HOT GEAR ! Sampler Buyer's Guide PLUS Eight Great Reviews

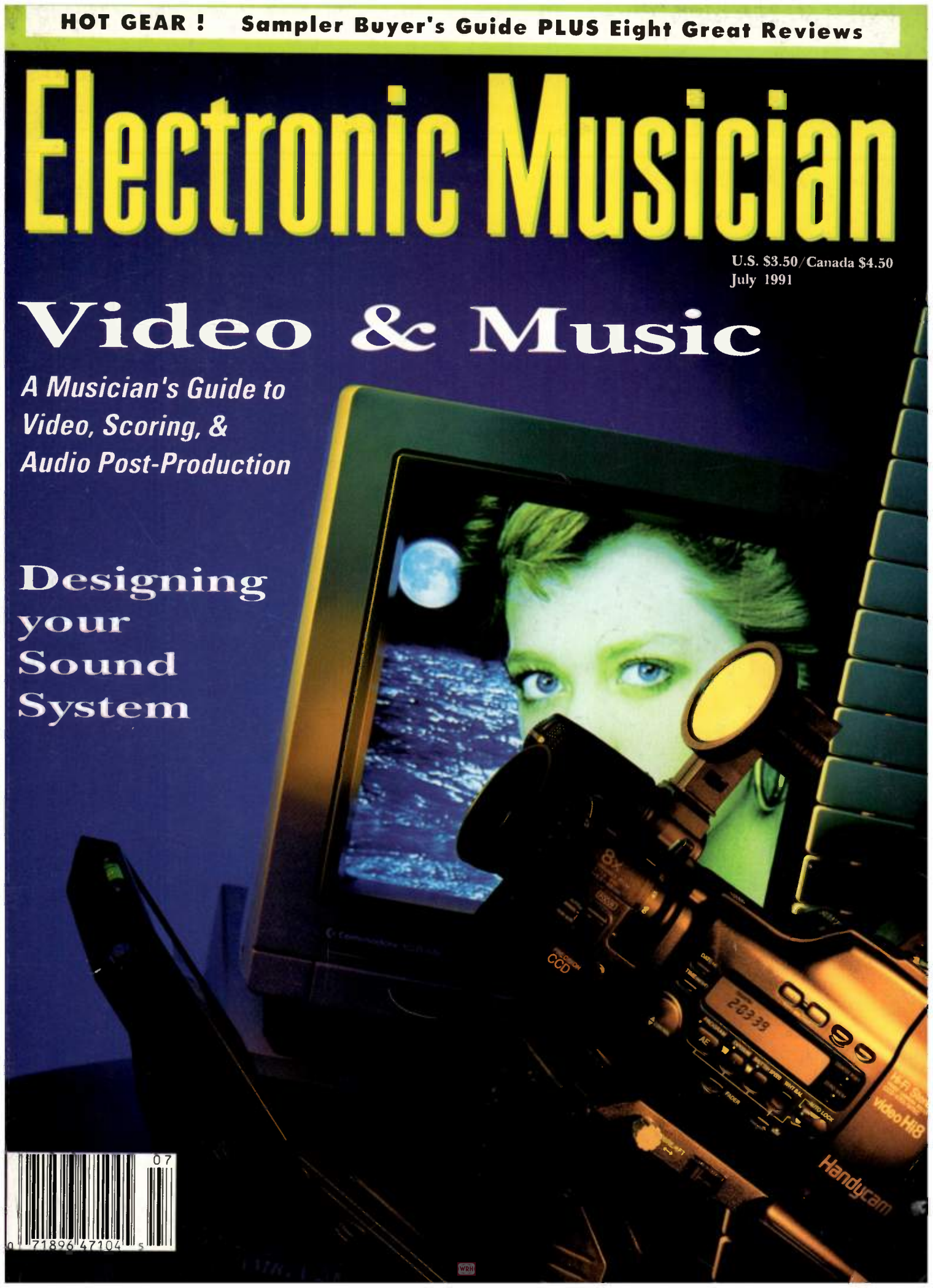
# Electronic Musician

U.S. $3.50/Canada $4.50
July 1991

## Video & Music

*A Musician's Guide to Video, Scoring, & Audio Post-Production*

## Designing your Sound System

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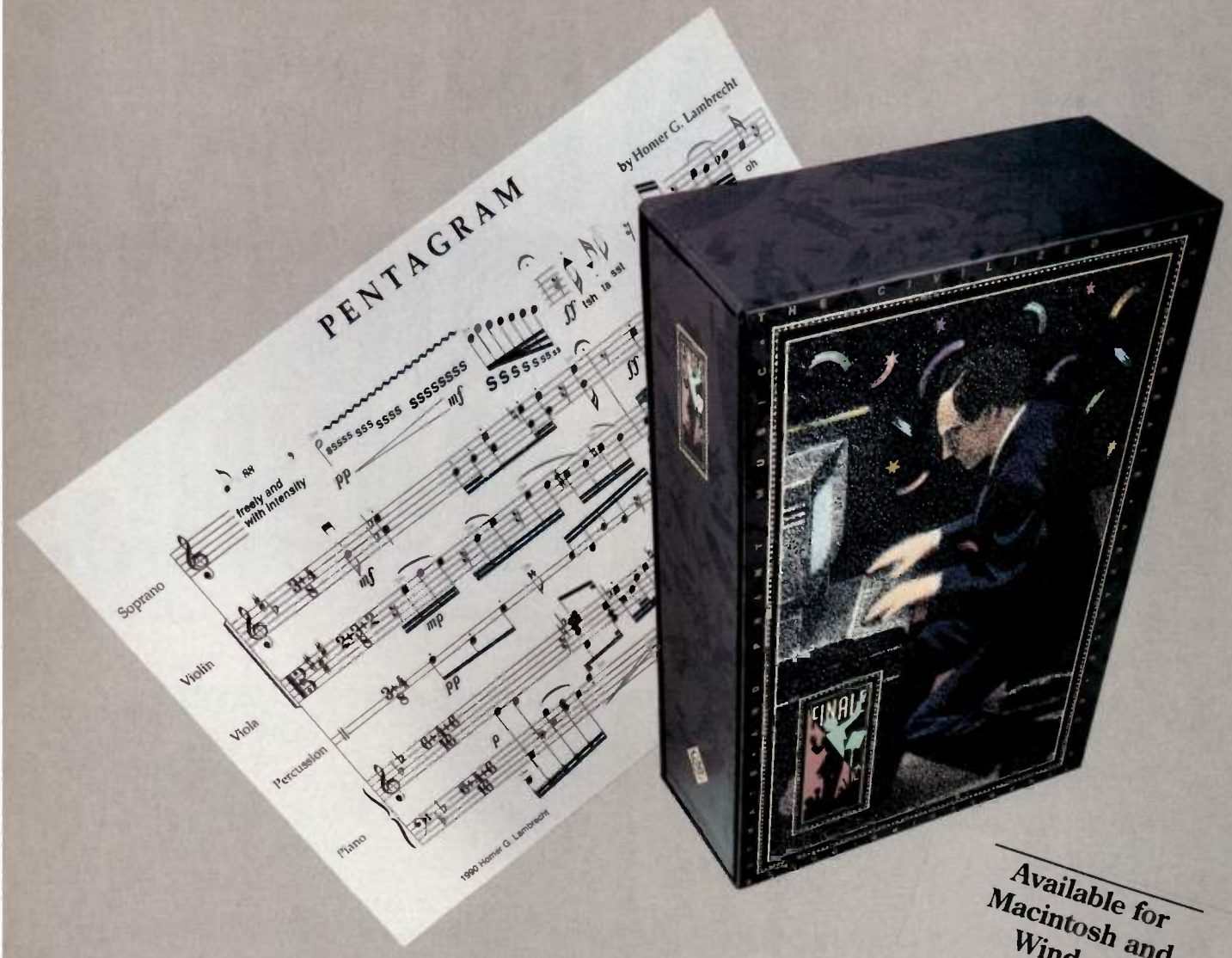


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# Electronic Musician

AN ACT III PUBLICATION
JULY 1991 VOL. 7, NO. 7

## features



## columns



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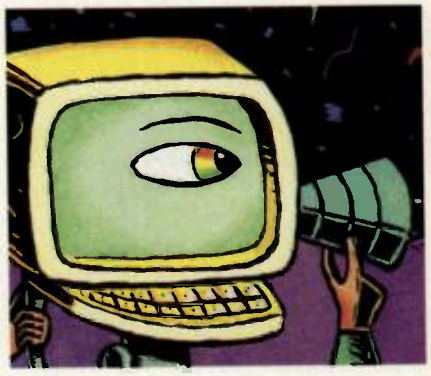

## reviews



## departments



**Cover: Photo by Robert Holmgren. Special thanks to Sony Corp., NewTek, Cinema Products Corp., and Commodore Business Machines.**

# Music and Video

Creative videomaking and scoring now are within the financial and technical grasp of electronic musicians.

The worlds of music and video often have been intertwined, but only recently has a video project—including scoring, producing, or both—been a realistic option for most electronic musicians. Either the "entrance fees" in required equipment were too high, the operation too confusing, or the opportunities simply lacking. But a number of interrelated developments are changing that situation.

First, the price of professional-quality video gear has dropped dramatically. Top-level consumer gear now offers capabilities previously reserved for broadcast-caliber production houses at a fraction of the previous cost. Hi-8 and S-VHS camcorders, video processing systems, and more are fueling an explosive new market. In fact, the development bears a striking resemblance to the home studio phenomenon. Pro-quality video production in the home is now a reality.

Second, the growth of multimedia and computer-related video products is spawning fresh interest in the field of video. Creative people who once were satisfied with participation in a single media are seeing the benefits of combining multiple media in their work and want to branch out into related technological fields. With the ubiquity of music videos, musicians seem particularly interested in video, even if they only want to learn more about how the process and technology works. Also, creative computer users are always eager to find new applications for their machines. Consequently, many multimedia-minded musicians are gravitating towards computer-based video editing, processing, and image creation as an adjunct to their desktop music production.

Finally, video applications and the demand for videos continue to grow, offering more opportunities for musicians and fledgling video producers. Instructional videos, video manuals, industrial videos, and other video projects are being produced on a more frequent basis as a direct result of lowered production costs. In addition, the quality of these videos is improving, and the need for higher quality music and sound is becoming more readily apparent.

Thanks to these developments, electronic musicians should expect video projects to be much more common, either as regular work or for personal creative enjoyment, or (hopefully) both.

To give you a head start on the subject, we've put together this special video issue. We offer enough information to get you started, then point you in the right direction should you wish to continue. "Scoring to Picture" discusses the creative and technical challenges facing the film composer; "Video for Electronic Musicians" provides a technical introduction to the subject matter as well as a glossary of video terms; the related "Computer Musician" column, "Desktop Video," ties in the computer connection; "Sampling Goes Hollywood" describes video-related post-production applications for your sampler; our "From the Top" beginner's column reveals the "Secrets of Synchronization"; and reviews of NewTek's Video Toaster and Opcode's *Cue* give you a perspective on some of the tools being used in video production and scoring. (If you're not interested in video, we also included a buyer's guide to samplers, an article on sound systems, and lots of other reviews.)

Though working with video will be a new experience for most electronic musicians, it should be a highly enjoyable, inspiring one for those who attempt the challenge. The initial projects may be difficult, but once you've made the plunge, there's no turning back.

Bob O'Donnell


# Electronic Musician

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**ELECTRONIC MUSICIAN OFFICES**
**National Editorial, Advertising, and Business Offices**
6400 Hollis Street #12
Emeryville, CA 94608
tel. (415) 653-3307
FAX (415) 653-5142

**Southern California Advertising Office**
tel. (818) 709-4662
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**Subscription Services Office**
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Nashville, TN 37204
tel. (800) 888-5139
or (615) 377-3322

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# LETTERS

Kudos, clarifications, and commentaries fill this month's collection of correspondence.

### LUDWIG, GIL, AND YOU

I agree with Mel Lambert ("Back Page," April 1991) that electronic music produced on a sequencer is often just plain boring.

To add to Mel's thoughtful suggestions, here's another tip: Stay away from your keyboard or fretboard. Write it in your head first. This way, you won't compose another tune consisting of the riffs and chords your fingers know all too well.

It's a technique that worked for Beethoven, Gil Evans, and most big band arrangers. When you take that musical sketch back to the keyboard, you might be amazed by what your head hears when it is not limited by technique.

**Bill Somers**
**Calgary, Alberta**

### GOOD GUIDE

I congratulate your staff on the "Buyer's Guide to Cassette Ministudios" (May 1991). It was a complete and well-thought-out piece.

It seems strange, but a lot of people buy a multitrack without investigating which models best fit their needs. A lot of consumers become disenchanted with recording when the unit they buy does not perform the tasks they intended for it.

With more insightful articles being published, people will hopefully begin to make more knowledgeable decisions when purchasing electronic equipment.

**Mike McDevitt**
**MIDCO International**
**Effingham, IL**

### EPS 16-PLUS

Regarding your review of the EPS-16 Plus (April 1991), Gary Hall mentioned that third-party sample disks created on the EPS will still be 13-bit samples when loaded into the EPS-16 Plus. This is not exactly true. Third-party companies that actually did their sampling directly into the old EPS (using the internal analog-to-digital converters) will indeed be 13-bit samples. However, if the samples were transferred into the EPS over MIDI or SCSI, they bypass the converters and are saved to disk as 16-bit data files. So, if your original was done on a 16-bit machine (as all our samples are at Livewire Audio), even if the samples were saved on an old EPS they will be loaded into either EPS model as 16-bit samples.

I hope this helps clear up some confusion.

**Mick Seely, President**
**Livewire Audio**
**Oceanport, NJ**

*You're quite right, Mick. The review comments apply to sounds that are actually sampled into the EPS, but the wording made it ambiguous. Thanks for the clarification—Gary H.*

### MIDI BASS CONTROLLERS

In his reply to a letter in the April 1991 **EM**, Bob O'Donnell said there are no bass synth controllers. That is a mistake. I just read an article in the March/April *Bass Player* magazine about them.

As a bassist, I've been looking for MIDI bass for a long time. I have a PG380-MIDI guitar that I'm happy with as a guitar, but guitars do not play like a bass.

**Dale Janus**
**Warren, OH**

*Dale—At the time I wrote the response to that letter there was a great deal of confusion surrounding the availibility of certain products, and I was informed that certain products I thought were available no longer were. It turns out the Valley Arts MB-4 MIDI Bass (a retrofit fret-switched system distributed by Valley Arts Guitar, tel. [818] 764-9604) is once again being imported from Australia. Also, Gibson's* Max *system, reviewed in the March 1991* **EM**, *can be used with bass, but you must use lighter-gauge strings.—Bob O'D.*

### THE BASIC ISSUE

Just about choked on my granola bar when I read Jay Meyers (March 1991 "Letters" ) comment on the back-to-basics issue: "I don't have time to waste on issues that take me back to basics." When will we ultra-hi-techno, electro-nuts (musicians?) learn that simplicity is the key to understanding the most complex issues in any field.

I have worked in cardio-pulmonary research involving enough sophisticated instrumentation to fill a black

DAVID POVILATIS

hole. Still, if I could not appreciate a back-to-basics review of the pulse, I would truly know nothing.

Thanks, **EM**, for giving the whole picture. And Jay, either get Zen or skip those basic articles.

**Paula J. Mack, DVM**
**Ramona, CA**

I am a professional musician who at times picks up on forgotten, or new, factors in **EM** that others haughtily label "basic."

Points that are basic, I have brothers and sisters that can use them. Points that are advanced, I have brothers and sisters that can use those also, and I aspire to their level of expertise.

**JB Clark**
**Reston, VA**

## MIND, BODY, AND MUSIC

In trying to make a valid point about the physical aspect of information on electronic music, David Zicarelli ("Back Page," February 1991) seems to have drawn some fundamentally incorrect conclusions about the creative process and music composition.

John Coltrane may not have produced his greatest work sitting at a desk, but Igor Stravinsky did. At a desk, using pen, ink, and an obscure mechanical device called a piano, he wrote his great music. Stravinsky couldn't play the bassoon, but if you listen to the opening measures of the "The Rite of Spring," it is clear he knew how the bassoon was played, and knew only the bassoon could provide the expressive characteristics he wanted. Many composers work in this fashion, and it is not a long jump from pen, ink, and piano to PC, software, and controller. The means of music production are artistically irrelevant.

The bottom line is, "How does the music sound?" How it was produced is only a curiosity, and knowing this cannot be a prerequisite for the music to have its full impact.

From another perspective, people with physical disabilities are not limited with regard to creating and producing music. In fact, they look upon electronic music and current technology as a way to express their musical creativity. Let's not pretend that the individual's physical involvement in making music is a crucial factor.

**Dan Daily**
**Montgomery, AL**

While Mr. Zicarelli makes some worthwhile points in his "Back Page," I feel he is way off-target on others.

The mind and the body are of equal importance in making music. The mind controls the body, and the body is the vehicle for the mind. The connecting force is the soul; without the soul, mind and body operate without any clear, preconceived direction or motivation.

Music has never consisted of data. Data itself is meaningless; it takes the intervention of flesh-and-blood people who, through manipulation and transmission of data, invest it with meaning.

The computer-based synthesizers and sequencer software we use today provide the computer musician with more power to manipulate their sounds than ever before. But there's a catch: Using this power to greatest advantage requires an investment of time and energy. With increased freedom comes increased responsibility.

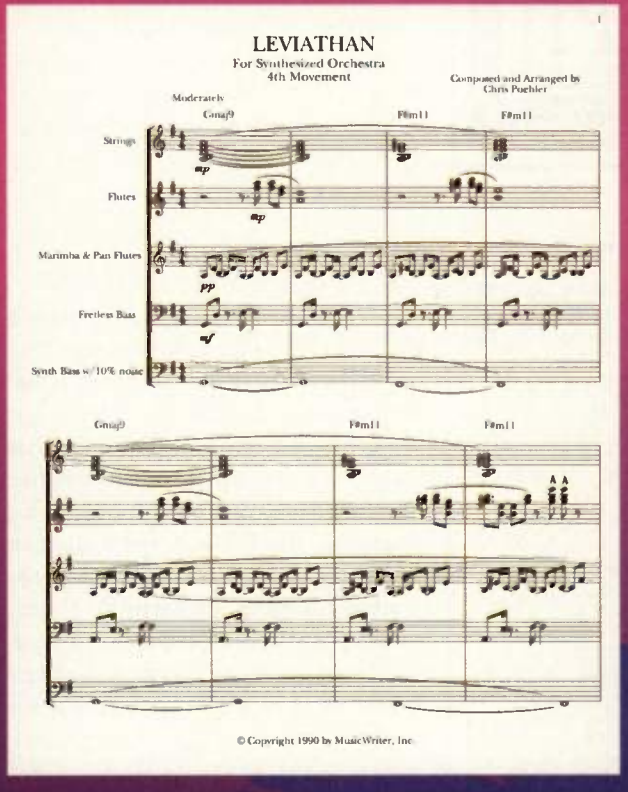
User interfaces are more at fault here than musicians. Computers and synthesizers are difficult to get a handle on. To make these devices accessible, synth designers and software programmers build user interfaces that make learning as painless as possible. This encourages users to take short cuts, to fall into patterns that make creating music with these new tools easier, but sap the life out of it. What takes work is using these tools to make music that sounds interesting, that has a visceral quality.

It is up to us to either train ourselves not to use these tools in a predictable fashion, or start demanding that software programmers and synth designers create programs and user interfaces that push us away from habit and more towards experimentation.

**Thomas O'Neill**
**Trumball, CT**

*David Zicarelli responds: In my article, I emphasized the need for computer music technology to consider the wide, expressive*

# Write Before Your Very Eyes!

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PASSPORT

*range of bodily gestures. I mentioned Coltrane—and not Stravinsky—specifically because I take African-American improvised music as my starting point. There is plenty of other software and hardware out there devised by people more likely to be devotees of the Western symphonic tradition.*

*Most "user interfaces" are not the problem. Even to think of musical performance as passive use is to admit defeat. When was the last time you "used" your guitar, or even your car? Merleau Ponty said in his* Phenomenology of Perception *that our bodies "inhabit" the space of physical devices we learn to operate skillfully. This is true even of the physically impaired, and it seems unfair to these individuals to imply they only possess a "mind" because something about their body is not in perfect working order.*

*In many ways, I don't think we should emphasize experimentation and exploration over repetition and habit. Experimentation is pretty easy: Either you're a genius, or you're wrong. My point was that it is ultimately a trap to believe computers take you out of the journey of "mindless" repetition and habit, which is in fact the essence of being a musician.*

### SHORT-LIVED NIRVANA

Laurie Spiegel aptly coined the label "intelligent instrument" for her *Music Mouse* (mentioned in "Beyond Sequencing: Interactive Electronic Music" in the February 1991 issue). That seems a good name for the new genre of virtual instruments composed of an electronic music system that includes a computer for generating, or remapping, controlling information. Unfortunately, learning techniques of a manual instrument don't apply to an intelligent instrument. There aren't a lot of muscles to train, but it does require practice. Instant gratification seekers will find Nirvana for the first few sessions, but then realize that this instrument takes as much practice as any other.

**Don Malone**
**Sharon, WI**

### ERROR LOG

April 1991, "EM Guide to Hardware Sequencers," p. 81: All three Brother sequencers offer Channel Reassign when receiving data, and the PDC-100 permits Transmit Channel Reassign. ●

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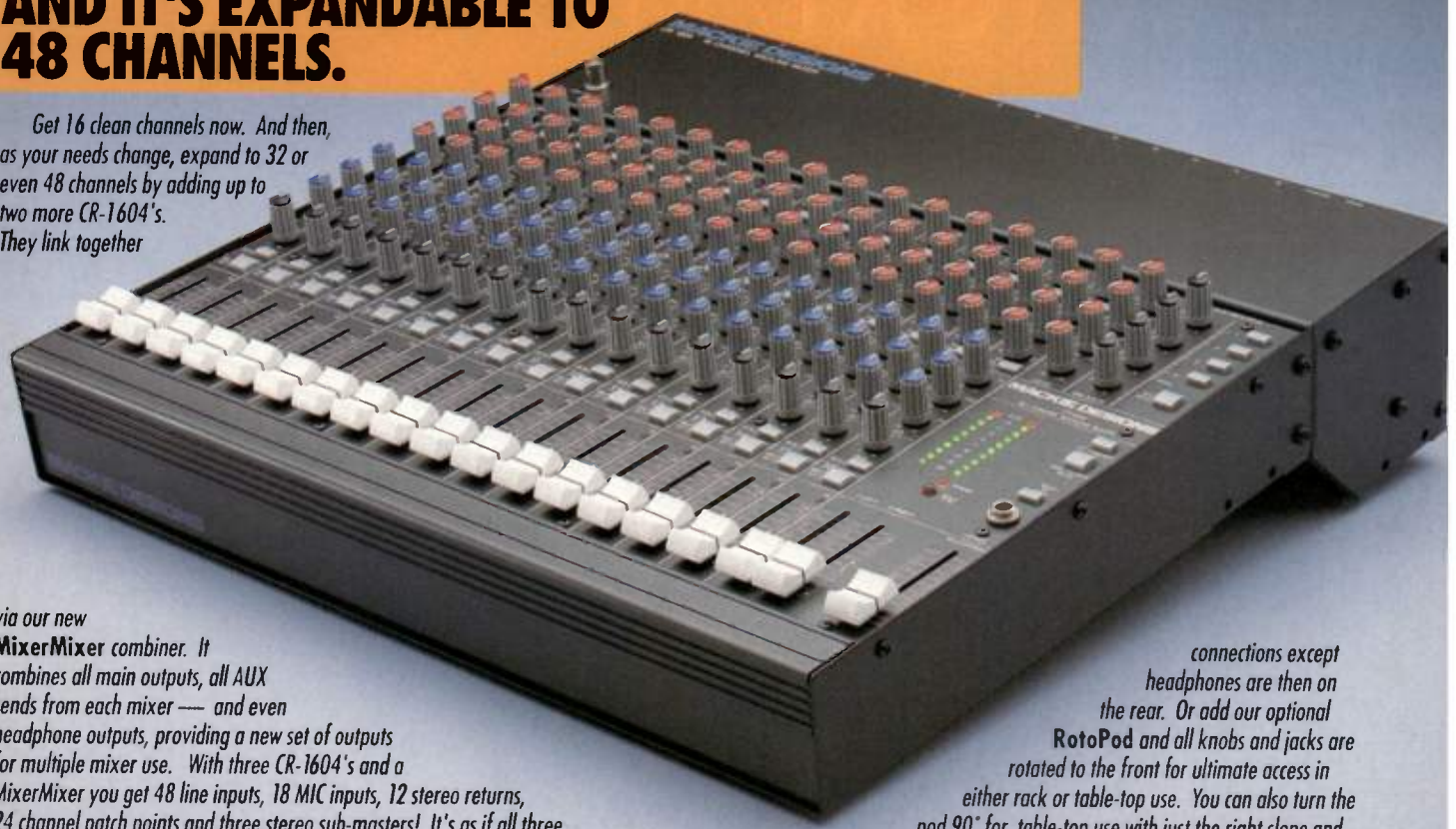

*Get 16 clean channels now. And then, as your needs change, expand to 32 or even 48 channels by adding up to two more CR-1604's. They link together via our new* **MixerMixer** *combiner. It combines all main outputs, all AUX sends from each mixer — and even headphone outputs, providing a new set of outputs for multiple mixer use. With three CR-1604's and a MixerMixer you get 48 line inputs, 18 MIC inputs, 12 stereo returns, 24 channel patch points and three stereo sub-masters! It's as if all three mixers were one.*

*connections except headphones are then on the rear. Or add our optional* **RotoPod** *and all knobs and jacks are rotated to the front for ultimate access in either rack or table-top use. You can also turn the pod 90° for table-top use with just the right slope and quick, convenient access to all inputs/outputs.*

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*Because all input and output circuitry is contained in the CR-1604's pod, you'll be able to add specialized Mackie control modules later. Numerous products are currently in development.*

## RUGGED CONSTRUCTION AND DETAILS THAT COUNT.

*Greg Mackie brings 20 years of practical design and production experience to the CR-1604. So you can be sure it's no lightweight, physically or electronically. You get a steel chassis,* **built-in** *power supply, double-redundant parallel-wired dual pots and environmentally-sealed rotary controls. It's reliable, roadable and backed by an unusually-long, confident warranty.*

## INTELLIGENT EQ POINTS.

*Because we so unflinchingly scrutinized "features" others take for granted, the CR-1604 delivers many un-typical but refreshingly useful differences. Like equalization centered where it's most musical: Bass at 80Hz (not 100Hz), midrange at 2.5K (not 1K), and HF at 12K (not 10K). Small touches, but indicative of the thinking behind every facet of the CR-1604.*

## 7 AUX SENDS PER CHANNEL.

*The CR-1604 can run 7 sends at once: 4 simultaneously per channel. AUX 1 has a pre/post button (separate busses) for multi-track or stage monitoring. AUX 2 is post; AUX 3/4 have shift buttons that convert them to AUX 5/6. This adds up to a remarkably flexible send section in a compact mixer.*

## PHANTOM-POWERED +48V MIC INPUTS.

*Not just afterthought XLR's stuck on the back, but discrete, balanced microphone preamps as good as you get in a big console or one of those expensive separate boxes. Four conjugate-pair transistors with large emitter geometry reduce distortion at all levels, and deliver extremely low noise (our published spec –128 dBM @150 ohms is real and verifiable). Attach our XLR10 module to add ten more MIC preamps quickly and economically.*

## THE ONLY MULTI-CONFIGURABLE MIXER.

*Our moveable "connector pod" attaches three ways and changes in five minutes. When rotated to the back, the CR-1604 becomes a 7-space rack-mount mixer. All*

## FOR JUST $1099, MORE IS LESS.

*The CR-1604's only flaw may be its price: Comments on warranty cards indicate some people think we're not charging* **enough** *for this much mixer. But then, Greg Mackie's philosophy is that with the right attention to detail, quality and performance don't have to cost more.*

*We've only touched on a few of the CR-1604's innovative features in this ad. For the whole story, call or write for a detailed 6-page brochure. Then see your nearest Mackie dealer to check out the CR-1604's sonic performance and features for yourself.*

*Yes, this remarkable design is real.*
*And you can own one right now.*

**CR-1604**

- 7 AUX sends per channel
- 4 stereo/8 mono effects returns
- Balanced main outputs (+28dB)
- +4 and -10 operation
- 8 direct outputs
- Inserts channels 1-8
- Studio-grade MIC preamps
- In-place stereo solo
- UnityPlus℠ gain structure
- Less than 0.025% distortion 20Hz-20KHz
- Frequency response 20Hz-20kHz ±1dB
- Occupies just 7 rack spaces
- 3-year Limited Warranty

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Beat the heat and ease your summertime blues with a 16-bit sampling board for the Amiga, an 88-key MIDI master keyboard, and a cool selection of dynamics processors and speakers.


Doepper LMK3 Keyboard Controller

## DIGITAL AUDIO

Beta Unlimited's **AudioLink** ($1,295) is a RAM-based, 16-bit stereo digital sampler on a card for the Commodore Amiga.

The system includes an internal card, an external analog-to-digital converter, and sound-editing software. The card comes with 1 MB of RAM but can be expanded to a maximum of 16 MB via standard Amiga SIMMS. According to the manufacturer, AudioLink provides sixteen voices in mono (eight in stereo) and offers variable sampling rates, including 44.1 and 48 kHz in stereo and 96 kHz (2x oversampling) in mono. Claimed frequency response is 20 Hz to 20 kHz (at 44.1 kHz), S/N is greater than 92 dB, and THD is .001%. The system, which supports MIDI, includes an S/PDIF digital interface, stereo audio outs, and sixteen multiple RCA outs with separate D/A converters on each out.

Software features include cut/copy/paste between voices; real-time playback; invert, reverse, and looping; loop start, end, and splice; zoom in/out; peak-level indicators for recording; multiple save formats, including AIFF and SAMP; and online, context-sensitive help.

**Beta Unlimited**
**87 Summit St.**
**Brooklyn, NY 11231**
**tel. (718) 852-8646**

## MIDI CONTROLLERS

The Doepper LMK3 ($1,595, including shipping and handling) is an 88-key, weighted, "piano-touch" MIDI master keyboard built into a flight case. The German import has monophonic aftertouch, two wheels (one spring-loaded), two data sliders, a data-entry wheel, and jacks for a double footswitch and sweep pedal, all of which are assignable to any MIDI controller. The LMK3 includes 32 velocity-response and eight aftertouch curves and can be split into eight overlapping keyboard zones. A Velocity Split function automatically transmits data on the next higher MIDI channel once a user-defined velocity threshold is reached. Program Change commands can be sent on a selectable MIDI master channel. You can program, name, and save 64 keyboard presets (in battery-backed RAM), with programmable controllers; MIDI Clock tempo; Start, Stop, or Continue command; and program number for the next footswitch-activated program change. Additional features include two parallel MIDI Outs and a panic button (which sends All Notes Off commands and reinitializes controllers).

**Cedos Corp. (distributor)**
**426 E. North St., Suite 209**
**Waukesha, WI 53188**
**tel. (608) 277-83050**

## TRANSDUCERS

Bag End Loudspeakers is shipping the **TA15-C** ($890), its first 2-way sound-reinforcement system with a 15-inch woofer. The TA15-C, a Time Aligned system, includes a Bag End E-15 380 mm bass driver and an E-500 constant-directivity horn and driver in a ported cabinet. The 37 × 22 × 18-inch box weighs 78 pounds and handles 200 watts of continuous sine wave, 800 watts peak, into 8 ohms. (The manufacturer recommends 400W/channel of power amplification, with a system limiter to prevent clipping.) Dispersion is 90° horizontal by 40° vertical. Inputs include two ¼-inch phone jacks, a double banana jack, and a Speakon connector.

Bag End also offers a slightly smaller, slant-wedge monitor version, the TA15-A ($890).

**Bag End**
**Loudspeaker Systems**
**PO Box 488**
**Barrington, IL 60011**
**tel. (708) 382-4550**

Barbetta offers a line of biamplified, sound-reinforcement speaker systems that feature active crossovers. The **2200A** ($599) combines a 12-inch woofer and a 3 × 7-inch tweeter to produce up to 114 dB SPL. The built-in power amps are rated at 100W RMS. The 17 × 14 × 12-inch unit weighs just

29 pounds. Three other models feature 15-inch woofers. The **3105 PRO** ($995), with its 4 × 10-inch tweeter, generates 150W (producing up to 120 dB SPL) and has ¼-inch and XLR inputs.

The top-of-the-line **3105 LS** ($1,295) weighs 52 pounds, features a 4 × 10-inch horn and a cast-frame woofer, has ¼-inch and XLR inputs, and can turn 200W RMS into 122 dB SPL.

**Barbetta Electronics**
**880 Calle Plano**
**Camarillo, CA 93012**
**tel. (805) 388-5753**

The Community **CSX57** ($695) is a 3-way sound-reinforcement speaker system that can handle 300W RMS, producing up to 128 dB SPL. (Sensitivity measures 102 dB SPL at 1 watt/meter.) The system's frequency response is 40 Hz to 18 kHz; the manufacturer emphasizes its ability to reproduce low frequencies with its twin 15-inch woofers. A horn-loaded, 1-inch, ferrofluid-cooled compression driver with titanium diaphragm covers the mids, while the passive crossover sends frequencies above 10 kHz to a horn-loaded PZT driver. The cabinet has a heavy-mesh grille, steel corner protectors, and a black-carpeted exterior. Community's PowerSense fuseless circuitry monitors operating levels to guard against system overload.

