MIDI spec doesn't address all of the unique requirements of live theater, so MIDI Show Control (MSC) was born to control the equipment used in live performance, from lighting and hydraulics to fog machines and pyrotechnics. MIDI Show Control can also be used to integrate different subsystems (lighting, rigging, audio, etc.) into one large system.

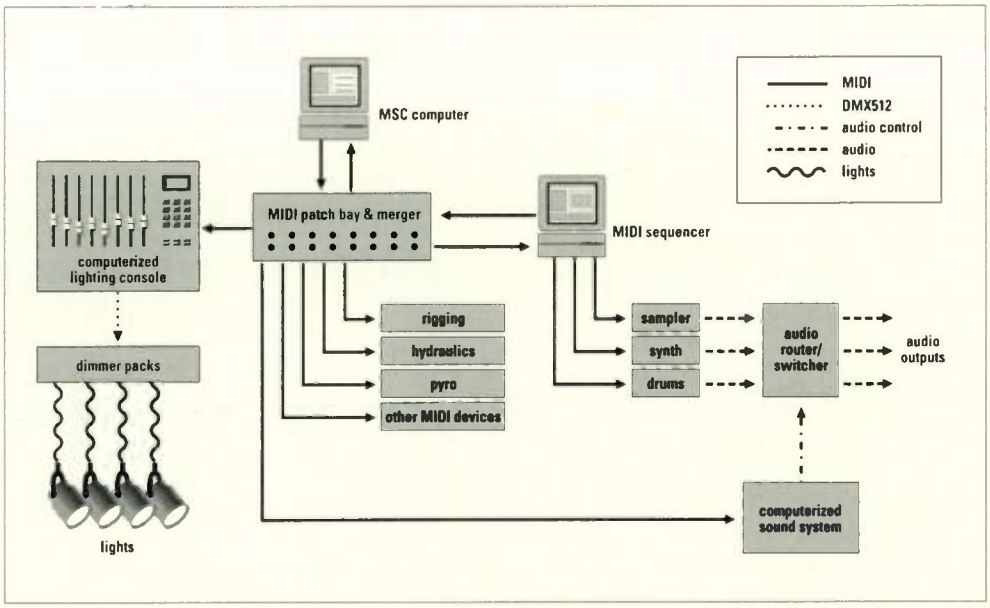


FIG. 1: A simple MSC system includes an MSC computer, MIDI sequencer, computerized lighting and sound systems, MIDI patch bay/merger, and a variety of MIDI devices.

THE MSC PROTOCOL

MSC is an open-ended protocol designed for expansion. It uses Universal Real Time System Exclusive

messages, which means that a single MSC controller can coordinate an entire network of MIDI keyboards and sound modules, computerized lighting and sound systems, automated rigging systems, audio/video equipment, and much more (see **Fig. 1**).

An MSC message is composed of the following segments: Device ID, Command Format, Command, and Data. The Device ID segment identifies the specific device or group of devices addressed by each message. MSC messages can be sent to an individual piece of equipment, a group of equipment (up to fifteen different groups are supported), or all devices connected to the system (a system-wide reset message, for example).

The Command Format identifies the type of command to follow. There are 55 Command Formats defined so far, organized into seven categories plus a global category (see **Table 1**). These formats ensure that devices respond only to appropriate commands. For example, an MSC Sound command is ignored by a fireworks array.

Commands are the message bytes that tell a device to do something. These include simple process-control commands such as Go, Stop, and Resume, as well as commands such as Start Clock and MTC Chase On, which are designed specifically for the Sound Command Format.

A simple MSC message ends there, but the specification also includes a Data segment that allows optional variables to be sent to more complex equipment.

PRACTICAL APPLICATIONS

Considering the complexity of a system that controls everything from MIDI instruments to laser beams and pyrotechnics, it makes sense to use one computer as a central MSC controller and link it to a MIDI sequencer. In **Fig. 1**, one computer running MSC-based stage management software, such as *Stage Manager* for the Amiga from Richmond Sound Design, is linked through MIDI to a second computer running sequencer software. (The MSC computer can also play MIDI sequences directly.) The computerized lighting and sound systems connect to the computers through a MIDI patch bay. Each system is dedicated to controlling a different aspect of the network.

Thanks to the flexibility of MSC, each device on the network can be a slave or a controller (and even swap control back and forth). This is one of the most powerful aspects of the protocol. The MSC computer in **Fig. 1** could send a Start command to the sequencer, which starts the song by sending messages to its own network of instruments and devices.

Also, it is possible for the MSC computer to send an MSC message to a MIDI device connected to the sequencer. The MIDI device is then under the direct control of the MSC computer, even though there is no direct connection between the two. This technique can be used to trigger a sampler to play a sound effect when the sampler is not being used by the sequencer.

Because MSC messages conform to the Universal Real Time System Exclusive spec, any sequencer with SysEx capabilities can send an MSC message. However, the MSC standard is so new that there aren't any sequencers on the

TABLE 1

NO.	COMMAND FORMATS
00	Reserved for extensions
01	**LIGHTING**
02	Moving Lights
03	Color Changers
04	Strobes
05	Lasers
06	Chasers
10	**SOUND**
11	Music
12	CD Players
13	EPROM Playback
14	Audio Tape Machines
15	Intercoms
16	Amplifiers
17	Audio Effects Devices
18	Equalizers
20	**MACHINERY**
21	Rigging
22	Flys
23	Lifts
24	Turntables
25	Trusses
26	Robots
27	Animation
28	Floats
29	Breakaways
2A	Barges
30	**VIDEO**
31	Video Tape Machines
32	Video Cassette Machines
33	Video Disc Players
34	Video Switchers
35	Video Effects
36	Video Character Generation
37	Video Still Store
38	Video Monitors
40	**PROJECTION**
41	Film Projectors
42	Slide Projectors
43	Video Projectors
44	Dissolvers
45	Shutter Controls
50	**PROCESS CONTROL**
51	Hydraulic Oil
52	H_2O
53	CO_2
54	Compressed Air
55	Natural Gas
56	Fog
57	Smoke
58	Cracked Haze
60	**PYRO**
61	Fireworks
62	Explosions
63	Flame
64	Smoke Pots
7F	**ALL TYPES**

market with built-in MSC messages. For now, MSC messages must be specified in hexadecimal format.

True to its roots as a theater automation system, MSC is cue-based. It is designed for performances that constantly switch between manual and automatic control. Fortunately, it is unnecessary for the entire network to run from a single, contiguous stream of time code. It even is possible for different elements of the system to use overlapping time-code sequences, as long as only one clock signal is sent to the MSC computer at a time. Each cue can also include multiple MSC messages, and multiple cue lists can be independent from one another.

In **Fig. 1**, the performance begins under the control of the MSC computer. The first cue sends an MSC message to a computerized lighting console to dim the house lights. Most computerized lighting consoles already have MIDI interfaces built into them (see **Fig. 2**), but the dimmer packs between the lighting console and the lights do not. The lighting console con-

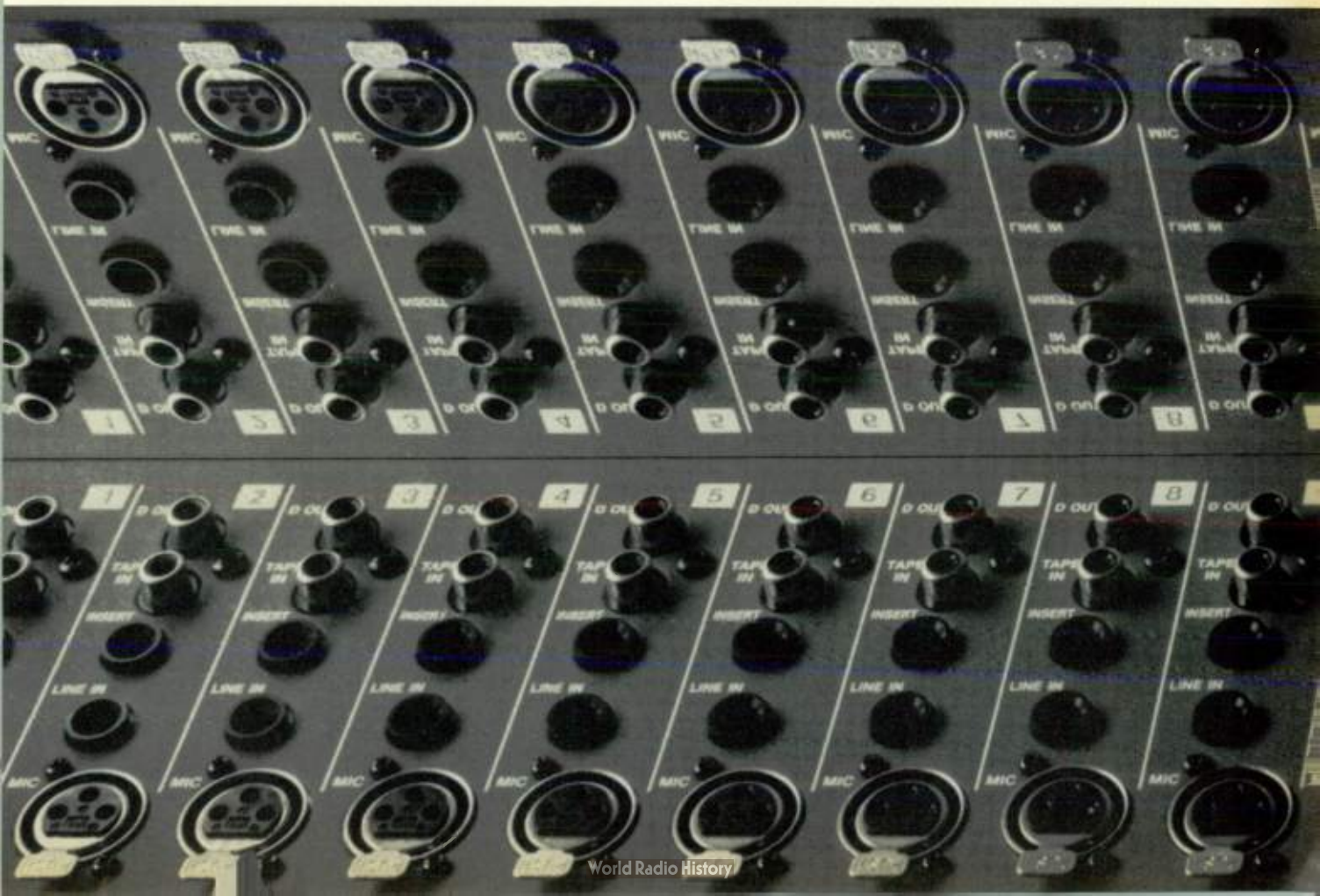
verts the MSC message into another protocol, DMX512, which the dimmer packs do understand. (DMX512 stands for Digital Multiplex for 512 dimmers.)

The second cue sends two MSC messages. The first message, MTC Chase On, is sent from the MSC computer to itself, preparing it to follow MIDI Time Code from the sequencer. The second message triggers the sequencer to start playing. The sequencer sends Note On, Note Off, and other messages to the synthesizers, samplers, drum machines, and other devices while it transmits MIDI Time Code back to the MSC computer. Slaved to the sequencer's clock, the MSC computer sends MSC messages to the other devices on the network, ensuring that all events in that segment of the show are synchronized to the music from the sequencer.

When the sequencer stops playing, one of two events can occur. In one case, the sequencer sends the MSC message MTC Chase Off, which tells the MSC computer to revert to its internal clock and go on to the next cue in the list. In the second case, when the MSC computer stops receiving MIDI Time Code from the sequencer, it simply stops its clock and waits for the human operator to trigger the next cue.

FIG. 2: ETC's Expression is a MIDI-controllable lighting console that lets you control up to 1000 dimmers.

Though the whole scenario described above can be implemented in a single cue list, with multiple cue lists you have the flexibility of controlling other



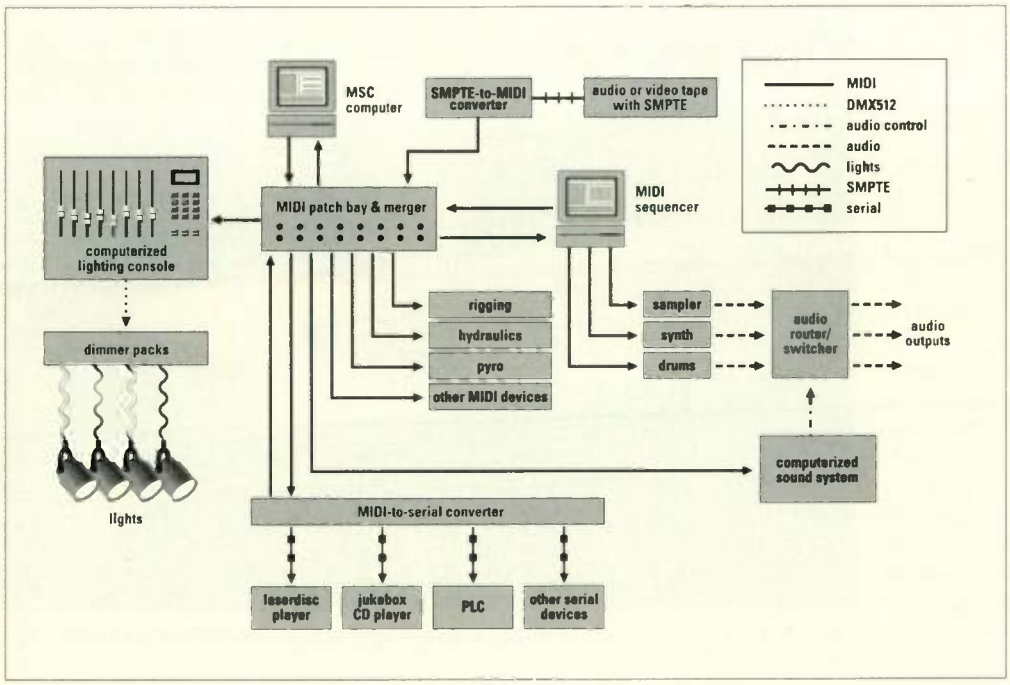


FIG. 3: A complex MSC system might include a SMPTE-to-MTC converter, MIDI-to-Serial converter, and a variety of MIDI and serial devices.

events and processes completely independent of what's happening in the sequencer.

The external clock controlling the MSC computer can also be SMPTE time code from a striped audio or video tape by way of a SMPTE-to-MTC converter. In this case, the sequencer can be slaved to the same external clock (see Fig. 3).

SERIAL MSC

A few MSC devices are scheduled to be on the market soon, including a CD player from Philips and the NEQ Network EQ from Rane. Also, many lighting companies such as Avab, ETC, High End Systems, and Pan Command are working to implement MSC in their products. CELCO offers an MSC option for their Navigator and Pathfinder lighting systems. Allen & Heath is implementing MSC in their GS3V mixer automation option for the GS3 compact consoles.