**Community Light and Sound**
**333 E. Fifth St.**
**Chester, PA 19013**
**tel. (215) 876-3400**

## DYNAMICS PROCESSORS

Symetrix released the **564E Quad Expander/Gate** ($989), its first product to offer pro audio features such as XLR connectors and a toroidal transformer. The 1U rack-mount unit contains four channels that can, with a simple knob-twist, be independently configured as either a gate or a downward expander. Other features include a Key Listen function and high- and lowpass filters for frequency-dependent gating; and six gain-reduction LEDs. When Fast Attack Time is used in Gate mode, the gate opens in 50 microseconds.

**Symetrix**
**4211 24th Ave. West**
**Seattle, WA 98036**
**tel. (206) 282-2555**

Barbetta 3105 PRO Loudspeaker

# MUSICPRINTER PLUS 4.0

## The Musician's tool for the 90's

**SPECIAL NOTE to Composers, Arrangers, Teachers and Students:**
MusicPrinter Plus 4.0 is light-years ahead of other music notation/performance packages. You owe it to yourself to call and get our $10 demo packet and try this outstanding package before you invest 50 to 100 times that amount in the wrong program.

Now With More Great MIDI Features

- *Acclaimed power, elegance, speed and intuitive ease of use*
- *Real-time and step-time MIDI input or direct entry with mouse or cursor keys*
- *Direct editing and instant rejustification, transposition and part extraction*
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- *Powerful MIDI performance from your score*
- *Best product support in the business*

### NEW features for 4.0

- *Direct conversion of standard MIDI files to notation; create standard MIDI files from notation*
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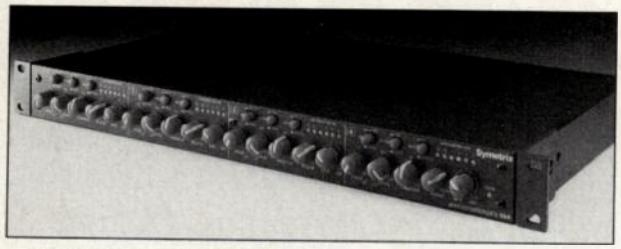

Symetrix 564E Quad Expander/Gate

Electro-Voice introduced the **COL-1** single-channel compressor/limiter ($674). The unit is designed for transient protection and level control in sound-reinforcement applications, not as an effects device. Instead of having attack and release time controls, the COL-1 includes dynamically variable attack and release times that track with the program material. Its feed-forward design provides stability at all compression ranges, and it employs an RMS detector for logarithmic gain changes. The processor uses peak reversion compensation to prevent audible pumping at low frequencies. The COL-1 features two LED arrays for simultaneous display of gain reduction and output level. A level reference jumper lets you select between -10, 0, +4, or +8 VU input levels to produce a 0 dBm output level. An optional TRB-4 isolating output transformer provides the unit with active balanced inputs and outputs.

**Electro-Voice**
**600 Cecil St.**
**Buchanan, MI 49107**
**tel. (616) 695-6831**

Drawmer is shipping the **DL24** dual-channel compressor/limiter ($699). The DL24 offers switchable, automatic, program-dependent compression; soft-knee/ratio; Program Adaptive Expansion; zero-attack time limiter; and multi-LED displays. The DL24's control functions include expander/gate, peak-limiter sections, and more.

**QMI (distributor)**
**15 Strathmore Rd.**
**Natick, MA 01760**
**tel. (508) 650-9444**

## SOFTWARE

Metsan Corp. offered *MidiText* ($195), a computer language for the performance of music via MIDI that runs on Apple Macintosh, Atari ST, Commodore Amiga, Yamaha C1, and IBM PC-compatible computers. Implemented as a text-editor, with the ability to translate and perform the language directly from memory, *MidiText* is not a sequencer or scoring program. Rather, it uses a textual representation of music based on the same principles as conventional music notation but with the precision and flexibility of a computer language. There are no limits on the number of parts defined or the complexity of rhythms, and any performance-related MIDI message can be generated. The language includes


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more than 80 commands and incorporates symbolic names and constants, macros, loops, blocks, and sections. Its ability to include complex expressions in macros makes it well-suited for building special-purpose Sysex messages or creating alternate tunings. Support is provided for transcription from conventional notation.

**Metsan Corp.**
**PO Box 475591**
**Schaumburg, IL 60168**
**(708) 307-8536**

*Patterner 1.3* ($50) for the Atari ST creates outgoing MIDI data at playback, drawing from data banks that contain the time, key number, MIDI channel, and other parameters of individual messages. The graphical shape of a musical phrase, labeled a "Beat," can be entered and edited within a graphic-editing grid, while its key numbers are contained in a Scale. With one mouse click, you can switch or transpose Scales, play the Beat backward or inverted, and more.

The program provides Beat, Scale, Pattern, Song, and MIDI Macro Banks, each holding up to 60,000 structures (limited by available memory). During playback, you can edit all data in real time, or automate most of the program's functions from the sequence. You even can access a buffer that records incoming MIDI messages that, in turn, modify the running sequence. A text editor lets you enter MIDI Macros containing a wide variety of MIDI data.

*Patterner* includes a library of routines that can be used to customize the playback section. Assembly language programmers can modify these routines or write their own.

**B'Brox Productions**
**Peter Kienle**
**1124B 7th Ave.**
**Tuscaloosa, AL 35401**
**tel. (205) 349-3479**


**Stewart PA-1200 and PA-1500 Power Amps**

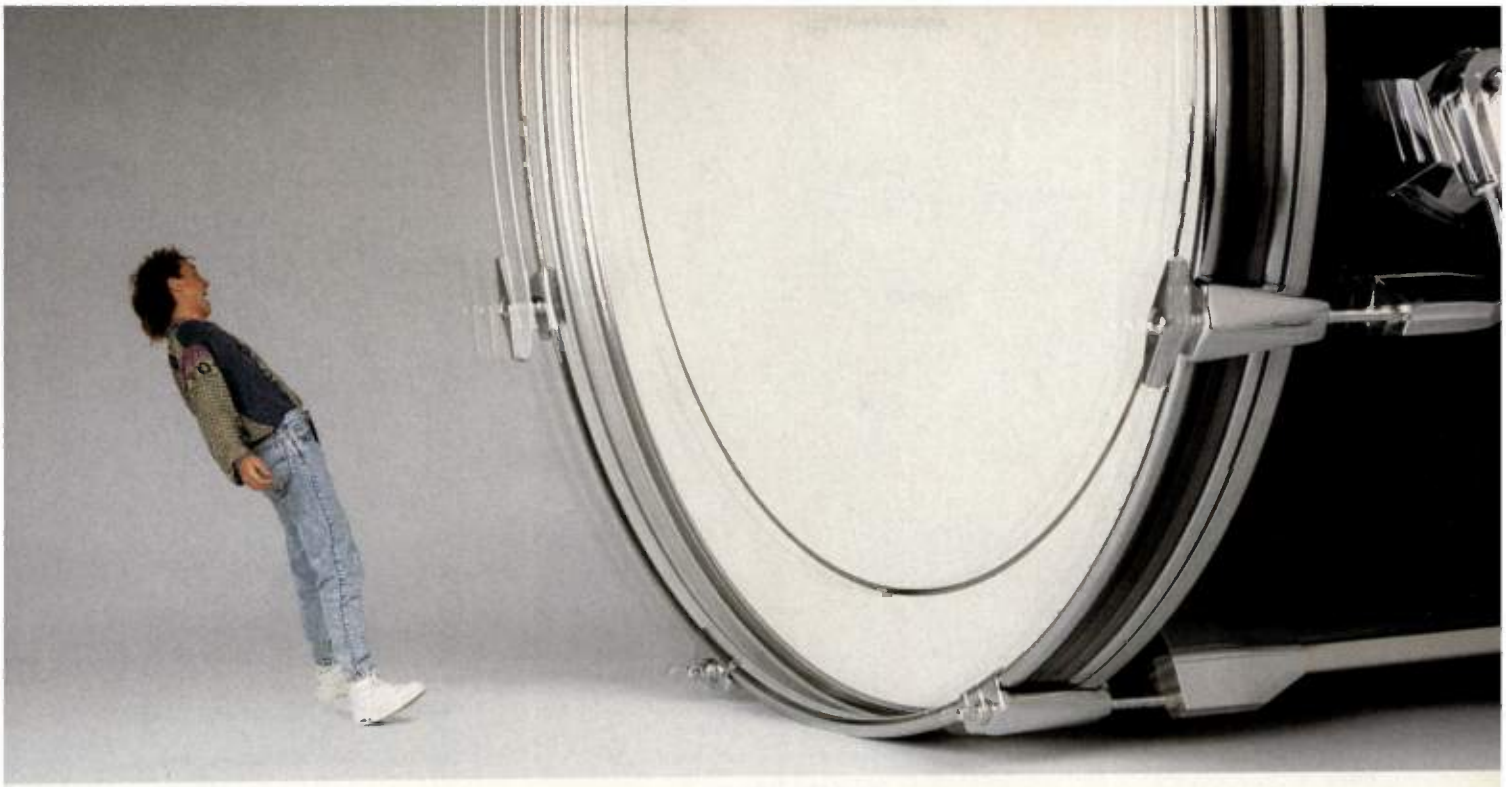
Patch Panel software announced *MIDI-to-AdLib File Converter 1.1* ($50), which allows conversion of Standard MIDI Files to a format compatible with song files for the AdLib and SoundBlaster FM synthesis cards for IBM compatibles. The unit successfully converts about 95% of Standard MIDI Files; most exceptions have too many voices for the card to reproduce.

**Panel Software**
**11590 Seminole Blvd.**
**Largo, FL 34648**
**tel. (813) 397-3530**

## POWER AMPLIFIERS

Stewart Electronics extended its line of power amps, introducing the **PA-1200** ($999) and **PA-1500** ($1,199). The PA-1200 produces 600W/channel into 2 ohms, 400W/side into 4Ω, and 250W/side into 8Ω. In bridged mono mode, it pumps 1,200W into 4 ohms. The PA-1500 drives 750W/side into 2Ω, 500W/side into 4Ω, 350W/side into 8Ω, and 1,500W into 4Ω in bridged mono mode. The amps feature XLR low-impedance and 1/4-inch auto balanced/unbalanced inputs; 1/4-inch and 5-way, 6-gauge, binding-post speaker outputs; a mono bridge switch; individual channel on/off and level controls; and a thermally controlled, variable-speed fan.

Stewart amps use a switching power supply that is said to recharge 1,000 times faster than a standard 60 Hz supply, offering extremely fast recovery time. According to the manufacturer, this lets the amps continuously function at full dynamic range. The amps run with equal efficiency regardless of load. This reduces both thermal man-



# MAXIMUM IMPACT.

E-mu's new Procussion™ Maximum Percussion Module doesn't do anything in a small way.

Over *1000* drum and percussion sounds based on 16-bit samples from the Emulator™ III library flawlessly reproduced by our celebrated G-chip. Each one too big, too hot, too real to be described by words.

So stop reading. And beat a path to your E-mu dealer to hear Procussion. Since you'll probably have to wait in line, you'll have time to read the rest.

Whether it's rock, hip hop, heavy metal, or Latin percussion, Procussion delivers maximum selection. Organized into 128 drum kits, there are literally hundreds of killer kicks, snares, and toms. And with our multi-channel MIDI capability, you can play up to 16 different kits at the same time.

Of course, great drum parts require more than great samples. You also need the subtle nuances and dynamics that define virtuoso drumming. Exactly where Procussion shines. Extensive real-time modulation and expressive controls, including our remarkable Super-switch™ software, allow you to control virtually every element of your sound by inputs such as velocity, trigger rate, tempo, and more. And to reproduce all your intricate rhythms perfectly, Procussion has a lightning-fast MIDI response time.

With unprecedented editing and layering capabilities, you have maximum flexibility to create startling new sounds. Our 32-voice polyphony ensures that even truly huge sounds won't reduce you to a 3-piece drum kit.

Since Procussion's from E-mu, we don't have to tell you how easy it is to use. Or that it's made in the U.S.A.

So put yourself in front of Procussion. Crank it up. Then brace yourself for maximum impact.

E-MU SYSTEMS INC.

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**applied magic for the arts**


# More Than Meets the Ear

When you buy SampleCell,™ you get more than a professional 16 bit sample player. A lot more.


*SampleCell is the heart of an integrated digital audio workstation.*

Sure, you get a custom 630 megabyte CD-ROM full of high quality, ready to use sounds. And our SampleCell Editor™ and Sound Designer™ II SC software for managing those sounds with unprecedented ease.

But more importantly, you get the power and convenience of an integrated digital audio workstation. A workstation that not only lets you make better music, but lets you make music *better.* Faster. With less hassle and more inspiration. And more creative options, too.

SampleCell is just one piece of an expandable audio production system for the Macintosh® II computer that can include sample playback, power sequencing, and digital audio recording. It's the kind of integrated workstation that you've always wanted, but could never afford—until now.

SampleCell—it's not just another sampler, it's the shape of things to come.

And speaking of things to come, look for these new CD-ROM sound libraries for SampleCell. All sounds are mapped, looped and ready to play.

- **East-West Communications**—ProSamples 1: *Drums by Bob Clearmountain,* ProSamples 2: *Percussion and Bass by Bob Clearmountain* (800) 833-8339
- **Optical Media International**—Denny Jaeger Master Violin Library, Sonic Images & Master Studio Libraries: *SFX, Instruments & Percussion* (800) 347-2664
- **Greytsounds**—Volume 1: *SampleCell* (818) 773-7327
- **OSC**—A Poke in the Ear with a Sharp Stick: *Non-Instrumental Sounds* (415) 821-6138
- **Prosonus**—SampleCell Volume 2, Sound Ideas Sound Effects Library (800) 999-6191

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agement problems and the need for heatsinking, which in turn reduces the size and weight of the power supply. Both amps carry a five-year warranty.

**Stewart Electronics**
**11460 Sunrise Gold Circle,**
**Suite 8**
**Rancho Cordova, CA 95742**
**tel. (916) 635-3011**

### ODDS 'N' ENDS

Gravitron Systems introduces the **MIDI-Optimizer** (variety of lengths; $29.95/10 ft.; $249/100 ft.), a self-contained, fiber-optic MIDI cable that consists of two connectors (the transmitter and receiver) and the desired length of simplex fiber-optic cable. The system's optical technology permits error-free, long-distance MIDI data transmission and is unaffected by electromagnetic and radio-frequency interference (EMI and RFI). The Optimizer conditions and improves the MIDI signal without requiring a power supply or batteries.

**$Y^2$ Ltd. (distributor)**
**1201 Via La Jolla**
**San Clemente, CA 92672**
**tel. (714) 492-1277**

### REV UP

Coda (tel. [612] 854-1288) is shipping *MusicProse 2.1* and *Finale 2.61* (free upgrades for registered users) for the Macintosh. *MusicProse 2.1* lets you turn off the Undo feature for faster program speed, allows automatic part extraction from the conductor score, features scrolling playback, and ships with Petrucci and Seville printer fonts. New Speedy Entry features allow faster note entry. *Finale 2.61* fixes an assortment of problems. Among the numerous improvements: The scroll bars in the Document window now work when the Lyric Tool is in Click Assignment mode; using Split Orchestral File on files that have multiple verses works correctly; problems with extremely wide measures when using Measure Layout have been fixed; and MIDI Playback starts on the correct measure. The newest features include slash (rhythm) notation, a Hand Grabber tool for quickly moving around the score, and guitar fingerboard notation. ●

# Chips Ahoy

The International Solid State Circuits Conference may not be everyone's dream date, but it's Mecca for IC designers.

*By Gary Hall*

Memory has long been a leading topic at ISSCC. This year, an entire session was dedicated to 64-megabit Dynamic RAM. Every memory manufacturer has these chips in the labs or in sample quantities, and it's clear that they will completely replace the current 1 meg and 4 meg parts within a couple of years.

Low-cost, high-density RAM is a driving force behind all kinds of development. Each time memory takes a step in density, we get a wave of innovation in hardware and software. Usually, memory has increased in multiples of four. This time we're jumping by a factor of sixteen, and we can anticipate some outstanding uses for these incredibly dense devices. But do you want to get *really* scared? Technology forecasters predict memory chips with capacities of one gigabit (that's one *billion* memory cells) within a few years.

Super-fast RAM was another hot topic. Most common memory chips have *access times* (the time needed to address and read one memory location) of around 100 *nanoseconds* (billionths of a second). Sounds pretty fast, but there was a lot of talk at the conference about 8-nanosecond parts, and IBM announced that they have achieved a speed of better than four nanoseconds. How fast is that? It's enough time for a beam of light to travel about five inches.

You may wonder what access time has to do with the price of milk. It turns out that memory access time determines the performance of many circuits. For example, access time is the most important factor in determining the number of voices that a sampler or sample-playback unit can produce. Today, 32 voices is typical, but as memory speeds increase, we could see instruments with 128 or even 512 voices.

## AUDIO DIGITAL

Thanks to the compact disk, there has been a tremendous explosion in technology for A/D and D/A converters. When I began working with digital audio in the late seventies, 16-bit converters were exotic parts with equally exotic prices. These Pulse Code Modulation-style (PCM) converters also required analog filters with very steep slopes to prevent aliasing. Unfortunately, the filters themselves introduce serious phase distortion, affecting stereo imaging and timbre. Early digital recorders and CD players got a bad rap among some audiophiles, in part because of these effects.

In the last few years, there has been a drastic rethinking of the conversion process. Using sophisticated math, designers have found that they can do a rough (one to four bits) conversion at a high sample rate, and then use digital processing to yield higher resolution at a lower rate. There are three advantages to this approach: It's cheaper for the same number of bits, it requires fewer components, and the resulting converters *sound* better than the equivalent conventional part.

This has led to a lot of excitement among designers. At an afternoon session of the conference, Analog Devices described their new 18-bit analog-to-digital converter, and there was talk of 20-bit devices. Don't confuse these with high-resolution digital-to-analog converters. A/D is *much* harder, and it's the key to real improvements in sound quality. Expect to see these first in high-end workstations and signal processors.

Compact discs and most digital recording formats are committed to 16-bit storage. The same techniques yield big improvements in these formats, especially at low signal levels and high frequencies.

## NOTEBOOKS OF THE GODS

The most interesting session was the conference opener, where an executive from Toshiba described the future of "notebook" computers. It seems this class of highly portable computers is about to explode. Recent developments have made it possible to build tiny computers with power equal to, or greater than, that of today's desktop models. Ultra-dense memories and large, flat graphic displays will give us powerful computing tools that can travel everywhere we go.

Industry leaders project that sales of notebook computers will overtake those of more conventional PCs as early as next year in Japan, and within three years in the rest of the world. Mass production means greater economy of scale, and developments should accelerate even faster.

Small, rugged, lightweight computers will encourage live performance applications. Most musicians are understandably reluctant to go onstage with a desktop computer and a fragile CRT, but portable computers have been too slow and clunky (or too expensive) for the needs of musical artists. Perhaps we'll experience an explosion of performance software to match the development sequencers and other composition-oriented programs have seen.

Was there more to see at this year's ISSCC? You bet, but that's all we have space for. Next month, we'll be looking at new high-speed communication networks that could even (gasp, shudder) *replace MIDI.*

*Technical editor* **Gary Hall** *spends a lot of time gazing off into space. It keeps 'em guessing.*

# Automatic Accompan… arrived
## ...and just got way better … n 4!

• IBM LAPTOPS – YAMAHA C1, KEE MIDIATOR (serial)
• FM CARDS – SOUNDBLASTER, AD LIB, SM 401
(in addition to MPU 401 MIDI)
NEW! NOW SUPPORTING …

# BAND-IN-A-B…™

## INTELLIGENT SOFTWARE FOR MACINTOSH, ATARI ST OR IBM PC …

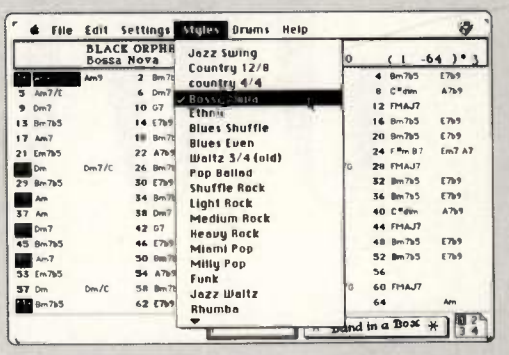
Type in the chords to any song, choose the style you'd like
and Band-in-a-Box does the rest...

**AUTOMATICALLY GENERATING PROFESSIONAL QUALITY BASS, DRUM AND PIANO CHORDING PARTS IN A WIDE VARIETY OF STYLES**

**24 STYLES** built in...

Jazz Swing • Bossa • Country • Ethnic • Blues Shuffle
Blues Straight • Waltz • Pop Ballad • Shuffle Rock • Light Rock
Medium Rock • Heavy Rock • Miami Sound • Milly Pop • Funk
Jazz Waltz • Rhumba • Cha Cha • Bouncy 12/8 • Irish
Pop Ballad 12/8 • Country (triplet) • Reggae

*...and now with **Version 4** you can **CREATE YOUR OWN STYLES** using the **STYLEMAKER**™ section of the program. The **StyleMaker** styles are 3 instruments (bass/drums/piano) and can be as simple or complex as you'd like. Now you can create or edit exisiting styles to your musical tastes!*




## WE DIDN'T SAY IT... PC MAGAZINE DID!

1990
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PC Magazine Award
for Technical Excellence
Band-in-a-Box
PG Music

*"This amazing little program from PG MUSIC creates "music-minus-one" accompaniments for virtually any song any style. You simply have to type in the chords, pick a tempo and one of 24 styles, and the program creates nicely embellished chords, a bass part, and drums to be played on a MIDI synthesizer. **Band-in-a-Box understands** repeats, choruses and verses, and even varies the accompaniment, just as human musicians would. Peter Gannon, the author of the program makes no claim to artificial intelligence, but Band-in-a-Box is software that repeatedly surprises and delights you, especially in its jazz styles."*

**PC Magazine Jan.15,1991 – Technical Excellence Awards**

## NEW FEATURES ADDED WITH VERSION 4:

- StyleMaker™ - create your own 3 instrument styles and save to disk
- Lyrics - enter Lyrics to songs
- Change styles at any bar/Change Time Signature at any bar/Patch changes any bar
- Playback from any bar

*"I can't imagine a better way to spend $59"*
**Electronic Musician Oct.1990**

*"One of the neatest programs I've seen in a long time"*
**STart magazine**

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By Jeff Burger

# SCORING TO PICTURE

***Creative and technical challenges await the composer eager to write for film or video.***

ROBERT HOLMGREN

Relax. Close your eyes for a minute. Visualize different feelings and let the music flow in your head: Friendly. Cold. Authoritative. Humorous. Deeply in love. Scared stiff.

Now, extend the exercise to physical settings: Race cars at Monte Carlo. Blue jeans on Bourbon Street. Catamarans off Hawaii. A hot cup of coffee on a rainy San Francisco morning.

A film composer's ability to visualize (or "auralize") a scene is funda-

mental. Does it sound like fun? It is, but not always that simple. Go back and think of three completely different themes for each aforementioned example, and you'll have a better idea of what film directors expect from composers.

Authors use such tools as adjectives, punctuation, and metaphor to tell a story, while filmmakers and video producers rely on action, dialog, and camera angles for emotional impact. Pictures without sound are hollow, so Hollywood's pioneers hired orchestras and live pianists to enliven silent films.

Today, music is a vital part of the visual arts, and composers have their own unique tools to bring life and power to the screen. These tools include melody, harmony, tempo, and a whole array of technologies that shape music to picture.

Many musicians dream of scoring soundtracks for film and video, but breaking into Hollywood's inner circle is as hard as getting The Big Record Deal In The Sky. Still, plenty of scoring opportunities exist for composers armed with the kind of electronic arsenal **EM** readers use every day. All you need to know is where to look and how to apply your tools to the job at hand.

## AESTHETICS

What makes a good soundtrack? First, appropriateness. From the beginning, you need to establish the mood the producer wants to communicate. Wall Street suits, Silicon Valley yuppies, and Venice Beach surfboarders project distinctly different sonic images. For a corporate video or commercial, consider the company's image. With more artistic projects, those same skills apply in even greater depth. Rather than dealing with an established image, you face a roller coaster of characters, emotions, and situations.

Memorability also makes a good score. The spine-tingling shower scene from Psycho, the ominous two-note motif from Jaws, and, heaven help us, the themes from A Current Affair and Jack In The Box and Toyota spots often remain in your brain long after you want them to. They're memorable because they are simple and communicate a feeling.



In a complex project, such as a movie or full-length video, you can assign unique aural "signatures" to individual people and places. Be careful to strike a balance between similarity and contrast in your signature themes. Continuity is important to a picture, whether in instrumentation, genre, or period.

Make every theme as flexible as possible. Directors are notorious for last minute edits that add or subtract from a scene that once fit perfectly with your music. Strive to build in the ability to repeat a motif or cut it in half. Add or delete tails. Draw out or condense an interlude. It's all part of scoring to picture.

Good scores don't overuse musical hooks. If every moment of a score is compelling, there would be little space for the visuals and dialog to make their impact. Film composers consider it a compliment if someone says the movie felt wonderful but they can't remember the music. It means the composer has played his or her part rather than dominating the project. It also increases the chances of being called for future projects.

You also need to know when not to score. Silence is truly golden and adds an intense dramatic effect. The absence of music makes the subsequent presence of music more powerful.

For better or worse, scoring is a compromise between the producer's creativity and your own. In scoring, there's no room for bruised egos. Your music is simply a part of a greater whole, and, like it or not, the client is always right.

## ON THE SPOT

A scoring project often begins with a spotting session. Spotting refers to the process of roughing out a "map" of the video's timing. Here, you (together with the producer) establish the musical requirements of each cue (scene or subdivision of a scene). For every cue, record time code locations for the beginning and ending, as well as for each hit point. Hit points are dramatic moments that require musical emphasis or change. A hit point can be as distinct as a nuclear explosion, or as subtle as coming upon a beautiful panorama in the midst of a desolate waste. Establish with the producer which hit points require sound effects, so that you can leave the appropriate space. (See " Sampling Goes Hollywood" on

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*The SQ-1 PLUS Personal Music Studio*

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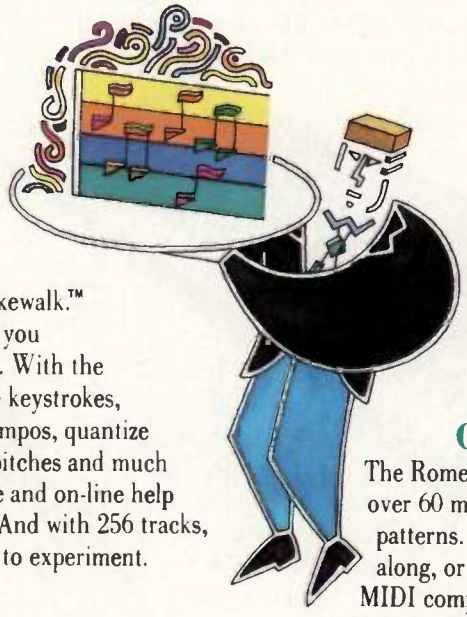

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FIG. 1: "Window burn" provides an onscreen visual display of SMPTE time for easy reference during scoring.

p. 52 for more on creating sound effects.) Music and sound effects work to complement, rather than compete with, one another. For example, music can add drama to a shot of a boat going over a waterfall, but leave the actual splash to the sound-effects people.

After establishing the basic parameters, return to your studio and breathe more definition into the spotting outline. Establish a tempo that feels right to you and has beats aligning with as many hit points as possible. Let's say you're scoring a kung-fu scene that contains twelve choreographed, major blows. Your goal would be to find a tempo (presumably fast) that catches each blow within a few frames of the beat. Because the odds are against hitting all of them, you'll have to fudge some, using changes in tempo and meter.

The result is a set of tempo and meter maps that look something like this: Start measure 1 in 4/4 at 120 bpm, change to 3/4 time and 90 bpm at measure 12, go back to 4/4 at 120 bpm at measure 20. At the same time, be careful to maintain the scene's pacing. Too many changes could destroy the continuity of the action.

If you use a sequencer and a SMPTE-to-MIDI converter, you can enter these maps into your system. If you use Song Position Pointer to control the sequencer, the map goes into the converter unit. If your SMPTE reader outputs MIDI Time Code, the sequencer will hold all tempo and meter maps. Remember that Song Position Pointer is like the stroke of the conductor's baton, while MTC is the steady sweep of a clock's second hand.

Does that sound difficult? It used to be harder. In the old days, sprocket holes in the film provided the only means of synchronization. Composers applied the constant of 24 frames-per-second against various tempos to establish which frame fell on what beat. Film composers used a scoring bible, called a click book, to guide them. Cross-referencing a dozen hit points would have been a tedious process.

Today, computer software helps us with the dirty work (see sidebar, "Film Scoring Software" on p.36). These programs accept your list of time code hits and calculate the options for tempos and their frame intersections. You then can enter the resulting tempo and meter maps into your synchronizer or sequencer.

## YIPES! STRIPES!

The work print is the composer's starting point for the scoring process. This is a video copy of the production, with SMPTE time code (usually) on one of the audio tracks. Typically, the time code numbers appear in a rectangular space in the lower middle of the picture, called a window burn (see Fig. 1). This is tremendously useful because it lets the composer identify each video frame without a time-code reader. Even if you own a reader, window burns are convenient. Longitudinal Time Code (LTC), by far the most common type in MIDI studios, is not readable unless the tape is in motion.

Normally, the producer provides the striped work print. If a pre-striped print is unavailable, you need to make one. This process requires a generator and a video machine with audio dub capability. This means you can record audio (in this case, LTC) on one or both tracks without erasing video. If your machine doesn't have this feature, use two video machines as an alternative. Transfer video from one machine to another, with the time-code generator output connected to the input of audio track two (by convention).

*Make every theme as flexible as possible. Directors are notorious for last-minute edits.*

There's one thing you should know about striping videotape. Video frames appear at precisely controlled time intervals, and there's no guarantee that the frames will go by at exactly the same rate as the generator spits out frame IDs. The solution is to use a genlock—a device that synchronizes a time-based device to incoming video or a master

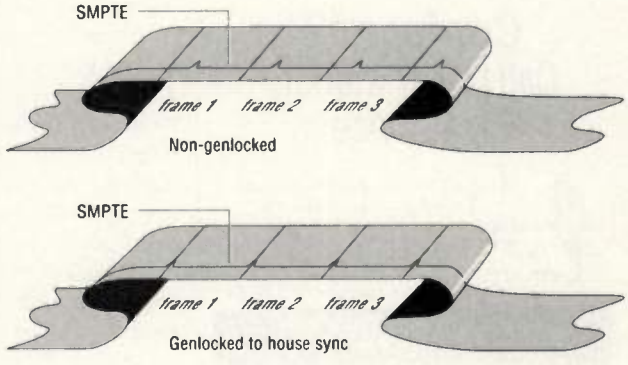



FIG. 2: Genlock ensures that there is exactly one SMPTE frame message for each video frame.

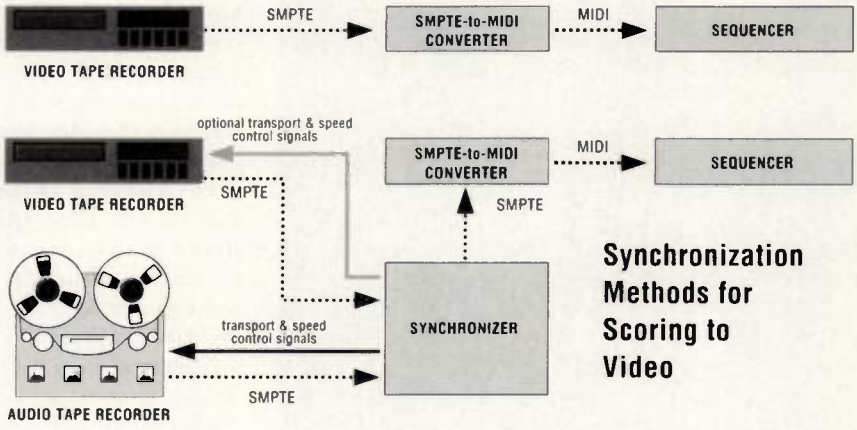



**FIG. 3: You can sync your sequencer directly to the videotape via a SMPTE-to-MIDI converter, or use a machine synchronizer for a combination of virtual and tape tracks.**

reference (see Fig. 2).

Professional time-code generators have this capability built-in, most code-generating units in musicians' studios do not. Recently, a few less inexpensive generators with genlock have appeared. Two examples are the Video Time Piece (reviewed in the April 1991 issue) from Mark of the Unicorn (tel. [617] 576-2760) and the SyncMan Pro from Midiman (tel. [818] 449-8838). Unless you are ready to invest in a generator of this type, we recommend that you go back to the producer for a pre-striped work print.

The SMPTE format used when striping videotape is 29.97 drop frame, although it's commonly referred to as 30 drop. (See "Decoding SMPTE" in the April 1991 EM for more on SMPTE formats.)

## THE SEQUENCER

There are several ways to integrate a sequencer into a video environment. If you're doing nothing but virtual tracks, lock the sequencer directly to the video. If you need both virtual and magnetic tracks, you need a machine synchronizer and a multitrack with the facilities to allow sync control. These items are not cheap. If you are just starting out, or only experimenting, you probably should forego such a purchase until your needs become more clear. Fig. 3 shows systems for locking a sequencer and a sequencer-multitrack system to video.

Some hardware sequencers have SMPTE inputs, but most do not. In this case, you need an external SMPTE-to-MIDI converter or a MIDI interface with the converter built in. SMPTE messages are converted into one of two types of MIDI messages: MTC (MIDI Time Code), which essentially embodies SMPTE-like time values in the MIDI datastream; or MIDI Song Position Pointer, which adds location information to standard 24 pulse-per-quarter MIDI Clocks by counting the passing of 16th notes in a composition. You can think of MTC as the steady sweep of a watch's second hand, while Song Position Pointer is more like an orchestral conductor, able to speed up and slow down as needed.

Most Macintosh sequencers accept MTC, but many sequencers on other computer platforms do not, hence MIDI Song Pointer messages are used more often with PC, ST, and Amiga programs.

If you use MIDI Song Pointer messages, an absolute reference of hours:minutes:seconds:frames coming off tape is converted to the relative time of MIDI Song Pointer. Because you're essentially asking the converter to transform time into beats, you must supply the missing variable: tempo in beats per minute. You'll also need to specify the meter so that the sequencer can accurately display your musical events in context. As described earlier, tempo maps and meter maps consist of this type of information. If you're using Song Pointer, you'll need to download the tempo and meter map to the synchronizer, but if you're using MIDI Time Code it's not necessary, because all the conversion will happen within the sequencing program.

You also need to specify the SMPTE

*offset*. By setting the appropriate frame rate and format (29.97 drop), you've specified *how* to keep things in sync, but you also must tell the equipment *when* to start playing. The SMPTE offset simply determines which frame is treated as measure 1, beat 1.

If you don't have a synchronizer and sync-ready multitrack deck, here's a little trick to keep you one step ahead of the bank. When you run out of synth voices, stripe your multitrack with SMPTE (be sure to use the same format as on video). Connect the the tape track that carries time code to the SMPTE-to-MIDI converter's input. Now, slave your sequencer to the audio tape, rather than video, and build up the rest of your composition using a combination of virtual and magnetic tracks. Later, you can mix down to a mastering machine, regenerating the time code in the process.

This process has you working blind, so it's important to get your major hit points established while you're still locked to video. Also, keep a good log of your SMPTE offsets as they may come in handy down the line.

If you use this method, always stripe your audio tape with more SMPTE than you think you'll need. On the front side, you'll need *pre-roll* (enough striped tape for the electronics to identify the location and lock up); on the back side, you'll need post-roll (enough time code that the electronics don't lose their reference point). You never know when a passage will grow on you, so most people stripe a fresh role of audio tape from beginning to end. Leave blank space at the beginning of the tape to compensate for leader and allow the tape to stabilize.

### IT'S A WRAP!

When you have finished the score, there are two ways to get your work back to the producer. In a low-budget situation requiring only mono, you can transfer the mix (in sync) onto channel 1 of an audio-dub-capable VCR. This wipes any dialog or sound effects, but the production facility will combine your score with those elements in a process known as *layback*. In a professional environment, sound quality is more crucial. In this case, you supply a master audio tape containing your mix, along with time code, for use in the layback process.

If you don't want to give up your master tape, your options are to create a second master or supply a dub. Keep in mind that you can't just copy SMPTE from tape to tape: You'll need a code *regenerator* to get a stable signal. If your mastering deck doesn't match the job spec or the format of the production facility, you can rent a mastering deck with the proper format, or go to a professional transfer facility.

If you're scoring a video of your own, or you can't overdub onto the workprint's audio tracks, you'll need a second VCR to transfer the original video with the new score. Connect video out from the master deck and the audio outputs from your mixer into the recording VCR.

### LOOKING TO SCORE

You've got the talent. You've got the technology. So where do you start on the road to success? Industrial video production provides the bulk of scoring opportunities. More and more companies are turning to video as a tool for presentation and communication. The bad news is that "needle-drops" from licensed music libraries have been, and often still are, Standard Operating Procedure. The good news is that industrial clients increasingly measure their productions' effectiveness against Steven Spielberg, MTV, and the endless stream of commercials on American television. Music libraries get producers close to their goals; your original creations can drive them all the way home.

When is original music called for? It varies widely, but almost any situation could benefit from custom scoring. Company sales videos are especially appropriate, particularly if the client wants to set their sales pitch to music. It's difficult to believe, but many companies are using rap music and dance videos to enumerate the features of their latest products. Corporations often develop audio/visual logos, complete with singing slogans.

Freelance producers are responsible for most of these corporate videos. Find out if there's a coalition of independent video producers in your area and make your services known. Ad agencies are another conduit, especially the ones that do local radio and TV commercials. When starting out, swallow your pride. A few ads for Crazy Harry's All-Night Hot Dog Emporium might pave the road to Ford, Levi's, or

## FILM SCORING SOFTWARE

Today's film scorers can use any of a number of programs, on various platforms, to ease their work. While each program has different features, they all help turn a list of timings into a bar/beat breakdown and a fixed or variable click track (or tempo map).

A film-scoring program typically saves its output (a tempo map) as a Standard MIDI File (SMF) or sends it as a Sysex message to a sync device such as Roland's SBX-80 or Adams-Smith's Zeta III. The composer also can use the tempo as a metronome for live conducting. Some programs, such as Opcode's *Cue* for the Mac (see review on p. 106), import and play sequences in SMF form. (Don't get false impressions, however; this type of simple sequencer is not suitable to replace a sequencer for recording music.)

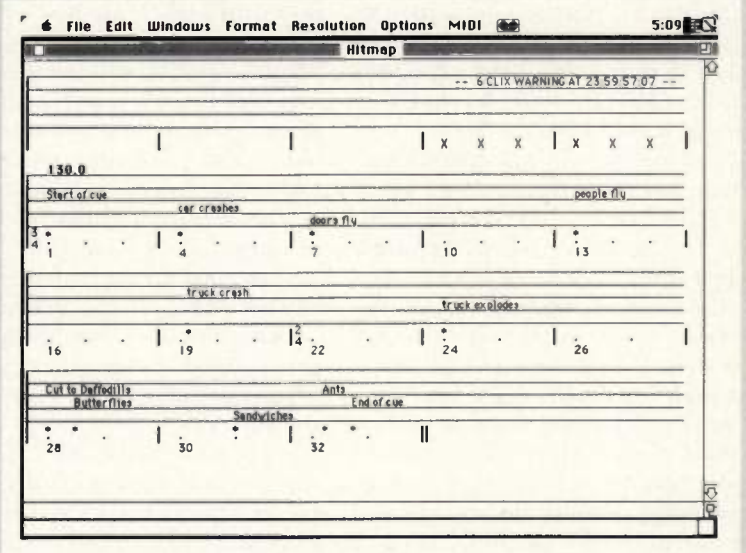
Other programs, such as *Clicktracks* (Passport Designs) for the Macintosh and *Hitman* (Dr. T's) for the Atari ST, have no playback capabilities of their own. *Clicktracks* can import and export SMFs, but normally the composer would use it with a dedicated sequencer program, as it deals exclusively with tempo maps and cue points.

Note that sequencers are not always time-accurate under their internal clocks. To keep music and picture together, it is important to use a reliable time code reference, such as a SMPTE-encoded video (preferably with the time code "burned in" to an onscreen window) of your project.

To illustrate the use of these programs, let's follow a music-scoring project in more detail. The first step is to "spot" the show (as discussed in the main article) to produce a master list of cues. Some programs have features to aid this process, but others do not. Then it is necessary to enter these timings in a form that the program can use. Ideally, a SMPTE-striped videocassette provides the needed information.

Far too often, however, this doesn't happen. In that case you must use a stopwatch to time each event, stopping the tape and rewinding constantly. Some programs let you enter the timing points by tapping on the keyboard while looking at picture. This information then goes directly to the *cue sheet*, also known as a *breakdown*. The program then displays this tempo map in a bar/beat breakdown for printout.

People who score one 30-second commercial per year most likely will be happy with a click book and a stopwatch. But if you score just one longer project, you'll find these programs to be immensely helpful.—*Nick Batzdorf*




A film-scoring program such as Passport's *Clicktracks* lets you print out tempo and meter maps in an easy-to-read format that resembles music notation.

Universal Pictures.

Looking for more altruistic work? Find out what kind of programming your local PBS or community cable stations produce. Talk to local organizations, such as museums and parks, who develop videos to inform and entertain their visitors.

As in other creative trades, you are only as credible as your portfolio, a real Catch-22 when you're getting started. Hook up with visual artists in the same boat, and do some backscratching. A producers' coalition probably has novices putting together their first demo reels. Find a local film school and score someone's class project. Investigate art schools where students are doing animation projects, and offer to add music to their labors of love.

If you are really looking to get some practice, you could simply score the family vacation or other home productions. Few home videos, however, have the pacing or dramatic tension to support real scoring (pre-recorded music is more like it). Before you go that far, look into rescoring an existing video, such as a scene from an old action or combat film. But, any way you can, get out there and start scoring. As with anything else, diligence combined with talent can pay handsome rewards.

**Jeff Burger** *is president of Creative Technologies, a multimedia production company based in Northern California, and author of the forthcoming book* The Multimedia Bible.

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### PART ONE: THE VIDEO SIGNAL

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By James Caruso and Mavis Arthur

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STUDIO SERIES

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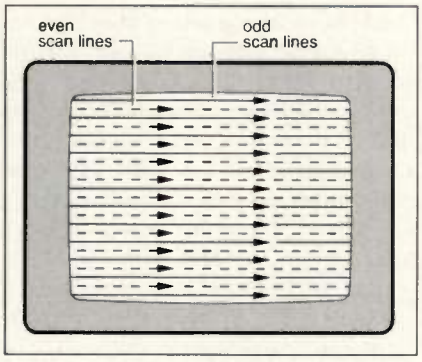


FIG. 1: The video beam scans the screen from left to right and from top to bottom. Two separate scans are required for one frame of video.

on tape, there are more differences in recording video and audio than similarities. For one thing, the video signal is more complex. A top-quality audio recorder has a frequency response of about 20 Hz to 20,000 Hz. Video, on the other hand, ranges from DC (0 Hz) to four *million* Hz (4 MHz). In other words, it takes about 200 times more information to record video than audio.

Also, while audio information is continuous in nature, the video signal is divided into individual *frames*, each of which holds a complete picture. The video frame further divides into *fields* and *lines*, as we'll discuss later. This *time-discrete* nature of video has important implications when it comes to processing and editing. (For more definitions, see glossary on p. 47.)

The video signal also carries information needed for recording, reproduction, and transmission. Elements of the signal include luminance (black and white) contrast and brightness, chrominance (color) saturation and hue, and sync (timing).

Video requires a standardized signal format for broadcast, recording, and playback. Today, three such standards are used in different parts of the world. They differ primarily in how they scan the picture.

In the U.S., Japan, and some other countries, the standard is NTSC (National Television Standards Committee). Most of the world, including Italy, Great Britain, and India, uses PAL (Phase Alternate Line). France uses SECAM (SÉquential Couleur À Memoire). These standards are not compatible: PAL-recorded tapes do not play on NTSC systems and vice versa. For a price, however, you can have recorded tapes converted from one standard to another.

Video signals put out from a camera and those recorded on tape differ from the *RF* (radio frequency) signal broadcast over the air or carried on cable. The RF signal combines the video and audio for many broadcast channels on one line. The video signal carries just the picture information and sync pulses needed for a single source. Not surprisingly, this isolated signal delivers a better picture.

In NTSC-standard video, the picture consists of 525 horizontal *lines*, which are created by an electron beam *scanning* across the face of a picture tube. Two complete scans are required to create one picture, and it takes 30 pictures to make one second of video. One complete picture comprises a *frame*, and each half-picture is called a *field*. The system works like this:

At the start of an NTSC video frame, the first field starts to trace, beginning in the upper left hand corner of the screen. This field contains the odd-numbered lines starting with line 1, then 3, and so on until it reaches line 525. When this field reaches the last odd line, the even field starts its trace in the top center of the picture tube and traces to the last even line, number 524. Thus, the lines of the two fields fall between one another, creating an *interlaced* scan (see **Fig. 1**).

During the scanning process, there are periods when the beam that traces the picture must travel back across the screen to start a new line, field, or frame. The time between the end of one line and the start of another is known as the *horizontal retrace interval*. The much longer period needed to bring the beam back to the top of the screen after completion of a field is called the *vertical blanking interval* (or just *vertical interval*). These blanking intervals provide timing references critical to accurate reproduction of the picture. They also provide a location to store SMPTE messages when using Vertical Interval Time Code (VITC).

Among its other functions, the vertical interval synchronizes the interlacing of video fields. The vertical interval also is used as a *switching point* in live broadcast and in editing. If the switching or new recording starts at a place other than the vertical interval, a glitch appears in the picture. High-end consumer and professional VCRs only start recording during the vertical interval.

In any situation that involves switching or dissolving between two or more video sources, it is crucial that the vertical interval of the video coming in from both sources are synchronous. Otherwise, when you combine the two pictures, you will have a glitch or hit on the picture. This introduces some important system considerations that simply don't occur in audio.

You can ensure synchronicity between video sources in two ways: *Genlock* involves feeding a common timing reference to each video source. This can be a regular video input or a separate input that accepts video for sync purposes only. Broadcast stations and production facilities distribute a single stable timing signal, known as *house sync*, throughout the building, so that the engineers can mix sources from different studios without problems. In situations that require combining unsynchronized, or "wild," sources, an external *Time Base Corrector* (TBC) is used to conform the wild signal to the timing of the rest of the system (see this month's Computer Musician column on desktop video on p. 74 for more on TBCs).

## PART TWO: VIDEO RECORDING

Video's higher bandwidth and its division into fields and frames demands a different type of tape mechanism than that used in audio reel-to-reel and cassette recorders. Instead of pulling tape across a stationary record or playback head, video recorders use a system in which both the tape *and* heads are in motion. A similar mechanism is used on DAT recorders.

Recording a video signal requires two heads: one to trace the odd field and one to trace the even field (see **Fig. 2**). These heads are mounted on a drum that spins at a constant speed as the video information is recorded onto tape. Each head records one field for every 180° of rotation. These same heads play back the recorded tape.

The mounting of the head drum puts

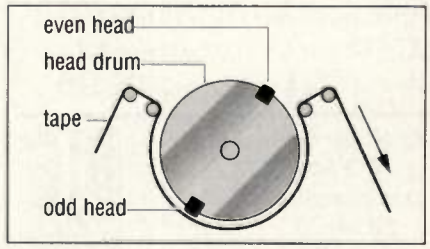


FIG. 2: Viewed from above, the video tape is wrapped part way around the rotating head assembly.

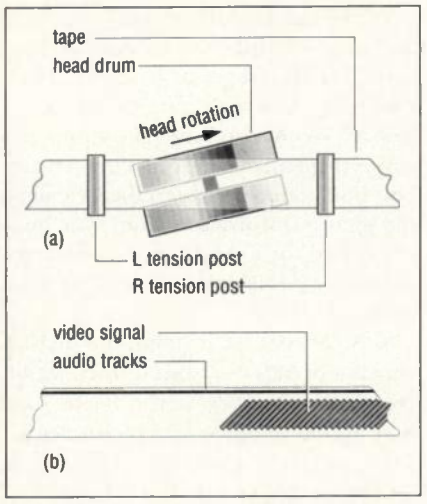


**FIG. 3: The head assembly is mounted at an angle to the tape path. The video signal is recorded on the tape as a series of slanting tracks.**

it at an angle to the tape's path (see **Fig. 3a**). The videotape moves diagonally across the spinning video heads. This motion places the magnetic traces diagonally across the width of the tape as it contacts the heads. This is called *helical scanning* (see **Fig. 3b**). The actual magnetic trace on the videotape is only 58 millionths of a millimeter wide on a VHS tape and less than half that width in 8mm video recorders.

In addition to the play/record heads, one or two additional heads may be mounted on the drum for special-effects playback such as freeze-frame. Some VCRs and camcorders include a *flying erase head* mounted on the drum. This head erases the previously recorded video trace by following the helical scan on the videotape. In doing so, it eliminates the rainbow pattern caused by recording over partially erased tape (see **Fig. 4**).

The rate of tape motion and the period of a head's rotation must be carefully controlled to maintain proper timing relationships in the output signal. The *control track* is a longitudinal tape track consisting of a string of pulses corresponding to the end of every frame's even field. It is critical to video recording because it supplies the primary timing reference used during playback. A discontinuity in the control track causes the picture to break up.

The control track pulses also can be used to locate specific frames on the tape for editing or other purposes. Using a fixed reference point, such as the beginning of the track, an *edit controller* (a remote control-like device used when editing video) identifies any other point simply by counting control track pulses as the tape shuttles. This does not provide as much accuracy as SMPTE time code, and it requires careful tape handling to ensure the reference point is never lost. However, a control-track editing system is much less costly than a SMPTE time code edit system.

Electronic *servo-mechanisms* provide tight control of the videotape mechanism by referencing head and tape motion against the control track. However, a considerable amount of short-term instability, or *jitter,* still appears in the recorder's output. The raw output of a video recorder has enough stability for reproduction on a video monitor, but processing and editing requires more stability. Time base correctors provide the needed signal stability. The TBC stores a short piece of video (a line, field, or frame) and clocks it back out in time with a stable timing reference. TBCs are critical components in video production systems.

Videotape comes in a bewildering variety of sizes and recording formats. One-inch reel-to-reel and ¾-inch videocassette formats dominate the professional broadcast fields. Half-inch videotape currently dominates the consumer market, with 8mm making some strides, especially in camcorders. These sizes are a common choice for professional video production. The pro versions of these formats generally use much higher tape speeds than their consumer counterparts.

In the beginning, there was just VHS (Video Home System) and Beta in the consumer market. Now, there are a variety of consumer tape formats to choose from, including VHS, 8mm, Compact VHS (VHS-C), Super VHS (S-VHS), Hi-8, S-VHS-C (Super Compact VHS), and Beta-ED. Whatever the tape format, the video signal records exactly the same. Even so, the formats themselves are not compatible, with few exceptions. VHS tapes play or record in an S-VHS VCR or camcorder, and 8mm tapes can be used in a Hi-8 machine. However, an S-VHS tape won't work in a VHS machine, nor will a Hi-8 tape in an 8mm unit.

Which camcorder or VCR consumer format is best? This question has more than one answer. If the question relates to which format delivers better technical quality and resolution, choose

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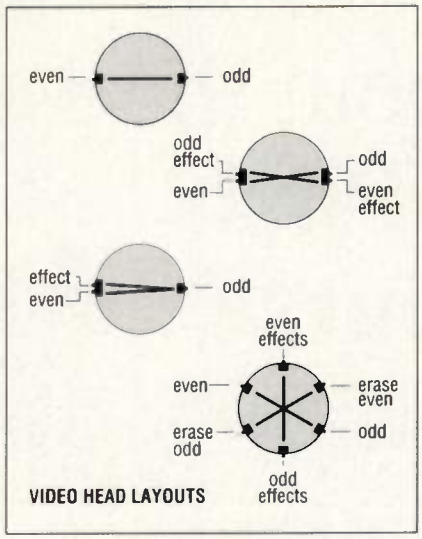


FIG. 4: The actual video heads are mounted on the cylindrical head drum. The number of heads and the geometry of their mounting is closely tied to the recorder's capabilities.

one that records *component* video, such as S-VHS, S-VHS-C, Hi-8, or Beta-ED. Component video formats record the picture luminance (Y) and chrominance (C) information separately. The luminance signal is recorded at a higher MHz band, which increases the resolution to well over 400 lines. The alternative to component video is composite video, which records all video information together. Standard Beta, VHS, and 8mm all record composite video. VHS offers about 240 lines of resolution, while 8mm tape does a little better.

These technical improvements do not come without a price, however. Cameras and recorders for component formats cost significantly more than composite video equipment. Prices rise further when professional production features (such as genlock) are added. For reference sake, a basic camcorder in a standard format costs $700 to $900, list. When you move to S-VHS or other component formats, you enter the $1,300 to $2,000 range. The one-inch and ¾-inch equipment used in broadcasting is almost certainly out of the individual's cost range.

**PART THREE: COMPONENTS AND SYSTEMS**

With the knowledge you have acquired so far, you can start to make decisions about the equipment available for your own productions. Video equipment spans a huge price range, from the very reasonable cost of "home video" gear, to astronomical figures for broadcast equipment. Home video, by the way, is a misnomer because consumers now have access to creative possibilities available only to professional video-production outfits a few years ago.

Unless your images are entirely computer-generated, you need a camera to turn real-life scenes into video pictures. Today, camera almost invariably means camcorder, a device that combines the functions of two pieces of equipment (camera plus recorder) into one. This is one of the most versatile pieces of equipment in your system: It records images that enter the lens and, thanks to the video input, images from any other video source. Camcorders send the video image to another VCR through the video or RF output.

Current camcorders all record good to excellent pictures, within the resolution of their formats. Picture quality, except for the difference between component and composite formats, does not usually determine cost. As previously mentioned, component format machines cost more, as does the tape on which they record. What adds expense are the feature packages added to the basic unit.

Some camcorders offer sophisticated features that let you do everything, from "fading in" a title stored in its memory, to recording shots with transitions (including fake dissolves using freeze-frame), to "fade out" with graphics superimposed over video. Features like these only work well if you are super-organized and your production is well-planned. Some of these features are not especially useful, except when used to record individual elements for later editing into the final production.

Camcorders do not record location audio very well. This is not a deficiency of any tape system but the result of the mic being situated next to the camcorder's lens. If you place the camcorder ten or twenty feet from the source of the sound, the sound won't record properly unless it is very loud. Ambient sounds compound the problem, as they are recorded whether or not you want them. The only solution is to place the mics in the correct locations and connect them to the Ext. Mic terminals on the camcorder. You may want to consider wireless mics for this purpose.

Though you might initially think otherwise, you don't need the same brand VCR as your camcorder, or even the

## RESOURCES

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Caruso, J. and M. Arthur. *Video Lighting and Special Effects*. Prentice Hall,1990.

Millerson, Gerald. *The Techniques of Television Production*, 11th ed. Focal Press, 1985.

Robinson, J.F. and P.H. Beards, *Using Videotape*, 2nd ed. Focal Press, 1976.

Utz, Peter. *Today's Video*. Prentice Hall, 1987.


**MAGAZINES**


*Video*, Reese Communications, Inc., 460 W. 34th St., New York, NY 10001; tel. (212) 947-6500.

*Video Prophiles*, IDG Communications/Petersborough, Inc., 80 Elm St., Petersborough, NH 03458; tel. (603) 924-0100.

*Video Review*, Viare Publishing Corp., 902 Broadway, New York, NY 10010; tel. (212) 477-2200.

*Videomaker*, Videomaker Inc., 290 Airpark Blvd., Chico, CA 95926; tel. (707) 891-8410.


same video format. However, sticking with one brand sometimes has advantages in editing, because the manufacturer may have designed the units to work as a system. You need to decide whether a particular feature has advantages for your work.

The features found on home VCRs are primarily concerned with off-the-air recording and audio reproduction. The recording features generally center around automatic recording and probably have little to do with production. Audio features are more relevant to our interests. Most of today's VCRs record and play stereo. Some

*(continued on p. 48)*


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## GLOSSARY OF VIDEO TERMS

A/B Roll: An editing process that uses two synchronized playback decks to achieve transitional effects such as dissolves and wipes. See Edit Controller.

Chrominance: The color portion of the video signal. Also applies to a color's hue and intensity. See Luminance.

Component Video: A type of video that stores and transmits individual parts of the picture separately. See Composite Video.

Composite Video: A type of video in which all picture information is incorporated in a single signal. See Component Video.

Control Track: An electronic pulse track on videotape, used to maintain constant tape speed.

DVE (Digital Video Effects): Computer-based effects, created by digitizing video and processing it in real time.

Edit Controller: A device used to coordinate two or more video decks for purposes of editing. The controller must be able to control location deck, as well as start, stop, and record functions.

EDL (Edit Decision List): A description of all edits in a production, including the source of each shot, start and end points, and the type of transition used.

Field: In NTSC, one-half of a video frame. One field carries the odd-numbered lines, and one carries the even. See Interlaced Video.

Genlock: The process of locking video sources together, so that the video signals begin at the same moment and continue running at exactly the same rate. See House Sync.

House Sync: A timing reference used to synchronize cameras, recorders, and editing equipment in a video studio. See Genlock, Time Base Corrector.

Interlaced Video: A type of video signal in which a complete picture, or frame, is made of two fields, each carrying half the lines of the picture. The lines of the second field fall exactly in between the lines of the first field. See Scan Line.

LTC (Longitudinal Time Code): A form of SMPTE time code that is recorded as an audio signal. See VITC.

Luminance: The part of the video signal that carries brightness information. See Chrominance.

NTSC (National Television Standards Committee) Video: A video standard used primarily in North and South America and Japan. PAL (Phase Alternate Line) is the system used in much of Western Europe, and SECAM (SÉquential Couleur À Mémoire) is used in France and the USSR.

Off-line: A process of using less-expensive equipment to make editing decisions, typically without reference to time code. The product of the off-line process is an EDL, used to assemble the final product.

On-line: The final stage of editing. All shots are transferred from the source reels in exact sequence, and the result is a master tape.

Overscanning: A process in which the picture is intentionally enlarged so that the edges are cut off by the screen.

RGB (Red-Green-Blue): A form of component video, in which the picture is divided into three brightness (luminance) signals, red, green, and blue.

Scan Line: A video picture is made up of horizontal lines, which are combined to produce the total picture. See Field, Interlaced Video.

S-Video: A form of component video in which the picture is separated into color (chrominance) and brightness (luminance).

Time Base Corrector (TBC): A device that stabilizes video signals by eliminating minute timing deviations. In addition, TBCs synchronize signals to a common reference, such as house sync. See Genlock.

VITC (Vertical Interval Time Code): A form of SMPTE time code in which the time information is embedded in the video signal. This allows time code tracking even in freeze-frame. See LTC.

● **VIDEO** *(cont. from p. 45)*

even do this in Hi-Fi stereo.

When you start investigating video recorders for editing, the first feature to look for is a flying erase head, needed for clean video "punch-ins." If a deck has this feature, it probably has other useful features. Some have built-in edit controllers or ports that give you access to edit features with an external control unit.

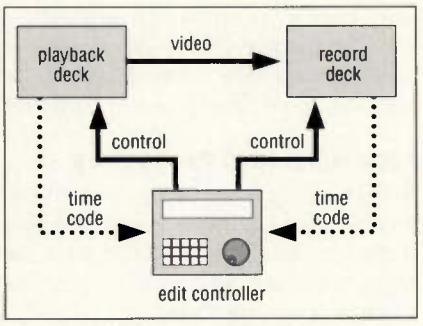
Home VCRs start at a few hundred dollars, and go up to about $3,000. Half-inch and ¾-inch format recorders for "industrial" video start at around $6,000. Recorders used in broadcast start in the low teens, and go up rapidly from there.

### VIDEO EDITING

Editing is crucial to video production and deserves special attention because the equipment and process of video editing have no equivalent in audio and music (at least not at the personal level). To an audio engineer, editing usually means cutting and splicing tape, or (more recently) moving blocks of sound with a hard-disk recording system. MIDI sequencers are even more facile, providing not just editing, but extensive manipulation of the music on a note-by-note, track-by-track basis. Video requires a different approach, because video tape cannot be spliced (it would wreck the picture), and the amount of information involved is too large for most computers and hard disks available today.

In video, editing consists of locking two or more recorders together (as shown in **Fig. 5**) and *assembling* the final tape by transferring video, one piece at a time, from the playback machine(s) to the record machine. This requires precise, synchronized control of both decks, typically supplied by an edit controller. Using a controller, you mark the edit-in and edit-out points on the play machine, then park the record machine and enter or mark its edit-in point. When you tell the system to begin the edit, both machines back up to a point a few seconds ahead of the desired edit and begin to play. As both machines arrive at the edit point, the record machine goes into *record*, and video from the playback machine is recorded up to the edit-out point. The editor continues this process until the edit session ends.

Simple editing may be done manu-




**Fib. 5: A video-editing system consists of one (or more) playback decks and a record deck on which the final product is assembled. An edit controller can be used to coordinate the operation of both decks.**

ally, providing that you have two recorders with accurate readouts of tape location. Some high-end home decks and professional recorders feature built-in edit controllers. Usually, though, the edit controller—which can vary widely in price and complexity—is an external box, similar in appearance to an auto-locator for audio.

Editing can be done with any two video play and recording devices, including one camcorder and one VCR. One plays the original material, while the other records. This basic editing configuration allows you to do basic, cuts-only editing—nothing fancy. If you want to do more than cut from shot to shot, you must add some "bells and whistles" to your system.

Two methods are used to determine tape location for editing. The less expensive and less accurate method uses the pulses on the control track. You can purchase inexpensive control track editing systems through home video dealers, and these can be used to very good effect. Tape handling requires care while editing, however. If you use full fast-forward or rewind, you'll lose the reference to tape position. Even ordinary shuttling can cause the tape to slip by a frame or two.

SMPTE time code-based systems are more expensive, but also more accurate. (See "Decoding Time Code" in the April 1991 issue for a full discussion of SMPTE.) Professional video recorders have a separate audio track for time code, but home decks require the sacrifice of an audio track to record longitudinal time code. An alternative for the professional is *Vertical Interval Time Code* (VITC), which is recorded as part of the video signal rather than as a separate audio signal.

An important note to Electronic

Musicians: As in the other parts of a video system, it is essential to tie the SMPTE time code generator to a common video reference. In recent years, SMPTE time code has become familiar to MIDI musicians as a means of synchronizing sequencers to tape, and a number of inexpensive time code reader/generators have appeared for this purpose. The generators in these units generally do not include Genlock capability and are not suited for video use. In music, time code just provides a basic measure of duration and relative location. In video, each time code frame must correspond to exactly one video frame. Otherwise, the time code "drifts" and havoc ensues.

## OFFLINE VS ONLINE

To date, edit systems that offer the slick results of professional production have been highly expensive. This has led to the practice of *off-line* editing. In an off-line session, the producer (and, perhaps, his engineer) view the source material on less expensive equipment and carefully list the beginning and end point of each segment by time code number, along with the type of edit (simple cut, dissolve, wipe, etc.) desired at each point. They may also perform practice edits to see how the edit will appear in the final product.

The off-line session results in an *Edit Decision List* (EDL) that provides a complete, step-by-step description of all edits needed. When the off-line edit is complete, an editing computer runs the EDL and assembles the show automatically. The producer can change, move, or delete shots on the edit list at any time without having to go through the whole production in sequence.

There are two types of edits used for editing a video: assemble or insert. An *assemble edit* records sections of video from the source material to the edit master sequentially from the beginning of the video to the end. Every assemble edit records video, audio, and control track. An *insert edit* replaces previously recorded video and/or audio with new video and/or audio, leaving the already recorded control track intact. You could assemble edit the video portion and then go back and do an audio-only insert edit to lay the music behind the video. Or you could do it the other way around.

Keep in mind that if you want to combine two separate video signals, they must be in sync. This applies to a simple dissolve from one picture to another, to a wipe, or to editing in an animated computer-generated graphic.

## PART FOUR: INTO PRODUCTION

Before you commit to the expense of buying video equipment or to even producing a video, you must complete the most important step in all video production: creating a plan.

Quality video productions start on paper, not tape. The plan starts with the basic idea for the video, which professionals then develop into a *script*. A script is a complete description of all elements in the production. If the video is not complicated, sometimes an outline or a treatment suffices. The point is: Before you start to shoot, *plan*, *plan*, and *plan* what you are going to record.

After you complete recording, you will likely have anywhere from two to ten times more material than you need for the final product. This is natural. Video production is a creative process and, even though you developed your idea on paper, you probably will see more or better ways to do things as you go along.

Before you start to edit, sit down and look at all the original material to see which shots work best. When the shots are located, write them down in sequential order, noting: either SMPTE time code or control track numbers; the number or designated name of the cassette on which they are recorded; whether you want audio, video or both from the noted location; the timing of the edit, if you have it; and the transition to this shot (i.e., cut or dissolve). This Edit Decision List shows you the location of the shot and the sequential order of where it will appear in the edited master.

## CONCLUSION

Video is a creative medium. As with other forms of expression, you'll need to know its characteristics, capabilities, and limitations if you want to work effectively. Don't forget the creative process. How you develop the concept, write the script, make and execute the plan is up to you.

**James Caruso** *and* **Mavis Arthur** *are video producers, contributing editors for* Video Magazine, *and the authors of* A Beginner's Guide to Producing TV.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# SAMPLING GOES

**The new wave of audio post-production starts with you and your sampler.**

# Hollywood

By Charles Clouser and Michael Molenda

In the early days of film, before power lunches and preteen blockbusters, moving pictures were temples of silence. You popped a coin into the nickelodeon, turned the crank, and watched "Aunt Martha" brush her hair. As cinema graduated from sideshows to movie palaces, theater owners installed pipe organs to enhance the film experience. A masterful organist could sweep an audience beyond the proscenium and into the terror of a phantom's unmasking, the heartbreak of a child's tears, or the pleasure of a lover's embrace.

The allure of sound spelled doom for the silent film. Dialog and musical soundtracks became important film production elements, later branching out into album and sheet music sales.

Music and dialog are important to the film sound experience, but sound effects also are essential in bringing film fantasy to every seat in the house. Would today's audience buy $250 million worth of *Home Alone* tickets without the "kersplat" of household weaponry? Sound is so critical to cinema's emotional impact that it's normal to record much of a film's sound *after* the cameras stop rolling.

This is audio post-production, the art of creating sound effects and background ambiences in sync with pictures.

Because it requires specialized equipment, audio post has long been the domain of large studios. But the alliance of samplers and MIDI threatens to tear down the soundstage walls. A sampler or hard-disk recording system has unlimited sound-effect capacity. Besides your own samples, CD libraries provide those hard-to-get sounds, such as nuclear explosions, car crashes, hurricanes, and small-arms fire. The sampler's instant ability to store and play back sound effects is a post-production engineer's dream.

Many musicians already have the tools to pitch their talents to directors (see "Scoring To Picture," on p. 28). Just owning a sampler gives you the post-pro capabilities to service corporate and industrial video projects.

It all starts with a collection of scenes on tape. To these "work cuts," you add sound effects, environmental sounds, or additional dialog. Usually, the tape includes dialog and/or music, so you can work around the existing soundtrack.

## SYNCHING IN

Synchronization is the key issue in audio post, and SMPTE time code is the big star (see "Secrets of Synchronization" on p. 84). SMPTE data lets you track time in terms of hours, minutes, seconds, and (video or film) frames. Post-production is easier if your sequencer (or hard-disk recorder) syncs to SMPTE, directly or via a converter.