But most other equipment, such as industrial-grade audio tape decks, video tape players, and LaserDisc players, can

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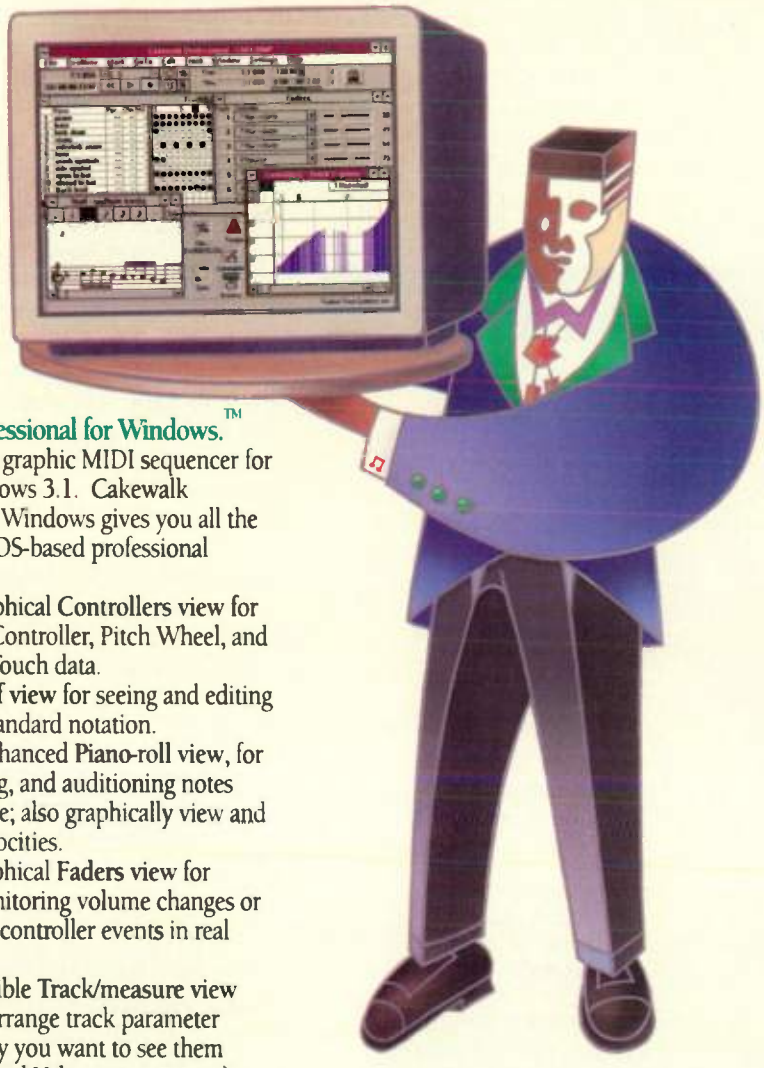

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be controlled only through RS-232 serial ports. To control such equipment, Richmond Sound Design has developed the MTS-232, a bidirectional MIDI-to-Serial protocol translator. The MTS-232 includes MIDI In, Out, and Thru on one side and four RS-232 ports on the other (RS-422 or RS-485 ports are optional). MSC messages are sent to the translator, which translates the messages and sends them on to the serial devices (see Fig. 3). Messages from the serial devices also can be sent back through the translator to the MSC computer. Up to 128 MTS-232s can be used in a single system.

One particularly useful device that can communicate serially is a Programmable Logic Controller (PLC). This custom-built system is used for highly specialized applications. A PLC typically is equipped with switches and sensors; when the switches are closed or the sensors are tripped, specified events occur. Sophisticated theme-park rides often employ PLCs to trigger events (music, robots, etc.) when a car riding on a track arrives at a certain point. In an MSC environment, a PLC might trigger a cue on the MSC computer or vice versa.

THE FUTURE

The future of MSC depends on how many theaters install MSC systems and how many manufacturers include MIDI interfaces and MSC protocols in their equipment. Much of the equipment now in use, particularly lighting and sound systems, already supports MIDI because customers have demanded it. Most of this equipment should be able to add MSC with simple software upgrades. Equipment that does not currently support MIDI will require some kind of MIDI retrofit.

Manufacturers have nothing to lose by supporting MSC, but they have much to gain. The explosive growth that musical instrument manufacturers experienced after embracing the original MIDI spec should provide encouragement. Of course, those who have the most to gain are the professionals who use the equipment and the audiences who are dazzled by the enhanced effects that technology now makes possible.

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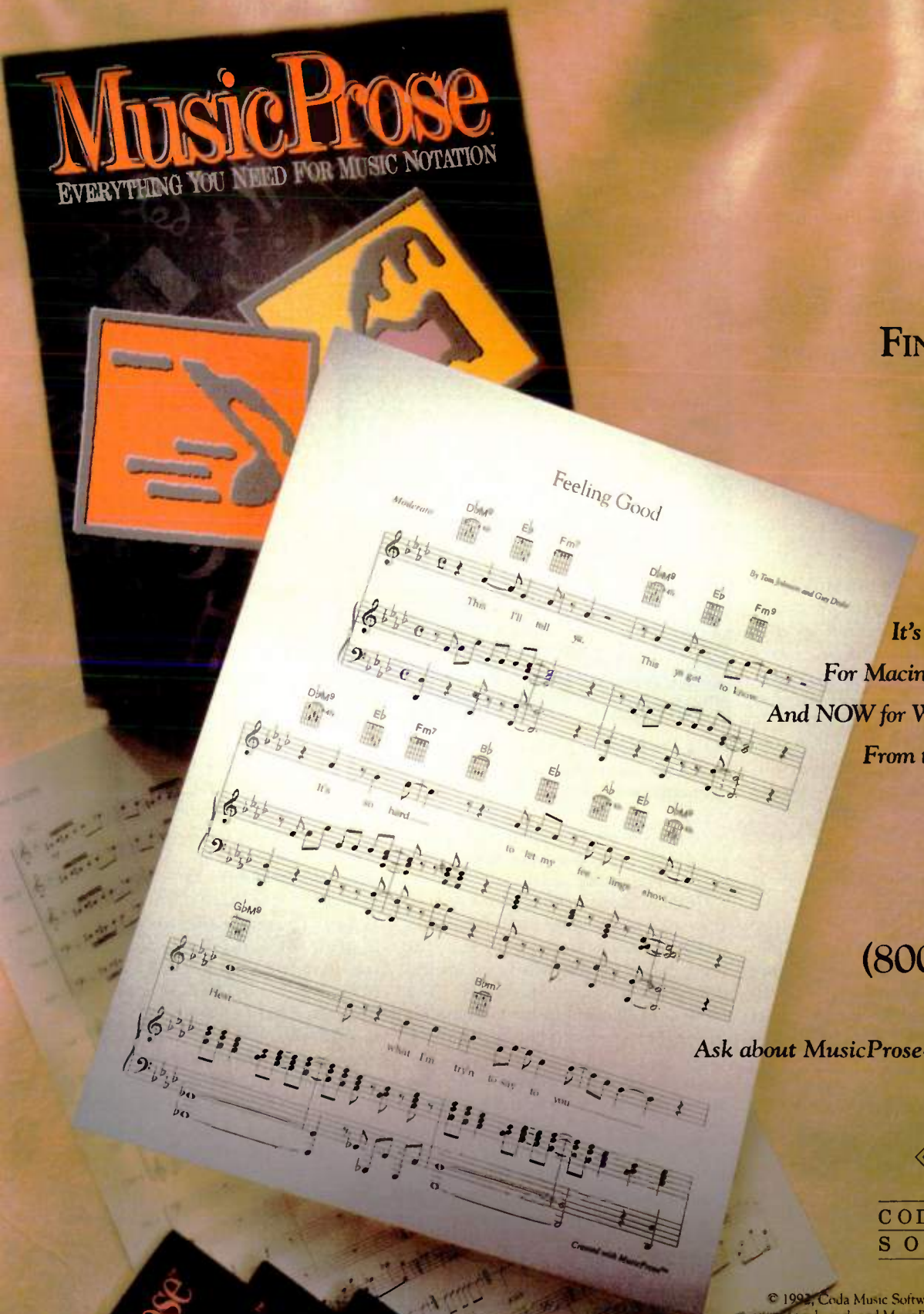
(Thanks to Charlie Richmond of Richmond Sound Design, who co-authored the MSC protocol and serves as Chair of the MSC Working Group.)

Michael Brown *is a freelance journalist covering the multimedia and video production industries. He is the author of* Desktop Video Production, *published by TAB/Windcrest Books.*

THE RIGHT PLACE TO START



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Digital Audio Storage

By David (Rudy) Trubitt

You need the right storage media to get the most from your hard-disk recording system.

FIG. 1: The Pinnacle Micro PMO-650 magneto-optical drive offers faster performance for digital audio applications than most competing drives.

Computer musicians are a fortunate lot. We have access to technology that our relatively small market would never have developed on its own. The huge group of general-purpose computer users with needs similar to ours supports the ongoing development of great toys. But every now and then, our requirements diverge from those of the herd. During these moments of vulnerability we must stay alert, lest we get bogged down by computer woes that distract us from working on music.

Mass storage is an excellent example. The computer industry as a whole is begging for larger, faster, and cheaper storage. This is great news, as we all know how much disk space digital audio uses. Unfortunately, digital audio makes an unusual demand on storage media; during recording, the stream of data is unrelenting, and your disk must to keep up the pace indefinitely.

TURN UP THE HEAT

"Most mass storage is designed and tested for burst performance," says Mark Doenges of Spectral Synthesis, a PC-based digital audio developer. "It doesn't get tested to see if it can sustain those burst rates for 30 minutes." Often it can't; heat-related expansion alters the precise tolerances of high-capacity drive mechanisms.

"If the disk material expands or contracts due to tilt or thermal difference, you might not be tracking correctly any more," says Verner Glinka of optical drive manufacturer MaxOptix. "You need a mechanism to compensate for thermal expansion." This mechanism, called thermal calibration, ensures that the drive head stays centered over the appropriate track. In turn, this insures data integrity—the top priority for general-purpose computer users.

However, an acceptable solution for the masses creates a special problem for us. "Thermal calibration can interrupt read or write access," says Digidesign's Michael Abowd. "If the drive's buffer is not large enough to spool during this adjustment, an audio drop-out will occur." This means an audible glitch could ruin a mix pass, or worse, spoil that perfect vocal take you just recorded.

Therefore, choosing an appropriate drive isn't as simple as ordering the biggest one you can afford from the back of a magazine. First, call the company who wrote your digital audio software. They'll probably suggest that you buy a drive from them. Although they typically charge more than a mail-order house, it's not an unreasonable request. Hardware-related questions are a major part of these companies' technical support burden. If they don't sell you the drive but you still need their help to make it work...well, you can see their point. By selling you both software *and* hardware, they are making a promise that the entire system will work together. If you're earning money with your setup, down time will cost you more than the money you saved buying mail order.

ON THE CHEAP

But what if you have more time than money? The temptation to save a buck is great, but be careful. Drive models, specifications, and ROM revisions change constantly. "Lists of appropriate drives are hard to keep up to date," says Abowd. "We recommend you buy from a reputable retailer who will take a return if it doesn't work. Find a dealer who knows digital audio and can work with you." Another option is a consultant with experience in the field.

If you want to test a drive, try this: Using the highest sampling rate, record the maximum number of simultaneous tracks non-stop until the disk is full. Then listen back for any clicks, pops, or other discontinuities. According to Abowd, you should also be prepared

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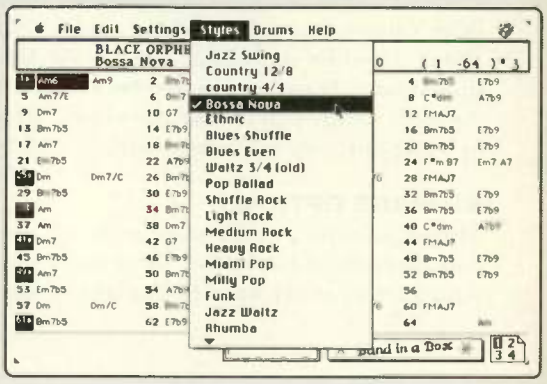

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to "take the personality from your personal computer" by removing all nonessential desk accessories, TSR programs, INITs, and the like. These software extras take valuable memory and processor attention.

Next, how much disk space do you need? If you plan on sequencing enough material for a full CD, you'll be comfortable with a gigabyte (which provides ample space for undos). However, these giga-drives are among the biggest and most expensive hard disks available. Simon Berry of DynaTek, a company specializing in rack-mounted drive assemblies, offers some advice. "I try to configure people with the smallest size that will do the job, as there's always changes in size and availability. I also let them know that they should have 20 percent headroom on the hard drive—when disks are close to being full, they act pretty weird."

STORAGE OPTIONS

Although most people start with a good-sized fixed hard drive, there are a number of other options available for your second unit. If you need to work on many small projects and/or transport sound data between studios, consider a removable cartridge drive, such as the well-known SyQuest 40 or 80 MB removable hard disk. Some SyQuest drives have a reputation for crashing, though, so *caveat emptor.*

Removable drives with larger capacities also are available, including magneto-optical (MO) storage. A 5.25-inch MO disk holds 325 MB on each side. The disk is flipped manually for a full 650 MB. (MO is an important topic; see "Computer Musician" in the November 1990 **EM**.)

There are several different MO formats, and not all are compatible. An ISO standard exists for 5.25-inch, 650 MB disks, but it has loopholes. In other words, ISO compatibility does not guarantee a disk will work with different drives and driver software.

One potential problem is the rotational speed of the disk. Faster rotation means better drive performance, but media and drives with different speeds are not always compatible. Also, some companies do not adhere to the ISO format. For example, MaxOptix's Tahiti II drive can read and write ISO standard disks, but it also has a more dense format that raises the capacity to about 1 GB. The ISO group is considering double and triple density formats that would raise their capacities further, but the details of the revised spec are far from complete.

A new crop of lower-cost 128 MB 3.5-inch MO drives is available, as well (256 MB models apparently are on the horizon). These drives haven't been thoroughly tested with digital audio applications, but initial reports are promising. As with any other type of storage technology, make sure an MO drive is compatible with your software and hardware before you buy.

THE NEED FOR SPEED

Historically, the performance of MO drives has lagged behind that of conventional hard disks, mostly because writing data to an MO drive requires two or three passes: one to erase what was there before, another to write

something new, and an optional third for verification. You can record stereo sound files onto an MO drive, but operations such as normalization that require a great deal of disk access are noticeably slower. The playback performance of MO drives is somewhat closer to hard-disk performance because only one pass is required to read the data.

MO is very resilient to environmental hazards that threaten conventional media, such as dust, mechanical shock, and stray magnetic fields. "I've only fried one MO in six months," says Sound Tools user Mark Wlodarkiewicz, a freelance film sound editor at the Saul Zantz Co. film center in Berkeley, California. "The room had an incredible amount of static. I was putting the disk in the drive and there was this crackle. *Norton Utilities* brought it back, but I eventually had to reformat it, although I'm still using the same disk."

MO excels as a transport medium, allowing users to work on the same project at several sites. "MO is really going to change the way we work," adds Wlodarkiewicz. "We couldn't have done these types of projects three years ago."

One of the manufacturers trying to address digital audio's demands is Pinnacle Micro. Their new PMO-650 5.25-inch MO drive exceeds previous MO performance (see **Fig. 1**) by using a fast internal processor, spinning the disk at high speed (3,600 rpm vs. 2,400 rpm on most drives), offering a 4 MB RAM buffer, and utilizing a lighter split-optics head design. Besides moving faster, this head assembly performs a write-verify during the same rotation as the write. The drive is said to be compatible with lower-rpm media, although performance is reduced.

Many users and developers have high hopes for high-speed MO. At press time, the $3,995 PMO-650 had just started shipping, and initial reports were encouraging. Emil Rizko of DAWN developer Doremi Labs called the drive "the fastest we've tried so far." Sam Ward of Elephant Music has been a major supplier of Pinnacle MO products to the music industry, providing drives and custom SCSI cabling to numerous L.A. facilities and musicians. At press time he had just run initial tests with the PMO-650 in his studio. "I'm recording two tracks in real time at blazing speed with Sound Tools," says Ward, "and I'm sure we'll get it working with Pro Tools." By the time you read this, there should be plenty of hands-on reports about the unit.