## • POST PRODUCTION

Let's say a director wants to match a gunshot sound with a revolver firing onscreen. In a professional situation, your work tape will have existing audio on one track, time code on another, and an on-screen window displaying the running time. If your sequencer reads SMPTE, you simply pause the video at the point of the gunshot and enter the time displayed. Your sound effect will align perfectly with the visual cue.

To keep sound effects aligned, you need to maintain the integrity of time code on the master tape. This process requires a sync box that can "jam-sync" (or refresh) time code during copying. Make sure your sync box has this capability. You also need to mix your work onto 4-track, or open-reel tape with center-track time code, because SMPTE needs its own tape track.

### NEEDLE-DROPS

Even without time code, you can do the job using the "needle-drop" method. Needle-drops harken to the days of radio, when engineers cued sound effects from record by putting the stylus to the desired track. This was "real-time" action, enacted from script cues during live broadcast, but the concept still applies.

Imagine a scene in which two paramedics react to the sound of a car crash. During the shoot, the actors turn their heads in the direction of someone off-screen yelling, "Crash!" When you receive the videotape cut of this scene, the scream may be recorded on tape, or you might see only the actors' visual reaction. In either case, the director wants you to "drop in" a sickening crash. No problem; just select some terrifying collisions from your sound-effect CDs and dump them into your sampler. With the videotape as your "cue guru," insert the effect to match the actors' response. Test a few variations until you find a sound that complements their reaction.

Low-budget productions often accept ¼-inch audio tape and have their technicians do "wild sync" to picture, dropping effects in without time code. In that case, be sure to edit right to the beginning and end of each effect and separate them with a generous length of paper leader. Depending on the project, your task may be as simple as laying the selected crash to a blank audio track on the work videotape,

## THE NAKED SOUND

Cinema buffs might be shocked to see a film with its soundtrack made up only of "location" audio. This sound, recorded while shooting actual footage, is seldom beautiful. Background noise often obscures dialog, and environmental sounds may not come through at all. Can you imagine why Kevin Costner feared jets while filming *Dances With Wolves*? Precious few 747s crossed the sky in the 1870s.

Post-production turns inadequate location sound into a mondo cowabunga stereorama experience. Basically, audio post involves two types of audio enhancement.

Foley (named for the man who popularized the process) is live sound recording keyed to picture action. Footstep replacement is a common example. The typical Foley studio has several "pits" with various earth surfaces (gravel, sand, hardwood, concrete, etc.) to match different kinds of terrain (see Fig. 1). The Foley artist studies an actor's motions and imitates each footstep on the appropriate surface. The engineer records these sounds and later synchronizes them to the soundtrack.

Foley sometimes requires as many as 24 (or more) tracks, even for simple scenes. Picture a scene on TV's *Star Trek: The Next Generation*. It's a red alert. Security men run down a hallway. The bridge doors open and the captain enters. The crew scrambles to battle stations. The navigator enters data to identify the enemy's location. Hostile fire strikes the Enterprise, and Captain Picard orders return fire.

The scene probably logs fifteen seconds of viewing time. Let's chart the Foley effects needed:

- alarm
- security footsteps
- weapons rattling during scramble
- swoosh of bridge doors
- captain's footsteps
- crew's footsteps
- squeak of navigator's seat
- "blip" as computer confirms data entry
- explosion of direct hit
- crew bumping against walls, floor, etc.
- blips as crew enters orders to weapons system
- return fire

That's a lot of cues in fifteen seconds, and it doesn't even include music or dialog.

Another aspect of post-production, Automated Dialog Replacement (ADR), is the re-recording of original production dialog. ADR helps remedy problems of poor location sound or lackluster performance. In ADR, the actor faces a large screen and tries to sync a new line reading with the mouth movements on film. The ADR engineer must scrupulously log every grunt and cough, so as to maintain continuity.

A famous example of ADR occurred during filming of the last *Pink Panther* movie. Actor David Niven suffered a neurological condition that robbed his voice of its articulation. Though his performance was available with the location sound, it was obvious his line readings would be unintelligible to theater audiences. In audio post production, impressionist Rich Little re-recorded every one of Niven's lines.

*—Mike Molenda*

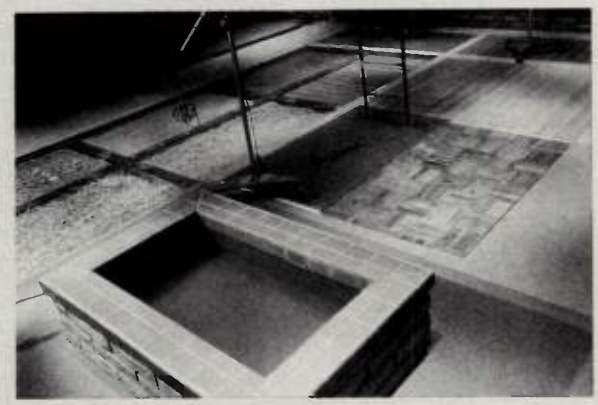

FIG. 1: A typical Foley stage with ground-surface pits and flooring panels.

using "audio dub" (recording audio without video).

### SOUND DESIGN

One enjoyable aspect of audio post-production is finding different ways to satisfy sound-effect needs. Sometimes, a custom sound is preferable to one lifted from CD.

Crumple cellophane, tinfoil, or paper to simulate a crackling fire. Use modulation to make it roar and delay to add a low-frequency rumble. A can opener or blender sounds like a steel mill or jet plane when played an octave or two below normal pitch, and ice cubes in a wooden bowl sound like a rockslide if you lower the pitch. Run your shower with a piece of paper or cardboard on the floor to imitate rain on a window or roof.

To add realism to environmental sounds, pump them through a short reverb or early-reflection effect, with the mix set to full wet.

If you're doing sounds for fictional machines, such as interstellar troop transports or anti-gravity surfboards, the sampler is a powerful tool. Remember the scream of the fighters in *Star Wars*? That primarily was a sample of an animal cry played at lower-than-normal pitch. If you need 50-ton robot footsteps, try layering low-pitched samples of marbles or BBs dropping onto metal. (Almost anything sounds interesting transposed down three octaves.)

### MULTITASKING

A sampler is all it takes to open the door to post-production work. If you're seeking work scoring music for commercial or industrial films, don't sell yourself short. Ask about audio post needs, and tell the producers you can handle those as well. Make a demo of your post-production work. You can assemble this at home, using a VCR with audio-dub capability and the needle-drop method. Put your camcorder to work and insert your coolest sound effects over the footage. You're only highlighting your post-production chops, so the video doesn't have to look like *Gone With The Wind*. Be inventive.

One way to show-off ADR chops is to replace dialog on existing productions. Have fun. Record an obnoxious television commercial and impose male voices on female speakers, and vice-versa. If you're really adventurous, replace an actor's dialog with radically different voices that change with each spoken word. You could even sample the words of, say, John Wayne to match a line spoken by PeeWee Herman. A little sample manipulation helps sync differences in articulation. Remember, creativity is great, but you're also showing a director how accurately you can match dialog. Whatever you do, make sure the inserts are precise.

The more jobs you can do, the more valuable you are. Low-budget operations will be eternally thankful if they can deal with just one person, or studio, for most of their sound needs. And as you collect those extra fees, the funds for your dream studio increase as fast as your reputation.

**Charles Clouser**, *a tri-coastal synthesist, would love for you to buy his band's debut album,* Nine Ways to Sunday.

# Easyverb

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If you want tracks that punch, you need a reverb that *speaks*. With small rooms that don't fizz. And halls that you can walk in. With chambers that make you want to sing. And, we precisely timed the delays to popular tempos, so they fall right on the beat.

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If you hate programming but love choices, or, if you love programming but hate the idea of buying another processor with complex editing, MICROVERB III is the only reverb for you.

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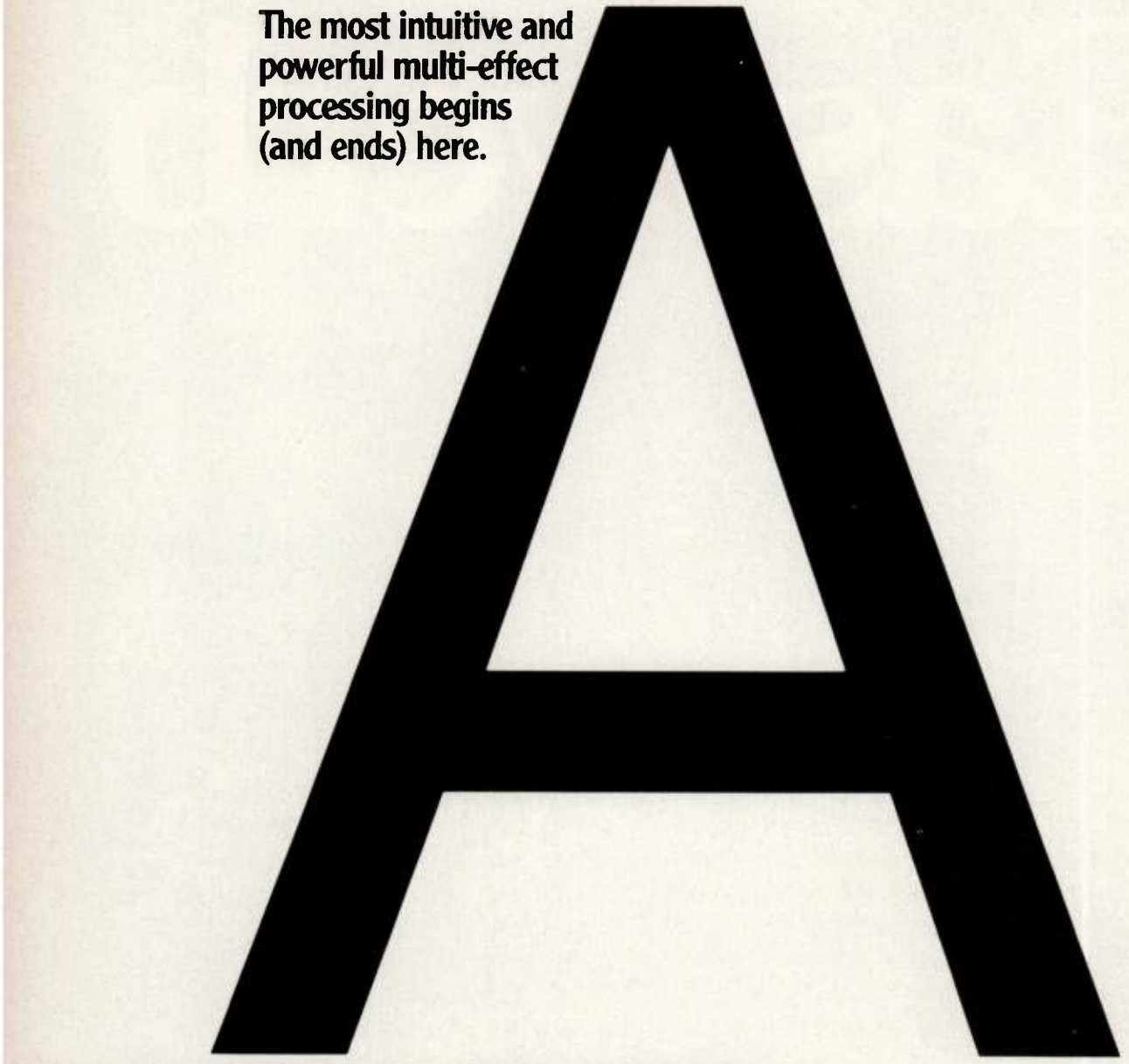



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Designed for demanding studio and live applications, the versatile A1 has 103 digital effects.

It features the same fast, intuitive user interface that's made the A2 and A3 so popular with working musicians and engineers.

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# EM GUIDE TO SAMPLERS

*Turn the world into your waveform.*


The conspiracy of the machine never happened. Samplers did not devour our jobs, strip us from our souls, or cheapen the quality of our work. Musicians still make music; samplers merely added new shades to the audio palette.

However, little more than a decade ago, musicians watched with bemused envy as New England Digital and Fairlight spit venom at each other's digital dream machines. The $100,000 price tags of these sampler/workstations made them as attainable as a lottery jackpot. E-mu introduced the first dedicated sampler in 1981, but it wasn't until Ensoniq released the affordable Mirage ($1,695) in 1984, that

BY JEFF BURGER

| Manufacturer/ Model | ADC/DAC Resolution (bits) | Record Sampling Rates (mono/stereo) | Standard RAM/ Expandable To | Internal Hard Drive | SCSI Port | Number of Voices | Multitimbral Capacity | LFOs (per voice) |
|---|---|---|---|---|---|---|---|---|
| Akai S950 | 12/12 | 7.5 kHz to 48 kHz mono | 750 KB/2.25 MB | no | no | | 8 | |
| Akai S1000 | 16/16 | 22.05 kHz/44.1 kHz stereo | 2 MB/32 MB | no | option $159 | 16 | 16 | 1 |
| Akai S1000HD (Hard Disk Version) | 16/16 | 22.05 kHz/ 44.1 kHz stereo | 2 MB/32 MB | 40 MB standard | yes | 16 | 16 | 1 |
| Akai S1000KB (Keyboard Version) | 16/16 | 22.05 kHz/ 44.1 kHz stereo | 2 MB/32 MB | optional 80 MB w/SCSI $1,995 | option $159 | 16 | 16 | 1 |
| Akai S1100 | 16/16 | 22.05 kHz/44.1 kHz stereo | 2 MB/32 MB | optional 80 MB $1,599 | yes | 16 | 16 | 1 |
| E-mu E-III | 16/16 | 33 kHz/44.1 kHz stereo | 4 MB/8 MB | 40 MB standard | yes | 16 | 16 | 1 |
| E-mu Emax II | 16/18 | 20 kHz to 39 kHz stereo | 2 MB/8 MB | optional 40 MB $995 | yes | 16 stereo | 16 | 1 |
| Ensoniq EPS-16 Plus (Keyboard Version) | 16/16 | 11.16 kHz to 44.64 kHz mono | 1 MB/2 MB (with Flashbank ROM) | no | option $199 | 20 | 8 | 1 |
| Ensoniq EPS-16 Plus (Rack Version) | 16/16 | 11.16 kHz to 44.64 kHz mono | 2 MB/3 MB with Flashbank ROM) | no | option $199 | 20 | 8 | 1 |
| Peavey DPM-SP and DPM-SX | 16/16 | 16 kHz to 48 kHz mono | 2 MB/32 MB | no | yes (2) | 16 | 16 | 1 |
| Roland S-550 | 12/16 | 15 kHz/30 kHz mono | 1.5 MB | no | option $295 | 16 | 8 | 1 |
| Roland S-750 | 16/20 | 22.05 kHz to 48 kHz stereo | 2 MB/18 MB | no | yes | 24 | 32 | 1 |
| Roland S-770 | 16/20 | 22.05 kHz to 48 kHz stereo | 2 MB/16 MB | 40 MB standard | yes | 24 | 32 | 1 |
| Simmons SDX | 16/16 | 44.1 kHz mono | 2 MB/8 MB | optional 20-70 MB ($1,000-$1,500) | yes | 16 | 16 | 4 |

**LEGEND** **Digital Signal Processing Legend:** Crossfading (CF), Digital Synthesis (DS), Equalization (EQ), Gain Normalization (GN), Sample Mix/Merge (MM), Sample Mix/Merge/Splice (MMS),

sampling became a tool of the people. Today, samplers are such a creative force, few musicians could envision a world without them.

## A MINI PRIMER

If you own a sampler, the world is your datastream. Anything audible can be captured and replayed. A sampler can transform tugboat whistles into snare drums, or marry Tibetan temple bells to a pop song.

A single sample is like an audio "snapshot." Acoustic sounds are converted to binary counterparts via an analog-to-digital converter (ADC). Various sampling rates are used to record a sound, with the audio bandwidth equal to half the sampling rate (the CD sampling rate of 44.1 kHz offers a theoretically offers frequency response of 22.05 kHz). Once in the digital domain, samples can be edited, stored, and retrieved. Eventually, the signal is routed through a digital-to-analog converter (DAC) so non-binary eardrums can assimilate the sound. A keyboard or MIDI controller alters playback rates to initiate pitch changes and accommodate musical performance.

## CHART TALK

There are two camps in the digital playground: musicians who sample and musicians who opt for prerecorded sound libraries. For the most part, manufacturers reconciled this by producing feature-laden professional samplers for the adventurous and affordable *sample players* for everyone else. In short, if you want a real sampler, you'll pay for it. The good news is today's machines are worth every dollar.

To facilitate reasonable comparisons, we've included only self-contained samplers in our guide. Products such as Digidesign's SampleCell (reviewed in the April 1991 **EM**) and Spectral Synthesis's SynthEngine (reviewed September 1990), are powerful sample-playback instruments, but require a computer and additional hardware to function as full-fledged samplers. The following definitions explain each chart category.

## ADC/DAC RESOLUTION

Sampler resolution refers to the number of bits used to represent a single sample. Current models boast 16-bit ADCs and DACs (marketing types can't resist calling this "CD quality"). Some manufacturers offer DACs with more bits than the rest of the digital chain, but generally resolution is only as good as the weakest link. Dynamic range is determined at a nominal 6 dB per bit, so 16-bit sampling theoretically rates 96 dB.

## RECORD SAMPLING RATES

Resolution is only part of the sound-quality picture. A sampling rate of 44.1 kHz is normally required for professional results due to the full frequency response it yields.

However, optional lower rates are valuable because they eat less memory, and some samples don't require maximum bandwidth.

## STANDARD RAM/EXPANDABLE TO

Anything you sample must be stored in random access memory (RAM), and like all good things, there is never enough. Creating an authentic grand piano requires multi-sampling, a real memory shredder. A sample must be taken every few half-steps throughout 88 keys to avoid the cartoon timbre of a sound transposed over too wide a range.

However, certain sounds can be looped to save memory and other applications, such as percussion sampling, require only small amounts of RAM.

## INTERNAL HARD DRIVE

A sampler is useless without a fast,

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | 12 db non-resonant | CF/MMS/RS/TCE | 80-character, backlit LCD | no | optional CD/ DAT input $169 | 8 plus mono/ stereo mix | $1,899 |
| 2 | 18 dB non-resonant | CF/MMS/RS/TCE | 320-character, backlit LCD | no | optional I/O port $599 | 8 plus stereo mix | $4,499 |
| 2 | 18 dB non-resonant | CF/MMS/RS/TCE | 320-character, backlit LCD | no | optional I/O port $599 | 8 plus stereo mix | $5,399 |
| 2 | 18 dB non-resonant | CF/MMS/RS/TCE | 320-character, backlit LCD | no | optional I/O port $599 | 8 plus stereo mix | $4,899 |
| 2 | 18 dB non-resonant | CF/MMS/TCE | 320-character, backlit LCD | no | yes | 8 plus stereo mix | $5,999 |
| 3 | 24 dB resonant | CF/EQ/GN/MMS/RS/SRC | 80-character, backlit LCD | yes | no | 16 plus stereo mix | $9,995 |
| 2 | 12 dB resonant | CF/DS/GN/MMS/RS/SRC | 32-character, backlit LCD | yes | no | 8 plus mono/stereo mix | $3,495 |
| 3 | 24 dB non-resonant | CF/DS/GN/MMS/RS/SRC | 22-character, fluorescent/ 29 dedicated status indicators | yes | no | 2 (6-output expander, $249) | $2,395 |
| 3 | 24 dB non-resonant | CF/DS/GN/MMS/RS/SRC | 22-character, fluorescent/ 29 dedicated status indicators | yes | no | 8 | $2,495 |
| 2 | 6 dB non-resonant | DS/GN/RS/SRC | 40-character, backlit LCD | no | no | 4 | SP: $999 SX: $349 |
| 2 | 24 dB resonant | CF/MM/RS | 32-character, backlit LCD | no | no | 8 plus mono mix | $2,495 |
| 2 | 24 dB resonant | CF/DS/GN/MMS/RS/SRC/TCE | 64 X 240-dot, supertwist LCD | no | no | 6 plus stereo mix | $4,995 |
| 2 | 24 dB resonant | CF/DS/GN/MMS/RS/SRC/TCE | 64 X 240-dot, supertwist LCD | no | yes | 6 plus stereo mix | $7,995 |
| 6 | 6 dB non-resonant | CF/RS | 9-inch, green phosphor, high-resolution monitor | yes | no | 16 plus stereo mix | $6,500 |

Reverse Sample (RS), Sample Rate Conversion (SRC), Time Compression/Expansion (TCE). **Notes:** (1) All keyboard versions have 61 keys. (2) Peavey SP and SX must be purchased together to function as full sampler (DAC and ADC).

effective way of storing and retrieving sounds. If you plan serious recording, auditioning, modifying, and playing of samples, a hard drive is essential.

### SCSI PORT

If your work requires obscene amounts of memory or sound-library storage, external drives can be added via the Small Computer Systems Interface (SCSI). A SCSI port allows up to eight compatible devices to access each other in a daisy chain.

### NUMBER OF VOICES

The amount of notes the sampler can play simultaneously.

### MULTITIMBRAL CAPACITY

The number of different sounds the sampler can simultaneously perform via MIDI.

### LFOS

The voice architecture of most samplers is as sophisticated as synthesizers, with multiple options for modulation. A low-frequency oscillator (LFO) is a feature that generates periodic control functions to modulate other parameters.

Sonic interest is enhanced by using this control to create effects such as vibrato and tremolo.

### ENVELOPES

Envelope generators typically can shape a sampled sound in terms of loudness, pitch, or frequency content over time.

### FILTERING SLOPE

High- and lowpass filters tailor the brightness of the sampled sound. The filter slope defines how sharply the attenuation of frequencies proceeds from the filter's cutoff point. Resonance refers to a filter's ability to emphasize the frequencies surrounding the cutoff point (a technique used to produce unique sounds). The Akai S950, which has only a static, non-variable filter, and the E-mu E-III are the only remaining instruments that use analog filters; all the rest do filtering in the digital domain.

### DIGITAL SIGNAL PROCESSING

Many samplers possess facilities to alter some aspect of a sound by digitally processing the individual samples. This procedure is not done in real time. Examples of this type of digital signal processing (DSP) are gain normalization and time compression/expansion. Do not confuse this application with digital effects processing (reverb, chorus, delay, etc.).

Currently, only two samplers have real time digital effects processing: the Ensoniq EPS-16 Plus and the Akai S1100.

### DISPLAY

We've charted character sizes of sampler displays, but readability is just one aspect of the user interface. Manufacturers use different methods of

### LIST OF MANUFACTURERS

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

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

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

Peavey Electronics
711 A St.
Meridian, MS 39301
tel. (601) 483-5365

RolandCorp US
7200 Dominion Circle
Los Angeles, CA 90040-3647
tel. (213) 685-5141

Simmons Drums
756C Lakefield Rd.
Westlake Village, CA 91361
tel. (805) 494-5007

accessing function information.

Make sure you study the amount of information contained in the alphanumeric display and how easily you can access it.

### ONBOARD SEQUENCER

As a general rule of thumb, onboard sequencers are not as powerful as stand-alone units. However, onboard units come in handy for live performance of sequences created on a home computer.

### DIGITAL INPUTS/OUTPUTS

The proliferation of DAT (and digital multitrack) makes possible the transfer of sounds completely within the digital domain.

### ANALOG OUTPUTS

Every sampler has a mono or stereo mix output that combines audio signals from all voices. Some instruments can place individual sounds at specific positions in the stereo field, or pan them between outputs under the control of an LFO or envelope. Recording studio applications make additional outputs desirable so individual sounds can be routed to separate mixer channels.

### A DIFFICULT CHOICE

Cost considerations aside, the impressive features of current samplers make for a tough purchase decision. It is important to evaluate the sampler's role in your musical game plan.

For live performance, a machine with as little as eight-note polyphony is fine. Multiple outputs and high-quality individual DACs are unnecessary. However, memory storage should accommodate all the sounds required for a set. If not, opting for a hard drive eliminates fumbling with slow-loading disks between songs. If an onboard sequencer is required to play sequences created elsewhere, simultaneous multi-channel recording is an essential feature.

Personal recording applications welcome built-in effects and multiple voices to take advantage of virtual tracking, and a hard drive or SCSI port for accessing a comprehensive sample library.

Professional applications require professional equipment. You'll need massive hard drives, stereo voices, and individual outputs. Voice programmability is of paramount importance, and goodies like time compression and expansion are necessary for high-level production work. Digital inputs and outputs insure crystalline sound quality when sample raiding DAT decks and digital multitracks (a must for dance remixers).

Another thing to remember amidst all this technology, is the difference between a machine and an *instrument.* One model may be more attractive than another because of its features. Then again, it may just "feel right." Let your intuition be your guide. ●

## FAB FACTS ABOUT YOUR FAVES

A comparison chart is a statistical survey of data grouped into categories. To facilitate a study of features, these categories often stress what is similiar about products, rather than what is special. So how would you like being categorized as simply a "jazz keyboardist?"

Every sampler has features that distinguish it from the pack. The following is an abbreviated look at each machine's trademark riffs.

Akai: The S1100 offers 50 programmable digital effects with a twist: the separate DSP (digital signal processing) card is designed to process external sounds. This gives the user an extra (albeit expensive) outboard effects unit. The S1100 also reads and writes SMPTE time code. An audio post-production engineer can assemble a "hit list" of sound effects locked to video cues without need of an external sequencer. The S1000 and S1100 have an "effects output" that doubles as a ninth signal output.

E-mu: The Emax II's Spectrum Synthesis feature allows creation of a near limitless variety of timbres. Integral sends and returns accept external effects units into the sound chain without a separate mixer. The E-III boasts one of the largest sample libraries available and a new expander module that pushes memory to 32 megabytes, voices to 24, the record rate to 48 kHz, and includes digital inputs and outputs. Both the Emax II and the E-III incorporate a gentle user interface that promotes rapid system fluency.

Ensoniq: The EPS-16 Plus has dynamic 24-bit stereo effect processing and allows resampling with effects (although the resampled sound is mono). Flashbank, optional programmable ROM, stores samples and/or the machine's operating system for instant recall. This memory is in addition to the unit's RAM. The onboard 16-track sequencer boasts more than 160,000 note capacity, 96 ppqn resolution, and extensive editing with the ability to audition most changes. (The EPS-16 Plus was reviewed in the April 1991 EM.)

Peavey: The cost effective DPM-SP/DPM-SX system offers split ADC and DAC units for those who use multiple samplers. A musician can assemble an entire platoon of playback decks (the SP), while drafting a single sampler as a "drill sergeant" (the SX). DPM-SP/SX expandability is enhanced with dual SCSI ports and up to 32 megabytes of RAM. (The SX is reviewed on p. 88 of this issue.)

Roland: The S-770 (reviewed in the January 1991 EM) boasts 24 voices and 32-part multitimbral capability. It has a 20-bit DAC for improved playback fidelity and a virtual smorgasbord of inputs and outputs (1/4-inch, XLR, and digital). The S-770 also has a CRT output for enhanced viewing of editing functions. The unit's digital filters have controllable resonance. The S-750 has all of the S-770's features except the digital I/O and standard hard disk.

Simmons: The SDX stresses a "drummer-to-sampler" user interface that allows, among other features, human performance dynamics and choked cymbals. Each of the company's optional "zone intelligent" pads (from $192 to $385 each), can dynamically trigger up to nine different samples. The 9-inch television display is *totally* cool.

*—Michael Molenda*

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Now don't think this is some "close-out-clearance" product. Quite the contrary. The Pro I is a newly-engineered rackmount version of the very popular Kurzweil K1200. It delivers all the features you'd expect from a professional synth, including 16-channel multi-timbral operation and dynamic voice allocation. And the Pro I is extremely easy to program.

So hurry to your favorite Kurzweil dealer and add the Pro I to your setup today. At $1595, we just eliminated your last reason not to have Kurzweil sounds yourself.

**Pro I Features**
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**Sound Memory**
6 Mbytes sound ROM. Acoustic Pianos, Electric Pianos, Acoustic Guitars, Acoustic Basses, Electric Basses, Electric Guitars, Drum Kits, Percussion Batteries, Synth Clavs, Percussive Synths, Lead Synths, Synth Bells, Synth Brass, Trumpets, Tenor Saxes, Synth Strings, Orchestral Strings, Pop Strings, Harps, Marimbas, Vibes, Choirs, Woodwinds, Organs, Synth Pads, Effects.

**Setup Memory**
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**YAMAHA**

By David Schierman

# PUTTING YOUR SOUND SYSTEM IN ITS PLACE

***Don't let room acoustics sabotage your performance.***

Let's face it: Woofers, tweeters, amplifiers, and crossovers are not exciting. But as far as audience enjoyment of a concert goes, the sound system is more important than a great haircut and a light show. If you don't agree, recount the times someone has accosted you after a performance and complained they couldn't hear the vocals. Or the guitars were too loud. Or everything was too loud. One way or another, it all comes down to sound equipment and how the system interacts with the performance space.

This article explores the basics of live performance systems and how to wring the best possible sound from most situations.

Acousticians speak of "the room" in reverent tones for a reason. Nothing affects audience perception of sound more than the size, shape, and style of the building in which you perform.

In a small room, such as an 80-seat coffee house or after-hours club, almost everything except vocals can be heard without plugging into the sound system. Care must be taken with dynamics; an insensitive drummer can seem louder than a New York City garbage truck, and a bass amp volume set at "1" can be overpowering. The more confined the space, the less you need to amplify, or reinforce, the sound of your instruments.

At the other end of the scale, a cavernous gym swallows up your riffs before they reach the front row. This situation requires a major rescue from the sound system.

It's good practice to develop a keen, intuitive sense about how a room affects sound. Play or sing a little and concentrate on the acoustics of the performance space. I once watched a popular singer walk onstage during a soundcheck at a theater. She clapped her hands. She whistled. She moaned. She was getting a feel for the room space, using sounds familiar to her.

Note the room's shape, as this affects your ability to provide smooth sound coverage. For example, square rooms can sound bright and harsh, while domed ceilings produce unusual "flutter" echoes. Every nuance of architecture figures into the shaping of sound. Interior decoration poses another

problem. If a room is crammed with plush chairs, a high-pile carpet, and an acoustic-tile ceiling, the resulting "soft" environment can make your show sound lifeless.

**Quick tips:**

- If a room is especially "live," back off the bass. Make all low-frequency instruments softer than normal. Add a bit more upper mids and highs (3 to 8 kHz) to your vocal mics, and make sure your speaker system doesn't point directly at a hard wall surface.
- "Soft" rooms can be livened up by using a bit more reverb. Make sure the kick and snare can be heard well enough to generate some excitement. It also helps to pump more lows through the system.
- Drum reflection presents a serious problem when a stage has a low ceiling, as the snare and cymbals often leak into vocal mics. Have the drummer play a little softer and add padding to the snare head. (Try using a washcloth and duct tape.) Affix duct tape to the undersides of cymbals and be sure to position vocal mics as far from the drum set as possible. If the drummer sings, keep the mic switched off or muted when not in use.
- If bass rumble becomes a problem in a wooden hall or auditorium, your speaker cabinets may be sitting directly over a hollow stage or an empty room. Uncouple the bass amp and/or speaker system from the resonating space by isolating it from the deck. Lift the speaker(s) onto milk crates covered with thick folds of scrap carpet or 6-inch foam rubber (available at most bedding stores), cut to fit.

## FINDING THE RIGHT LOCATION

Unfortunately, clubs often position stages to benefit sight lines and bar access, rather than to optimize acoustics. If a venue allows you to determine stage placement, don't automatically set up where the house manager always puts the band. Picking the ideal performance space in a room can make your show sound better than all the knob twiddling in the world.

Select an area that allows sound dispersal to the majority of the audience without firing directly into a hard surface. Look carefully at wall surfaces and ceiling heights, clapping your hands to determine the quality of the echo.

# The XD-5 Builds Stronger Drum Tracks Ten Ways.


**1. Total Expressive Freedom** Unlike any other drum module, the XD-5 is a full-blown Percussion *Synthesizer,* not just a sample-playback unit. As a result, the XD-5 gives you total expressive control over every aspect of your percussion sounds.

**2. Create Totally New Sounds** With an XD-5, you can create your own custom sounds, even new sounds never before conceived. And with 256 Waveforms on board, there are literally over a billion mathematical sonic possibilities.

**3. Sound Stacking** Up to four different drum sounds can be stacked together into a single sound for incredibly explosive power.

**4. More Flexible Kits** Sixteen programmable 88-Note Kits offer the most versatility of any unit on the market.

**5. Digital Filters** No other module allows the customization of completed drum sounds like the XD-5's on-board Digital Filters.

**6. Programmable Outputs** Eight fully programmable Output Routings offer the kind of flexibility you've simply got to have when you go into the studio.


**7. Sound Design Manual** Our Sound Design Manual combined with the XD-5's user-friendly programming makes it possible for even novice programmers to create great sounds.

**8. Disk-Based Drum Patterns** Kawai's expansive library of Disk-based Drum Patterns (available in Q-80 format as well as standard MIDI file) will turn your sequencer or computer into an incredibly powerful software-based drum machine. Both pros and novices can benefit from the ideas and inspiration of world-class drummers.

**9. Extensive Sound Library** Beyond the Kits resident in memory, Kawai's top-notch programmers have developed a series of specialized custom XD-5 Kits available on ROM.

**10. Demo Cassette** If amazing specs, glowing reviews, and great street buzz haven't already moved you to buy a Kawai XD-5, our demo cassette will. Order it and see what stronger drum tracks are all about. Send $1.50 to: XD-5 Demo Cassette, Kawai America Corporation, 2055 E. University Drive, Compton, CA 90224 (213) 631-1771.

**KAWAI**

Digital Magic.

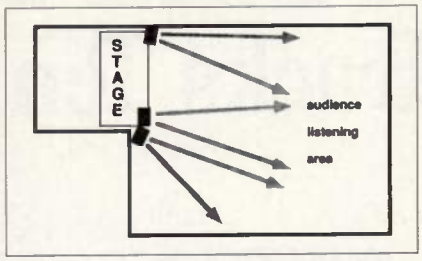


**FIG. 1: An asymetrical room demands additional speaker coverage for the larger audience area.**

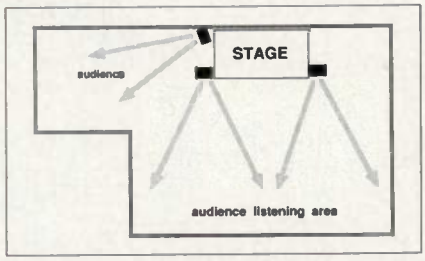


**FIG. 2: Stuck with poor sight lines and reflected sound, an alcove audience is hard to please. Shake some action by pointing a fill speaker in their direction.**

A typical rectangular room usually can be filled by a simple sound system comprising identical boxes (or groups of boxes) placed to the left and right sides of the stage area. Music travels down each side of the audience, with sound from the stage reinforcing the center aisles. This format, on a much larger scale, is used by major touring groups in arenas and auditoriums.

If you perform at a club where one side of the audience area is significantly larger than the other, add a third speaker cabinet to cover the larger side of the room (**Fig. 1**). It is seldom necessary to double up the smaller side, as too much reinforcement in a limited space punishes an audience with harsh sound.

In situations where part of your audience is set off in an alcove, pointing a small fill speaker or extra monitor in their direction yields impressive results (**Fig. 2**). Direct at least some sound wherever people are listening. Pleasing the whole audience, instead of just the center dance floor, is a consideration that impresses both crowds and club owners.

## RAISE 'EM UP

Elevating your speaker system above audience level allows better coverage of a room without blasting people in the front. Place simple, all-in-one enclosures atop sturdy tables or tripods to gain suitable height.

If your system is a component type (low-, mid-, and high-frequency speakers packaged separately), consider keeping your low-frequency speakers on the floor and elevating only the high-frequency components. A simple, easy-to-fabricate system requires nothing more than metal pipe and sturdy hardware. Steel pipe can be cut to a length above the average audience member's head (typically six to eight feet), but not so long as to be unstable. The bass cabinet is used as the ground support, with the metal pipe secured to support and elevate the high-frequency component (see **Fig. 3**).

Another method is to use a hand-powered hoist or lift, similar to those used as ground-support systems for lighting trusses. The speaker system can be secured to the lifting mechanism with approved rigging straps and raised to the desired level (see **Fig. 4**).

Since low frequencies are less directional and less susceptible to being blocked by a crowd of people than mids and highs, these methods offer increased coverage of a room space with a relatively small sound system.

For larger systems, such as those used by regional touring acts, a simple method of gaining sound system height is to use scaffolding. These can be rented at construction supply yards at reasonable cost. You also can find good deals on used scaffolding sections and platforms if a building contractor goes out of business.

A hard rock band I encountered purchased two 4 × 8-foot scaffold structures with wooden decks from a construction site for only $20. These provided a sturdy platform for the band's speaker system at a height six feet above floor level. The system took only minutes to assemble.

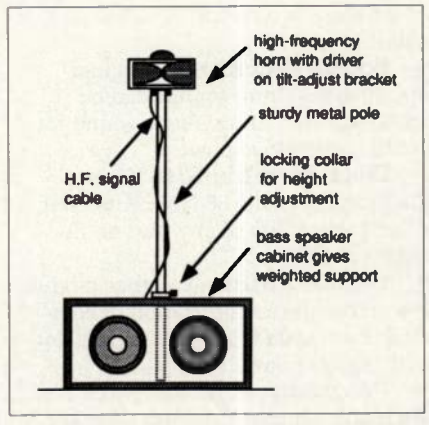


**FIG. 3: Simple, homemade rigging increases sound system efficiency by raising high-frequency drivers above the audience.**

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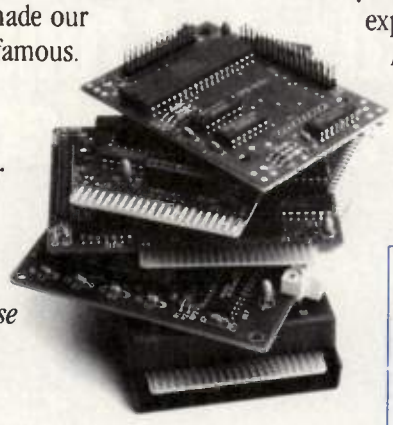

Our SCSI Rackmount Disk Drive System is compatible with *Akai S-1000, Dynacord ADS, EMU Emax II, E III, Mac SE/IICX, Ensoniq EPS, EPS 16 Plus, Roland W-30, S-550, S-770, Soundtools by Digidesign* and others . . .

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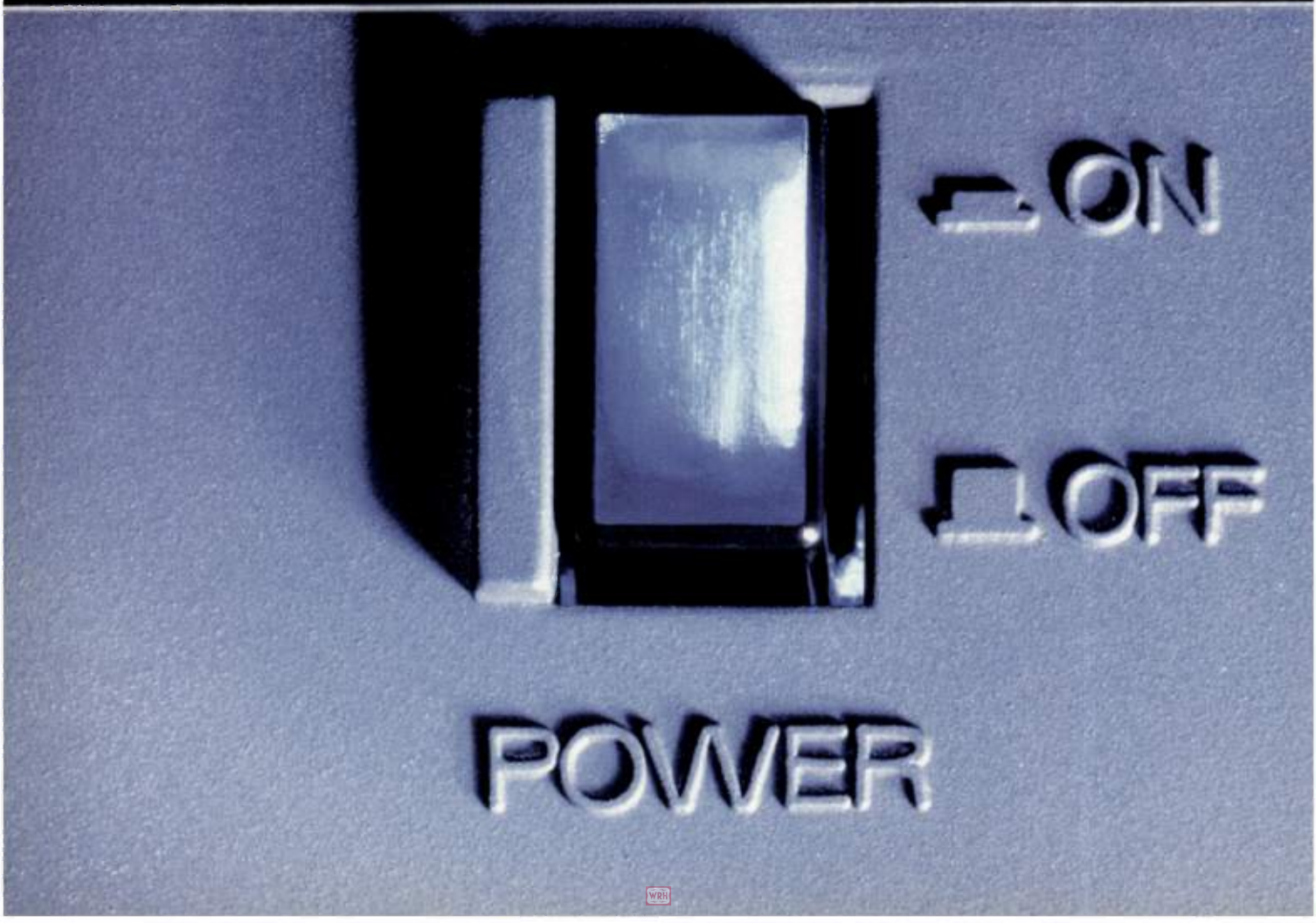
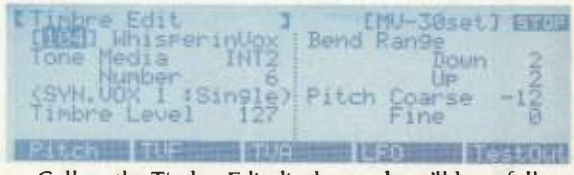



*Studio M's Compu-mixer records MIDI volume levels and pan settings for internal and external parts.*

If you'd like to produce professional quality music without first obtaining an advanced degree in rocket science, you've come to the right ad.

Introducing Studio M, a remarkable little powerhouse that integrates a sequencer, sound module and Compu-mixer into a versatile music production system. But just because Studio M is engineered to be incredibly simple to use doesn't mean it's simple-minded.

After all, in addition to its seamless integrated design and helpful displays, Studio M is 8-part multi-timbral and offers 30-voice polyphony. So you'll be able to play a lot of sounds at once. And you'll have lots of them to play with, since 220 sampled sounds are built in.




*Call up the Timbre Edit display, and you'll have full control over envelopes, LFOs and multi-mode filters.*

And whether we're talking about Studio M's great piano, drum and synth sounds—or any of its other sounds, for that matter—they're always easy to access. And even easier to edit. You'll also have built-in effects to add reverb, delay or chorus.

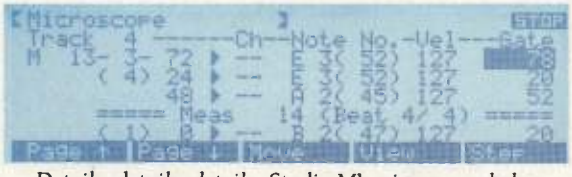

*You can forget about MIDI channels with Studio M. To sequence: Pick a track, choose a sound and go.*

Then there's Studio M's 16-track sequencer, which will allow you to choose the sequencing style—pattern, linear or loop—and then control up to 136 internal and external parts. When you combine this with Studio M's more than generous 50,000-note memory, we're obviously talking about major composing power.

When you're ready to mix, any adjustments you make using the 8-fader Compu-mixer are stored to provide a powerful auto mix-down function—as you monitor every fader movement on the LCD.


*Each song will load along with its proper sounds.*

Need more features? To sync to tape players with ease, Studio M offers Tape Sync II. For preserving your creations, the built-in disk drive stores up to 150,000 notes on a single disk. And for adding the newest sounds as your composing needs call for them, Studio M offers two ROM card slots for optional Roland sound cards.




*Details, details, details: Studio M's microscope helps you make even the smallest changes to your music.*

All of which makes our Studio M the ideal tool for music production at all levels. It serves as a stand-alone music studio or as the core of a larger MIDI system. Providing, of course, that you're up to speed on the function we've highlighted to the left.

Hey, even Studio M can't do everything for you.


Roland®

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However, these items take up vast amounts of space and only are viable if you have a large equipment truck. Also, inquire about a venue's insurance and construction requirements when large structures are part of your production.

Regardless of the method used to elevate your sound system, remember that low-frequency components work best on the bottom. High-frequency components should be placed on top, where they work more efficiently and encounter the least obstruction from audience and architecture.

**Quick tips:**

• It takes twice the amplifier power to reach a mere three decibels of system gain. However, coupling bass cabinets to building walls and the floor can create six decibels or more of apparent low-frequency gain in the room, without buying bigger power amplifiers.

• If your sound system is used primarily for vocals, and performance volume is moderate, the left and right speakers may be tilted slightly toward center stage. This allows you to hear the main system mix and eliminates the need for monitor speakers.

## MONO OR STEREO?

The decision whether to set up your sound system in mono or stereo format depends largely on your type of musical program, the style of rooms you play in, and your budget. A stereo system (or even a dual mono system) requires two of everything: a soundboard with stereo outputs, two electronic crossovers (if applicable), and two of each type of power amplifier. The left and right program feeds cannot be fed through the same signal path, requiring two completely separate, identical paths. That means twice as many cables.

So why bother with stereo? Because it allows remarkable sound effects with reverbs, delays, and pitch changers. You can take full advantage of stereo keyboard programs and spread drums and other sounds across the audience listening area.

The stereo system, with its separate crossover, equalizer, and power amplifier controls for each side, also provides more flexibility and control when you need to adjust to architectural quirks. If one side of a hall has a balcony or mirrored wall, you can tune the system to allow for the acoustical differences.

There are drawbacks, however. The first is complexity. If you have two signal paths instead of one, you have twice as many places to look when something goes wrong. It also is tempting to misuse a stereo system. Doing hard pans (sending a signal to only one side of the sound system) cheats half your audience.

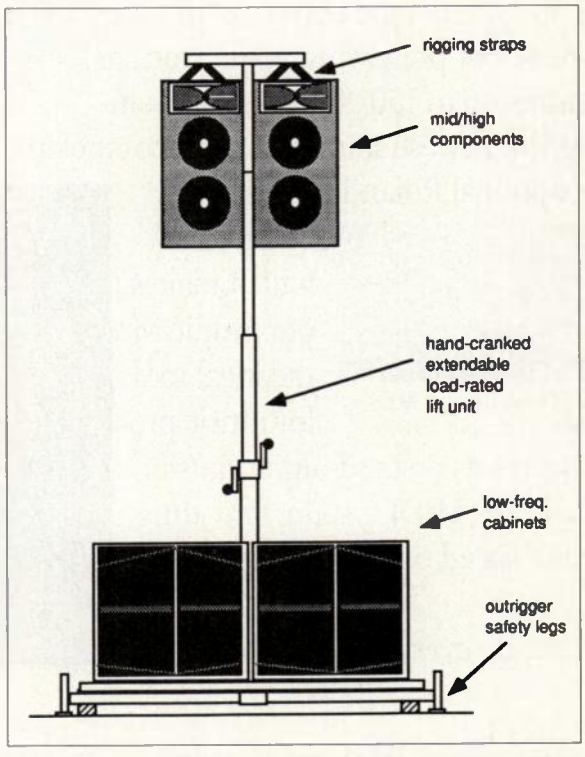



FIG. 4: Larger venues require more extensive speaker rigging to fill the room with crystalline sound. Make sure all equipment conforms to local safety codes.

**Quick tip:**

• If the guitar amp sounds too loud on the left side of the room, increase it a bit in the right side of the sound system. This gives a smoother, more balanced music mix in the audience area.

## DISTORTION IS NOT YOUR FRIEND

The most common problem that plagues sound systems operated by working musicians is distortion. Harsh, buzzsaw tones can be a tasty special effect on guitar riffs but don't belong

in your overall sound mix.

Overdriven amplifiers are a primary cause of audible distortion in a sound system. Make certain your amplifier's power channels are rated at a high enough output to handle your needs. Make sure you don't clip (overdrive) the amps. Also, see that your vocalists don't bear down too hard on their microphones and that no soundboard inputs and outputs or equalizers are being overdriven.

If everything looks good on the electronic side of your system (no clip lights, no meters in the red), and you still hear distortion, it is possible an impedance mismatch exists between the input and output of some of your gear. For instance, make sure you haven't tried to feed line-level signals into a low-level input.

If all cabling and equipment connections check out, the next possibility is the speaker system. Prior abuse may have damaged one or more loudspeaker components. Replace any speakers that are "rubbing" or exhibiting other signs of overuse or excessive wear.

If all individual speaker components work and you know that the system distortion is not in the microphones or the front-end electronics, your power amplifiers may be pumping too much power into your speaker system. Many loudspeakers can operate close to the edge of failure, causing audible distortion, without actually suffering permanent damage. Either back down the level of your amplifiers or add more speakers.

### TAKING RESPONSIBILITY

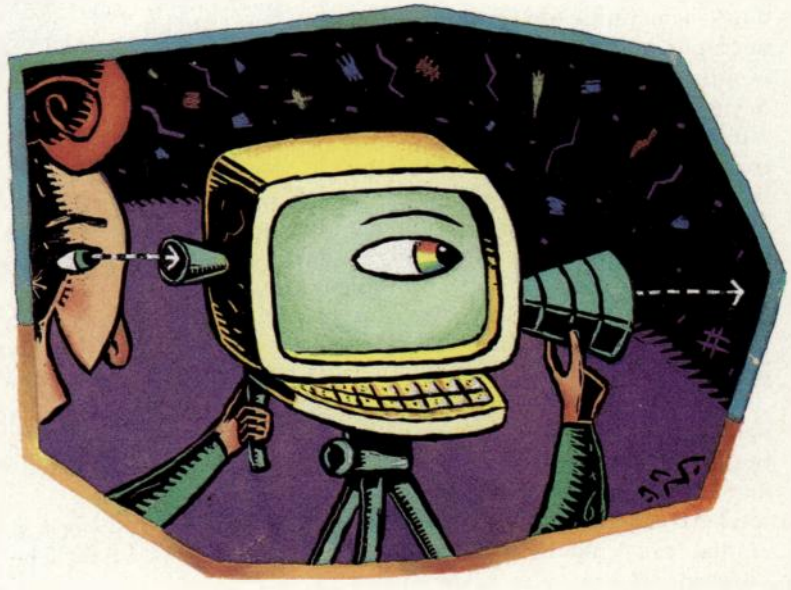
Musicians need to use their inherent creativity in every facet of their presentation. Creative problem solving doesn't end after the songwriting process or at the completion of a master tape. Don't buy into the myth that "musicians know nothing about sound," or that you must be an engineer to set up and operate a sound system. It's your show. Don't let ignorance and hostile acoustics sabotage your music. Think about the room and determine how to use it to your advantage. Improving your live sound helps draw the entire audience into the excitement of your act.

**David Schierman,** *a former professional musician, has worked with concert sound systems since 1972.*

# Desktop Video

*By David (Rudy) Trubitt and Terry Barnum*

*You've used your computer to help make records, now use it to make movies.*



As a young television viewer, I puzzled over an unanswered question. By twiddling the horizontal and vertical controls on my TV, I discovered some of the picture hid behind the plastic frame surrounding the screen. Try as I might, I never found a setting that revealed the entire image. Later in life, I realized this was a fundamental lesson: You never see the big picture.

Fortunately, current video and computer technology allows a measure of revenge. Desktop video puts the big picture under your control. Your computer can transfer its graphics to videotape, receive images from videotape for enhancement, generate video special effects, and even sync video decks together as an edit controller.

However, there are things you should know about the video medium before you start bending and shaping it to your whim. To help explain, I'm joined by Terry Barnum, a post-production digital audio/video editor and electronic musician. (See also "Video for the Electronic Musician," on p. 38).

## THE BASIC SIGNAL

The video signal generated by your computer and sent to its monitor is not the same signal that travels the airwaves. Some of the major differences are resolution, scan rates, overscan, blanking, and color reproduction.

Resolution is determined by several factors, although bandwidth is the most important for the purposes of this article. Broadcast video has a narrow bandwidth due to limited "space" in the airwaves. Computer video does not compete for airwave space, so it uses a higher bandwidth to gain superior resolution. Computer video resolution is expressed in terms of pixels, the smallest sensitized unit of a video screen or CCD (charge-coupled device, a photoconductive chip). Broadcast clarity is rated by lines of resolution.

Scan rate is the time an electron beam takes to repaint a screen image from side to side and up and down. In the broadcast world, television scan-rate specs insure compatibility between brands and models. Computer video displays have no common scan rate and vary widely. As a rule, the higher the scan rate, the more stable the picture.

When the electron gun in a video monitor or television finishes painting an image, it returns to the top of the screen to begin the next one. During this reposition, the electron beam switches off until the picture signal resumes. This "blanking period" facilitates transmission of non-picture signals such as VITC time code, teletext, and closed captioning. Computer video doesn't concern itself with these features and instead maximizes picture area by reducing blanking time.

Every computer screen has a black edge band, but unlike the viewing puzzle of my childhood, computers allow scrolling (or image shrinking) to reveal the entire picture. Broadcast video on the National Television Systems Committee (NTSC) standard overscans images to compensate for transmission losses. NTSC signals produce a larger picture than consumer TV screens can render. Also, there are no strict guidelines for television manufacturers to determine where active video starts. To be safe, they overscan images by approximately fifteen percent. (Professional

AD MCCAULEY

# Presenting the new SD▼1 from ENSONIQ.

## The best way to blend sound, performance and composition since the baton.

▼ Great music is an artful balance of these three elements. And it's never been easier to achieve than with the new ENSONIQ SD-1—the next generation in integrated music production synthesizers.

▼ Great sound? The SD-1's sampled waveforms cover the gamut of instrument sounds: from orchestral to pop, solo instruments to imaginative synthesis. Then add our unique Transwaves™ for a dynamic sound that brings synthesis to life—all played back through new 16-bit state-of-the-art output circuitry that gives unsurpassed fidelity to your music (the same circuitry we use in our EPS-16 PLUS sampler!).


*Our new 16-bit piano waveforms deliver the clarity and richness of a great grand piano.*

▼ Performance flexibility? With the SD-1 you can combine acoustic, analog synth and exotic digital textures at the push of a button—no MIDI cables needed! And 24-bit dynamic effects, expressive Patch Select buttons, and a third generation Poly-Key™ Pressure keyboard add to performance possibilities that no other synthesizer offers.

*The SD-1 already has a large library of sounds, thanks to compatibility with our VFX and VFX-SD synthesizers.*

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video monitors may have an underscanning option that allows viewing of the entire image.)

These differences come into play when a desktop video system converts computer-generated video to broadcast video. What you see on your computer screen is often compromised when transferred to video. For instance, NTSC video can't do major color shifts simultaneously and may render different hues from those created via computer graphics. Narrow (one pixel wide) horizontal lines may flicker in the final image, because they show up in only one of NTSC's two scanning fields.

But even with format conversion problems, desktop video offers powerful access to the visual medium.

The Selectra AG 1960/RS is a computer-controllable, S-VHS VCR based on Panasonic's AG-1960.

## COMPUTER VIDEO APPLICATIONS

Computers can bestow amazing graphics capabilities upon the common video deck. One example is *character generation*. This allows identifications like "Joe B. Schmoe, Reporter" to be superimposed or "supered" onto an anchorperson's video image. Broadcast engineers define this process as *keying* because a video "keyhole" is filled by text, graphics, or even another picture.

There are two main types of keying: luminance and chrominance. Luminance keying uses brightness level to determine the areas exchanged for fill video (the video satellite map behind a weather reporter is an example of luminance keying). Color defines the keyhole in chroma keying. "Blue screen" work is a staple of film and video special-effects editors.

Animation is another feature of desktop video, and many software programs allow creation and choreography of two dimensional objects. More realistic (and more expensive) computer animation involves a process called *rendering*. This demands the inputing of specific details such as color, light sources, and textures. A single frame can take minutes or hours to render, depending on its complexity and the speed of the computer doing the job. When complete, each frame is transferred to a video recorder capable of recording one frame at a time (*not* a common feature). The process is repeated 30 times for each second of motion.

A computer also can control a video switcher, analogous to an audio mixer, that permits selection of a specific video input source. Through the switcher, video images are manipulated by cuts (a "razor blade" edit from one picture immediately to another), dissolves (a "crossfade," one image diminishes as another increases), wipes (the image is replaced by another from side to side, or top to bottom), or other transitions. These fancy edit functions are called *digital video effects* (DVE).

It's impossible to watch television these days without being smothered in DVEs. Page turns (where the image on the screen seems to turn like a page in a book), tumbles, and collapses are examples of more complex DVEs.

Computers also are valuable to the final assembly process because they can bark orders to videotape recorders. A complete computer-based editing system takes scenes from a playback deck and precisely inserts them onto a record deck. More elaborate systems use timecode for simultaneous control of several video source decks.

All VTRs (professional video tape recorders) offer computer control, but two new S-VHS consumer decks offer interfaces at reasonable cost to entry-level customers. Both the PC-VCR from NEC (tel. [800] 323-6656) and the

# Q: What Atari sequencer gives you the most for your money?

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| • Realtime piano roll note/controller editing | **YES** | no | yes | no |
| • Realtime graphic tempo editing | **YES** | no | no | no |
| • Multiple track and controller graphic editing | **YES** | no | no | no |
| • Realtime graphic song editing | **YES** | no | yes | no |
| • Remote song start | **YES** | no | no | no |
| • Event list editing | **YES** | yes | yes | no |
| • Transcribe notation | **YES** | yes | yes | no |
| • Print full scores | **YES** | yes | yes | no |
| • Multiple MIDI ports | **32*/64**** | 64** | 64** | 32*** |
| • Start sequences from computer keyboard | **YES** | no | no | no |
| • Stand alone song player | **YES** | no | no | no |
| • Sysex editing | **YES** | yes | yes | no |
| • Algorithmic composition | **YES** *** | no | yes | no |
| • Multi-program switching | **YES** | yes***** | yes***** | no |
| • Color monitor compatible | **YES** | no | no | yes |

* With Phantom hardware which includes SMPTE for $250. ** With optional hardware. *** With optional MIDI Transport which is no longer available.
**** Includes Level II algorithmic composition system. ***** Switching with their programs requires use of a special copy protection "Key expander box" at $399+.

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Selectra (tel. [415] 283-1670) AG-1960/RS (which contains a Panasonic transport) can be externally controlled through built-in RS-232 serial interfaces. Besides receiving commands to operate the transport, these units can send the current tape counter position to the controlling computer.

## GOING "ONLINE"

You can't animate or key even one video frame unless you have the right tools. Enthusiasts cite the Amiga as the computer of choice for video. They point to several advantages, including a system clock compatible with the NTSC scan rate and built-in graphics-support chips. The Amiga 1000 has a built-in NTSC output, while the 500, 2000, and 3000 require additional hardware to generate a recordable video signal. The Amiga accepts one of the hottest video add-ons: the NewTek Video Toaster. This plug-in card lets the Amiga mix several external video sources, add incredible digital video effects, and create 3-D computer animation. (For a complete review of the Video Toaster, see p. 95.)

The Amiga has a head start in video, but there are options for other systems. Several PC-compatible video cards, offered by companies such as Truevision (tel. [317] 841-0332) and Progressive Image Technologies (tel. [916] 985-7501), offer NTSC inputs and outputs. In many cases, these boards also function as display adaptors for your non-NTSC monitor.

Macintosh users have various options, including products from Radius (tel. [408] 434-1010), Raster Ops (tel. [408] 562-4200), and Avid Technology (tel. [617] 221-6789). Some companies (such as Radius) complement Macintosh's strong presence in publishing with devices that focus on video as an unlimited source of images. Atari users aren't entirely out in the cold, but video activity on the ST is minimal.

## VIDEO SYNC ISSUES

To use your desktop video computer to switch or edit between two or more video sources, the system must be precisely synchronized so each source video starts a new frame at exactly the same moment. Without proper sync, a visual glitch results on the assembly (master) tape. This reminds me of my stint as a nightclub DJ. If I faded between two records without (manually) synching the downbeats, the dance floor would empty in a flash.

A *genlock* is used to sync your computer to an external video source. This device monitors incoming video sources and generates a digital clock to permit glitchless editing.

Another device, called a *time base corrector* (TBC), makes sure incoming video signals are synched with outgoing signals. These devices accept video in, video out, and a sync input. The most important function of a TBC is to stabilize the signal from a videotape. Videotape, like audio tape, is a physical medium and never travels across the heads at a constant rate. TBCs remove these timing variations from the video signal. The TBC digitizes the slave video, delays it slightly, and then spits it out in sync with the master signal. A TBC also can strengthen a weak signal and strip or modify color.

## FADE TO BLACK

The boom in desktop video production and synchronization offers computer musicians new tools of expression. However, a few words of warning: A desktop video system won't give you the equivalent of a video production house, no matter how good an ad sounds. Musicians should never forget all the (grossly inaccurate) hype promising MIDI systems would give them all the capabilities of a professional recording studio.

Finally, don't forget that successful communication in a visual medium requires just as much practice as working with music. Video equipment can't make you a director anymore than a sequencer can make you a songwriter. But you'll never learn if you don't try.

**David (Rudy) Trubitt** *and* **Terry Barnum's** *last collaboration was* Find'EM, *the* **EM** *computerized index. To get* Find'EM *for your computer, see p. 19 of the February 1991 issue.*

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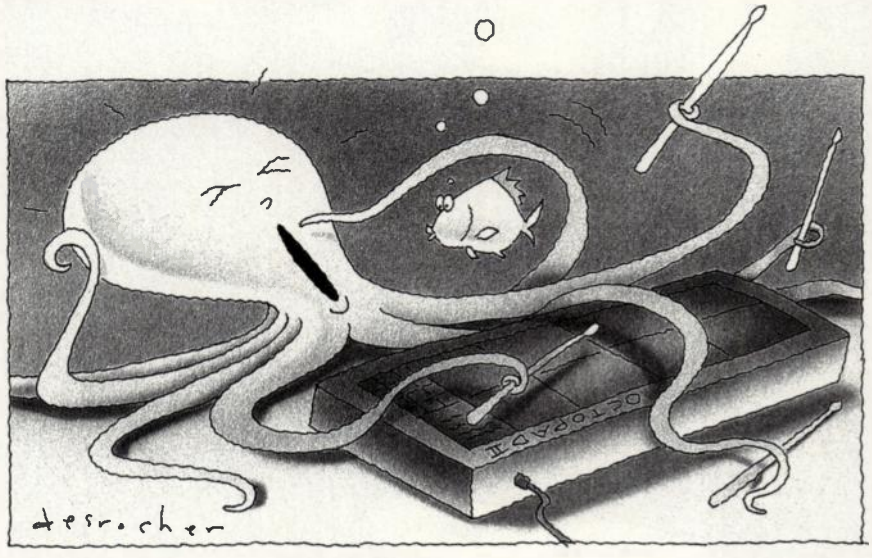
# Questions and Answers

*By Alan Gary Campbell*

*If your Octopus is sluggish, I'd suggest you either raise the water temperature or change its diet. Oh, you said Octapad? Well, never mind!*




**Q. I have a Roland Octopad that I'd like to use with external triggers. For some reason, the Octopad's response is sluggish or worse; it misses half the hits, no matter how hard I whack the pads. I've tried various pickups. It seems to respond when the trigger is first plugged in.**

**The unit was dropped once, and a small circuit board area cracked. This was fixed and still appears okay; the repair center could find no problems. Do I need cleaner trigger pulses, or is there another disturbing possibility?**

**A.** Similar symptoms can be caused by programming long gate times, so that the Octopad outputs haven't time to reset before the next hit. Try adjusting the gate time while controlling a sustained sound. You should notice a considerable difference in the effect over the range of gate times available. If not, then there may be a circuit defect.

If a defect is suspected, reference the previously damaged area of the circuit board to an Octopad schematic (refer to a Roland Octopad service manual) to determine the portion of the circuit that is affected, then work backward from there.

**Q. I have an Ensoniq ESQ-1 synth that has provided great service, until now. When I use my EPROM cartridge, I intermittently get garbled data. This does not happen with the internal banks, but if I download banks from the internal memory to cartridge, they eventually get garbled. I returned the cartridge to Ensoniq, and they said there was no problem.**

**Also, intermittently, a note on the keyboard will "not be there"—not only the same note (i.e., all Cs or Ds), but any note—and this also affects the sequencer.**

**A.** Garbled cartridge data can be caused by a defective cartridge (a variable you have already eliminated), an electronic problem on the ESQ mainboard, or dirty contacts on the cartridge or on the connector that receives it (inside the ESQ). Have a service technician clean both sets of contacts with Freon. If that doesn't solve the problem, have the mainboard replaced by an Ensoniq authorized repair station (Ensoniq provides service via modular exchange rather than by component-level repair).

Occasionally, a software glitch can cause a voice (or voices), and, hence, notes to become intermittent. Reinitializing the unit will fix this; however, reinitialization erases all RAM and reloads the factory sounds into the Internal memory. If you with to retain the internal sounds, the normal procedure would be to save them to Cartridge memory, but since the cartridge functions of the unit in question are suspect, it would be wise to save them to tape, instead—a sensible archival procedure, in any case.

To reinitialize the ESQ-1, turn the unit off, turn it back on, press and hold the Record button, then press Soft Button #1. The display will read "Erase All Memory and Reinitialize?" Press the upper-right soft button.

(Note that ROM versions 2.2 and lower load the Brass #1 patch into all internal memory locations. These older versions should be upgraded to the current revision 3.5, for improved operation. Revision 3.5 ROMs are available through Ensoniq repair stations at no charge, but labor charges for installation are not included.)

If reinitialization does not fix the problem, then there is probably an intermittent voice on the mainboard. In this case, too, the mainboard should be replaced, but in fixing two problems at once, you get more for your money (sort of).