Ward also has configured MO drives with a variety of samplers, and he points out an advantage for those who have both. "One big hard drive must be formatted for either the sampler or the Mac," says Ward. "When you buy a removable optical drive, you've got the equivalent of all these little partitions that can be in different formats." By sharing the same drive mechanism for your Mac and sampler(s), you also share the cost, making the MO option more attractive.

BUY THE RIGHT DRIVE

Buying the right drive is not easy. There's no substitute for proper research and first-hand advice from those who have gone before you; make some phone calls early in the shopping process. And remember that your options will continue to change. "Things are moving along pretty quickly," says WaveFrame's Gus Skinas. "The usefulness of these systems depends on advancements in storage technology. We're all waiting for better, faster technology, and we're all ready to consider the alternatives that might pop up."

Even after writing this article, **David (Rudy) Trubitt** *isn't sure which drive to buy for his hard-disk recording system.*

REFERENCES

"Computer Musician: The Story of SCSI" June 1991 **EM**
"Computer Musician: An Optical Disk Primer" November 1990 **EM**
"Storage Buyer's Guide" July 1992 *Mac User* (Also of interest to non-Mac users.)

MANUFACTURERS

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Drum Pads and Controllers

By Scott Wilkinson

Drummers join the MIDI band without leaving the throne.

You've probably heard some variation of the old joke by now: "The band has three musicians and a drummer." But despite their much-maligned reputation, drummers are musicians in every sense of the word. Unfortunately, they rarely get to explore the realms of melody or harmony; their gig's in the rhythm department.

Although it was created to connect keyboards, MIDI also offers drummers the opportunity to control synthesizers and samplers, freeing them to play melodies and harmonies. MIDI drum controllers expand the drummer's horizons to include all aspects of music-making and bring them into the computer age of sequencing, sampling, and synthesis. (If you don't already have a basic understanding of MIDI, check out "From The Top: What Is MIDI, Anyway?" in the January 1991 **EM**.)

ELECTRONIC PADS

MIDI drum systems perform the same function as MIDI keyboards: Striking a pad sends a Note On message to a MIDI sound-making device. A typical drum system consists of three basic components: trigger pads, a trigger-to-MIDI converter, and one or more sound sources.

MIDI drum pads resemble rubber practice pads. Underneath the rubber surface is a sensor that detects when the pad is hit and generates an electrical voltage, with an amplitude corresponding to the strength of the hit.

There are two types of sensors used in MIDI drum pads: *piezo triggers* and *force-sensing resistors* (FSRs). Piezo triggers are about the diameter of a quarter and are glued to the underside of the rubber in the middle of the pad (see **Fig. 1**). They get their name from the *piezoelectric effect*, in which a quartz crystal under sudden compression generates an electrical voltage. The harder the hit, the greater the voltage.

Force-sensing resistors consist of two pieces of plastic film that are coated with electrically conductive ink. Like piezo triggers, the harder they are hit, the more voltage they generate. FSRs are more sensitive than piezo triggers and generate a continuous voltage that changes with the pressure. This lets you trigger the pad with varying force; the resulting voltage differences can be used to control different parameters of the sound. (For more on force-sensing resistors, see "Fun Under Pressure" in the September 1991 issue.)

TRIGGER-TO-MIDI CONVERTERS

When you hit a pad or acoustic drum sensor, it generates a voltage. But these voltages must be changed into MIDI note messages to get sound from your MIDI sound source. So the voltage from each sensor, called the trigger signal, is sent to its own input on a trigger-to-MIDI converter (see **Fig. 2**). The converter sends MIDI messages to one or more sound sources, which respond by playing the specified notes. Any MIDI sound source will work, allowing drummers to play melodies and harmonies with synths and samplers.

When setting up the converter, you assign specific MIDI note numbers to each trigger input. The converter uses these instructions to determine which MIDI notes to send when signals arrive at the trigger inputs. When you strike a pad, the converter measures the voltage of the incoming trigger signal and

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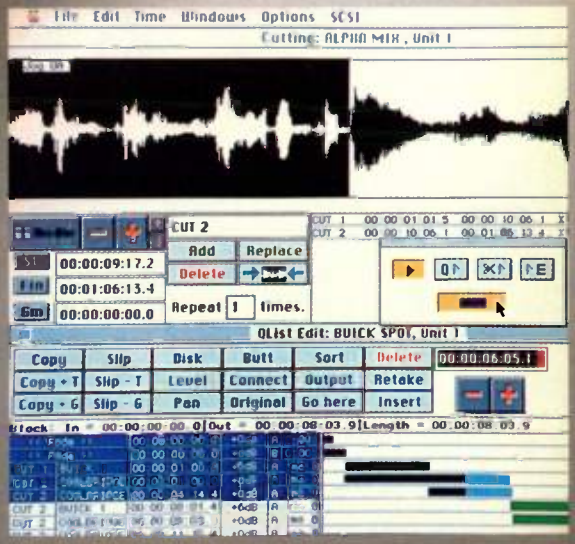

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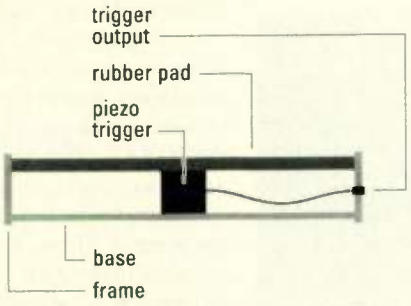

FIG. 1: A piezo trigger is mounted beneath a rubber pad and connected to the trigger output. When the pad is hit, the trigger generates a voltage that is sent from the trigger output to a trigger-to-MIDI converter.

sends the appropriate MIDI Note On message with a Velocity value. As the strength of the hit increases, so do the voltage and the corresponding Velocity value. Some converters also send MIDI Aftertouch or Mod Wheel messages in response to varying pressure on a pad with an FSR sensor.

Unlike keyboard players, drummers can't sustain a note by holding down a key; they must accept the fixed, rapid decay of virtually all percussive sounds. Using a trigger-to-MIDI converter, however, drummers can play sounds that don't decay until a Note Off message is received. In order to avoid sustaining notes indefinitely, most converters include a *gate time* setting. This function automatically sends a Note Off message to the triggered source after a specified period of time.

Some pads have distinct areas that send different voltages, which you can route to separate inputs on the converter to create different notes. For example, the pad itself might trigger a snare drum sound, while its rim triggers a rim shot.

More sophisticated trigger-to-MIDI converters can send different notes depending on the strength of the hit (velocity). For example, hitting the pad softly might play a brushed snare sound, while hitting it harder plays a sharp, sticked snare sound. This is called *velocity switching*. A related feature is *velocity mixing* or *adding*, in which harder hits add different notes to a soft base note. Velocity switching and mixing also can be applied to MIDI channels: A hard hit sends the same MIDI note message as a soft hit, but the note is sent on a different channel. Using this feature, a soft hit could play a flute sound on one sound module on channel 1, while a hard hit adds or switches to a trumpet sound on channel 2.

DRUM CONTROLLERS

There are three basic types of drum controllers: integrated controllers, individual pads, and acoustic drum triggers. Integrated controllers include

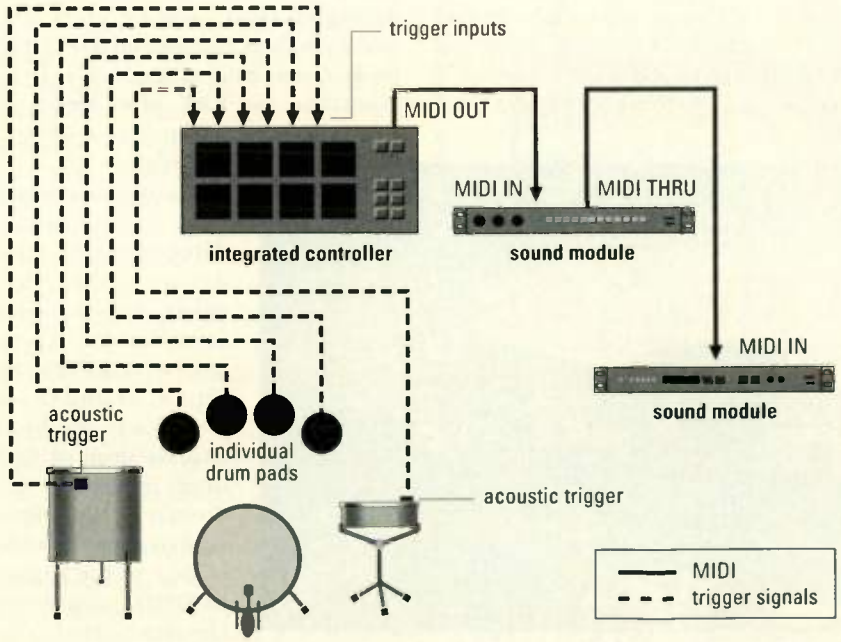

FIG. 2: Individual pads and acoustic triggers connect to the trigger inputs of an integrated controller, which sends MIDI messages to a MIDI sound module.

Tracking Guitar

By Michael Molenda

Producing astonishing guitar sounds requires getting in touch with your heart, your brain, and your microphone.

GORDON STUDER

A few years ago, another music magazine (I'm not telling which one) published an article on "recording tips." The author gave specific instructions, right down to the equalization settings, for achieving great guitar, bass, and drum sounds. Call me irresponsible, but I tore the magazine into confetti and torched the sucker. I detest simple, step-by-step tutorials that reduce the pursuit of a creative discipline to a no-brainer. (Hey, professional audio engineering now is easier than programming your VCR!)

Recording great sounds is *not* as easy as 1-2-3. Getting magnificent guitar noises on tape requires good ears, ingenuity, and the ability to concentrate on minute nuances of sound. Technical manuals sometimes forget that audio engineering is an art form of calculated anarchy with few rules and no limits. This freedom drives recording engineers to produce sounds that are clearer, more evocative, and weirder than the existing sonic palette. But you can kiss these discoveries goodbye if you let a book tell you how to tweak a guitar sound.

So here's the deal: This article won't chart the EQ slope of Eric Clapton's lead tone, expose The Edge's delay parameters, or measure the distance from the amp of a "proper" room mic. We'll toss out some concepts behind professional guitar tracking and let you run with them. The prime directive is to trust your ears. Happy hunting.

THE SOURCE

Microphones are not magic wands. Inspired miking of a poor guitar or guitar/amp combination only serves to record a bad sound exceptionally well. Too many musician/engineers, seduced by the methodology of recording—mic selection, mic placement, gain stages, equalization, and signal processing—forget to scrutinize *what* is being recorded. Like Humpty Dumpty, all the technological wonders in the audio kingdom can't save a vile source sound.

For example, if you record an acoustic guitar in a bathroom (often the premier "isolation booth" of the home studio), make sure that sympathetic sound reflections don't add an unwanted metallic or boomy quality. If the result is less-than-beautiful, drape a few blankets around (as a "quick fix" for sound absorption) or seek a more complementary recording environment.

Room acoustics are not the only sonic booby traps awaiting the recordist. Be sure to check for anomalies haunting the guitar itself: fret buzzes, dead strings, poor intonation, and so on. The easiest way to "fix" a crummy guitar is to beg, borrow, or steal a new one. However, if you're stuck with a sonic dysfunction, remedies are available.

Lifeless strings (as well as a player's uneven dynamics) can be punched up by compressing the guitar during recording. Simply put, a compressor raises the level of weak signals to effect an overall smoother sound. In this application, tweak the compression parameters until the strings sound tight and even. You'll also have to adjust the EQ on the board to compensate for increased bass response. (The relative level of low frequencies often increases when a signal is compressed.) It doesn't hurt to add a little sparkle by boosting the midrange; just take care not to increase audible hiss by overdoing it.

Thin-timbred acoustic guitars with annoying fret buzzes often can be tamed by employing a de-esser. This

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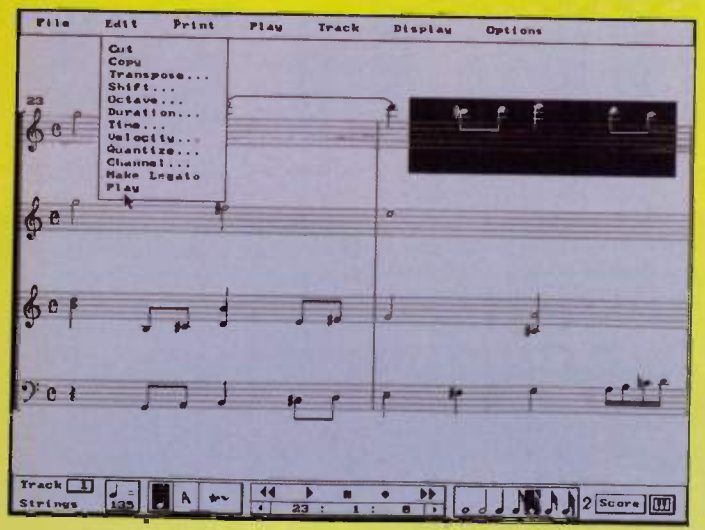

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device, usually employed to diminish sibilant vocals, sometimes can mute fret sizzles enough to allow passable tracking. Intonation problems are tough calls. You can attempt subtle mixtures of chorus and/or pitch shifting with the fundamental sound, but the result seldom sounds natural. Adding modulation to smear tonalities works better with electric guitars, because massive signal processing often is a major component of the sound.

Speaking of electric guitars, adding an amplifier to the source sound equation can be a nightmare. If audible hiss and hum are major problems, try recording with a noise gate in line. Noise gates have saved more "dirty" tracks than I can count. Take care to set the threshold so it shuts down noise when the guitarist is not playing, but isn't so eager that it cuts out softer dynamic passages. For industrial strength hiss, use a single-ended noise reduction device (such as the dbx 563 Silencer or Rocktron's Hush) in addition to a noise gate.

PLACE SETTINGS

Zealots often discuss mic placement as if it were the holy grail of sound recording. They're absolutely right. The relatively simple procedure of positioning a microphone where it "hears" the best sound separates great engineers from audio dilettantes.

Good mic placement requires cognitive hearing. The trick is to visualize yourself as a microphone, using your ears to approximate what the transducer will record on tape. The closer you get to your idealized sound through mic placement, the less you'll rely on equalization and signal processing. The result is a cleaner signal with maximum impact.

Miking acoustic guitars. The dominant tonality of an acoustic guitar usually is found approximately six inches over the soundhole. Brighter, more articulated timbres often appear closer to the bridge and along the fretboard. A single condenser microphone, such as an AKG C414 or Sony C48, often does a great job reproducing the shimmering timbres of a fine guitar. Use your ears to determine the best mic position. Avoid placing the mic directly over the soundhole because the resonance can muddy bass tones.

A stereo effect can be recorded by positioning two mics to reproduce different tonalities from a single guitar. The classic position is a "V" pattern, where one mic is pointed toward the bridge and another toward the soundhole. I employ condenser mics for this application, but I don't use a matched set of identical models. I've found the tonal variance (and therefore the stereo effect) is intensified when different mics are used. I often mismatch an AKG C414 with an Audio-Technica AT4033 or Sony ECM33F.