JACK DESCROCHER

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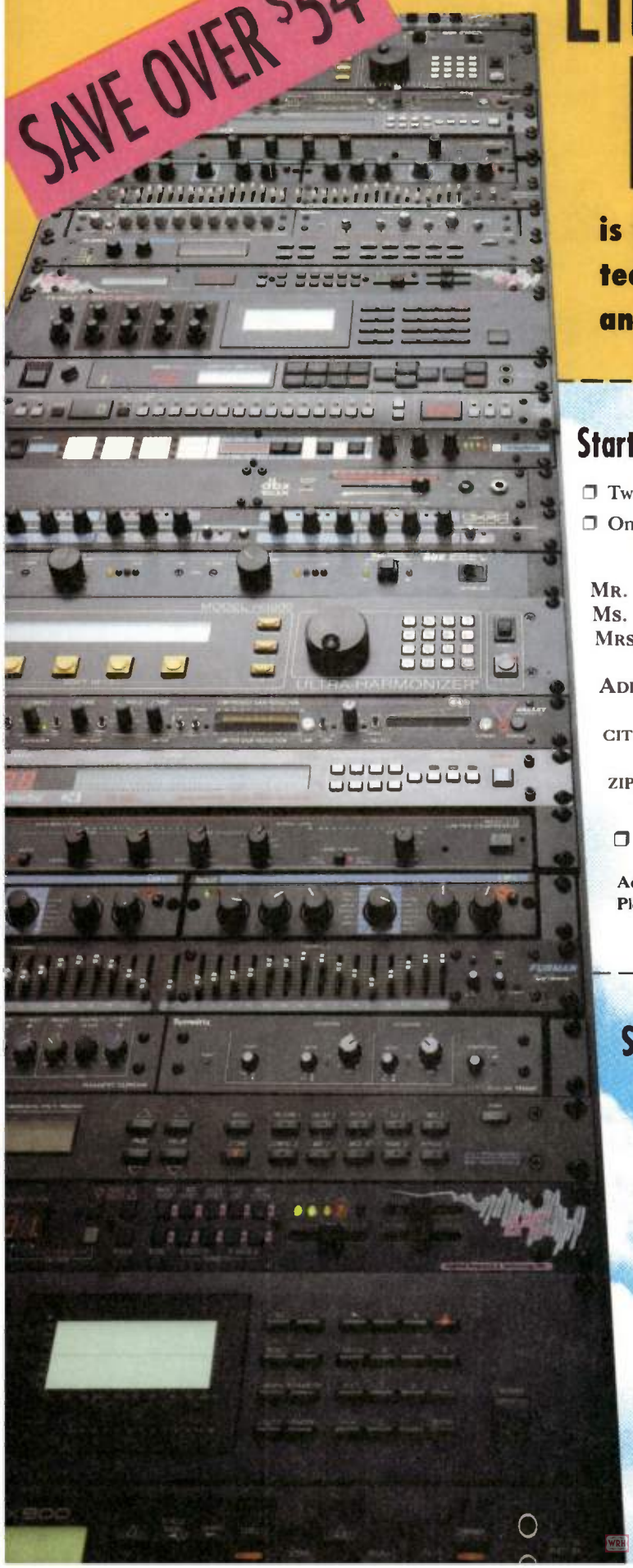


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**Q. What's the difference between slo-blo fuses and regular types? Which should I use with power supplies for projects such as those in EM?**

**Q. Is it okay to replace a pigtail fuse with a standard fuse to which leads have been soldered? Pigtail fuses are hard to come by.**

**A.** Slo-blo fuses are intended for use in applications where the start-up current significantly exceeds the normal operating current. Some applications for slo-blo fuses include use in devices that incorporate AC motors (e.g., cooling fans) and high-current power supplies (e.g., power amplifiers).

Small power supplies, as used with audio processors, mixers, MIDI devices, and similar do-it-yourself projects of the type often discussed in **EM**, generally require standard, or "instrumentation" fuses, which are very fast-acting. Misapplying a slo-blo fuse in such a circuit can be hazardous to your project's health. In the time that it takes a slo-blo fuse to open, a defective low-current circuit can self-destruct.

Some low-parts-count projects, e.g., a basic line mixer, draw minute amounts of current—a few milliamperes, typically. It can be difficult to obtain low-current fuses for such projects. (A 1/4-amp fast-blo fuse, the smallest value available from Radio Shack, is comparatively so oversized as to be functionally useless.) Instrumentation fuses in values ranging from 1/5- to 1/100-amp are available from full-line electronics suppliers, such as Newark Electronics. Check the Yellow Pages under "Electronic Equipment & Supplies—Dealers."

Soldering leads to a standard fuse can and often does reduce the service life of the fuse. This procedure should be used only in exigent situations as a temporary measure. Full-line electronics suppliers generally carry pigtail fuses. Again, check the Yellow Pages.

*Caution: Always* unplug equipment before attempting to remove or replace fuses. *Always* replace fuses with the exact type and rating specified. If in doubt, contact the equipment manufacturer. *Never* replace a fuse with one of a higher current rating. *Never* replace a fuse with one of a lower voltage rating. Never replace a fast-blo fuse with a slo-blo type. *Absolutely never* replace a fuse with a wire or with a fuse case wrapped in foil. *Always* use a non-conductive fuse-puller (Radio Shack catalog number 270-1199, or similar) to remove fuses from clip-type fuseholders; *never* use your fingers or a screwdriver. *Failure to observe these safety precautions can result in serious shock and fire hazards.*

Note: Fuse voltage ratings were discussed in the February 1990 "Service Clinic."

**Q. I replaced a burned-out red LED on the front panel of my Memorymoog Plus, but the replacement is not as bright as its companions. Is it okay to replace a standard LED with a high-brightness type, will this fix the problem, and will it draw more current?**

**A.** High-brightness LEDs can accept higher currents but do not require them; they are brighter by virtue of greater efficiency. A high-brightness LED used to replace a normal LED will draw approximately the same current. In front-panel applications, a high-brightness type (Radio Shack catalog number 276-066, or equivalent) or jumbo type (Radio Shack catalog number 276-041, or equivalent) often is a better match. It is wise to test the replacement LED under normal circuit conditions, before installation, to be sure that it provides a reasonable match of wavelength (color) and luminosity (brightness).

## LINE MIXER RE-REVISITED

Readers are still inquiring about corrections to the figures in the "Line Mixer Duo" article in the February 1990 **EM**. For the record, **Fig. 4** requires the following correction: The panpot (dual potentiometer) values, not labeled, should each be 100k. Also, the fourth formula given, in the "Active Line Mixer" section, should read:

$$R14 = R12 \times 20$$

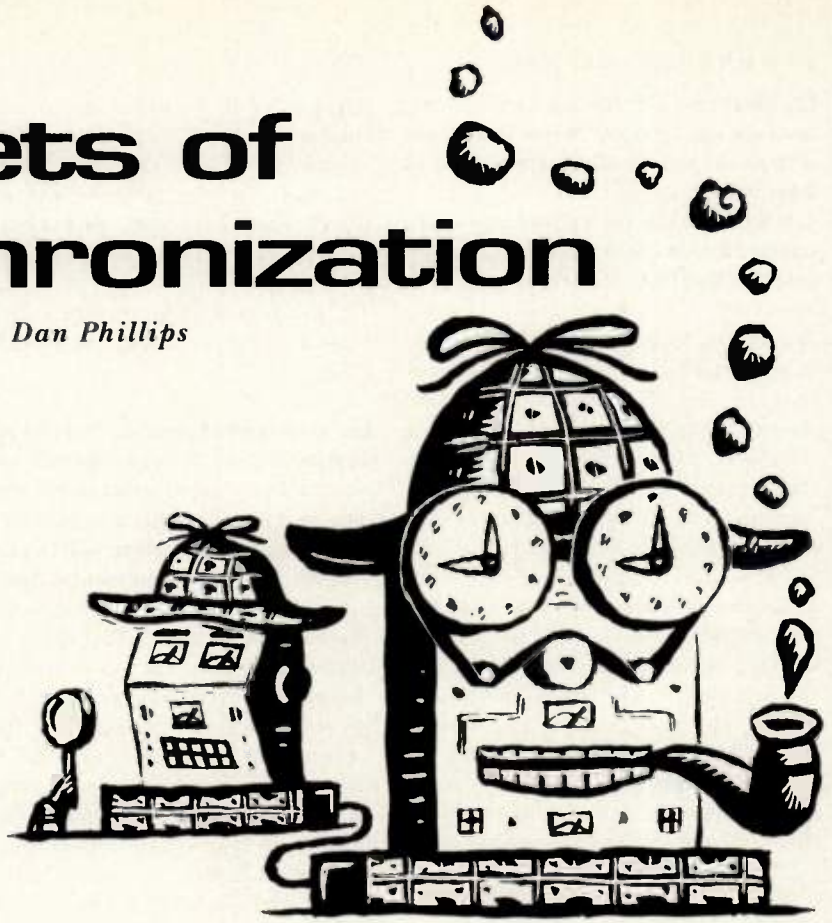
In defense of our argus-eyed editors, these glitches appeared during that phase of magazine preparation known as *typesetting*, wherein intelligent, artistic people attempt to make out-of-context sense of engineering hieroglyphics scribbled on the backs of envelopes.

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

# Secrets of Synchronization

*By Dan Phillips*

*Sequencers, drum machines, and tape recorders all keep time individually, but it takes a little more to make them work together.*



While yesterday's home studio was lucky to boast a 4-track recorder, its 1990s counterpart commonly features several recording devices, including multitrack tape, sequencers, and drum machines. This adds power, but also creates a problem: how to make everything work together. Synchronization helps solve this problem. Synchronization ensures that everything starts at the same time, at the same point, in the music and then stays in step.

When you record live tracks to tape, you don't worry about sync. Your multitrack is always "synchronized" to itself. It's the only device that has to start when you press play; all the tracks begin simultaneously and never drift in relation to one another.

The situation changes when you bring a sequencer and a multitrack together. Both record and play back music, but they need to do it together, like musicians playing in a band. The problem is that, unaided, your pieces of equipment can't listen to one another. They need a conductor.

Imagine an orchestra in rehearsal. The conductor tells the musicians to begin at a specific bar, or beat within the bar, and signals them to start. Each dip of the conductor's baton indicates a beat of the music. As long as the musicians track the conductor's gestures, they never slip out of time. In synchronization, the conductor is the *master* and the musicians are the *slaves*. The master marks the start and provides the "beat clock." The slaves follow accordingly.

## MIDI SYNC

Your sequencers and drum machines communicate in a similar way. MIDI has a special message, the MIDI Clock, that the master transmits 24 times for every quarter-note, like a metronome beating out 64th-note triplets. Like musicians watching a conductor, sequencers and drum machines can get their clock from this pulse. Most sequencers have higher resolutions than 24 pulses per quarter note (ppqn). These devices maintain clock resolution by interpolating between MIDI Clocks.

Many sequencers also use Song Position Pointer, which carries measure and beat information. For example, the master can tell the slaves, "You should now be at beat 3 of measure 74." Song Position Pointers provide a count of sixteenth-note intervals to tell the slave its exact location at any moment. Drum machines and sequencers are programmed in terms of beats and measures, so the combination of MIDI Clocks and Song Position Pointers makes them easy to synchronize (see **fig. 1**). We'll explore other ways to sync up a little later.

Multitrack recorders don't deal directly with conceptual constructs such as measures and beats; they just record sound. To synchronize with tape, we need to relate the recorded audio to bars and beats. This service is provided by an external device, the *tape synchronizer,* that converts clock and location information into an audio signal that can be recorded, or *striped,* onto tape. Once the tape is striped, the tape synchronizer listens to this signal and translates it into the form that sequencers and drum machines use.

AD McCAULEY

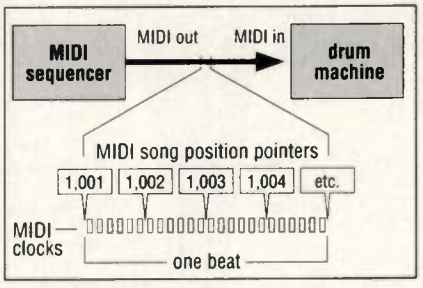



**FIG. 1: MIDI clocks and MIDI Song Position Pointer messages provide sync information for use by sequencers and drum machines. Each beat contains 24 MIDI clocks and four sequentially numbered Song Position Pointers.**

In this way, every spot on the tape is tied to a particular measure and beat. (For more on synching sequencers to tape, see "Sync or Swim" in the January 1991 **EM**.)

To work as a synchronization slave, a piece of equipment must accept control by an external clock. Sequencers and drum machines accomplish this easily, but tape recorders generally do not. For this reason, it's normal to use tape as the sync master so that the more agile sequencers can take on the burden of synchronizing to it.

So far, we've discussed tempo-based synchronization. MIDI Clocks and Song Position Pointer are the computer-oriented side of this, but there are others. Frequency Shift Keying, or FSK, is a technique for recording tempo information onto tape. Older FSK synchronizers may record the clocks, but not the measure/beat location. Every time you want to sync up, you have to start from the beginning. Newer devices, such as J.L. Cooper's PPS-1 and Midiman's Syncman, record Song Position Pointers in the sync tone. This lets you start from any point on the tape.

Early drum machines and sequencers used several types of DIN sync, using signals similar to MIDI Clocks, with 24, 48, or 96 clocks per quarter note. These systems are all music-related, based on ideas such as tempo and measures.

## SMPTE SYNC

Another common type of sync is not as directly music-related. Instead of communicating in terms of beats and measures, it works with time in minutes and seconds. This type of sync includes SMPTE time code and its offspring, MIDI Time Code. (SMPTE is an acronymn for the Society of Motion Picture and Television Engineers.) SMPTE time code originated from the need to synchronize film and its audio components.

SMPTE and its compatriots deal with absolute time instead of tempo. It's the high-tech equivalent of your computer dialing "time" on the phone. In American video, for instance, every thirtieth of a second a SMPTE convertor sends a message like this: "The time now is two hours, seventeen minutes, three seconds, and eight frames." In response, all the slave units scramble to reach the internal point that matches the master time, like a commando team synchronizing their watches.

While this makes sense, it means your sequencer and other gear have to calculate the bar and beat at, say, 2:17:03:08. SMPTE deals only with

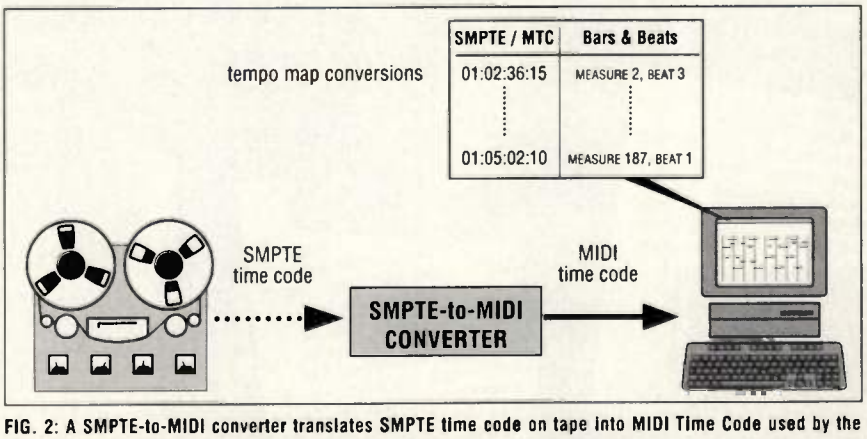



**FIG. 2: A SMPTE-to-MIDI converter translates SMPTE time code on tape into MIDI Time Code used by the sequencer. The sequencer uses a tempo map to determine the bars and beats location from the absolute time.**

absolute time and contains no information about tempo or start point. To use time code with music, a synchronizer or sequencer must relate tempo and a start point to absolute time.

Let's return to the orchestra analogy. Suppose you want your orchestra to perform background music for a precisely timed ceremony. You might give the conductor the following instructions:

- Start the slow introduction at 9:05, beginning with a tempo of 100 bpm.
- When the intro ends, at 9:07 and 37 seconds, begin the body of the first movement and increase the tempo to 120 bpm.
- At the end of that movement (9:12 and 43 seconds), begin the second movement at a tempo of 87 bpm.
- When you reach the coda, slow down gradually, so that the movement ends at exactly 9:17.

This set of instructions is a *tempo map*, listing start times and tempi in relation to absolute time. For many pieces, the tempo map is just a start time with a single tempo value.

If you have to deal with multiple slaves, you could give each its own copy of the tempo map and hope they run accurately enough to stay in sync. A better plan is to let your sequencer or tape synchronizer take charge of the tempo map, feeding MIDI Clocks and Song Position Pointers to the rest of the system. This ensures that each piece of equipment receives exactly the same interpretation of the map.

MIDI Time Code and Mark of the Unicorn's Direct Time Lock are MIDI codes that serve the purpose of SMPTE for sequencers. Unlike SMPTE, they are not recorded on tape but transmitted between units as a MIDI data stream. Translating between MIDI and SMPTE time codes requires an external SMPTE-to-MIDI converter (see **Fig. 2**).

Time code is especially helpful for work with sound for video. When sequencing sound effects, you can identify the exact SMPTE frame on which the sound should occur, and then enter that into your sequencer without having to figure out which measure and beat it would come on.

Some sequencers and drum machines cannot use MTC directly. These require an external synchronizer to create the tempo map and convert time code into MIDI Clocks and Song Position Pointers at the correct tempi.

*To use time code with music, a synchronizer or sequencer must relate tempo and a start point to absolute time.*

Because time code is a little more complicated to use than clocks and pointers, you may wonder why you'd ever use it other than with video. There are several reasons to use time code in musical applications.

First, it provides tempo independence. It allows you to change tempo after striping the tape and laying down the beginning of the audio tracks; you're not locked into a set tempo. You also can use a sequencer with prerecorded audio tracks: Lay down the SMPTE stripe, then construct a tempo map to fit. Some devices are able to create tempo maps from someone tapping the keys in time with the music.

In all types of tape sync, start with a sync signal on the tape. Make sure your equipment can read the stripe you record. FSK and SMPTE signals usually go to tape and back without a hitch, but bad levels or a problem with the tape can cause the code to drop out. Occasionally, a reader just refuses to decode a signal recorded on one particular type of machine.

Sync can be a bear when you're getting started. But once you know the principles, you'll keep your studio working like, well, clockwork.

**Dan Phillips** *would like to thank his mother and father for their hospitality and courageous test-reading, and his brother for the use of his computer and the gift of a music that is synchronized to the heart.*

# Reviews

## Peavey DPM-3$^{SE}$, DPM-V3, and DPM-SX

*By Greg Rule*

**The line between synths and samplers narrows every day.**

"Our product ends the cycle of obsolescence." This familiar pitch rates right up there with the promise of "no new taxes." But the folks at Peavey hope to change music-industry history with their DPM-3 Composition Center, a sample-based synth with onboard sequencer and disk drive.

Introduced in January 1990, the DPM-3 quickly caught the industry's attention with its all-purpose DSP chips and software-driven engine. While other manufacturers cranked out new keyboards each year (often rendering previous models obsolete), Peavey planned to release DPM software and hardware upgrades instead. The plan went further: The DPM is one of the few synths that accepts samples via the MIDI Sample Dump Standard. The introduction of the DPM-3$^{se}$ and the DPM-SX analog-to-digital converter module is early evidence that Peavey takes its plan seriously.

C.R. KING

Peavey DPM-SX Sampling Expander, DPM-V3 rack-mount synth, and DPM-3$^{se}$ synthesizer.

With no further ado, let's examine the DPM-3$^{se}$ and DPM-SX and take a quick peek at Peavey's DPM-V3, a rack-mount module based on DPM-3 technology. We'll cover only the new features of the DPM-3$^{se}$, so if you're unfamiliar with the unit's main functions, see the DPM-3 review in the March 1990 **EM**.

### DPM-3$^{se}$ SYNTHESIZER

Owners of the original DPM-3 will be pleased to learn that upgrading to a DPM-3$^{se}$ requires a simple, $49.95 ROM chip replacement. Your local Peavey service center should be able to perform the upgrade.

The DPM-3$^{se}$ upgrade adds several sample-editing options, including trimming, manual/auto looping, keyboard remapping, name-assignment, and pitch-assignment. With one hand on the DPM's keyboard and the other on the editing buttons (or data wheel), you can hear the effects of each edit in real time, a nice feature. In addition, the DPM-3$^{se}$ stores all samples in its 64K of non-volatile RAM (expandable to 1 MB), so your samples won't be erased if the power is turned off.

The DPM-3$^{se}$'s sample-editing menu is not the most elaborate on the scene, but once a sample has been downloaded into RAM, it is a quick and easy system to use. If you wish to further refine the sample, transmit it to any computer sample-editing program that supports the MIDI Sample Dump Standard (SDS).

The next batch of new goodies relates to the DPM's onboard signal-processing. The DPM-3 includes two effects processors. One is global (i.e., it processes all output). The second proc-essor is accessed via an internal effects bus; you route individual patches to the processor with a send-level control, the same way you would use a mixer effects send. In the original DPM-3, you saved your effects-send levels as part of the patch, but you couldn't save levels within the onboard sequencer in order to set different effects levels for each track. The DPM-3$^{se}$ lets you do it either way.

The effects, while a tad noisy at times, rival the built-in effects on any other synthesizer I've heard. Peavey also has improved the exciter algorithm. The effects processors sometimes get overworked, though, and you run out of processing power. When you hit that wall, you can't use

the reverb algorithm.

The DPM-3$^{se}$ packs some additional MIDI punch thanks to the addition of memory locations for four assignable, 16-voice multitimbral setups (rather than one); assignable MIDI In/Out channels; and expanded MIDI filtering. These features, especially the assignable channels, come in handy when using the DPM-3 as a MIDI master keyboard.

New DPM internal sequencer features include track muting, automated mix-down, an effects-send control for each track, and recordable Program Change commands. Although it took several hours of button-pushing to feel comfortable with the 9-track, 20,000-note sequencer, the whole process soon became second nature.

The DPM-3$^{se}$ upgrade also adds three preset (and two user-programmable) alternate tuning maps and a combination patch delay page that allows separate delay settings to be programmed for each patch within a combination.

Much of the early buzz about the DPM-3 involved its software-based, open-voice architecture, made possible with general-purpose Motorola 56001 DSP chips instead of the proprietary chips that most manufacturers develop for their instruments. Potentially, alternate operating systems could instruct the 56001s to perform completely different types of synthesis. The operating system is ROM-based, though, so you would have to swap ROMs to change it; you couldn't toggle between op systems. To date, Peavey has not produced the promised new op systems for alternate synthesis methods. It remains to be seen whether the 56001 processors have enough power to support significantly advanced operating systems.

The company has, however, taken advantage of a less-discussed DPM-3 feature: the ability to load samples via floppy disk or MIDI Sample Dump. (At present, the only non-Peavey synths/sample-playback units that can load via Sample Dump are the Akai S1000PB, the Korg T-series synths, and the Korg M1 combined with Cannon Research's Frontal Lobe and PCM Channel. The soon-to-be-released Kurzweil K2000 and Yamaha SY99 synths also can download new samples via SDS.) Be aware that the DPM-3$^{se}$ only can be expanded to 1 MB of RAM, which a large sample can swallow in a gulp.

If you add a 16-bit analog-to-digital converter module to the front end of a synth that supports the Sample Dump Standard, the line between synth and sampler disappears. Peavey thought of that and produced the DPM-SX.

### DPM-SX A/D CONVERTER

Housed in one rackspace, the DPM-SX is a monophonic, sampling "front end" for the DPM-3, DPM-3$^{se}$, V3, and any other device capable of receiving a MIDI Sample Dump. The SX has no audio output of its own; it must send its sample to an SDS-compatible receiving device via MIDI before the sound can be edited or played back.

The DPM-SX samples at 16-bit resolution, with a selectable 24 or 48 kHz sample rate. It comes with 256 kilobytes of volatile RAM (pray the power doesn't die before you transfer your sample to a storage device or a connected instrument), expandable to 16 megabytes using standard, Macintosh-

type SIMMS. When using a DPM-3$^{se}$ to control the SX, you can select sample rates of 16, 24, 32, 38.4, 44.1, or 48 kHz.

The SX front panel is relatively sparse, with one 1/4-inch input, one XLR input, one input level knob, one clip LED, four function LEDs, and four buttons. The rear panel contains a jack for an external AC power supply; a SCSI interface; and MIDI In/Out/Thru jacks. The only major omissions are an input-level meter—the SX's "clip" LED leaves a lot to be desired—and an on/off switch.

Using the SX is a simple, but slow, process because it sends its sample to a receiving device via MIDI before you can hear it. In my test, a 4-second sample (at 48 kHz) took several minutes to download into the DPM-3$^{se}$. Once the sample arrived, I was pleasantly surprised with the sparkling-clean sound quality.

You can use the SCSI bus to transfer data to a computer or storage medium, which speeds things up considerably. When the DPM-SP sample-playback module is released, you'll be able to transfer samples via SCSI to that instrument. (You'll be able to load the SP with up to 32 MB of RAM, too.) It's too bad Peavey didn't add SCSI to the DPM-3$^{se}$ and V3, though.

The SX manual, while well-written, is poorly edited and in need of updates. It occasionally refers to "Chapter XX," which doesn't exist, and there are dozens of other errors. In addition, the manual never instructs users to enter the DPM-3$^{se}$'s MIDI mode and make sure Sysex is turned on, which can lead to several hours of frustration. The SCSI port is never mentioned. (The DPM-3$^{se}$ manual is better, but vague on a number of issues.) Hopefully, Peavey will take care of these oversights in the near future.

Despite these minor gripes, at $349, the SX is a must-have for owners of DPM-3, DPM-3$^{se}$, V3, and other SDS-compatible, sample-playback devices.

## DPM-V3 SYNTH MODULE

The V3 essentially is a DPM-3 in a single-space rack module (minus the sequencer and disk drive). The other main differences are four additional audio outputs (six in all); a 40-character—instead of 80-character—display; the absence of "soft buttons"; and 200 internal patches, as opposed to 100 on the DPM-3. It sounds the same as its siblings.

At the heart of the V3 lies the same three general-purpose Motorola 56001 DSP chips found in the DPM-3 keyboards. As with those instruments, the V3's sample RAM can be expanded up to 1 megabyte, holding up to 48 individual samples. The module also contains three preset tunings and two user-programmable alternate tunings.

Getting around on the V3 is a painless process. Like E-mu's Proteus, the V3 features a continuous data knob (or "alpha wheel") for scrolling through patches and parameters. The fact that the V3 receives samples via SDS is enough to justify its $1,099 price tag.

## KEEPING PROMISES

All things considered, Peavey deserves an ovation for doing much of what they promised to do: provide a continuous upgrade path for the DPM-3. The main unfulfilled promise involves the alternate operating systems; hopefully, we'll see them someday. The DPM-3$^{se}$ upgrade adds sample-editing, expanded sequencing, and updated effects to the DPM-3 (to name just a few), while the DPM-SX turns the unit into a 16-bit sampler. Add to this a sleek, rack-mount module—the V3—and you've

got an impressive family of musical products.

*When not tweaking synth parameters or flailing away at his Mac keyboard,* **Greg Rule** *can be seen around San Francisco pounding defenseless percussive instruments with wooden sticks.*

## Product Summary

**PRODUCT:**
Peavey DPM-3$^{SE}$ and DPM-V3 synthesizers
DPM-SX analog-to-digital converter module
**PRICE:**
DPM-3$^{SE}$ $2,299
DPM-V3 $1,099
DPM-SX $349
**MANUFACTURER:**
Peavey Electronics
711 A St.
Meridian, MS 39301
tel. (601) 483-5365

| EM METERS | RATING PRODUCTS FROM 1 TO 5 |
|---|---|
| FEATURES | ● ● ● ● |
| EASE OF USE | ● ● ● ● |
| DPM-3/V3 VALUE | ● ● ● ● |
| SX VALUE | ● ● ● ● |

# Voyetra Sequencer Plus Gold 4.0 (IBM)

*By Allan Metts*

**An old favorite grows with the times.**

You finally made it to bed after spending all evening working in your basement studio. All of a sudden, you're wide awake. It hits you: the perfect synth lead that will make your whole song come together. You simply must record that lead before it leaves your head.

But you've already powered down your studio, and to record it, you would have to locate and reload all your banks of patches and Sysex data, set up your controller's parameters, and find the scrap of paper on which you wrote the level settings and track descriptions. You decide that the synth line has to wait until morning, but by then, you probably will have forgotten it.

With Voyetra Technologies' IBM-based sequencer, *Sequencer Plus Gold 4.0*, you can remedy the situation with ease. The program isn't just a sequencer, but a virtual Swiss Army Knife for the professional or home studio. In addition to the comprehensive sequencer, *Sequencer Plus Gold* contains a universal librarian that supports over 130 instruments, a versatile MIDI data analyzer, and extensive support for SMPTE, MIDI Time Code, multiple MIDI ports, and Standard MIDI Files. Plug-in music cards such as the Sound Blaster and IBM PC Music Feature are supported, too.

### ON MAIN STREET

In the Main screen (**Fig. 1**), you are presented with track names, port and channel assignments, program settings, and pan position for devices that support this controller. You can control track volume with MIDI Controller 7, or velocity (with scaling). Non-destructive transposition, quantization, time offset, looping, and muting are available here, as well. Recording resolution is switchable between 96 and 192 ppqn. All of this stuff is pretty basic, so let's get into the guts of the program.

## ● SEQUENCER PLUS

*Sequencer Plus Gold* offers 64 tracks as a default. If you have enough memory, command-line options allow you to set up over 2,000 tracks at program startup. Due to the memory constraints of a typical PC, a realistic maximum for the number of playable tracks would be no more than a few hundred.

You can assign each track to a particular group, which enables multiple tracks to be sorted and reorganized based upon their group designation. You can also control solo or mute status on a group basis. Group designations are great for working on sections of a song at a time, or for manipulating all parts of a certain flavor (all brass parts, for example) at once.

For MIDI-based bands and musicians with more than two hands (or with controllers capable of transmitting on multiple channels simultaneously), the program offers a multichannel recording option that records up to sixteen tracks at a time from up to two different ports. This option could come in handy when dumping the contents of a hardware-based sequencer into *Sequencer Plus*.

### DOWN BY THE TRACKS

From the Main screen, one keystroke takes you into the View screen, where tracks are manipulated on a measure-by-measure basis. From here, you may add, delete, copy, replace, or move any combination of measures from any track. To aid in the process, *Sequencer Plus* provides punch-in/out capability, user-defined markers for locating specific sections of your music, and eleven internal memory buffers that accept data from any one track. If working with one track at a time isn't your bag, there is a Block mode that enables you to conduct many of the same operations on multiple tracks.

Any track can be designated as the tempo track, although notes embedded in the tempo track will not play. This arrangement is superior to that of one fixed "conductor" tempo track because you can create multiple tempo tracks and audition several of them with one song. You can copy, cut, and paste the tempo track just as you can note events.

The Edit screen works with one measure at a time and displays each note onscreen in piano-roll format. You can display the note reference along the left side of the screen with flats or sharps, as MIDI note numbers, or as

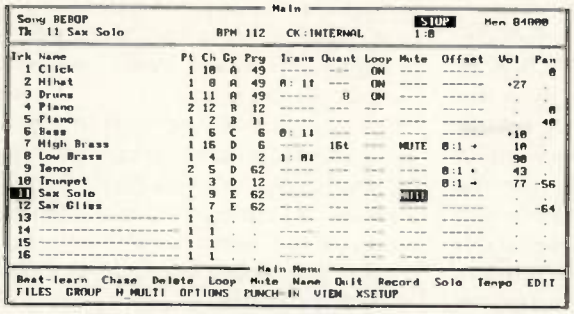



**FIG. 1: The Main screen allows you to specify port, channel, program and group for each track. Transposition, quantization, volume, and other playback features are also available.**

piano keys. One nice addition for a future release would be the ability to name note numbers, making it easy for those of us who can't remember whether their drum machine puts a rimshot or a cowbell on MIDI note 37. You can add, remove, or move notes using the computer keyboard, mouse, or step-entry functions, and further manipulate both note and non-note MIDI data by traveling to "sub-screens" deeper within the program (see **Fig. 2**).

## TRANSFORMATIONAL SEQUENCING

Probably the most powerful feature of *Sequencer Plus Gold* is the set of algorithms Voyetra calls "Transforms." These Transforms operate on any range of measures and tracks in the View screen and can manipulate MIDI data in almost every imaginable way. You can transpose or invert notes either normally or harmonically by key signature; split tracks according to five different criteria (pitch, velocity, etc.) and merge them together again; and add, change, move, or—pay attention, wind-controller users—intelligently thin MIDI controllers and events. You use transforms to add crescendos, decrescendos, accelerandos, or ritardandos. A Tap Tempo Transform allows you to utilize a separate reference track to set up bars and tempos after recording a free-form performance.

The quantization functions are highly advanced, allowing experiments with swing feel, quantization off the beat, and adjustable sensitivity/quantization amount settings for durations and start times. For that "human" feel, Transforms can randomize pitch, note start times, duration, or velocity.

There are 52 Transforms in all, and you can gain even more power by using several Transforms in succession on one section of data.

## IN THE LIBRARY

One of the biggest hassles in working with a multiple-instrument MIDI setup is making sure that the most appropriate sounds are loaded into each synthesizer prior to recording and playing. *Sequencer Plus Gold* allows you to pick and choose your sounds from within the program by using the built-in universal librarian (see **Fig. 3**). You can build an entire MIDI setup (up to 32 devices) into each song file, and send or retrieve the appropriate banks of patches from each instrument whenever necessary.

The librarian allows you to specify the instrument (over 130 devices are currently supported), the port and channel for System Exclusive information, the particular bank to load into memory, and the program from that bank to use in the song. A "Generic" instrument is available for non-supported instruments, and a "Names Only" instrument can be included to remind you to manually set up devices that don't receive patch data via MIDI.

You can store all patch banks for each instrument on your hard drive and audition, mix, and match the patches. Detailed help, outlining each supported instrument's bank structure, limitations, and eccentricities, is available with one keystroke.

Those with Sound Blaster or AdLib FM synthesizer cards will appreciate the inclusion of a Voice Editor screen

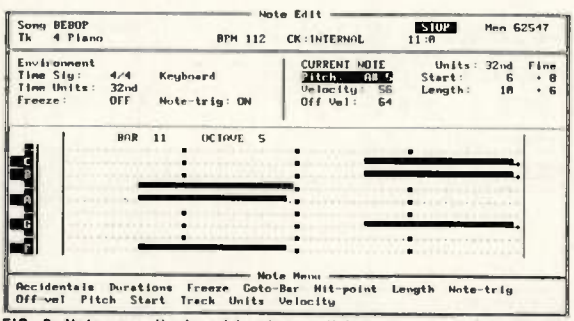



**FIG. 2: Notes are displayed in piano-roll format and can be edited in minute detail.**

YOU'RE CREATIVE HOWEVER

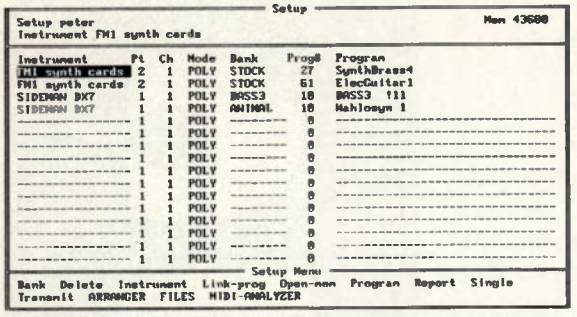



**FIG. 3: You can configure up to 32 instruments in the Setup screen, and load and send patch banks to each instrument.**

that lets you modify any program within a bank. I found myself craving editing features for all my other synthesizers.

## FEATURES FOR DEMANDING CREATURES

Voyetra gives you a host of other features that allow you to do a variety of studio-related functions without exiting the program. The disk-file utilities are comprehensive, although it isn't possible to drop to the DOS command line temporarily from within the program. In addition to its own format, *Sequencer Plus Gold* loads Type 0, 1, and 2 Standard MIDI File formats and saves songs using SMF formats 0 or 1. *Personal Composer* and *AdLib* file formats are partially supported.

The program has a digital delay tempo/timing calculator, Chase mode for hands-free operation, a feature that lets you trigger notes from the computer keyboard, and a single-page text-editor for level settings, lyrics, and track assignments. The program offers a bar number/SMPTE monitor that can be seen across the room, as well as metronome functions that provide a tempo via the PC speaker or any connected MIDI device. A MIDI Thru window enables a multiport interface to act as a limited MIDI patch bay by mapping up to two input ports to any of eight output ports. Port-mapping and data rechanneling can occur automatically, based on the current track being recorded or played.

The SMPTE implementation is extensive. You can generate and read SMPTE time code in five formats, and the automatic rate-detection can read incoming SMPTE and set the frame rate and type accordingly. You can monitor elapsed time as the actual time on tape, or relative to any SMPTE offset, and you can move to any hit-point. In addition, stall/dropout detection, tape offset, and Beat Learn from an audio clicktrack are supported for properly equipped interfaces.

The manufacturer has thrown in a capable MIDI data analyzer that displays MIDI data in raw form; in a structured, matrix-style format (see **Fig. 4**); or in a Formatted Trace mode that attaches relevant command descriptions to each string of MIDI bytes. The data is captured into a buffer and can be saved to disk or transmitted back into the MIDI stream. Song Position Pointer, MIDI Time Code, and other real-time messages are gracefully handled from within the analyzer. In addition, the analyzer allows you to assign a string of MIDI bytes to the ten numerical keys on your computer keyboard. You can use these strings of data to turn off memory protection, configure devices, request MIDI dumps, etc.

Voyetra has abandoned the Roland MPU-401 standard. (MPU-401 Intelligent mode doesn't support multiple MIDI ports, MIDI Time Code, or the use of anything other than a bus-based MIDI interface.) Instead, Voyetra created a protocol called VAPI (Voyetra Applications Programming Interface, described in the February 1991 "Computer Musician"). VAPI involves a set of DOS software drivers that provide a link between the complex, high-level MIDI applications and the various hardware-specific, MIDI-interface protocols. As Voyetra envisions it, each piece of MIDI hardware (including MPU-401-compatible interfaces) will be sold with its own VAPI driver. As of this writing, VAPI drivers are available for several interfaces, including those from Roland, Voyetra, and Music Quest, and for the Sound Blaster, AdLib, and IBM PC Music Feature cards.

## FINAL CONSIDERATIONS

On a typical PC with at least 640 KB of RAM, individual track memory is limited to about 65 K, which is roughly one-fifth of the total note-capacity of the sequencer. This shouldn't be a problem unless you want to record a half-hour's worth of wind-controller data, but a little flexibility might be nice here. More effective use of extended or expanded memory would be a useful enhancement.

Operation under Microsoft *Windows 3.0* is possible, but not recommended. No multitasking or other *Windows* environment enhancements are available, song memory is decreased significantly, and the program's manual warns of "strange problems."

The program's user interface is well-thought-out, although there are a few places where you must dive a little too deep to change a parameter. This probably is a tradeoff for the sheer volume of features available in the program, because only a limited amount of menu commands can be put on one screen without making it too complicated. Where possible, Voyetra has included certain "hot key" combinations to help speed up common operations.

The user interface seems inconsistent in a few places. I sometimes want to "point and shoot" and type in data, while the program wants me to press increment/decrement buttons or execute a command first. In other places, the "point-and-shoot" method is allowed.

The manual has the expected number of typos and one or two outright errors, but otherwise is complete and well-organized. Plenty of illustrations are included and everything is laid out logically. One particularly impressive feature of the manual is that concepts, not just the program, are explained. For instance, there is a section on basic recording techniques when using a sequencer, a section on synchronizing to tape, and short sections on the MIDI message protocol and FM synthesis.

For those that don't need all of the power and versatility of *Sequencer Plus Gold*, Voyetra offers two other sequencer packages that provide fewer features at reduced prices. *Sequencer*

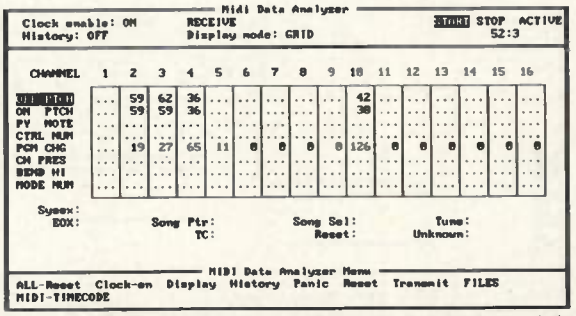



**FIG. 4: The MIDI Data Analyzer can display data in several forms, including the Grid mode shown here.**

*Plus Classic* ($169.95) contains most of *Gold's* sequencer functions, but lacks the universal librarian and MIDI data analyzer. A few minor functions and some of the more advanced transforms are missing, too.

*Sequencer Plus Junior* ($69.95) is an entry-level music sequencer that supports multiport MIDI interfaces. No transforms are available, but the measure- and note-editing screens are just about the same as those found in *Classic* and *Gold*. Step-entry mode, SMPTE support, and advanced tempo functions are also missing from *Junior*. The program is packaged with the MIDI Connector option for Sound Blaster cards.

Other than patch-editing support, it's hard to think of a synth- and sequencer-related software need that isn't incorporated into *Sequencer Plus Gold*, especially when combined with a multi-port, SMPTE-capable interface. Overall, Voyetra has done an outstanding job.

**Allan Metts** *is an Atlanta-based musician and electrical engineer. He has been known to spend hours trying to figure out how to take his keyboards with him when he backpacks on the Appalachian Trail.*

## Product Summary

**PRODUCT:**
*Sequencer Plus Gold 4.0*
sequencer/universal librarian

**SYSTEM REQUIREMENTS:**
IBM PC, XT, AT, or PS/2; DOS 2.0 or later; hard drive; 512K RAM; VAPI-supported MIDI Interface; CGA, VGA, EGA, or Hercules graphics card

**PRICE:**
$299.95

**MANUFACTURER:**
Voyetra Technologies
333 Fifth Ave.
Pelham, NY 10803
tel. (914) 738-4500

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

# NewTek Video Toaster

*By Ray McDonell*

**Pro-quality digital video processing enters the world of personal production.**

The NewTek Video Toaster brings remarkable capabilities to the emerging field of personal video. Using technology from Commodore's Amiga computer, the Toaster merges video, titles, and computer graphics into a complete presentation, with features such as video switching, digital freeze-frame, and image manipulation. It includes software modules for video painting, character generation, 3D modeling, rendering, and animation; it also supports external control via *ARexx*, an Amiga control language. Purchased separately, each of these features would require specialized equipment costing far more than the Toaster's list price.

NewTek offers the Video Toaster in two forms. The stand-alone Toaster is a complete table-top system priced at $3,995, including all computer hardware in a single enclosure (see Fig. 1). An internal 50 MB hard disk carries all of the Toaster system software. For Amiga owners, the Toaster is available as a densely-populated circuit board that comes with eight floppy disks. This version requires a 2000-series Amiga with a hard disk, at least five megabytes of RAM, and the "Fatter Agnus" version of Commodore's graphics and

FIG. 1: The NewTek Video Toaster video processing hardware with sophisticated software for effects, graphics, and animation.

FIG. 2: The Switcher screen provides the main control center for Toaster operations.

animation co-processor. *(According to NewTek, the Toaster should be compatible with an Amiga 3000 by the time you read this.—GH)*

The Toaster plug-in card serves as the video interface, with four composite-video inputs and two outputs, all on professional BNC-style connectors. The Toaster incorporates two frame buffers and an Amiga genlock. The frame buffers contain the memory necessary to store digital images for processing.

The software package includes six semi-independent software programs, or modules, accessed through the Toaster's central "Switcher" screen.

The six Toaster software modules are:

- *Switcher*
- *ChromaFX*
- *ToasterPaint*
- *ToasterCG*
- *LightWave 3D*
- *LightWave Modeler*

Other programs or computers can control the Video Toaster through *ARexx*.

## VIDEO SWITCHING AND EFFECTS

The *Switcher* module (see **Fig. 2**) controls the heart of the Toaster, which consists of a seven-input production video switcher with digital effects and freeze frame. The user supplies four of the switcher's inputs, while two inputs come from the internal frame buffers. The remaining input is for Toaster-generated backgrounds.

These seven inputs are routed to three output buses. The *Program* bus supplies the output to your VCR for recording. It works in tandem with the Preview and Overlay buses. This arrangement lets you use any of the seven inputs as sources for digital video effects (DVE).

The *Preview* bus lets you see where you are going when setting up digital video effects or transitions. The Toaster performs a dazzling array of transitions between any two inputs. Software controls all the tumbles, rolls, fades, and fly-ins, so software updates can provide new effects without changing the hardware.

To set up a transition, select one of the seven inputs on the Preview bus, choose the transitional effect, and press the space bar. This invokes an "auto" command that triggers the effect at a predetermined speed. You can manually control the transition using the "T-Bar" object on the switcher screen. Switch closures or *ARexx* commands also can trigger transitions.

The *Overlay* bus is used for *keying*, a process of electronically cutting a hole in one video picture and replacing it with another video image. This lets you place text over picture, or blend images together for special effects. With *luminance* keying, the brightness levels of the picture determine the edges of the *key*, or hole. For example, users can key images from one input over all the black (or white) portions of an image on another input.

The background generator supplies the seventh input to each bus. Users can choose from nine supplied backgrounds or select a custom background by using *ARexx*. The Toaster-supplied backgrounds come in black, white, red, green, blue, yellow, magenta, cyan, or video snow. These backgrounds, called *mattes*, can add impact to a video transition.

The *ChromaFX* module is a real-time, color effects system, with colorization, posterizing, color cycling, filtering and other visual effects. This type of effect appears frequently in music videos and science fiction movies.

**The Paint Box:** *ToasterPaint* delivers capabilities previously reserved for expensive professional video paint boxes. With it, Toaster users can highlight or manipulate freeze-frame images or create backgrounds.

*ToasterPaint* tools are similar to those of computer draw and paint programs. The user can easily create squares, circles, and polygons. Features such as texture-mapping and transparency prove helpful for colorizing images. It also allows you to cut portions of images or drawings to use as brushes. These can be stamped on another page or blended like a mosaic.

When you complete an image, you can save it to disk as a 24-bit IFF (Amiga-compatible image file) or as a

## MIDI AND THE VIDEO TOASTER

Commodore has adopted *ARexx* as a standard control language, opening the doors for affordable multimedia. Many developers, including NewTek, have placed *ARexx* hooks in their software to allow external control and interprogram communication. Programmers can take advantage of these hooks to solve their interfacing problem.

Among other things, *ARexx* serves to link MIDI with the Video Toaster's software. All you need is a MIDI interface and a MIDI-to-text conversion program. *MIDI-mice* ($85) from Tensor Productions (tel. [805] 685-6245) converts MIDI note data into *ARexx* text commands. An *ARexx* script then interprets and executes these commands. In this way, the savvy user can map any MIDI message into any action, or series of actions, by the Toaster system. The same applies to any other program that implements *ARexx* control.

A system designed by The A/V Medium (tel. [415] 797-4955) demonstrates the value of *ARexx* as a control language. This system provides MIDI control of VCRs, laser disks, CDs, or any other device equipped with infrared remote control. These devices supply the input to the Video Toaster platform, also under MIDI control.

An Apple IIe running Passport's *Master Tracks* supplies MIDI information to the Toaster and to an Amiga 500 system. The 500 system uses the *MediaPhile Desktop Video System* from Interactive MicroSystems (tel. [603] 898-3545) to control the audio/visual equipment, using *ARexx* commands sent by *MIDI-mice* in response to MIDI note data. Each device is programmed and accessed on a separate MIDI channel to simplify orchestration.

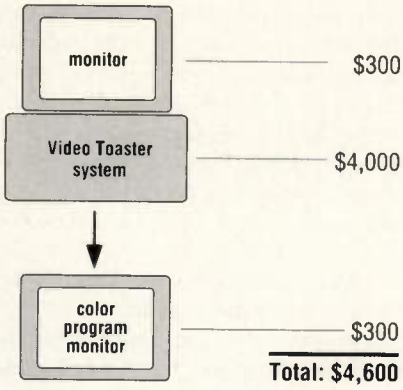



FIG. 3: In its most basic configuration, a Video Toaster system requires only one additional video monitor.

Video Toaster frame image. Other Toaster modules, such as *Switcher*, can recall these image files directly and load them into either frame buffer for immediate access. (*NewTek is preparing a software release, which should be available by the time you read this, that reportedly exchanges files in common Mac and IBM image formats.—GH*)

**Character Generation:** *ToasterCG* is the Video Toaster's character-generation module. It provides broadcast-quality character generation, and is extremely easy to use. It can display title pages in any of four formats: Key, Frame, Scrolling, or Crawling pages.

A *Key* page lets the user put stationery graphics over live video. Letters can appear with outlines or transparent shadows. *Frame* pages use internally generated backgrounds. These backgrounds consist of single colors or gradients between two colors. (*According to the manufacturer, the next software release will be able to use any frame-store image as a background.—GH*) *Scrolling* pages move text from the bottom of the screen to the top at various speeds, much like the credits seen after TV shows or movies. *Crawling* pages move text from the right edge of the screen to the left at various speeds, in the manner of stock market reports or special bulletins.

**3D Animation:** *LightWave 3D* is a "key-frame" animation system. The user creates a starting frame and an ending frame. The program generates all the frames between. It calculates object motion, object size, camera angle, lighting, shadows, and color. You can see 3D animations daily in news broadcasts, title sequences for sports programs, music videos, and TV shows of all sorts.

With *LightWave*, titles and logos fly around the screen. Viewers take journeys that exist only in the computer, and images wrap around objects and appear in full motion. With broadcast-quality output, capabilities previously limited to professional post-production facilities are now available to the home artist.

**3D Modeling:** *LightWave Modeler* is a program that creates and modifies 3D objects for use by the animation program. It displays objects on a screen divided into four views. Various display options let the user select a view. The program can size, stretch, or rotate objects that the user creates. It provides a variety of special tools, including Lathe, Extrude, Clone, Flip, Polygon, Attach, and Mirror. The user also can edit objects imported from other 3D software programs.

***ARexx* Implementation:** *ARexx* is an Amiga command language that allows a programmer to customize application programs by creating macros or scripts. Other software programs, or messages received through the serial port, can control the Toaster through *ARexx*. For example, video edit controllers invoke transitions at precise locations, and MIDI sequencers control the Video Toaster in time with music (see sidebar, "MIDI and the Video Toaster"). This external control, in effect,

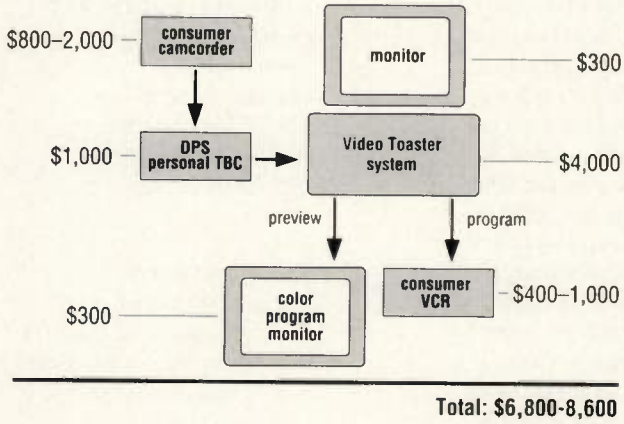



FIG. 4: Adding a consumer-model camcorder and VCR, along with a low-cost time base corrector, brings sophistication and flash to home video productions.

lets a Toaster system serve as a peripheral for any computer or controller.

### ASSEMBLING A TOASTER SYSTEM

The beauty of desktop video is its comparatively low cost and expandability. All you need to get started is the Video Toaster and a composite video monitor. Fig. 3 illustrates this system, including approximate prices for each component.

This system allows you to create stunning (though static) computer graphics, using the paintbox or the 3D modeling and rendering program. Using the two frame buffers, switcher, and keying functions, you can perform a variety of interesting transition, colorizing, and image-combination effects (with scrolling titles to boot). You can record the output on any home VCR and enjoy your creations any time you like. At this level, desktop video costs about the same as a nice, though not extravagant, MIDI system.

If you want to use the Toaster for more serious work, you'll need additional hardware. For example, you may

## DIGITAL PROCESS SYSTEMS PERSONAL TBC

The cost of a full-frame time base corrector normally starts around $2,600, which can be an expensive stumbling block when building a multi-source desktop video system. At a list price of $995, the Digital Process Systems Personal TBC is a suitable companion for the NewTek Video Toaster.

The Personal TBC installs in the Amiga's IBM-compatible expansion slot, or in an IBM PC. Each VTR in a multi-deck system needs a separate card. The TBC takes its power from the main bus, but is not dependent on program control.

As you might expect, there is a trade-off between price and features. If you only need to lock a VCR with the Toaster, then the Personal TBC fills the bill. It produces a signal at the low end of the "broadcast-quality" scale, and does not offer the special effects and processing capabilities of more expensive units. It does, however, do a great job of interfacing with the Toaster.

The TBC is not accessible by software, so jumpers on the TBC board control the options. For example, changing the input from composite to component video requires changing several jumpers. While not difficult, this is inconvenient if the computer is located in a difficult-to-reach place or mounted in a rack.

For professional applications, signal quality is the most important consideration. I compared the image from the Personal TBC with one from another (low-cost) TBC. The Personal TBC uses RCA connectors, and some signal degradation occurs in the RCA-BNC adaptor. This showed on the video waveform monitors, but onscreen the differences were negligible to the eye. On half-inch video, where the original signal was less stable, the Personal TBC passed on some signal jitter that the other unit corrected.

The Personal TBC is a wonderful unit that addresses many technical and budget problems in low-end applications, while still maintaining strong signal specifications. DPS's Personal TBC is a sound investment for any Amiga or IBM desktop video system and a good start in building a professional post-production system.—*James B. Brandt*

### Product Summary

**PRODUCT:**
Personal TBC
**REQUIREMENTS:**
Video Toaster, IBM PC compatible, or Amiga 2000-series computer.
**PRICE:**
$995
**MANUFACTURER:**
Digital Processing Systems, Inc.
55 Nugget Ave., Unit #10
Scarborough, Ontario
Canada M1S 3L1
tel. (416) 754-8090

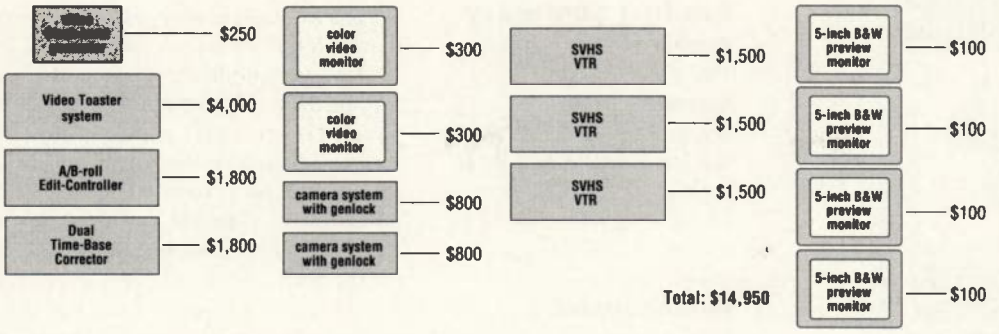



**FIG. 5: Professional production requires more sophisticated video hardware and control systems.**

be interested in computer animation. By itself, the basic Toaster system can produce all the frames, one at a time, with beautiful 3-dimensional rendering. Recording these images for continuous playback requires a video recorder with the ability to record individual video frames. You also need an *animation controller* such as the V-LAN from Videomedia (tel. [408] 745-1700) or the Minivas from Lyon Lamb (tel. [818] 843-4831). Most animation controllers cost well over $2,000, but Nucleus Electronics (tel. [416] 859-5218) has just released the PSFC (Personal Single-Frame Controller) for $425. You still need a deck that accepts control commands in serial (RS-422) form, and these start at around $4,000.

After you buy the recorder and controller, you can get started, but you may find yourself getting impatient with the time it takes to render each frame. Rendering time varies with the complexity of the picture, but it can easily take several minutes to create one frame of video. If a frame requires five minutes of rendering, a single minute of 3D animation is going to take over six *days* of non-stop computation. It's time to look into accelerator boards.

A quality 68030 accelerator costs between $700 and $1,800. (Of course, if you already have the 68030-equipped Amiga 2500/30, you're in good shape.) The cost of your basic video system has now increased sharply. Even so, computer animation is a slow process, at least for images of any complexity. Todd Rundgren's stunning video for his song "Change Myself" required no less than *ten* Toaster systems running in parallel for a period of five weeks. Presumably, a single Toaster could have handled the job, but it would have taken about a year.

## HOME VIDEO PRODUCTION

To a certain degree, the Toaster's functionality depends on the system you build around it. In a simple home environment, you can do real-time frame grabbing and image manipulation by connecting any NTSC color video camera to the Toaster's input. Point the camera at a source, select the camera's input from the *Switcher* screen, and click on the "freeze" button with the mouse. Once frozen, you can save these images to disk and load them into *ToasterPaint* or wrap them around objects as 3D textures. You also can orchestrate transitions between live video, frame-store images, and title overlays.

If you want to use multiple video sources or any type of taped video as input to the Toaster, you need to deal with video's sticky timing requirements. Time base correctors (TBCs) remove "jitter" (see "Video for the Electronic Musician" on p. 38) from the output of a video recorder. Most TBCs today also serve as *frame synchronizers*, locking the video signal to an external reference. Unfortunately, stand-alone time base correctors aren't cheap (some VCRs and camcorders incorporate time base correction and thus don't require an external unit). The least expensive model currently available is the $1,000 Digital Process Systems Personal TBC (see sidebar review).

**Fig. 4** shows a nice little system (nothing fancy) for basic video production that uses the Toaster with consumer video gear. This might be considered the equivalent of adding a multitrack cassette and a good effects unit to a basic MIDI studio. The cost of the system rises substantially if you add an edit controller or more video sources.

By now, you may be starting to get the picture. Video equipment costs are dropping, but they are still high compared to those of audio and MIDI gear.

## INDUSTRIAL PRODUCTION

Professional work requires professional equipment, and **Fig. 5** shows a system that might be used for general-purpose production, including "A/B-roll" editing (two source decks, one record deck) and two-camera capability.

This system uses all the capabilities of the Video Toaster, with an emphasis on industrial production. An edit controller provides dubbing multiple-source playback and Video Toaster control. The rest of the system includes two "genlockable" cameras, two playback VTRs with time-case correction, and a third deck to serve as the edit master. There are individual black-and-white monitors for each Toaster input and color video monitors for the Preview and Program outputs. A black-burst generator provides a common sync for all parts of the system.

While the cost of such a system might seem steep, it's far lower than systems from just a few years ago that had similar capabilities, and prices are still on a downward trend. That's what makes the field so exciting right now. We are standing at the brink of an enormous explosion in capability, similar to that experienced by musicians in the last few years.

## CONCLUSION

The Video Toaster is affordable, versatile, and expandable, and these are admirable qualities in any product. Add to this its functionality and ability to be controlled externally and you'll understand why this product has generated such enthusiasm. I recommend the Toaster to anyone interested in incorporating video into their work. From corporate presentations to nightclubs, or from home videos to industrial productions, this system delivers.

**Ray McDonell** *is a composer, musician and founder of The A/V Medium, a multimedia consulting and equipment brokering company in Newark, CA.*

## Product Summary

**PRODUCT:**
The Video Toaster
**REQUIREMENTS:**
Amiga 2000 or 2500, 50 MB hard disk, 5 MB RAM.
**PRICE:**
$3,995 complete, or $1,595 for the Amiga plug-in version.
**MANUFACTURER:**
NewTek Inc.
215 SE 8th St.
Topeka, KS 66603
tel. (913) 354-1146
or (800) 843-8934

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

# Tascam M-1024 Stage Mixer

*By Larry "the O" Oppenheimer*

**If your band has grown too big for its mixer, check out Tascam's affordable sound-reinforcement board.**

There was a time when a little mixer that could handle a few vocal microphones was all a club band needed. Those days are now buried in history books. The proliferation of affordable synthesizers, samplers, and signal processors triggered a critical need for mixers with multiple inputs and professional features such as channel insert points. What didn't change was the little mixer that was now a big mixer still needed to sell at a price a band in the trenches could bear.

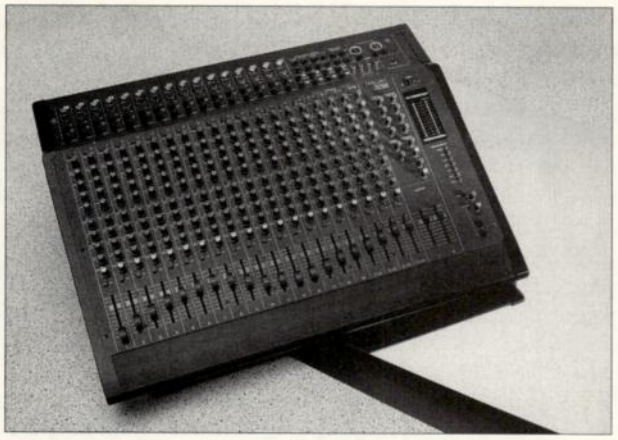
This brings us to Tascam's new M-1024 and M-1016 Stage Mixers (24- and 16-input models, respectively). Tascam has long been a mainstay in the low-cost mixer arena, but their previous emphasis was on studio boards that often ended up onstage. Apparently, the burgeoning live-sound market has become too juicy to ignore.

The M-1024 (our choice for review) weighs in quite reasonably at approximately 30 pounds and takes up just 26 × 21 inches of tabletop space, including an armrest and horizontal patch panel. This compact package offers 24 input channels in the form of sixteen mono and four stereo inputs. Each mono input channel has a balanced, XLR mic input, an unbalanced, ¼-inch phone jack input, and a ¼-inch TRS (stereo) insert jack on the back panel. The front panel features a preamp trim pot, a 30 dB pad switch, 3-band equalization, an overload LED, six sends, a pan pot, a PFL button, and, of course, a level fader. The EQ section has shelving filters with 12 dB of boost or cut for low- (100 Hz) and high-frequency (5 kHz) bands, and a sweepable midband of 250 Hz to 5 kHz with 15 dB of boost or cut.

Tascam has arranged the sends differently than most mixers (more on this later), apparently for cost-reduction and streamlining. Instead of using pre/post select buttons on the two Aux sends, turning a center-detented pot clockwise sends a post-fader signal, while a counter-clockwise twist sends a pre-fader signal. The four post-fader sends also utilize center-detented pots; clockwise rotation routes to the even-numbered buses (2 and 4), and counter-clockwise services the odd buses (1 and 3).

The stereo channels do not have mic inputs or pads, but otherwise offer the same features as the mono inputs. Left and right inputs are maintained separately through the channel, but equalization is applied identically to the two inputs. The pan pot is used as a left/right balance control for the single stereo fader. Presumably, the two inputs are summed to mono for the send buses, although I was unable to find confirmation of this in the manual. The two ¼-inch inputs for each stereo channel are wired so the channel becomes mono if a signal is patched into the left input without anything being plugged into the right.

The master section of the front panel has master level pots for all six sends, level pots for the four stereo effects returns, and level and pan pots for the two mono returns. This section also has the left and right master faders, the power switch, two 12-segment PPM-type meters, a power indicator LED, a PFL indicator LED, the master and headphone level pots, two headphones



Tascam's 1024 sound reinforcement mixer offers 24 input channels.

jacks, and meter/phones select buttons that allow you to choose between the stereo master buses or any of the sends.

The patch panel has unbalanced, ¼-inch outputs for the six sends and six cleverly wired jacks for the returns: Four are stereo (TRS), while the remaining two are mono. However, many sound technicians won't appreciate being forced to use TRS splitter adapters for the effects returns, and Tascam has anticipated this. The four stereo returns can be treated as four mono returns either by using regular 2-conductor plugs (with the returns hard-panned, 1 and 3 to the left and 2 and 4 to the right), or by inserting a mono plug in the odd-numbered jacks. If the even-numbered jacks are empty, the signal is fed equally to the left and right mix buses.

Left and right master outputs are available on balanced, XLR jacks and unbalanced, ¼-inch jacks. A summed mono master output is on another unbalanced, ¼-inch jack. Finally, there are RCA stacking inputs for the left, right, Aux 1, and Aux 2 buses; a phantom power on/off switch; and a non-detachable, 2-wire AC cord.

## EVALUATION

As the M-1024 is intended as a stage mixer, I field-tested it with my band, Phoenyx. This opportunity also allowed other engineers (Jeff Kliment, Chris Scarabosio, and Mike Haefflin) a chance to evaluate the board and give me their impressions.

Phoenyx is a good test of sound-reinforcement equipment because the two electric violins, mandola, and bodhran (Irish side drum) are difficult sources to reproduce in a live environment. But the M-1024 passed the stress test with honors, largely because of its "sweet" equalization and generous headroom. The harsh EQ of some moderately priced mixers ruins the tonality of our instrumentation, but the M-1024 produced beautiful sounds. It also was a pleasure to discover we could clobber the board with level without inducing clipping. Headroom is important in live sound boards because the instant a mixer clips, the distortion is airborne and punishes your audience.

I like many of the mechanical aspects of the M-1024: The size and weight work well in cramped club environments, and the accessibility of the patch panel is a blessing. Although it may cause a little more strain on cables over time, I like having easy access to the connections, especially when troubleshooting. Tascam even printed the pinout of their XLR connectors right on the patch panel. You don't have to wonder which pin is hot (pin 2). The ¼-inch jacks are the cheap plastic variety, which gave me difficulty with some plugs. However, through the application of finesse and, occasionally, force, I was able to get everything plugged in.

The biggest problem with the back panel was the 2-wire AC. I have complained about this before (and probably will again). In club environments, it is usually necessary to plug the mixer into a different circuit than the power amplifiers and stage gear. This means hum and buzz problems are *de rigeur*. Without either a third pin on the AC, or a ground lug, there is little flexibility in eliminating these problems. Often, I end up lifting the third pin on the power amplifiers, and with the amount of current that runs through them, that is less agreeable than lifting a mixer's third pin.

Remember the "different" sends configuration discussed earlier? The center-detented pot routing of pre- and post-fader signals can be big trouble in the field, and—daring to be tactlessly blunt—I find the feature stupid. In a studio environment, an unorthodox arrangement can be learned and tol-

erated, since split-second "panic" adjustments are seldom necessary. In a live environment, negotiating a tricky system can be fatal for instance, when feedback is screaming in the monitors, necessitating a sudden grab for the monitor pot on the offending channel."When feedback hits, every experienced engineer on the planet is going to rotate the M-1024's pot counterclockwise to turn it down," says sound tech Jeff Kliment, "which, in the case of this board's aux sends, would now yield *full* pre-fader gain." Furthermore, this arrangement means there is only a half-rotation of resolution for any of the sends. If you purchase this board, you might want to consider modifying the aux sends with regular pots of an appropriate value and hard-wiring them as pre-fader.

The M-1024 pad's 30 dB of attenuation is more than on most mixers and really helped tame hot signals. Although our bench tests indicated some noise in the mic preamps, in actual use, I found the M-1024 to be quieter than some more-expensive mixers, and noise was never a problem. The faders, although not a full 100 mm, were surprisingly responsive. The EQ proved to be smooth and flexible, although it is too bad the midband only goes to 5 kHz, as this leaves a bit of a hole in a rather crucial region below where the high-frequency (10 kHz) control kicks in. Our bench testing, by the way, generally confirmed Tascam's claims for the board, with the EQ being right on the money in terms of center frequency and amount of boost and cut.

The stereo input channels are a great way to squeeze more inputs in a small amount of space, accomodating the hordes of stereo synths and effects processors. Other touches I found helpful were the clever wiring of the effects-return jacks, the PFL master (so you can avoid a level jump in the phones if you go from monitoring the stereo master buses to the PFL bus), the ability to meter any of the aux sends, and the overload LED. I also greatly appreciate the substantial amount of documentation contained in the owner's manuals, including signal flow and level diagrams, illustrated explanations of typical hookups and use, diagrams of the rear panel connector schemes, complete specifications, and even a separate *Brief Guide* for quick reference.

In summary, the M-1024 has a well-chosen selection of features and very good sound in a compact package at a good price. Although I found a few design choices (the pre/post Aux send pots and lack of grounding) that were unfortunate, on the whole, the M-1024 is one of the most attractive live sound mixers in its class.