If you desire a more spacious sound, set up a condenser mic on a boom stand and position it far forward and above the guitarist. This room

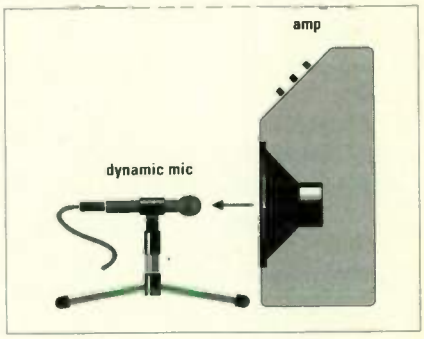
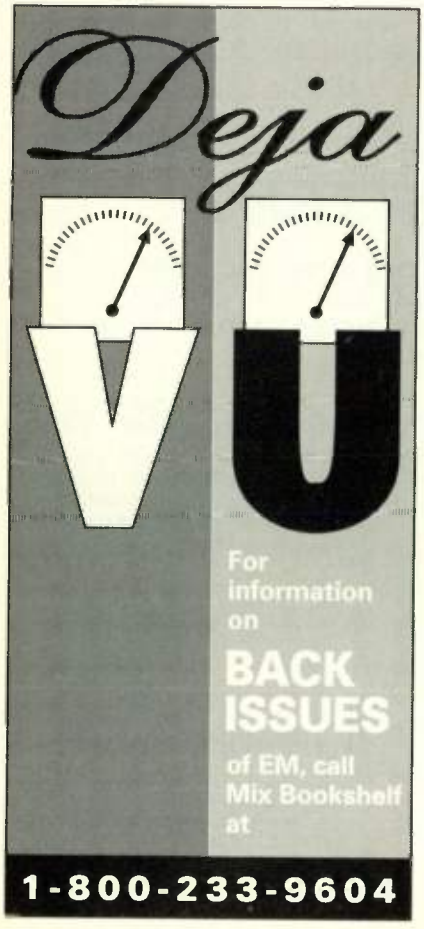


FIG. 1: The classic combo of a Shure SM57 (dynamic mic) and a Marshall or Fender amp is hard to beat.



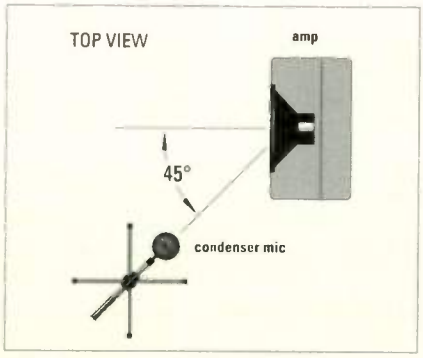


FIG. 2: Off-axis mic positions favor bright, bell-like tones.

perspective can be recorded onto a separate track for a hard stereo effect (close mic sound left/dreamy room sound right), or mixed into the primary acoustic guitar sound.

I enjoy the sound of naked acoustic guitars, so I don't often dress them up with signal processing. However, I can't resist stacking unison tracks to construct an orchestra of strumming guitars. (Thank you, Phil Spector.) Obviously, the more tape (or digital) tracks you have at your disposal, the more intense this effect becomes. I typically submix six to eight tracks down to stereo, although in a tremendous lapse of reason I once submixed fifteen tracks to mono. Compression is always employed to tame wayward dynamics for a harmonious blend.

Miking electric guitars. A single dynamic mic pointed dead center at a guitar speaker is the classic rock and blues position (see **Fig. 1**). Practically the entire history of rock guitar sounds is written in the space between a Shure SM57 microphone and a Marshall or Fender amplifier. This position offers an accurate representation of the sound of the guitar and amp, because the close proximity of the mic to the speaker eliminates much of the personality of the room.

The re-emergence of funk players in the mid-1980s popularized an interesting turn on the single mic technique. The off-axis position (see **Fig. 2**) accentuates the jewel-like tones of a clean guitar and delivers a sharp, aggressive timbre. Condenser microphones work best for off-axis applications because they intensify the steely timbre.

Of course, the sky is the limit for some engineers. I've witnessed sessions where both speakers of a 2 × 12-inch, open-back cabinet were close-miked front *and* back, stereo room mics were positioned behind and in front of the amp, and stereo mics were mounted on the ceiling. The classic room mic set-up (see **Fig. 3**) is much simpler and serves the same purpose of mixing an acoustic environment with the source sound.

ALTERNATIVES

The bell is tolling for the guitar amp. Speaker simulators, amp emulators, and rack-mount preamps are sending our trusty Marshalls and Fenders down the path of the typewriter. I can already see the day when old-timers and retro wackos lug around combo amps with the nostalgic fervor of a World War II veteran stuffed into 50-year-old olive drabs.

I don't believe these emulating upstarts sound as wonderful as the real thing yet, but it's difficult to renounce their practicality. Electric guitars are noisy by nature, and if your home studio is an apartment, a live amp is a quick ticket to eviction. A good amp or speaker simulator makes it possible to record "loud" guitar sounds direct: no microphones, no 120 dB concussion zones, and you can monitor at neighbor-friendly volumes (or over headphones). In addition, setup and sound-tailoring time is slashed, because these units are designed to plug in and play.

My personal favorite is Marshall's SE100 (reviewed in the November 1991 **EM**) because it is a speaker simulator that lets me use my own amp. All my familiar settings are available, but I don't have to hassle with microphones, because the SE100 (see **Fig. 4**) routes the amp signal directly to the mixer.

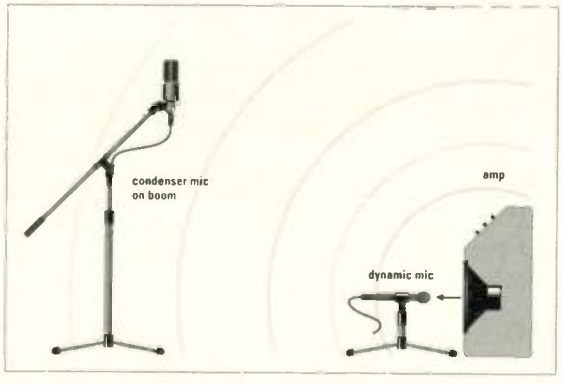


FIG. 3: Expansive guitar sounds are gained by positioning a condenser mic to record room tone.

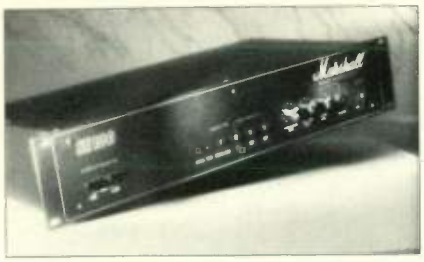


FIG. 4: Marshall SE100 Speaker Emulator.

Once the speaker output of an amp head is plugged into the SE100, the signal is brought down to line level and impedance is tracked like a real loudspeaker. The result is a direct sound that emulates the timbre of your amp close-miked through a quality microphone.

On the emulation front, Tech 21's versatile SansAmp (see review in the August 1991 **EM**) is a favorite of home recordists and project studio owners. I wasn't impressed with the floor pedal (see **Fig. 5**)—it sounded a little brittle and "transistory"— but I recently laid tracks with the rack-mount version and loved it. Some multi-effects processors, such as several models from ART and the new Ensoniq DP/4 (see the review on p. 97), include amp emulators as a standard feature. The success rates vary, and few are truly convincing. The same can be said for preamp systems such as DigiTech's GFX1 Twin Tube (reviewed on p. 106), ADA's MP-1, or the Rolls MP-45. (The MP-1 and MP-45 were compared in the October 1991 issue.)

To be fair, most of these devices at least *imply* a professional sound. Clean amp tones are punchy and overdrive sounds possess the requisite bite, so almost any model is fine for demo use.

FIG. 5: Tech 21 SansAmp guitar amp emulator.

However, if you plan to cut guitar tracks worthy of a master recording, audition these devices with an extremely critical ear.

RIFFING OFF

Guitar sounds are highly personal and tremendously subjective. I love to hear guitarists argue about *the* definition of a killer guitar sound. Some musicians still worship the pristine perfection of the guitar timbres Roger Nichols engineered for Steely Dan. At the other extreme, Mathew Sweet's latest album (*Girlfriend*) boasts the crudest demo-level guitar sounds I've ever heard. The wonderful thing is that each sound fits flawlessly into the sonic landscapes of these disparate artists. Discovering sounds that enhance an artist's musical vision should be Job One for creative engineers and producers. And there's no way I can tell you (at least with a straight face) that musical sensitivity is attained by cutting 6 dB at 15 kHz.

EM *associate editor* **Michael Molenda** *currently is seventeenth on the list of Frustrated Guitar Hurlers (Les Paul Division).*

Making Contact

By Nadine Condon

In the music industry, who you know can be more important than what you know.

PAT JOHNSON STUDIOS

Nadine Condon at the 1992 Bay Area Music Awards with San Francisco 49er Steve Bono (left) and Los Angeles Raider Roger Craig (right).

Few musicians start their careers with a direct line to the "starmakers." Fortunately, this limited access often saves new artists the embarrassment of acting like dorks in the presence of label executives. Let's face it, many talented, creative individuals have no clue about professional interaction with business people. Such ignorance is deadly because poor people skills are as detrimental to career advancement as poor musicianship.

Developing music-business contacts is an art form that requires as much creative discipline as songwriting. Getting powermongers to take your calls (and maybe even remember your name) takes time and patience and thousands of handshakes. Industry approval is a big factor in determining whether a musician receives the tools necessary to build a career. So how do you impress these big record-biz mucky-mucks? Well, (surprise!) you start at the bottom and work your way up, which explains why every "overnight" success often is ten years in the making.

YOUR FIRST FRIENDS

A new artist should seek increased stature in the industry when he or she meets a few of the following criteria: consistent headline or mid-slot status in professional clubs, completion of a professional demo tape, the interest and support of a performing rights organization (BMI, ASCAP, SESAC, etc.), or representation via a reputable music-industry lawyer or manager.

Let's start at the beginning. Believe it or not, the people you contact to secure gigs can plant the seeds of your success. Talent buyers (club booking agents) are considered the bottom fish on the recording-industry food chain, but they are usually your first professional allies in the music business. Bookers get the word out about which bands are hot, and knowledgeable A&R reps (record-label employees who seek out new talent) depend on them for tips on emerging musical trends.

Getting the attention of a talent buyer is relatively easy. Generally, all that's needed is a demo tape, a photo, and a one-page biography. This *promotional package* helps the booker determine whether an act's musical style fits their club format (alternative rock, country, folk, heavy metal, etc.).

At this early career juncture, don't bust the bank account on promotional materials. The demo tape can be recorded at a rehearsal (select three songs that best represent your music), and the standard 8 × 10 black-and-white photos can be taken and printed by a photography student. The bio should name the band members and the instruments they play. Be sure to include your contact person's telephone number and any press clippings (reviews of shows, demos, etc.).

However, don't scrimp on professionalism. Developing solid relationships with industry people requires large doses of courtesy, dependability, and a willingness to go the extra mile. In short, don't blow a valuable contact by being a jerk. Most talent buyers only accept calls during certain hours on certain days, so adhere to this schedule when seeking permission to submit a promo package. Follow up with polite calls (once a week will do) to inquire about your status. Be charming. Be nice. Be persistent.

When you get the gig, help the club sell tickets by enacting a little self-promotion. Send flyers to the fans on your mailing list, bug the local music paper to publicize the show, and tell all your

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friends. And remember, the show is *never* over. When you load out after the performance, be sure to thank the entire club staff, from door-person to stage manager. Not only is this common courtesy, it's smart. If the talent buyer enjoys working with you, he or she may initiate the first buzz that entices labels to check out your act.

THE TAPE CONTACT

Exploiting a local reputation to obtain record company interest requires enlarging your sphere of contacts beyond the club scene. To accomplish this, you need a more tangible measure of your talents than live performances and rehearsal tapes. A professional demo tape is your ticket to the next level of the industry.

The very nature of recording a professional demo tape offers opportunities for important contacts. For one, the studio manager at a commercial recording facility is a valuable asset. Record labels realize that studios are resources for tomorrow's chart-toppers. Many executives keep in touch with engineers and managers whose opinions they respect.

A reputable producer is another valuable contact, and you should not begin a serious demo project without one. A professional demo often is the main arbiter of an act's commercial promise, and it is too important to your success to gamble on self-production (unless you're a registered musical visionary) or semi-pro direction from band buddies or live soundpersons. The ears and experience of a professional who is sensitive to your musical vision are essential to producing a successful demo.

Working producers also have a "down-the-line" advantage: They often have forged their own relationships with label executives and can shop your tape directly to the decision-makers. If all goes well, the producer can hand-deliver your tickets to paradise.

THE SHOPPING GAME

Everyone knows (or *should* know) that record labels do not accept unsolicited tapes. The hundreds of tapes sent weekly to label offices end up in the circular file (i.e., the trash can). Once your tape is finished you must develop relationships with recognized music-industry professionals, who can act as your representatives with the labels.

Producers. We've already talked about how producers' relationships with the industry make it easier for them to send tapes to labels for evaluation. However, hiring a producer to oversee and shop your project is a "buyer beware" situation. Many producers have nothing but recording chops and good intentions. If a producer does not have a working relationship (actual album credits) with a label, he or she has limited industry clout.

Performing Rights Agencies. Representatives of performing rights agencies, such as BMI and ASCAP, work solely on the behalf of songwriters. These "angels" are direct conduits to record labels and publishing companies and often work closely with developing bands. Both agencies encourage new talent through regional showcases and music conferences.

Lawyers. Many entertainment lawyers shop tapes to record labels. Obviously, a reputable lawyer also can handle contract negotiations if the label wishes to sign you to a recording deal. Generally, music lawyers charge by the hour, or they accept a percentage of your record deal.

Professional Managers. A manager also can shop your tape to labels. However, unlike some shopping agents, a manager doesn't disappear when the deal is done. Managers seek binding contracts to oversee the business aspects of your career, including record deals, merchandising agreements, song selections, and so on. The rule of thumb is that you hire a lawyer and marry a manager. If you obtain a recording contract, the label will insist that you have a manager to handle the daily business of the industry.

Managers and lawyers (as well as other industry professionals) can be found through the recommendations of other bands or industry contacts, on the liner notes of CD covers, and in industry sourcebooks such as the *Album Network Yellow Pages*, the *Gavin Report* directory, and *Billboard's International Talent and Touring Directory*.

DECORUM

A large part of developing industry relationships involves earning respect (it's also great if people like you). It's no advantage for you to develop a reputation for being lazy, arrogant, stupid, or "not together." When you meet a

(continued on p. 116)

Questions and Answers

By Alan Gary Campbell

Our tech ace explains how to store your gear, view synth waveforms on the oscilloscope, and deal with AC adapter polarity disparity.

JACK DESROCHER

Q. What are safe storage conditions for electronic musical instruments? Is high humidity harmful? Are any special precautions advised regarding exposure to temperature extremes when shipping instruments?

Q. When I had my Yamaha DX7 synth serviced, I got to see it opened up and was amazed at how much dust had accumulated inside. The technician cleaned it out and said it wasn't a problem. Can dust interfere with the operation of the DX, and should I have it cleaned on a regular basis?

Q. I live on the Florida coast. I suspect the salty air affects the service life of my gear, as it seems to require more frequent service than that of my inland colleagues. Is this the cause, and is there anything that I can do to protect my keyboards?

A. Generally, areas that are comfortable for humans are satisfactory for the use and storage of electronic musical instruments. Instruments and accessories should *not* be stored in attics, basements, garages, rented storage units, or any other area that is not climate-controlled. Some of the electronic components within modern instruments (e.g., batteries and capacitors) can be permanently damaged by prolonged exposure to extreme temperatures.

Instruments should not be exposed to direct sunlight or placed near a window, radiator, space heater, heating/air-conditioning duct, etc. Using equipment in areas that are too warm can elevate case temperatures and interfere with proper operation. Sunlight or close contact with heat sources can cause instrument outer components such as overlays, trim, and keys to soften, melt, and even catch fire.

Instruments should not be used or stored in damp or highly humid areas. Damp playing areas pose a serious shock hazard. Moist concrete floors can provide a dangerous, low-resistance current-path to ground. Moreover, damp storage areas can cause significant keyboard and panel switch-contact oxidation.

Normal environmental dust and "fallout" from foam road-case liners does, as a matter of course, accumulate inside instruments. Such dust is comprised largely of benign, nonconductive materials. However, it can interfere with the operation of sensitive analog synth circuits and some high-frequency digital circuits under damp or humid conditions (another reason to avoid such conditions). Excessive dust from long-term accumulation or from construction and similar sources can contaminate and damage mechanical components such as keyboards, performance controllers, and potentiometers.

Though normal dust is not a significant problem, routine cleaning is a wise precaution and a good investment. It can extend the life of your equipment, help to maintain its resale value, aid in identifying small mechanical and electronic problems before they become big ones, and provide a clean, well-cared-for instrument that is more fun to play. Routine cleaning can be a do-it-yourself job, but it often requires knowledge of tricky disassembly and reassembly procedures. It isn't a good first-time project. (Static-voltage hazards caused by the vacuum cleaning of equipment were discussed in the January 1992 "Service Clinic.")

Brief exposure to extreme temperatures is not usually harmful to electronic equipment. With regard to the

packing and shipping methods, no special precautions are necessary. It is a good idea to allow equipment road cases and shipping cartons to reach room temperature before opening them; this minimizes condensation inside the instruments.

The use and storage of electronic equipment in coastal and island environments can reduce service life. Taking steps to minimize salt-air contact can make a considerable difference. Of foremost importance is climate control. Ideally, equipment should be used only in environments that provide central heating/air conditioning with proper filtering of outside air. Leaving your synth on the screen porch of your manager's beach house is an excellent example of what *not* to do. Also, if equipment is to be transported for any significant distance inside a trailer or a luggage pod, it should be wrapped in plastic before being placed in its case. In such environments, it is especially important to ensure that cases and equipment are allowed to come to room temperature gradually after transport, since internal condensation can result in precipitation of corrosive, conductive airborn salts.

Note that electromechanical instruments such as the Rhodes, Clavinet, and Hammond B-3 are more sensitive to environmental effects.

Q. Is there a way to view synth envelopes (not just the waveforms) on an oscilloscope?

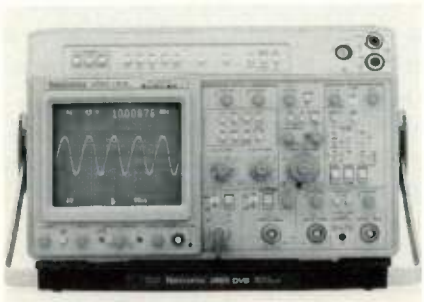
Q. Is it okay to plug a synth directly into an oscilloscope? How should I do it?

A. You can view synth envelopes on an oscilloscope by sending a line-level synth output to a vertical input of the 'scope, set for the proper gain, and selecting a very low sweep rate (0.5 seconds per division, or slower). This technique relies somewhat on the properties of the CRT phosphor and persistence of vision, but it does have a certain bad sci-fi-movie appeal. Unfortunately, many modern, affordable oscilloscopes do not incorporate such low sweep rates; an old, military-surplus "room heater" type is more likely to do the job.

You can connect a synth output directly to an oscilloscope. The easiest way is to acquire a coax patch cord with the proper terminations (usually a BNC or UHF plug), chop off the plug on one end, and attach a standard, ¼-inch phone plug instead.

You could avoid all this trouble by using a sampler to capture and display the waveform. (But it just wouldn't be the same, would it?) Still, a direct-input patch cord is sometimes useful in servicing equipment. Any excuse to mess around on the bench!

Q. I have a Casio AZ-1 strap-on MIDI controller that stopped working after I accidentally plugged in an adapter of the wrong polarity. It came on for a second, then died. Now it won't work, even from battery power. Could it have a blown fuse or some other



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protection device inside? Does this sound like something a novice can fix?

A. In order to utilize the maximum available battery voltage, the AZ-1, like many portable instruments, does not incorporate a reverse-polarity protection circuit. Unfortunately, it also does not incorporate a fuse or other current-limiting device. It is extremely likely that one or more of the subsections of the power-supply circuit, and perhaps the reset circuit, have been damaged. These are discrete, transistor-based circuits, and would not be an easy fix. It is advisable to refer the repair to a Casio repair center.

▼

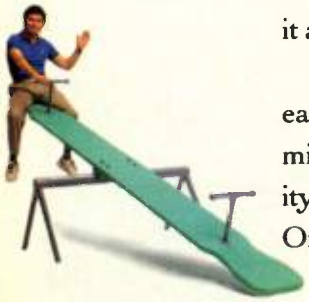
A protective diode can prevent a reverse-polarity DC power adapter from damaging your gear.

I would strongly recommend that you have the repair technician install a reverse-polarity protection diode in the unit prior to returning it to service. In this procedure, the DC power-input trace on the CN5M board (jack board) is opened by cutting the trace at a convenient point, and a 1N4001 silicon rectifier diode is tack-soldered across the cut. This prevents further damage if a similar mishap should ever occur.

If you are using battery power I suggest you have the unit modified to receive phantom DC power via the MIDI cable instead. (I am considering writing a general, do-it-yourself article on this subject if there is sufficient interest.) Batteries waste important, non-renewable resources, and their disposal is a source of environmental pollution.

Finally, the MIDI output jack on the AZ-1 is mechanically weak. Reinforcing the jack assembly and jack PC board with silicon sealer is a wise precaution.

EM *contributing editor* **Alan Gary Campbell** *is owner of Musitech, a consulting firm specializing in electronic music product design, service, and modification.*



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Reviews

Ensoniq DP/4 Multi-Effects Processor

By Michael Molenda

This audio wonderbox boasts enough processing power to out-think Einstein.

America is in trouble, friends. The media mirages seeking the presidency are pale echoes of the visionaries and scoundrels who built this nation. A frustrated electorate cries for a leader of substance and grit. The time has come for bold action. I propose we acknowledge and embrace the candidates' tragic lack of substance by electing an inanimate object President of the United States. And I'll tell you what gets my vote: The Ensoniq DP/4.

The DP/4 delivers more than empty promises and a Cheshire Cat grin. It won't balance the federal budget, but there's no stingy "trickle-down" economics in the incredible power this unit delivers for $1,495. Ensoniq's premiere foray into digital multi-effects processors offers four *independent* signal paths, 400 presets (200 ROM, 200 RAM), real-time MIDI control over two parameters per effect algorithm, and an internal "patch bay" for configuring outputs and effects combinations.

Constituents with home or project studios won't find a better tracking mate. The DP/4 looks good, sounds wonderful, and fulfills every sonic oath.

Sonic Enlightenment: Ensoniq's versatile DP/4 unites four independent digital effects processors, a mixer, and a patch bay into a single box.

PETER DIGGS

THE EXECUTIVE CABINET

The DP/4 front panel is deceptively concise for a device offering myriad programming capabilities. Minimal controls—chrome knobs and square black buttons—on a matte black face evoke something out of a Buck Rogers movie serial. Input 1 is a ¼-inch jack that turns the 2U rack-mountable box into a ready and willing guitar processor. This front-panel jack shares input circuitry with its twin on the rear panel and disables that input when accessed.

Eight chrome knobs control the input and output levels for the DP/4's four discrete processors. These are neatly stacked (and legibly marked with bright white numerals) as four input knobs over four output knobs, with separate peak and signal LEDs atop each row. The 32-character, backlit LCD displays preset and parameter information, while a large LED numeric display posts program numbers. Directly below the LCD/LED screens are seven function buttons: Write/Copy, Cancel/Undo, Scroll Left, Scroll Right, Select (mode), Edit (mode), and System MIDI.

A large chrome data entry knob allows rapid shuttling between preset and parameter values. Each value or program change is confirmed with a solid click, which is a nice feature. Under this gleaming orb lie the four Unit buttons (A, B, C, and D) that activate, bypass, or select each signal processor and edit algorithm parameters. A Config button selects or bypasses all four processors; it can also edit input sources, internal patching, and output assignments. Each button is matched to status LEDs that announce whether the source is bypassed or active.

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The DP/4's rear panel is straightforward and nearly foolproof (more on this later), with a detachable AC cord; MIDI In, Out, and Thru connections; two ¼-inch footswitch jacks; four ¼-inch audio inputs; and four ¼-inch outputs.

The "foolproof" feature concerns the inputs and outputs. In a crunch, anyone can mess up a simple audio connection. (Don't laugh; I've seen heavies *this close* to tears of frustration over a misrouted input cord.) Considering the awesome processing power of the DP/4, I didn't relish tracing output signals from some arcane internal patching algorithm. Thankfully, the unit employs automatic switching that routes signals only to connected outputs. I only wish that second engineers had an identical fail-safe.

OVERQUALIFIED?

Okay, I admit it. I skimmed the DP/4 user's manual and freaked. This device is so rich in programming power that I feared dealing with it. Perhaps it was this lack of confidence that prompted a mean trick: I installed the DP/4 in the effects rack at Sound & Vision (the commercial recording studio I co-own with **EM** contributor Neal Brighton) and hid the manual. After a few cursory explorations, our staff engineers declined to scale the DP/4's learning curve on paying sessions. Yes, we could have limited ourselves to presets, but some client always demands five milliseconds more decay time on the cowabunga reverb program. Oops.

Finally, a local independent engineer named Mark Lemaire took the plunge. Lemaire tried the DP/4 on some rough mixes for folk artist Charlie Nimovitz's upcoming release and found a reverb that beautifully enhanced the singer/songwriter's voice. This preset became the premier vocal reverb throughout the final mixes, and Lemaire even discovered how to change parameters *sans* manual.

"The reverbs are very smooth," says Lemaire. "Quality-wise, the timbre is far above the average multi-effects processor. I'm thankful we had the DP/4 for the entire mixdown process. There would have been a definite sound compromise if we had to finish the record without it."

FACE-TO-FACE

Thoroughly embarrassed, I walked into the belly of the beast. Guess what? The DP/4 isn't hard to use at all. All programming gestures are rationally and elegantly laid out. If you visualize the DP/4 as four separate effects boxes connected to a mixer and patch bay, you'll be fine. As a studio owner, I should have known this; it's just weird having one signal processor take on so many jobs.

Basically, you have four independent effects "boxes." These can be configured as four separate mono signals, two stereo signals, one stereo signal and two mono signals, and so on. The internal mixer even allows four mono input signals to be split to left and right buses, processed with stereo effects, and assigned to two of the four available output jacks. Anyone familiar with routing multiple synth outputs and effects to a mixer's stereo subgroups is

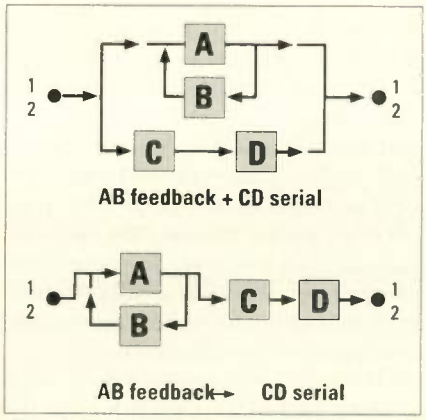


FIG. 1: Two examples of versatile routing schemes offered by the DP/4's four independent processors and internal patching options.

already conversant with the DP/4's patching methodology.

These four virtual effects boxes are called *Units*. Utilizing the DP/4's internal patch bay, these Units can be linked together in series or parallel routings (Fig. 1). Each Unit offers 100 presets: 50 in RAM and 50 in ROM. You also have the ability to "feed back" a signal from one Unit into another. The feedback feature alone makes for some bizarre sound-sculpting possibilities.

In addition to basic presets of one-Unit, two-Unit, and four-Unit effects chains, the DP/4 offers more sophisticated presets, called *Configs*, that decide how signals are routed through the outputs. Config Presets are provided along with blank templates to help the user construct customized presets. One of the coolest things about the DP/4's routing scheme, especially for guitarists used to chaining their stomp boxes any way they choose, is that you can put any effect anywhere in the chain. (That is, unless you use an effect, such as the vocoder, that gobbles all four processors.) Freedom from a predetermined routing architecture is something few digital multi-effects processors offer, and it's a glitch that has bugged me for years.

Another problem with mid-level multi-effects processors is the memory bank. If you withdraw a cathedral reverb and a chorus, you'll probably be out of funds when you want to add a 1,500-millisecond, multi-tap delay to the chain. The DP/4's four powerful digital processors are almost immune to embarrassing "insufficient memory" messages. Well, don't try to couple the 3.3-second delay with more than a two-Unit reverb program, but just about anything else of value to the home recordist can be freely linked, kitchen sink included.

Parameter changes are enacted through the cursor buttons and the large data-entry knob. The methodology is familiar to anyone with even basic knowledge of multi-effects processors.

The MIDI features also are user-friendly. Eight possible controllers are available, and any two can affect a given preset. All commands are enacted gently, without the zipper glitching apparent in some devices. This smoothness was evident even when MIDI control was performed with a footpedal.

THE SOUND DEBATE

Immense programming power forestalls obsolescence, but if the box is the aural equivalent of dirty laundry, who cares? Fortunately, the DP/4 is one of the best-sounding signal processors I've heard. It holds its own against megabuck legends (AMS and Lexicon) and shows no mercy to excellent mid-line processors such as the Alesis QuadraVerb Plus and ART's Multiverb Alpha. Patching into the DP/4 is like opening a window onto a breathless vista. Reverbs seem to expand beyond the confines of monitor speakers, choruses shimmer in lush waves, and delays snap with full-bodied articulation.

The DP/4 offers an abundance of sonic riches. There are far too many effects configurations to describe in 10,000 words or less, so I've limited commentary to overall assessments. All presets were auditioned three ways: with an Ibanez 540RJB guitar through a Marshall 50-watt 2 x 12 combo amp, with the same guitar direct through Sound & Vision's Trident Model 65 mixing board, and in actual mixdown sessions utilizing client master tapes.

Modulation effects. I always decry the fact that most affordable digital signal processors can't produce a sensual chorus, so I'll spare you another rant, especially since the DP/4 has finally made me a happy boy. This is a chorus to die for; sensual in the extreme, with jewel-like clarity.

The four-Unit presets offered the widest spatial qualities, but even single-Unit choruses exhibited the billowing sparkle of my favorite analog processors. I was pleasantly startled by

the three-dimensional punch of four-Unit presets such as Super Spreader, Time Machine, and Super Clean Guitar. Although the DP/4's internal noise gate does a great job keeping things quiet between signal inputs, a few of the programs (particularly Big Acoustic Guitar, a four-Unit preset) exhibited audible hiss during performance. A gentle EQ tweak at the mixing board solved most noise problems.

Reverbs. The DP/4's reverb programs are a boon to home recordists. These reverbs sound impressively close to the rich timbres produced by effects processors costing thousands of dollars more. Say goodbye to the brittle top end and jagged decay of mid-level reverbs. Even the DP/4's less sophisticated single-Unit reverbs exhibited astounding fullness.

The reverb programs are another reason you should kiss the DP/4's quadraphonic architecture. No longer must a recordist be limited to running one signal through the best reverb he or she can afford to buy (or rent). I often face situations where a studio has one great reverb. Usually, the lead vocal gets the classy treatment, and everything else takes whatever processors are left over.