**Larry the O,** *having foolishly disregarded his grandmothers' sage advice, performs with Phoenyx and does live and studio engineering, post-production sound-editing, and consultation under the name "Toys in the Attic."*

## Product Summary

**PRODUCT:**
Tascam M-1024 Stage Mixer
**PRICE:**
$1,899
**MANUFACTURER:**
Tascam/TEAC America, Inc.
7733 Telegraph Rd.
Montebello, CA 90640
tel. (213) 726-0303

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

# Mark of the Unicorn MIDI Mixer 7s

*By Daniel Sofer*

**A MIDI pioneer gets into the mix.**

Mark of the Unicorn's Mixer 7s is a 14-channel MIDI-controlled mixer in a single-space rack-mount package, with inputs that appear as seven stereo pairs (hence the name). The 7s includes two stereo effects loops, tone controls, and a noise gate for each stereo input, all programmed using Continuous Controller messages.

### HARDWARE

Each channel has two inputs, Left/Mono and Right. The front panel input trims also affect the noise gate thresholds. For mono input, the Pan control functions as a panpot, but with stereo sources it serves as a balance control. Bass and treble controls roll over at 100 Hz and 10 kHz, respectively. Their effect is smooth, though I found myself wanting a bit more extreme EQ.

Each channel can send to either, but not both, of the stereo effect sends. Through the magic of software, the send can appear as one stereo knob or as separate knobs for left and right. I found this convenient for feeding mono-input effects from a single channel. The master sends and returns have trim controls on the front panel.

Each channel has separately enabled noise gate and smoothing functions, with attack and release rates determined by global settings. Smoothing only affects the fader and prevents gain-change glitches, at the cost of a slight lag.

An extra input pair appears on its own outputs, but not in the main mix. This seems unusual, but it has two applications: The input can be used as a master fader; or, when the 7s is used as a submixer, the aux input can provide MIDI control of a separate source, such as a CD or tape player.

The main inputs and the master outputs are on standard, ¼-inch phone plugs, but the effect sends, returns, and the aux jacks are on RCA-type connectors. When asked why, Mark of the Unicorn replied, "We ran out of room on the rear panel."

The front panel is minimal: The only controls are input trims, master level and gate sensitivity, and a headphone jack with level control. There is an input LED for each channel, useful as a visual indication of signal activity.

This is a box to be buried in your rack, since the panel is really on your computer screen.

Mark of the Unicorn claims respectable noise and distortion figures, and my listening supports their readings (see sidebar). I found the noise gates objectionable due to their slow attack (even at short settings). I wouldn't recommend using them on transient sources such as drum machines. Fortunately, you can enable each noise gate independently.

### SOFTWARE CONTROL

The 7s mixer uses Continuous Controllers 16 to 53 and 66 to 79. There are no

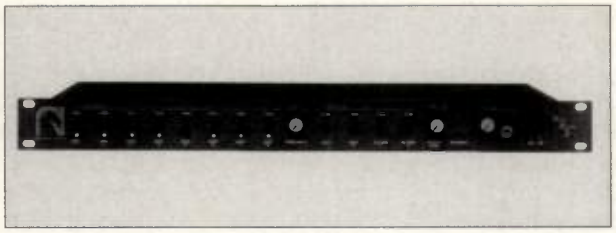


FIG. 1: The Mixer 7s from Mark of the Unicorn is a full-featured, MIDI-controlled mixer in a single rack-space package.

Sysex messages used, so it should be easy to run the mixer from almost any controller. Fader boxes, such as the J.L. Cooper Fadermaster or Lexicon MRC, present possible control solutions, but the sheer number of faders makes a computer attractive.

Mark of the Unicorn provides a front-panel application for Macintosh, Atari, and MS-DOS computers, called *7s Console*. I tested the Macintosh version, which provides a friendly front end for the mixer, with full MIDI Manager support. *7s Console* looks and feels like a little console and implements all 7s parameters. It includes controls for levels, pans, sends, and tone controls, as well as gate and smoothing enables for each channel. There is even space to label each input.

The response of the mixer to *7s Console* is fast and smooth, even using *MIDI Manager* on a Mac Plus. Initially, the channel Mute and Solo were slow to respond, but a beta copy of *7s Console 1.1* solved the problem. (*The current version of* Console 7s, *1.1.1, is sent automatically to registered owners.—GH*)

*7s Console* also features complete presets, called Scenes, with the ability to select them from the screen (with the mouse or a keyboard command) or with MIDI Program Change. Scenes are implemented in the application program rather than in the mixer. To use this feature, you must run *7s Console* under *MultiFinder* and *MIDI Manager*.

### SEQUENCER AUTOMATION

Besides the *7s Console* application, Mark of the Unicorn includes a file for *Performer*, with sliders for all mixer parameters. Using these sliders, you can record, play back, and edit all of the mix parameters including volume, pan, effects, bass, treble, and gate times. The only drawback is the large number of faders slows response time. On a Mac IIcx, the *Performer* sliders are slower than those in *Console*, and the recorded controller steps are rather large. On a Mac Plus, the full fader set is too slow to be usable.

There are several solutions to these problems. The Smoothing function slows any sudden change down to a slow, even transition, like a Steadicam for your mouse. Smoothing is also great for fade outs and Scene transitions. The problem, of course, is that you can't do anything quickly.

I also found it helpful to create a new set of sliders with only the seven input level faders. Even on a Mac Plus, this solution was definitely useable.

You also can patch the output of *7s Console* into a sequencer using MIDI Manager. I tried this after I got the same results from the faders in *Vision* as

### SOUND CHECKING THE MIXER 7S

The spec sheet for the Mixer 7s lists the S/N ratio as 78 dB with the noise gates off, 90 dB with the gates on, and distortion under 0.1%. On a Panasonic test system, the 7s met its distortion figures handily and came within a few decibels on signal-to-noise. The Mixer 7s performs well, meeting all of its specifications, as our noise figures fell in the margin of experimental error.

The 7s is very quiet when the gates are on, but less so when they're off. It sometimes may be necessary to turn the gates off on transient sources, and the user should be aware of the additional noise on ungated channels.

The 7s' performance compares well with inexpensive mixers, and the control features are unheard-of in this price range. The 7s is a good choice for many situations, but I hesitate to recommend it for critical applications. In a situation such as mixdown for release, one needs the extra audio performance of more expensive hardware. *—Gary Hall*

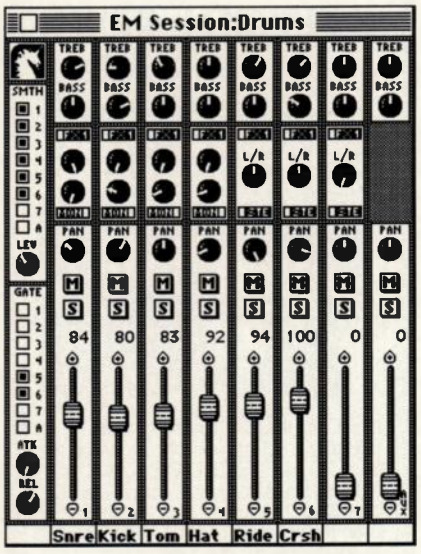



**FIG. 2: The 7s Console application provides full control of the Mixer 7s, using graphic faders, buttons, and rotary controls.**

I had with *Performer*. Recording the *7s Console* faders, instead of using *Vision's* faders, gave quick response and smooth sound.

## CONCLUSIONS

Mark of the Unicorn designed the 7s as a MIDI system peripheral. In this scenario, with a sequencer and other control devices, the 7s has lots of potential.

The dynamic performance of the Mixer 7s is very good. Mark of the Unicorn went to great lengths to maintain smooth audio when changing levels, and I found the transitions smooth, without zipper noise or other artifacts. If you need clean crossfades, the 7s is definitely up to the job, but there were times when the response seemed slower than I would have liked.

If you sometimes use your system without MIDI control, the 7s may cause grief when you have to boot the computer just to add some echo. If you always use a computer or MIDI fader box, the 7s MIDI Mixer offers good performance, lots of inputs, and full MIDI automation at a great price.

*A Jewish-American of Iraqi ancestry,* **Daniel Sofer** *hopes the war will finally bring all Middle Eastern people together to make the Big Peace.*

### Product Summary

**PRODUCT:**
MIDI Mixer 7s
**REQUIREMENTS:**
Mac, Atari, or IBM-compatible w/MIDI interface, or any source of Continuous Controllers messages
**PRICE:**
$595
**MANUFACTURER:**
Mark of the Unicorn, Inc.
222 Third St.
Cambridge, MA 02142
tel. (617) 576-2760

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

# Opcode Cue 3.0 (Mac)

*By Bill Heagy and Michael Molenda*

**When scoring is hit and miss, Opcode comes to the rescue.**

The continuing expansion of cable, video, and film markets opens new windows of opportunity for composers who dream of writing soundtracks. Unfortunately, the precise cataloging of hundreds of details required throughout the scoring process can turn the dream into a nightmare. Even experienced composers are overwhelmed by cue sheet preparation, hit point synchronization, score and tempo map calculations, deadline pressure, and budget limitations.

*Cue* 3.0, for the Macintosh, can't increase a budget or stretch a deadline, but its management of film scoring data makes it as valuable (and as rare) as a movie mogul with street smarts.

## REEL APPLICATIONS

During "spotting" sessions, the film director, music editor, and composer decide where music shall be inserted into the film. Usually, reams of legal pads are devoured by handwritten notes detailing music start-and-stop points, key hits (where music punctuates an onscreen action), and other soundtrack data. *Cue*, however, can read SMPTE time code from the work videotape and log music start and stop points with a single keystroke. The composer also can enter specific data regarding each music cue and hit point. This feature not only helps save today's trees from becoming tomorrow's legal pads, it puts cue data right at hand and saves hours of searching through scribbled notes.

As the composer begins actual scoring, *Cue* helps keep the music synchronized to film. It's an unwritten rule that a soundtrack works best when the music follows the tempo of the action onscreen. In the old days, composers used a "click book" to manually calculate tempos to hit desired cues. *Cue* calculates tempos automatically with a Tempo Search feature (see **Fig. 1**). The composer enters SMPTE beginning and ending times for the film sequence to be scored, and *Cue* reports which tempos offer the most hits. Tempos also can be recorded manually, as the work videotape is viewed, by tapping a rhythm on the mouse button while *Cue* is locked to SMPTE.

When the inevitable tragedy of "Changes in the Film" occurs, *Cue* minimizes the task of matching music to the new visual edits. Let's say a composer writes music to accent ten footsteps. A few weeks later, the director cuts the footage to three footsteps. Past methods required a music editor (and/or composer) to scratch out the cue notes for this revised footage and start all over. With *Cue*, Tempo Search recalculates the timing of the new edit, and the composer rescores to suit.

In its highest form, *Cue* provides a music editor with a precise cue list and all the data needed to cut the music into the film. The composer is armed with a vast database of production information (from actors' names to which performing rights society con-

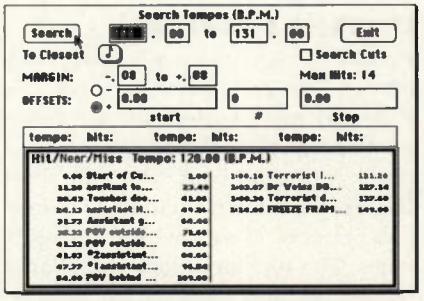



**FIG. 1: The Tempo Search automatically finds appropriate "hit point" tempos and saves composers from deciphering the dreaded "Click Book."**

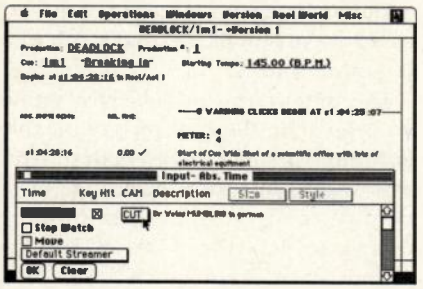



**FIG. 2: Production information is always at hand in the Cue Sheet window, while the Input window updates hit points.**

trols the music), a tempo search to calculate hit points, streamers (visual cues guiding a composer or orchestra to a hit point), and the option to print custom score paper annotated with cue data (gunshot, train crash, explosion, etc.). In addition, *Cue* can save tempo maps as MIDI files and export them to a sequencer.

## THE SOFTWARE ROLE

*Cue* is constructed around a series of task windows. Most of these windows have an Operations menu for entries of basic text and technical information. For example, "Set Production Information," allows you to enter biographical data such as project title, episode number, director, actors' names and much of this information is automatically inserted into common data fields.

The Cue Sheet window (see **Fig. 2**) displays detailed information such as a general catalog of hit points in relative (the time logged from the beginning of the cue) or absolute (the actual timing off the work videotape) time, cue information, meter, tempo, and timing clicks. The Input window (Fig. 2) is where specific information regarding each cue point is entered. In order to enter a cue, the Time and Description areas in the window must be completed.

The Playback window (see **Fig. 3**), is configured like a large strip of film with sprocket holes (the manual invokes artistic license on this) and offers helpful visual cues for timing hit points. In addition to SMPTE timing references, the Playback window has a stopwatch and can show streamers (lines that visually guide the composer to a hit point by diminishing in length as a "zero point" approaches). These guides are particularly helpful when the composer is conducting a scoring session. If you really want to impress the music editor, *Cue* can interface with an optional Tesla box to record colored streamer cues on the work videotape.

Another visual guide for lining up cues is the Clicks window. This is configured like drum beat notation and is helpful for estimating which rhythmic figures best sync to specific hit points.

*Cue* provides flexibility and control of a number of time formats: all types of SMPTE drop and non-drop frame, 16mm, 35mm, and more. If you're chase-locked to a work videotape, you can enter hit point times "on the fly" by running the video to the desired cue and clicking the mouse button. The exact time reference is automatically logged into *Cue*. Manual entry of hit points is also allowed, but logging a complete SMPTE time into *Cue* necessitates a reintroduction to the coded strikes of your PC DOS days. The feature is essential if you receive cue sheets from a music editor or director who doesn't own *Cue*.

MIDI implementation takes a clever turn with a MIDI event "sequencer" that outputs MIDI On/Offs synched to hit points entered on the Cue Sheet. This specialized module allows performance, copying, pasting, and editing of up to 40 separate MIDI events. As *Cue* supports all kinds of data file interchange from text to MIDI, it offers a new pipeline into your MIDI studio.

For powerful, time saving access to commands, *Cue* provides blank templates that can be customized to the user's main application needs. This feature saves jumping around the main menus. *Cue*'s design also includes some flexibility in configuring the display and format of some of its windows.

Hard-copy output encompasses the following reports: Title Page (with your own logo), Spotting Notes, Master Cue List, Performing Rights List (for music rights clearance information), Custom


**FIG. 3: It doesn't wave a baton, but the Playback window is a conductor you can count on.**

Score Paper. The score paper is really a nice touch, as well as a money saver, and even can print graphic notation of key hits directly on the page.

Forming a conclusive impression of *Cue* is difficult due to the sheer scope of the program. *Cue*'s steep learning curve demands an organized, detail-oriented approach from the composer. This is not a program to learn "on the job." But *Cue*'s ability to track hundreds of details throughout a mammoth film project is certainly worth any struggle. Remember the old "pay me now or pay me later" routine? All aspects of the score (hit points, composer, performing rights clearance, etc.) must be documented. You can learn to enter this information into *Cue*'s friendly databases during the scoring process, or you can review stacks of legal pads crammed with handwritten notes. Get the picture? Once mastered, *Cue* turns the whole film scoring nightmare into a Hollywood happy ending—complete with radiant sunset.

(For more information on scoring, see *Scoring for Films* by Earle Hagen and *On The Track* by Rayburn Wright and Fred Karlin. Both books are available from Mix Bookshelf; tel. [415] 653-3307.)

**William Chang Heagy** *is a New York City filmmaker, composer, and producer specializing in high technology applications for the arts.*

## Product Summary

**PRODUCT:**
Opcode *Cue* 3.0
**REQUIREMENTS:**
Macintosh with minimum
1 MB; optional MIDI and SMPTE interface.
**PRICE:**
$595
**MANUFACTURER:**
Opcode Systems
3141 Haven, Suite A
Menlo Park, CA
94025-1010
tel. (415) 369-8131

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

# DigiTech MEQ-Series Programmable EQ

*By Gary Hall*

**Outstanding display features make this EQ more than equal to the competition.**

Programmable equalizers have many uses. For traveling sound, they offer an easy way to optimize for each room. For theatrical production, they can be used as "telephone" filters or to provide an illusion of distance. For an instrumentalist, they can dial up a selection of tone colors instantly. With MIDI control, EQ changes even can be orchestrated as part of a composition.

DigiTech offers three models in their MEQ series. Each have similar circuitry and front panels, but differ in the number of separate audio channels and the number of bands of EQ. The MEQ Quad 7 has four audio channels but only seven bands. The MEQ Dual 14 divides its two channels into fourteen bands of ⅔-octave width, and the MEQ Mono 28 provides a single channel with 28 ⅓-octave frequency bands. (I worked with the Mono 28.) In each case, the boost and cut range is ±12 dB. The audio interface is flexible, with electronically balanced XLR and ¼-inch connectors. A button switches between operation at +4 dBm and -10 dBV nominal level.

All of the MEQs provide 99 nonvolatile memories that can be recalled from the front panel or via MIDI Program Change. In addition, you can assign all EQ , Input Level, and Bypass settings to individual continuous controllers, so that the equalization curve can be programmed using a computer or a MIDI fader box.

### SOUNDS LIKE...

Sonically, the MEQs perform solidly. My tests confirmed DigiTech's specs: Signal-to-noise ratio and distortion are better than 90 dB and 0.03% (at 1 kHz), respectively, at full input and flat EQ.

Equalizers generally lose some dynamic range in operation (boosted bands may clip, and cutting can increase noise). Optimal performance depends on a good tailoring of the EQ curve to provide the desired result with the input source.

The audio specs and subjective sound are similar to those of programmable graphic EQs from other manufacturers, which isn't too surprising, since most of these units are based on the the same IC (the LMC 835 from National Semiconductor).

### LOOKS LIKE...

On the front panel, each band of EQ is represented by a vertical line of twelve small LED lamps and a rectangular, rubber button. To program the MEQ, use the buttons to select a band, or group of bands, and adjust gain with the large, friendly, rotary control at the right side of the panel.

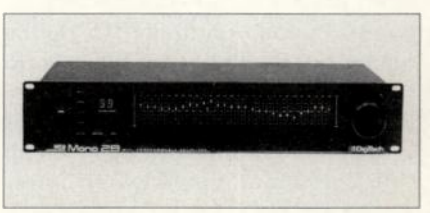
Two simultaneously lit LEDs indicate in-between gain settings, so the display can show the full boost and cut range in 1 dB increments. A 2-digit display indicates program number, MIDI channel, input-level attenuation, or controller number. Bypass and Edit Compare functions also are available. In level-setting mode, the MEQ display serves as an input-level meter. The panel interface and operation are well-thought-out, and I found the MEQ to be a pleasure to use.

The MEQ's discrete LED display distinguishes it from its competition. The display is clearly readable, even across a room or under bright lights, and visibility improves in the dark.

### MIDI UP

The MEQs respond rapidly to program changes, and the continuous modulations are noise-free. The MIDI implementation is good but lacks elaborations such as maps for program changes or controller numbers. Everything works fine, at least when used normally.

My first interest in programmable equalizers was for dynamic tone modulation, and I wanted to use the MEQ-28 for some of my experiments. By



DigiTech's MEQ-28 offers 28 bands of MIDI-controllable equalization.

assigning each band to a MIDI controller, I found I could produce elaborate sweeps in real time, using Opcode's *Max* on a Macintosh SE computer to map a continuous sweep into a separate, 128-step map for each of 28 controllers. (You can work it out. It's a lot of information.)

At first, I had problems with buffer overflow on the MEQ. I can't fault the unit for having difficulty handling sustained controller messages at full MIDI bandwidth, but unfortunately, a buffer overflow would cream the user memories. I soon discovered how to thin the data stream, however, and after that was troubled only by occasional glitching in the audio. I don't know if these clicks and burrs are inherent to the National EQ chip, or if they are the result of the way the operating software interacts with the MEQ hardware. No matter; I concede that my usage constitutes cruel and unusual practice.

Even as I moved on to MIDI-abuse of other units, I found the MEQ-28 useful as a MIDI display, since I could see the movement of 28 different controllers at one time. This proved handy for debugging *Max* patches and producing **EM** DIY projects. Admittedly, I have more use for this kind of display than most folks, but there might be a useful product here.

### ALL ELSE BEING EQUALIZED

The MEQs are well-suited for sound reinforcement and other conventional uses of equalization. Like other programmable EQs, they are less well-equipped for dynamic sound-shaping. With an enhanced MIDI implementation, such a device could become a powerful performance effects unit. Controller-scaling and more options for mapping would provide some interesting possibilities.

The MEQs are solid, well-designed, programmable equalizers for general use, with good audio performance and the right connections and operational features. The panel display is attractive and well above average in its utility. If you need graphic EQ for any of the common purposes, or if you want the unique powers of a programmable unit, one of the MEQ-series units is an excellent choice.

### Product Summary

**PRODUCT:**
MEQ-series MIDI-Programmable Equalizers
**PRICE:**
MEQ Quad 7: $599.95
MEQ Dual 14: $569.95
MEQ Mono 28: $569.95
**MANUFACTURER:**
DigiTech
5639 South Riley La.
Salt Lake City, UT 84107
tel. (801) 268-840

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

## Alesis Microverb III

*By Michael Molenda*

**Alesis makes it simple: Twist a knob, get reverb.**

Sometimes, freedom of choice paralyzes a mix faster than an equipment malfunction. The massive sound-sculpting power of programmable multi-effects can be intimidating, and it's easy to get lost in their vast menus of parameters. I've seen engineers take more time tuning a delay than it took the Beatles to mix their first three albums.

But there are situations where it is neither appropriate, nor desirable, to become obsessed over minute details. You may want the muse to take over and transform a mix into a collection of happy accidents. Or maybe you just want, literally, a "little reverb," and you want it now.

That's when devices like the Alesis Microverb III come to the rescue.

The Microverb III puts 256 preprogrammed, 16-bit PCM, stereo effects (144 reverbs, 96 delays, and sixteen special effects) within the twist of a knob or two. A concise front panel reveals all operations at a glance with input, mix (dry/effect), and output controls, an input level LED, low EQ (±10 dB at 100 Hz), high EQ (±10 dB at 4 kHz), a bank knob, and a pro-

gram-number knob.

Choosing an effect takes mere seconds. You turn the bank knob to a desired effect type (small rooms, chambers, long delays, etc.), then spin the program knob through sixteen choices until you find something you like.

Alesis obviously has put a great deal of thought into the range of effects, an important point in a unit that is not programmable. The basic reverb programs offer enough room sizes and decay times to fill almost any mix requirement. Delays are provided with single and multiple repeats in a variety of lengths, and the handy menu chart actually times out the programs (sixteenth-note triplet at 200 beats per minute, etc.).

In test mixes with musical genres ranging from solo piano and voice to thrash/metal/funk, I never ran into a situation where the Microverb III couldn't give me an effect I needed. There were even some surprises: I became addicted to the unit's "slow bloom" reverbs that added a lush ambience to stacked acoustic guitars and layered background vocals.

Considering what you get for what you pay, the Microverb III complaint department is small. The unit proved to have audible hiss (though no more than other units of this type), and an attempt to diminish it by cutting the high EQ only compromised the quality of the effect. Using a noise gate on the Microverb III's outputs (or returns) is strongly advised. Even then, hiss may be audible during soft musical passages.

Another minor point: The input-level LED shines yellow when the input is insufficient, green when optimum, and red when overdriven. Unfortunately, by the time you see red, you're dead. It would have been nice to include a step-stage LED meter so one might preset an input level to a safe range and allow a few "notches" for the occasional peak.

For the price and features, the merits of the Microverb III far outshine the noise factor. This is a fine primary or secondary effects processor for the home studio, and I wouldn't be surprised to find a Microverb III in a few professional studios. Sometimes, even the hitmakers want just "a little reverb."

**Michael Molenda,** *co-owner of Sound & Vision Studios in San Francisco, is the new kid on* **EM***'s editorial staff.*

## Product Summary

**PRODUCT:**
Alesis Microverb III
reverb/delay processor
**PRICE:**
$199
**MANUFACTURER:**
Alesis Corporation
3630 Holdrege Ave.
Los Angeles, CA 90016
tel. (213) 467-8000

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

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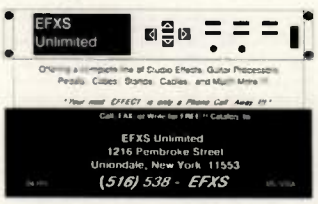


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# The Decibel and the Damage Done

Loud music can be exhilarating, but when the sound fades, will your hearing follow?

*By David Schwartz*

If you are a musician working in a home studio or playing on stage for a living, beware of the sound pressure levels imposed on your ears. Noise-induced hearing loss is approaching epidemic proportions among music people due to current concert, studio, and headphone listening levels.

Individual tolerance to high sound pressure levels varies dramatically, but permanent damage occurs without warning. One of the first signs of dangerous noise exposure is a ringing in the ears. In many cases, the ears recover and the ringing ceases. But repeated exposure slows recovery time until the hearing loss is permanent. Tinnitus—a high-pitched ringing, whistling, whining, or hissing in the ear—doesn't go away and cannot be treated.

Guidelines for noise exposure levels in the workplace have been in existence since the Occupational Health and Safety Administration (OSHA) developed recommended sound-level criteria in the 1940s. Music professionals, however, have rarely embraced these guidelines for their lack of specific attention to the complexities of music monitoring. Rather, these individuals have policed themselves, setting, and in too many cases exceeding, their own safety limits.

The live performance stage is a minefield of sound pressure perils. Keyboard players, guitarists, and vocalists can protect their ears with suitable earplugs, careful positioning of stage monitors, and a rational overall sound pressure level. Bass players must not stand too close to cymbals, and drummers must be made aware of the lifelong hearing loss they risk from playing at rock-concert levels night after night.

The performing artist, invoking the "Total Artistic Control of All Sound, Lighting, and Production" clause in a contract rider, has ultimate control over stage and audience volume levels, unless overruled by local noise ordinances. Unfortunately, too many musicians refuse to take sound-level hazards seriously.

The studio, for all of its control over sound, is just as dangerous as the concert stage. It is a matter of discipline for the musician/engineer/producer to remain conscious of safe volume levels. Top career studio engineers establish listening levels that provide needed sonic information without blasting them out of their chairs.

Sure, it's tempting to crank up the monitors once in a while. But during endless night sessions, more can be accomplished with low-level monitoring. It's wise to set your own rules, such as keeping basic track monitoring down to an average level of 90 dB, with mixing levels topping off at 80 dB. Shorten the times you check fine details at higher volumes. These rules also negate the tendency to overdrive monitors. Everyone should respect your guidelines if they know you are protecting your career.

Contrary to popular opinion, using headphones does not prevent hearing damage. While a loudspeaker's transient energy is dissipated during its journey through space to reach the ear, headphones are almost directly coupled to the ear and provide no such buffer. Headphone levels must be kept carefully in check to stop transient peaks from assaulting the eardrum.

Digital sound is more dangerous for hearing than analog sound due to its greater dynamic range. This allows transient spikes picked up by close miking to be reproduced without the damping provided through saturation on analog tape.

In a similar way, synthesized sounds contain transients and wave shapes frequently more dangerous to the ear than those of acoustic instruments. This is because synthesizers generate the sound wave electronically, which removes the natural resistance of mechanical mass to erratic vibrations. This often results in unnatural waveforms that can do a great deal of damage when fed loudly into our ears.

No reasonable person in the music industry, given the choice, would sacrifice their hearing for the sake of a career. Yet, many professionals walk a fine line between critical listening and hearing conservation.

While we cannot encourage the idea of legislation for the sound industry (other than where it threatens public health), we must strive in every potentially hazardous situation to maintain sane sound levels for our careers' sake.

**David Schwartz,** *editor-in-chief and co-founder of* Mix *magazine, serves on the advisory panel of the House Ear Institute, a non-profit hearing research organization.*

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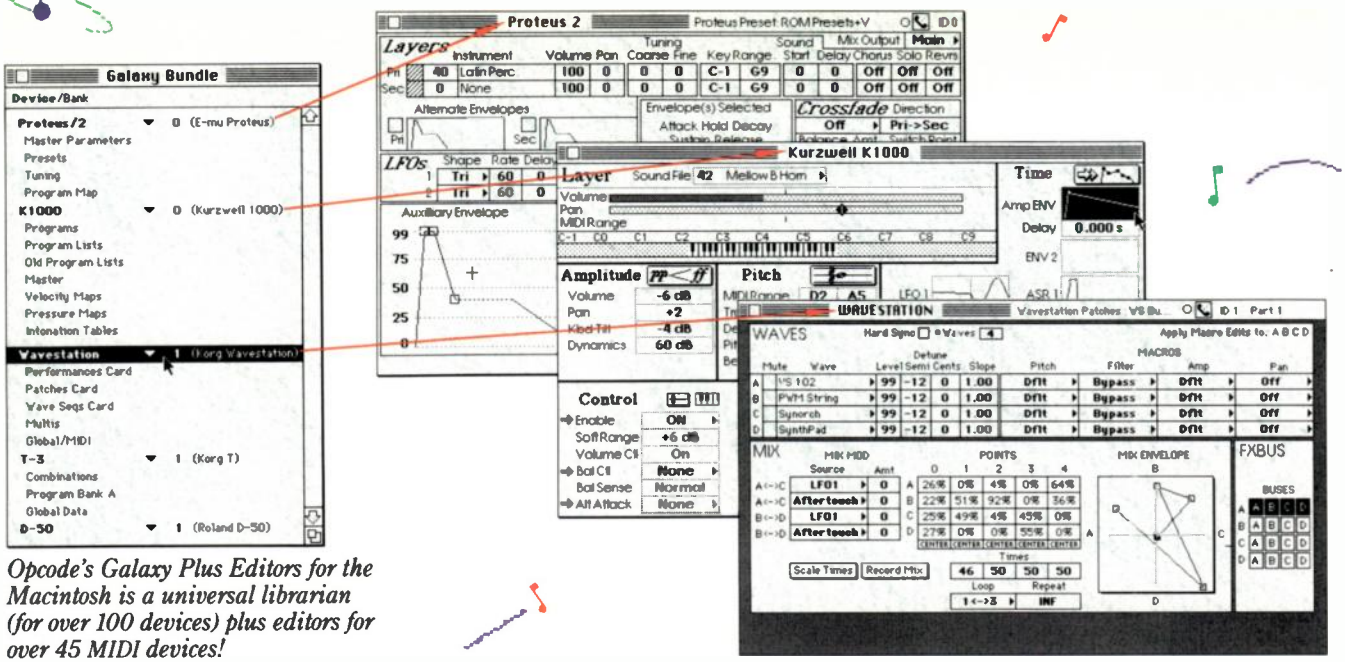


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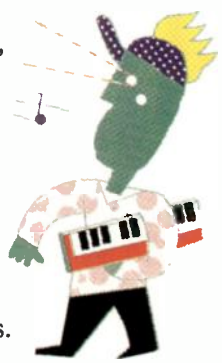

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*E-mu:* Proteus 1/2/XR *Ensoniq:* ESQ-1SQ-80 *Kawai:* K1 *Korg:* M1, M1R, M1EX, M1REX, M3R, T1, T2, T3 Wavestation *Kurzweil:* K1000 (SE, SE II, Extended, 1000 PX, HX, SX, GX, PX Plus, AX Plus, K1200, Pro1, Pro2, Pro3) *Roland:* D-50/D-550 D-5/D-10/D-110/D-20/MT-32 *Yamaha:* DX7/DX7II/TX7/TX816/TX802 TX81Z, DX11, DX21, DX27, DX100 REV5 Reverb SPX90/SPX 90II Effects

### Librarian Compatibility

*Alesis:* Quadraverb, MIDIverb III *Casio:* CZ-1, CZ-101, CZ-1000, CZ-3000, CZ-5000, RZ-1 *J.L. Cooper:* MSB 16/20, MSB+ *E-mu:* Proteus 1/2/XR *Ensoniq:* ESQ-1, ESQ-M, SQ80, VFX, VFX-SD, SQ1, SQR *Fender:* Chroma, Polaris *Kawai:* K1, K3, K4, K5 *Korg:* DW-8000, EX-8000, M1, M1R, M1EX, M1REX, M3R, T1, T2, T3, Wavestation *Kurzweil:* K1000 (SE, SE II, Extended, 1000 PX, HX, SX, GX, PX Plus, AX Plus, K1200, K1200 Pro1, Pro2, Pro3) *Lexicon:* PCM70, LXP-1 *Linn:* LinnDrum *Oberheim:* Matrix-6/6R, Matrix-1000, OB-8, Xpander, Matrix-12 *Peavey:* DPM-3 *Rane:* MPE 14, 28, 47 *Roland:* Alpha Juno 1/2, CM-32L, CM-32P, CM-64, D-70, D-50, D-550, D-5, D-10, D-20, D-110, Juno-106, JX-8P, MKS-50, MKS-70, MKS-80, MT-32, R-8, R8M, GP-16, S-330 (names only), Super Jupiter, U-20, U-220 *Sequential:* Prophet VS *Yamaha:* SY77, TG77, DX7, TX7, DX5, DX1, TX816, DX7/E!, DX7/E! v2, DX7s, DX7II, TX802, TX81Z, FB-01, REV-5, SPX90, SPX90 II, DX11, DX21, DX27, DX27s, DX100 *Generic Bulk*

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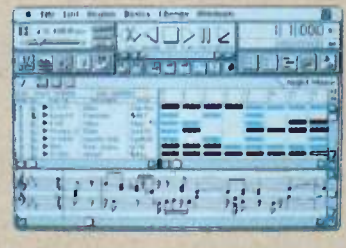

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