This is a major drag if you love the way the drums sound through the expensive reverb, but need a different environment than the current "vocal" program. The DP/4 erases the frustration of limits; you've got four discreet processors at your command. The lead vocal can get a beautiful stereo (two-Unit) preset, and there's still another completely different

Product Summary

PRODUCT:
Ensoniq DP/4 digital multi-effects processor

PRICE:
$1,495

MANUFACTURER:
Ensoniq
155 Great Valley Parkway
Malvern, PA 19355
tel. (800) 553-5151
or (215) 647-3930

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ● ◖
EASE OF USE	● ● ● ●
SOUND QUALITY	● ● ● ● ◖
VALUE	● ● ● ● ◖

stereo reverb available for the drums.

Guitar amp emulators. Ensoniq obviously expended a ton of brain power making the DP/4 sublimely versatile. In addition to all the other goodies, why else rescue frustrated apartment-dwelling recordists (and "get it quick" demo jockeys) by including amp emulation? These presets allow you to record simulated 115 dB Marshall stack stampedes direct to tape: no microphones, no amps, no screaming neighbors. For the most part, the DP/4's amp emulators deliver the illusion of the real thing.

Unfortunately, the amp programs favor shredders (i.e., loud, heavily distorted, Valkyrie war cries). The so-called "vintage" or (dare I say) more sedate presets were rather lame; weirdly aberrant timbres did little to produce a convincing miked-amp sound, much less evoke a classic crunch. Tuff But Nice (a four-Unit preset) even sounded like a speaker having a nervous breakdown. I'll give the software programmer high marks for approximating a torn cone, but if a guitarist brings a faulty amp into my studio, it's not recorded.

I enjoyed soloing with over-the-top programs such as four-Unit preset Rockin' Lead Guitar. The blustering roar is as good as anything I've coaxed from a Marshall. Rhythm guitar tones are great for heavy metal, aggressive dance, industrial, and some alternative rock applications. However, if I needed to emulate an amplifier tone for R&B, pop, jazz, or blues, I wouldn't look to the DP/4.

Other stuff. The vocoder is fun. It requires all four processors, so I'm sure Ensoniq jumped through hoops to produce it. Thanks, gang. Would I use it more than once a year? Probably not. Wah Lead Guitar (a four-Unit preset) reminded me of the classic sound of a Vox Crybaby through a Fender Twin. (I barely resisted the urge to play the theme from "Shaft.") The pitch-shifting programs offer a variety of tonal control.

CONFETTI TIME

Do you get the impression I'm awed by this processor? I apologize if my enthusiasm ran amok, but I can't suppress my delight. If it makes you feel better, I'll reveal what I absolutely hated about the DP/4: the two LED input indicators (Signal and Peak). I can't stand one warning before I cook a signal. A step-ladder LED indicator with six segments would be appreciated.

Now that journalistic balance has been attempted, I can only add that I love this box, I love this box, I love this box. If you want your audio productions to shine with the glow of professional majesty, the DP/4 is your avatar. Believe me, none of those glorified nerds running for the presidency are going to enrich your life as much as the DP/4.

Yamaha MT120 Multitrack Cassette Recorder

By Geary Yelton

Record righteous 4-track demos without emptying your wallet.

Recording magnetic fluctuations on spools of metal-coated plastic is something many of us have been doing most of our lives. Though digital multitrack tape recorders probably will replace analog cassette decks someday, they're quite expensive today. If you have a choice between recording music at less than pro quality and not making music at all, a multitrack cassette recorder is a logical choice.

Compact, lightweight (less than six pounds), and inexpensive ($525), the dark-gray MT120 4-track cassette deck sounds good enough to make a respectable demo. Its feature set compares favorably to the competition, though with some different approaches. For instance, instead of channel EQ, the MT120 has a 5-band stereo graphic on the master bus. In comparison, the Tascam 424 ($549) offers 2-band shelving channel EQ but no master EQ, and the Fostex X-28 ($599) has only a 2-band shelving master EQ. However, the MT120 has four channel inputs, while the other two machines have eight.

Yamaha's manual is clear and straightforward. It's written in three 23-page sections: first in English, then French, and finally in German. If it's been translated from Japanese, someone did a pretty good job.

MIXER SECTION

The 4-channel mixer is flexible enough for basic recording, playback, and mixdown functions. In addition to the RCA-type, main stereo out jacks, there's a pair of monitor outputs. The monitor output section includes four faders to change the balance of the channels independently of the main mixer section. This feature is useful for monitoring tracks when overdubbing. The stereo headphone output is identical to the monitor output.

Each of the mixer's four channels has a ¼-inch mic/line input on the front. Input sensitivity is controlled by a gain control (trim) slider with a surprisingly long throw. The gain control sits parallel to each channel's main fader, which looks and feels just like the mixer's single master fader. A rotary panpot is conveniently located in the geographical center of the channel strip. Each channel also has an RCA-type tape out jack on the back panel for directing its signal to an external mixer, effects processor, or tape recorder. Channel 4's tape out also can be used as a sync out port. The white lettering that identifies back panel jacks is printed below the jacks, so you may have to lift the MT120 to find the jack you need.

The mixer's effects loop has a mono aux send and stereo return, and each channel has an aux send fader. In a pinch, the aux returns can be used as an extra pair of line inputs. This setup is ideal for connecting a signal processor with a mono input and stereo outputs.

As mentioned earlier, instead of individual EQ controls on each channel, the MT120 has a stereo graphic equalizer that tailors the tone of all the channels simultaneously. Each side of the graphic equalizer has five frequency bands: 100 Hz, 400 Hz, 1 kHz, 5 kHz, and 10 kHz. Each band can be boosted or cut by 10 dB. EQ can be applied during both recording and playback.

There are four LED peak meters and a switch that allows you to display the levels of either the four mixer channels or the main stereo outputs. The meters smooth the peaks somewhat, so you don't see extreme spikes. If you use your ears judiciously to avoid spike-related distortion, this works out well.

RECORDER SECTION

The MT120 is optimized for use with chrome tape only, so the tape bias and EQ can't be adjusted for other tape types. It operates at either of two tape

Product Summary

PRODUCT:
MT120 multitrack cassette recorder
PRICE:
$525
MANUFACTURER:
Yamaha Corp.
PO Box 6600
Buena Park, CA 90622
tel. (714) 522-9011

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ●
EASE OF USE	● ● ●
AUDIO QUALITY	● ● ●
VALUE	● ● ●

speeds: 1⅞ and 3¾ ips. For best results, the higher speed is recommended, but that cuts your recording time in half. A 60-minute cassette records 30 minutes at low speed and 15 minutes at high speed. (Since four tracks take up the entire width of the tape, you can't flip a cassette over and record on the other side.) A tape-speed fine-adjust slider can raise or lower the pitch by approximately a whole step.

According to the manufacturer's specs, the high end rolls off at 18 kHz when the tape is running at high speed and 13 kHz at normal speed. Of course, this falls short of the frequency response of open-reel and digital recording media, but the high-speed spec is pretty good for a 4-track cassette deck. To test its bandwidth, I used the MT120 to record well-engineered CDs and made comparisons. Even with ears that have been abused as much as mine, I could hear a loss of high end when I played back something recorded on the MT120 at low speed. When I played cassettes recorded on other machines or recorded at high speed, the high end was pretty clear.

Turning on the dbx noise reduction drastically reduces tape noise, but you lose some of the high end. When the noise reduction is switched on, it affects all four tracks. Audible sync tones such as FSK and SMPTE, however, don't work well when they're recorded with dbx. For this reason, you can disable noise reduction on the fourth track. I recorded a SMPTE time code track and synchronized my computer's sequencer to it with no difficulty.

At reasonable monitoring levels, with dbx turned off, bleed-through to the adjacent track wasn't as loud as normal tape noise. Even with dbx on, I had to really crank my sound system up to ridiculous levels to hear the sync tone bleeding through. At that point, I could barely hear all the channels bleed through, even if I turned all the channel faders down and the master fader up.

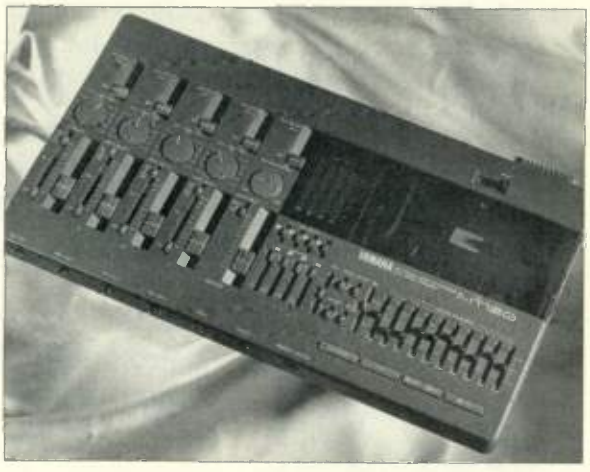
A mechanical, 3-digit counter with a reset button tracks your tape's progress. A digital, real-time counter would have been nice, but what do you expect for $525? The only memory function stops the tape when you rewind to zero.

TAPE TRANSPORT

When you press Play, Rewind, Fast Forward, or Stop, the transport mechanism responds with a definite "clunk." This is only slightly annoying, but if the microphone is close enough to the recorder, the tail end of this sound is recorded. The tape on my test unit always ran evenly and smoothly, with nary the slightest hint of wow or flutter.

Two inputs are available for controlling the tape transport externally. One is a ¼-inch jack for a standard footswitch that allows you to punch in and out without taking your hands off your instrument. A multi-pin port lets you connect an optional RCM1 remote controller, which duplicates the MT120's transport control buttons. I didn't have an RCM1 to check out this feature.

Unfortunately, after using the MT120 for about 50 hours, Fast Forward and Rewind stopped working. When I opened the unit (probably voiding the warranty), I discovered that a white plastic piece had broken off. I couldn't figure out where it belonged, but it was obviously necessary for the two tape-transport functions. For that matter, none of the sliders or switches are of outstanding quality, but the MT120 is an inexpensive



Yamaha's MT120 4-track cassette recorder, the successor to the MT100 II, lets you record on all four tracks simultaneously and offers a 5-band master graphic EQ.

device. I hope my problem with the tape transport was an isolated incident; even at a great price, poor reliability would be a serious flaw. (Yamaha notes that the MT120's failure rate has been quite low, and the company has an excellent reputation for honoring warranties.)

ROUTING AND LEVELS

At first glance, I found the switches that route audio signals to the mixer channels and tape tracks confusing. Each mixer channel has an input-selection switch to choose whether its signal is coming from the mic/line input or the tape. The master fader has a 3-position monitor-select switch for listening to tape tracks, mic/line inputs, or a mix of both. The position of this switch affects only the monitor out signal, not the stereo out.

When recording, the Record Select switches determine how channels are routed to tracks. You can route each channel directly to its tape track (channel 1 to track 1, etc.) or route channels to tracks via a stereo bus (e.g., when the switch for a track is in the "left" position, the track records any channel that's panned left). This method makes it possible to route several mixer channels to a single track, or to create a stereo mix of all four inputs.

Getting the right recording level can be a bit tricky. The manual suggests that the ideal level for the channel faders and master fader is 7 or 8 out of 10. (The numeric scale is arbitrary and isn't associated with a unit of measure.) Any setting above that risks audible clipping. You're told to set the channel's trim control so the meter averages between 0 and +3 dB. Considering that the meter's highest reading is one notch above +3, there's very little meter range above this ideal. The meter is a smoothed peak-response type, so if the top LED is flickering and you're not getting audible distortion, you're probably okay. Tracks recorded just fine with a variety of inputs, ranging from a low-level Casio FZ-1 to a B.C. Rich bass with the active electronics turned on.

CONCLUSIONS

If you're in the market for a 4-track cassette recorder, the MT120 should be a serious contender. This machine has just about everything you could ask for in an affordable, portable studio. It lacks bells and whistles such as low-impedance mic inputs, multiple effects buses, and individual bands of EQ on each channel, but if you're trying to save money, you'll have to live without these features. You can always connect an external mixer if you really need them.

The MT120 is a wonderful addition to the low-budget MIDI studio. It's unlikely you're going to create master-quality cassettes on this machine, but that's not its *raison d'être*. For getting your musical ideas down on tape, it's surprisingly quiet and does the job with a minimum of confusion and expense.

Geary Yelton *urges you to buy several copies of each of his books,* The Musical PC, Music and the Macintosh, *and* The Rock Synthesizer Manual.

DigiTech GFX 1 Twin Tube Guitar Preamp

By Peter McConnell

Make your ax sound more powerful than a locomotive.

If there's one thing a guitarist wants to do on stage, it's get attention. After all, heroic impulses come with the territory when you play a loud, melodic instrument. But if you want to sound like Superman, Clark Kent's preamp won't do.

DigiTech's GFX 1 Twin Tube guitar preamp is definitely *not* Clark Kent's preamp. This sonic crusader is a tube-driven, digitally controlled, single-rackspace preamplifier with loads of control features. The Twin Tube provides selectable tube gain and clean circuits enhanced by eleven effects (six of which can be used at a time) that include compression, a 7-band equalizer, three built-in stereo effects, and an external effects loop. You also get a 6-band speaker-simulator circuit and an extra helping of MIDI control. But the real attention-getter is sound, and while the Twin Tube is noisier than I would like, its hot, punchy lead sounds are unbeatable.

FASTER THAN A SPEEDING BULLET

A first look at the Twin Tube shows a front-panel interface with a big, easy-to-read, 3-digit LED display that identifies the current program. A backlit display provides detailed numerical and graphic information about parameters. Buttons are provided for getting around the displays, while knobs set input and output levels.

For the most part, the interface allows intuitive operation. However, the proximity of two sets of arrow keys—one for parameter values and another for program numbers—invited accidents. I often sent the unit into unexpected territories. The frustration of losing your place while editing was compounded by a complicated "tree" structure of key presses that access some utility parameters. Still, there are a few nice bells and whistles, such as an edit-compare function that lets you track how a program's sound evolves from its original form during editing.

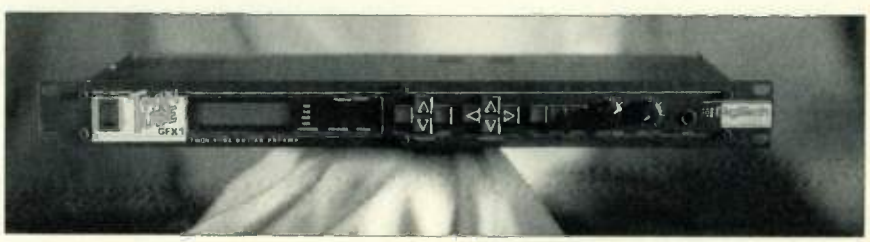
The Twin Tube has 120 program locations, divided into two identical groups of 60. Each group contains factory presets, and both groups can be overwritten to hold user programs. (The manual is unclear and implies that one group of factory programs is permanently stored. DigiTech has promised a new manual in the immediate future.)

As soon as I stepped through the presets, I was really impressed. Good presets not only make a wonderful first impression, they provide a road map for getting the most out of a preamp. The folks at DigiTech deserve a hand for equipping this unit with an excellent variety of truly hot programs, from funk to classic rock to techno leads.

LEAPING TALL BUILDINGS

Follow the signal path though the Twin Tube, and you'll run into some powerful features. First, unlike most guitar preamps, there is a compressor with adjustable threshold and ratio *before* any gain stages, so you can use compression with either clean or distorted sounds.

You can select between tube and clean circuits, and the tube circuit has two bias settings for a smooth or raunchy sound. There are two stages of tube gain: one entering the tube circuit and another (saturation) within it. The tube circuit is followed by a 7-band graphic equalizer with a range of ±12 dB.



PETER DIGGS

DigiTech's GFX 1 Twin Tube preamp delivers stunning sonic power.

Another unusual feature is independent control over levels. There appear to be two separate level parameters, one of which is enabled when the tubes are in the circuit and one when the tubes are off. You can turn the tubes on or off within a single program without awkward volume changes. After this stage is a noise gate with a choice of sixteen threshold levels, followed by a mono effects loop for adding external effects.

Finally, the Twin Tube gives you a choice of three digital effects—chorus, delay, and flange—that offer more than the usual number of parameters. For example the flanger allows control of the basic delay, LFO rate, depth, waveform, and feedback. The flange and chorus sound especially good, evoking a smooth analog quality that is seldom evident on digital effects boxes.

All effects parameters are stored when you create a program, and with a few exceptions, they are similar to controls found on other guitar preamps. But the Twin Tube also has a speaker simulator with an additional 6-band EQ that is independent of the current program. The speaker simulator has nine presets designed for a range of standard uses and five user-programmable configurations.

AND MIDI TOO

MIDI is another realm where the Twin Tube shines. Like other MIDI-capable preamps, the unit can load programs according to incoming MIDI Program Change messages and dump programs externally using System Exclusive. But the Twin Tube also can change parameter values according to user-defined

Product Summary

PRODUCT:
GFX 1 Twin Tube guitar preamp
PRICE:
$649
MANUFACTURER:
DigiTech/DOD
5639 South Riley Lane
Salt Lake City, UT 84107
tel. (801) 268-8400

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ●
EASE OF USE	● ● ●
SOUND QUALITY	● ● ● ●
VALUE	● ● ● ●

MIDI continuous controllers. This process, which DigiTech calls "linking," means you can use a MIDI footpedal that sends these controller messages as a remote control. Two links are available at the program level, and a global link allows you to control any number of parameters for all of your programs with the same MIDI controller message.

The trouble is that when you use this feature while playing, some parameters glitch too much. Although the effect feedback parameter works well under MIDI control, the level and EQ parameters are a little rough, and the tube parameters glitch to the point of being unusable. I also ran into some bugs in the linking feature on my version of ROM firmware, 1.04. Some of these, but not all, are supposed to have been corrected on version 1.05. If you are into esoteric kinds of MIDI control, there are other preamps that do a better job.

NOT INVULNERABLE

Like Superman (unable to commit to Lois Lane, fear of glowing green rocks from home planet, etc.), the Twin Tube does have shortcomings. The manual is often unclear and, in a few cases, downright wrong. But the worst problem is noise. Although the heavily distorted tube sounds are unmatched in punch and power, they seem noisier than those on competitor's units. The noise gate helps, but it is heavy-handed and clamps down swiftly at low threshold settings (so swiftly that many finger-players may find the feature unusable). Even the clean circuit is too dirty for many recording situations.

But as I said, the Twin Tube is not Clark Kent's preamp. Its strength is not cleanliness, but power. You should listen for yourself, but I found its heavy lead and warm classic sounds to be unmatched by any competitor near its price class. For stepping out and cranking up, the Twin Tube is the sonic equivalent of the Man of Steel.

When **Peter McConnell** *isn't composing and designing music software for Lucasfilm Games, he plays electric violin, guitar, and keyboards in the Bay Area bands Lotus Eaters and Never Land. He also does production work in his own company, Little Big Note Music.*

MIDIMAN Syncman Pro

By Dave Bertovic

Presenting the Swiss Army Knife of SMPTE-to-MIDI converters.

One of the great advantages of electronic music is that it can be sequenced and synchronized to video or film without committing it to tape until the last steps of post-production. Film and video sound synchronization is accomplished using SMPTE (Society of Motion Picture and Television Engineers) time code, which represents the passage of time in hours, minutes, seconds, and frames. There are five frame rates (specified in frames per second) currently in common use: 24, 25, 29.97, 30, and 30-drop.

However, MIDI sequencers, drum machines, and cue list programs rely on MIDI Time Code (MTC) or Song Position Pointer and Clock messages for timing their events. In order to integrate the two systems, a SMPTE-to-MIDI converter such as MIDIMAN's Syncman Pro is required.

OVERVIEW

The Syncman Pro is a single-rackspace unit powered by an external AC adapter. The rear panel has MIDI In, Out, and Thru ports; connectors for Tap Tempo; Punch In and Out; and SMPTE In and Out. The SMPTE Out level can be adjusted by a recessed trim pot adjacent to the two jacks. In addition, the rear panel has two BNC video connectors—Video In and Thru—that are used to route a composite video signal through the unit.

The front panel sports an 8-character LED display for all functions, including time code position in hours, minutes, seconds, and frames. The display also shows MIDI Song Position in measures, beats and clock pulses, of which there are 24 per quarter note. User controls include mode select, cursor direction, and data increment and decrement buttons. The Tap Level knob sets the level of the input signal to the rear-panel Tap Tempo jack, which I'll explain in a moment.

MODES OF OPERATION

In normal operation, the Syncman Pro functions as a SMPTE time code reader/generator. In addition, it converts SMPTE into MIDI sync messages to synchronize MIDI sequencers, drum machines, and cue lists to a master film, video, or audio tape deck.

The device offers five operational modes: Read, Write, Song, Cue, and Utility. In both Read and Write modes, it can read a previously recorded SMPTE time code signal and also can record (or "stripe") a SMPTE signal on audio or video tape. The unit supports all common SMPTE frame rates. On the MIDI side of things, the Syncman Pro outputs MIDI Time Code, Song Position Pointer and MIDI Clock, or Direct Time Lock (for older versions of Mark Of The Unicorn's *Performer*) while reading SMPTE in Read mode.

The Syncman Pro generates SMPTE time code based on its own internal clock or external house sync, a pilot tone, a click track, or even a composite video signal. If an audio track on a video tape can't be sacrificed for a SMPTE signal, a feature called Spot-Lock slaves the unit to the video signal itself. A MIDIMAN innovation, Spot-Lock allows the user to record a short burst of SMPTE time code at the head of a video tape. The Syncman Pro then cues off this spot and counts video frames as its sync source.

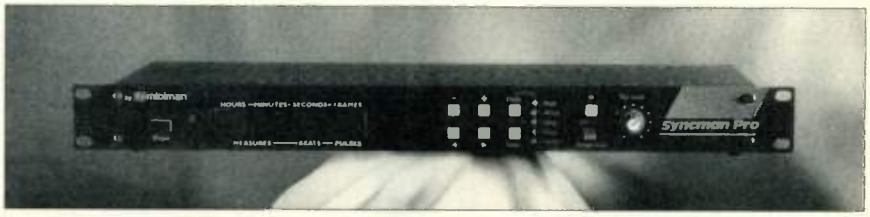
Song mode is used to create a tempo map. The tempo map can be input manually from the front panel or sent automatically into the Syncman Pro from a sequencer or drum machine. Tempo maps also can be created

Product Summary

PRODUCT:
Syncman Pro
PRICE
$699
MANUFACTURER:
MIDIMAN
30 North Raymond Ave.
Suite 505
Pasadena, CA 91103
tel. (818) 449-8838

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ● ◖
EASE OF USE	● ● ● ● ◖
DOCUMENTATION	● ● ●
VALUE	● ● ● ● ◖

• SYNCMAN PRO



PETER DIGGS

MIDIMAN's Syncman Pro SMPTE time code generator/reader and SMPTE-to-MTC converter offers a Spot-Lock feature that lets you sync directly to a video signal.

manually by tapping on a front-panel button or footswitch, or by sending MIDI Note On messages or even audio clicks into the unit. Video hit points can be input from a MIDI keyboard and locked to specific SMPTE times.

In addition, the unit performs several auxiliary operations. Both Read and Write modes let you specify an offset in the display. Time code can be recorded starting at any position other than 00:00:00:00, and the Read offset can "zero out" the display if desired. The Syncman Pro also provides an easy way to read, write, and display "user bits," which are commonly used to identify reels of film or audio tape.

If a tape has a bad SMPTE stripe (e.g., the level is too high or too low), or a section of the stripe is missing, the Syncman Pro can regenerate time code. Two regeneration modes are available: Spot (for a small section of tape) and Continuous. The Syncman Pro also can duplicate incoming SMPTE time code and send it on to another device. This function reshapes the time code pulses so that interference from noise reduction is minimized when copying SMPTE from one machine to another.

In Cue mode, the Syncman Pro records a list of MIDI Note Ons that are played back at specified SMPTE times to activate a MIDI device (such as a sampler), with sound cues assigned to different notes. This amounts to a "mini-sequencer" that plays back MIDI events referenced to SMPTE time rather than measures and beats. Up to 760 cue points can be stored. Cue mode also records up to 80 footswitch hits. On playback, these signals can be used to trigger punch-ins and punch-outs on the tape machine. This mode is fully independent, allowing you to trigger MIDI hit points and punches while synching sequencers and drum machines to film, video, or audio.

The Syncman Pro has just about everything for the producer of music for video or film.

The Utility mode sends and receives MIDI SysEx data that represents the Syncman Pro's memory. The memory is battery-backed, but saving tempo maps and cue lists may be important to users who need to create many

such files. I tested this function using Opcode's *Galaxy*, and it worked like a charm.

EVALUATION

The Syncman Pro has just about everything for the producer of music for video or film. Its SMPTE compatibility is right on the mark, with all sorts of useful sync functions. Operation is smooth and as simple as synchronization can be. Even complex tasks such as duplicating SMPTE while outputting MIDI worked the first time, glitch-free.

However, there are a few missing features that should be pointed out. For starters, I would like to see more user RAM, so you could store more than one tempo map or cue list. This is not a major problem, since the memory can be off-loaded to any SysEx storage device. But if a number of separate maps and cue lists are needed back-to-back, it takes some time to save and retrieve the data.

To be fair, MIDIMAN made a design decision not to partition the memory to provide multiple tempo maps. Not only would this have raised the price of the unit and required a significant overhaul of the user interface to allow map selection, but the feedback from users was clearly in favor of longer maps. So the current version of the unit provides a single tempo map up to fourteen minutes long. A memory expansion is available for $100 that increases the maximum tempo map length to 22 minutes.

If you're new to this technology, the owner's manual should be a comfort. Its step-by-step procedures are helpful for getting around the displays, although I would like to see an index and perhaps a brief glossary of terms.

Also, users who are accustomed to seeing the H:M:S:F display on their video monitor may be disappointed to learn that the Syncman Pro does not do a screen burn. The unit's display mirrors everything that a screen burn would tell you (and more, actually), but this omission could be a significant point for some users.

The last word on this box is that it does what it says. A well-designed unit, the Syncman Pro incorporates a complete array of SMPTE and MIDI synchronization functions. This product comes highly recommended.

Dave Bertovic *is a freelance writer, synthesizer addict, and sound mixer in L.A.*

AKG Tri-Power Series Microphones

By Michael Molenda

These "studio mics for the stage" are the best of both worlds.

New microphones are seldom treated to splashy, Hollywood-style premieres, so the promotion behind AKG's Tri-Power Series is impressive in its extravagance. Announced at the January NAMM show with full-page ads and massive press kits (custom binders, color brochures, black-and-white photos, color slides, stickers, and buttons), the mics boast a new look and several technological breakthroughs. And here's another surprise in this age, when many promise but few deliver: The line truly is worthy of the hoopla.

THE FAMILY TREE

The Tri-Power Series consists of four vocal and three instrument microphones rendered in sophisticated "dress black" with discreet green stripes and white logos. Each silhouette is a beautifully rendered ideal of practical sculpture. The triangulated body design (which fits into conventional mic clips) of the vocal microphones improves grip while evoking the lines of art deco masterpieces. There is no apparent practicality in the stubby shape given to the instrument models, but they look so cool that form definitely outranks function.

However, these microphones offer much more than enticing profiles. The shells are battleship-tough to withstand performance abuse, and sturdy plastic inner cages protect the neodymium/iron boron-alloy transducers.

THE VOCAL SIDE

Consisting of two high-end (D3900/D3800) and two budget models (D3700/D3700S), the Tri-Power Series dynamic vocal microphones feature hypercardioid polar patterns and maximum sound pressure-level ratings of 147 dB (with 1% total harmonic distortion). The D3900 posts a flat frequency range of 40 Hz to 20 kHz. However, this model features recessed

contour switches that amend frequency response to 100 Hz to 20 kHz with the bass rolloff deployed and 40 Hz to 22 kHz with the treble boosted. The D3800 does not include frequency contouring and exhibits a 40 Hz to 21 kHz range.

To AKG's credit, features were not slashed on the affordable D3700 model. (The D3700S is the same mic with an on/off switch.) Frequency response is rated at a respectable 60 Hz to 18 kHz, and the maximum sound pressure level matches the D3900/D3800 spec.

Both the D3900 and D3800 received AKG's patented Moving Magnet Suspension system (MMS), which diminishes handling noise by matching the dynamic motion of the magnet to that of the diaphragm. I don't really understand the technical gobbledygook, but I was astounded by the result: These mics can be shaken, swung, and rudely palmed without suffering excessive rumbling and "scratching."

Recently I recorded a singer in the traditional manner (an AKG C414 on a boom stand) and got a good sound, marred by a lackluster performance. Upon hearing the tracks, the vocalist admitted she wasn't used to singing without the microphone in her hands. Normally, a "mic holder" drives prissy engineers nuts because handling noise can ruin a beautifully recorded vocal. But I took a chance (hey, it's rock 'n' roll) and handed her the D3900. Please excuse the cliché, but I couldn't believe my ears. The vocal track was virtually unmolested by rumble or any other sonic problems caused by handling. To top it off, the mic's tone was frighteningly close to my expensive (and much revered) C414.

The next torture test was at my band's tiny rehearsal studio. Five vocalists, two guitarists, a drummer, a bassist, and a keyboardist are crammed into a closet and pummeled with the sheering midrange of cheap column-type P.A. speakers. Not surprisingly, turning the vocals up loud enough to even have a prayer of hearing them above the din of the instruments produces feedback so vile that I fear our DNA is mutated by each exposure.

However, the feedback problem

Product Summary

PRODUCT:
Tri-Power Series Microphones

PRICE:

Instrument Mics
D3400 $219
D3500 $239
D3600 $379

Vocal Mics
D3700 $189
D3700S $199
D3800 $279
D3900 $319

MANUFACTURER:
AKG Acoustics
1525 Alvarado St.
San Leandro, CA 94577
tel. (510) 351-3500

Vocal Mics (overall)

EM METERS	RATING PRODUCTS FROM 1 TO 5
AUDIO QUALITY	● ● ● ● ◖
VALUE	● ● ● ● ◖

Instrument Mics (not including D3600)

EM METERS	RATING PRODUCTS FROM 1 TO 5
AUDIO QUALITY	● ● ● ◖
VALUE	● ● ● ●

vanished when the D3900, D3800, and D3700S were employed. (The drummer retained his Shure SM58.) The sound-rejection on the AKG hypercardioid mics is among the best I've experienced. I could sing directly into the mic while snapping my fingers a few inches off to the side without the snaps being audibly disruptive.

Another exciting result was a huge improvement in the sound of the vocal ensemble. The D3900 and D3800 produced a sharp but intimate tonality usually reserved for high-quality studio microphones. Even the budget D3700S exhibited smooth, articulate timbres with warm bass response. Live background vocals sounded almost as lush as sampled choirs. Since our P.A. system is near-prehistoric, it was truly scary how good these mics sounded without the benefit of compression, comprehensive EQ, or other tonal enhancers.

AKG D3600 instrument mic

THE INSTRUMENTAL SIDE

If Lieutenant Worf rummaged through the starship *Enterprise's* weapons arsenal, I bet he'd find stun grenades resembling AKG's D3600, D3500, and D3400 cardioid instrument microphones. The futuristic design of these mics is remarkable for its subtle weirdness.

The D3600 (which was not available for review) employs separate high-and low-frequency, dynamic transducers to minimize the proximity effect exhibited by cardioid microphones. Frequency response is rated at 20 Hz to 22 kHz (flat) or 50 Hz to 22 kHz (with bass rolloff employed), and maximum sound pressure level for 1% THD is 147 dB. The D3500 and D3400 have single-element transducers, share the SPL rating of the D3600 and post a flat frequency response of 80 Hz to 20 kHz. (The D3500's bass rolloff switch amends its range to 120 Hz to 20 kHz when deployed.)

Each microphone has a built-in stand adapter and combats stage noise with an elastomer suspension system. The integrated stand adapter is a great idea —I've lost hundreds of the conventional detachable types—but the adapter's cushy suspension made it difficult to tighten the set screw after adjusting microphone angles. Although the mics never slipped positions, the shaky bond made me nervous.

Overall, the instrument mics are solid performers, though not as sonically impressive as the vocal models. The D3500 and D3400 exhibit a clean, sharp timbre that enhances some instruments and is problematic for others. On toms, the mics accent the attack of the drumstick and the initial tone produced by the impact. I found this characteristic a boon for eliciting crisp, aggressive tones from rack toms. However, the mics ignore the low "oomph" of floor toms unless console equalization is added. Snare and kick drums also sounded a bit thin for my taste when miked with either model.

Both mics worked beautifully with acoustic guitars, evoking shimmering bell-like timbres from nearly every angle, including close and "room sound" positions. I had less success miking guitar amps. The initial tone proved brittle whether the guitarist used a clean tone or distortion. For close-miking applications, I usually abandoned the D3500/D3400 for a Shure SM57 or Sennheiser MD421, even after tweaking the AKGs with compression, mic position, and EQ.

WRAP UP

I get suspicious when manufacturers tout a product as revolutionary. How many times must musicians be insulted by the same tired marketing jargon? However, the Tri-Power Series deserves the over-enthusiasm of the AKG sales force. These are excellent microphones that deliver on the hype. Each model offers near-indestructibility, immunity to most handling noises, sexy looks, and great sound. And although AKG

won't replace the pretty face on their print ads with my tattered visage, I nonetheless testify that the Tri-Power Series is an exciting addition to my microphone palette.

Interval Music Systems' *s-EDIT* (Mac)

By Peter Freeman

Complete onscreen editing for the Akai S1000/ S1100 samplers.

Although the Akai S1000 and S1100 are great-sounding and popular samplers, navigating through the various layers of pages and submenus from their front panels can be a rather frustrating experience. The first S1000/S1100 editor, Interval Music Systems' *s-EDIT*, allows nearly all of the samplers' functions to be accessed from the Macintosh by acting as a software front panel. The program greatly simplifies time-intensive tasks such as setting up a new patch with a lot of Keygroups.

I used an S1000 and tested the software on a well-equipped Mac IIci running System 7.0 (the program is System 7.0-compatible, but not 7.0-savvy). According to Interval, you only need a Mac Plus with 1 MB of RAM and a pair of floppy drives. *S-EDIT* fully supports Mark of the Unicorn's MIDI Time Piece.

▼

S-EDIT greatly simplifies time-intensive tasks.

THE LOWDOWN

The program has three main windows: Catalog, Program Edit, and Map-O-Rama. The Catalog window displays the current contents of the S1000's memory, but the real action takes place in the Program Edit window. Each Keygroup in any current S1000 Program is accessed and edited individually, with complete onscreen control over all parameters.

Each Zone in a Keygroup is addressed separately. The four Zones are displayed from left to right and viewed by scrolling. Those with larger (19-inch and up) monitors will enjoy the most convenience; simultaneous display of all parameters in one or more Keygroups requires a lot of onscreen real estate. This is unfortunate, as it means a lot of scrolling around the screen when working with many Keygroups. However, there probably is no other practical way to achieve the same result. You also can jump directly to a Keygroup by sending the program a MIDI Note On message.

A variety of onscreen controls such as faders, knobs, numerical fields, and line-segment envelopes are used to edit the various parameters. In addition, *s-EDIT* (like Interval's other programs) allows any MIDI Continu-

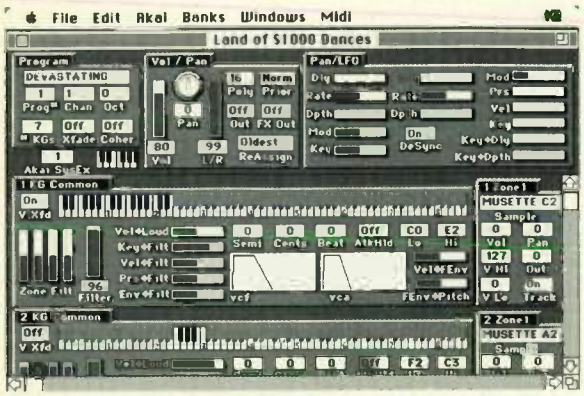


FIG. 1: In *s-EDIT's* Program Edit window, you can use virtual faders, knobs, numericals, and line-segment envelopes to edit all parameters of each S1000 Keygroup.

ous Controller to be defined as a parameter slider. Once defined, clicking on the desired parameter and moving the MIDI controller (the Mod Wheel on your master controller, for example) provides instant access. This is an extremely cool feature and should be implemented by every manufacturer.

One of *s-EDIT*'s most useful features is its ability to Auto Map samples based on user-defined criteria and then automatically create a Program. This saves a lot of time and button-pushing. In this process, select the desired samples in the Catalog window by Shift-clicking on their names, then click the AutoAssign Selected Samples button in the Create a New Program dialog box. Next, the Map-O-Rama dialog box appears, with various split and tuning options (Split around Original Pitch, Even Split across 8 Octaves, and so on). After selecting the desired choices, *s-EDIT* creates the new Program in the S1000 in a few seconds. This feature alone is reason enough to buy the program.

Among *s-EDIT*'s other noteworthy features is the ability to graphically set sample key ranges in a Keygroup by dragging the mouse across an onscreen keyboard. This can also be done by clicking in the Hi and Lo Note fields and playing the appropriate notes on your MIDI controller—very convenient. Keygroup parameters can be copied and pasted from one Keygroup to another, which also is a time-saver. *S-EDIT* includes a Manage-KG page that allows Keygroups to be copied, inserted, and deleted, and a Rand-O-Pan option that randomly sets the pan position of each Zone in a Keygroup.

The S1000's response to System Exclusive messages sometimes is erratic, so the manual thoughtfully provides information about which front-panel settings are best and worst when using the program. This is helpful, as this type of problem can be irritating and hard to track down. While we're on the subject of the manual, it is brief but fairly good and covers the program's features well.

CONCLUSIONS

S-EDIT makes working with the S1000 and S1100 much more convenient, greatly speeding up operations. I was hooked; I definitely did not want to return to using the S1000's front panel. If you own an S1000 or S1100 and a Macintosh, *s-EDIT* will prove an invaluable tool.

Product Summary

PRODUCT:
s-EDIT 1.0.3 editor for Akai S1000/S1100
PRICE:
$189
SYSTEM REQUIREMENTS:
Macintosh Plus or better with two 800 KB floppy drives or hard disk, 1 MB RAM, and System 6.0.3 or higher; System 7.0- and *MIDI Manager*-compatible
MANUFACTURER:
Interval Music Systems
12335 Santa Monica Blvd., #244
Los Angeles, CA 90025
tel. (310) 478-3956

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ●
EASE OF USE	● ● ●
DOCUMENTATION	● ● ●
VALUE	● ● ● ◖

Peter Freeman *is a freelance bassist/synthesist and composer living in New York City. He has worked with John Cale, Chris Spedding, Hipsway, Jon Haskell, L. Shankar, Sussan Deihim, and Richard Horowitz.*

label representative, be polite and charming. Do some research and find out what other bands he or she works with and what type of acts the label is known for (alternative, avant garde, heavy rock, commercial pop). Use this knowledge as a common thread of conversation. Do not talk about yourself ad nauseam or try to hard-sell your band. (Your music does the selling, not your mouth.)

Preliminary contacts with industry professionals should follow accepted rules of courtship. Update your promotional package with your latest demo tape and call the lawyer, manager, or other representative you are pursuing to ask if they are accepting tapes and/or new clients. If the answer is yes, type a short cover letter to the person you contacted (never scrawl a handwritten message on a scrap of paper; it may be charming, but it's not effective) and send the package. Always follow up with a phone call ten to fourteen days later. Be polite. Be charming. Invite them to your shows. If there is any interest on their part, arrange a business meeting.

When you take this business meeting, be punctual, well-groomed, polite, and professional. Be prepared to explain your vision of creative and financial success. Ask specific questions regarding client rosters and industry contacts. Listen closely to what the representative says and trust your instincts.

▼

The rule of thumb is: Hire a lawyer and marry a manager.

It also pays to keep a log of everyone you meet in the industry, from club bookers to engineers to label reps. Just because a lawyer or manager passes on you doesn't mean you shouldn't keep them informed about your progress. They may reconsider their decision or forward your name to another industry contact. Be sure to use the log to chart the successes of the people listed. Everyone appreciates recognition of their work. If you see a contact at a show, compliment them on their latest triumph, and don't miss the opportunity to update them on your career.

CLOSING NOTES

When you finally catch the ears of industry bigwigs, your fate is in the hands of the gods. Initial interest always means more work: improving your live show, writing better songs, producing yet another demo tape, and so on.

I can't stress how important it is to treat every aspect of your career professionally. If you act flaky, it will be a struggle getting people to take you seriously. Treat everyone you meet with respect, from the lowest door-person to the president of a record company. You never know, in two years that door-person could be a record company president.

Nadine Condon *is a music business consultant specializing in promotional strategies. Her clients include BMI, The Polygram Label Group, MCA Records, and Island Records.*

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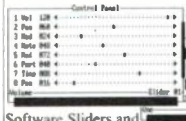

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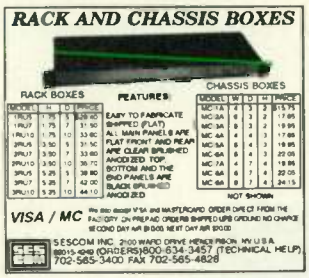

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Expressive Electronics

What makes an electronic instrument feel and sound expressive?

By Robert Rich

A real musical instrument lives and breathes. It screams when you hit it, it purrs when you stroke it. It pushes back. Musical sounds are gestures; we must actively maintain them to keep them alive. The tone of a flute lives only as long as your breath. Musical sounds respond to context: A cymbal sounds different with every strike, and its harmonics build in complexity with repetition.

Can we make electronic instruments do all that? I think we can. We need to improve at least three areas to achieve this goal. First, we need to explore new methods of synthesis. Second, we need to pursue performance controls that feel intuitive and physical. Third, we must master these new electronic instruments to make full use of their expressive depth.

Electronic instrument manufacturers are feeling a big financial pinch these days. Lackluster markets trigger conservative thinking, which spells death for an industry that thrives on creativity. Let's not get complacent; escaping the doldrums requires radical action. Here's my map for the future:

We have not exhausted the range of synthesis techniques. Dozens of untapped ideas have popped up in computer music labs throughout the world.

The hardware is no longer very expensive, and much of the theoretical groundwork is already laid. I know hackers who are playing with this stuff on their home computers.

So what's new? Let's start with modulation. High-frequency modulation has almost been ignored since the analog days, and it could breathe new life into digital synthesis. We know the rich potential of FM, but what about amplitude modulation (AM), granular synthesis, or high-frequency filter modulation? The results can be non-linear, chaotic, and beautifully grungy.

Let's make samples obsolete. First we must separate pitch from duration, then get to the roots of timbre. A musical gesture should fundamentally change a sound's overtone structure. We might accomplish these goals with waveform interpolation, phase vocoding, or resonant synthesis. Store a description of a sound, then rebuild it in real-time. Physical modeling may prove even more powerful, although it has limits: What equations could model the sound of a train wreck?

Expressive control involves the ability to change several complex parameters at once with a single physical gesture. Consider the drum: Its sound changes in several fundamental ways depending on where and how hard you hit it, with complex interactions between loudness, pitch envelopes, overtone relationships, distortion, and rattle. It sounds slightly different every time you hit it.

How can we make a synth do that? Imagine a macro knob labeled "Gruzz" that can continuously modulate the timbre at a fundamental level. As you turn this knob, the sound gets "gruzzier." When you lean into a note, it gets even gruzzier. Once you can map controls such as these to intuitive physical gestures, you'll have something that feels more musical. An intuitive gesture connects the way you start a note to the way you sustain it and end it. Overblowing a flute is intuitive, as is twisting a violin bow, bending a guitar string, and spitting into a trumpet. Let's at least make polyphonic aftertouch a standard feature.

Controls like the Gruzz knob should form the highest level of a multi-level user interface. Deeper down, expert modes would provide macros to help tweakers perfect their own sounds, patch their own algorithms, and assign controllers to groups of parameters that affect each other in complex and chaotic ways. In other words, users could create their own Gruzz knobs. A synthesizer should allow people to break convention; it should reward creative abuse like a guitar rewarded Jimi Hendrix. Now there's a challenge!

Expressive sounds need an expressive interface, but expression takes time to master. Who is going to take time with an instrument that doesn't reward the effort? Who is going to commit a lifetime of practice to an instrument that becomes obsolete in two years? I maintain that if an instrument provides the right kind of expressive depth, if it responds to subtle gestures with living, breathing, dynamic music, it will not become obsolete. It will encourage deep study.

Until a synthesizer can claim the lifetime attachment of a guitar, piano, or saxophone, it will fall short of being a true musical instrument.

Robert Rich *has numerous albums on European and American labels. He plays electronic music with acoustic instruments, and vice versa.*

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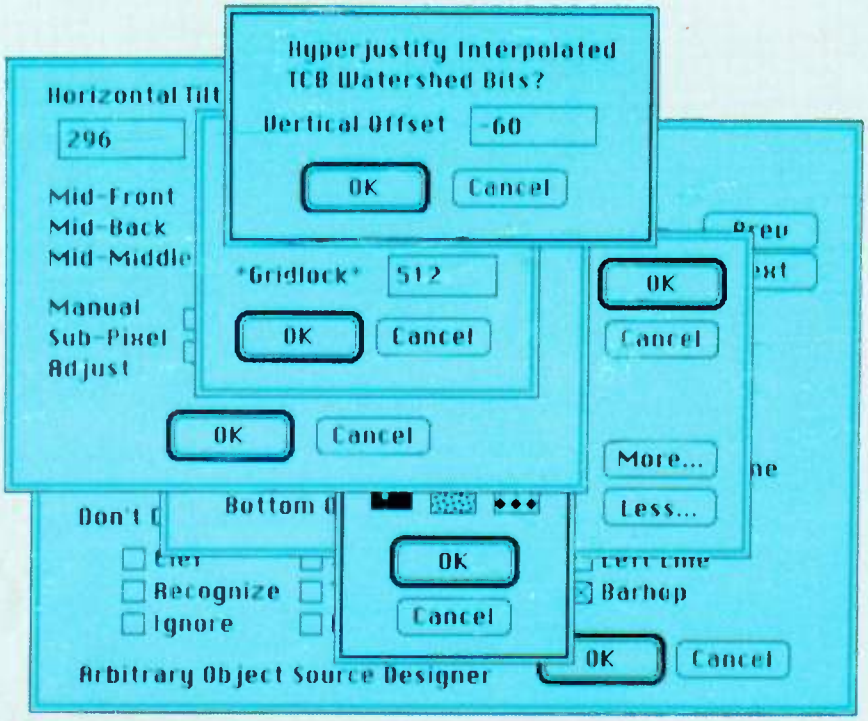

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