Music Education Software for Children ◆ Cruising the Internet

Electronic Musician

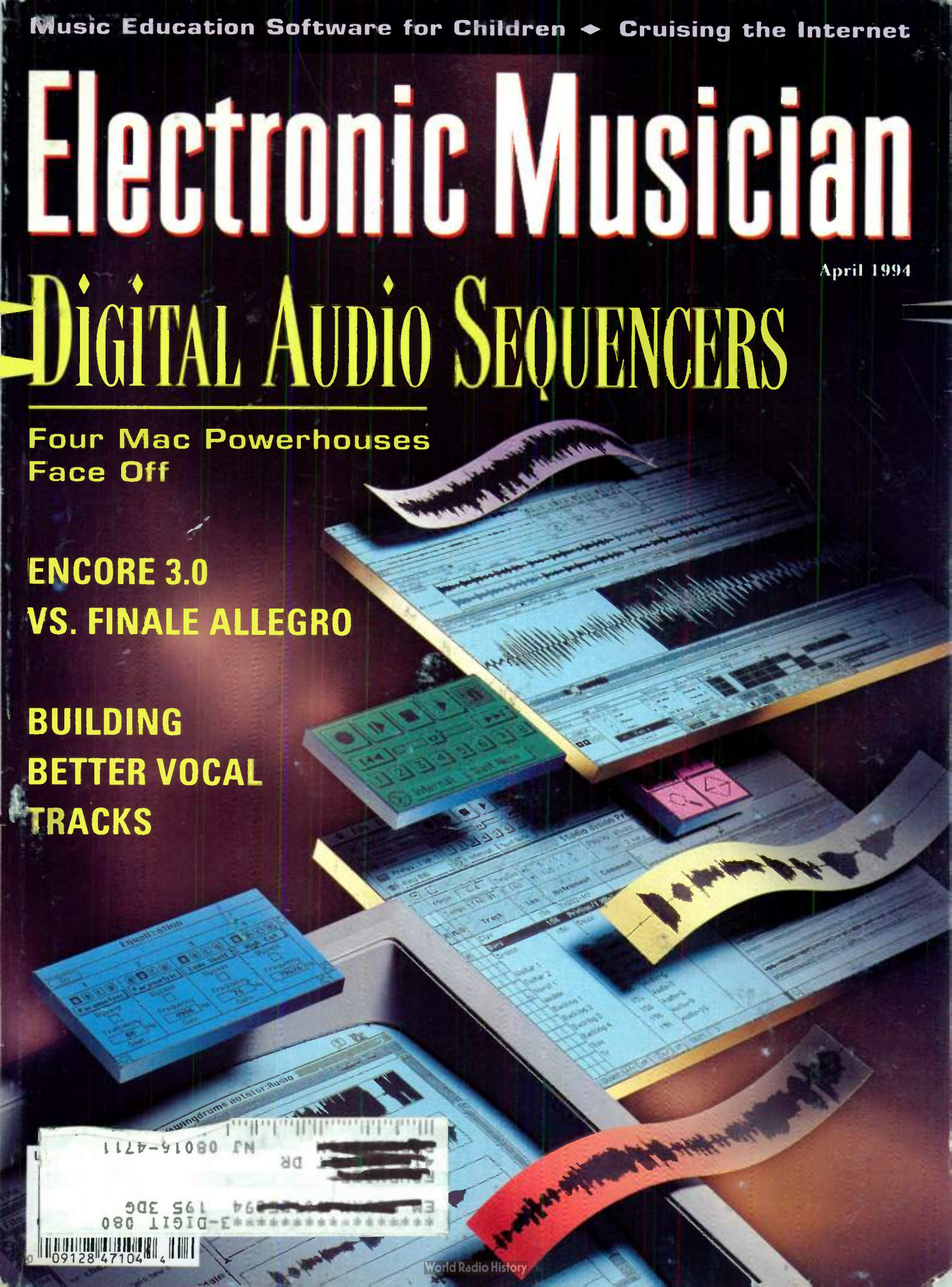
April 1994

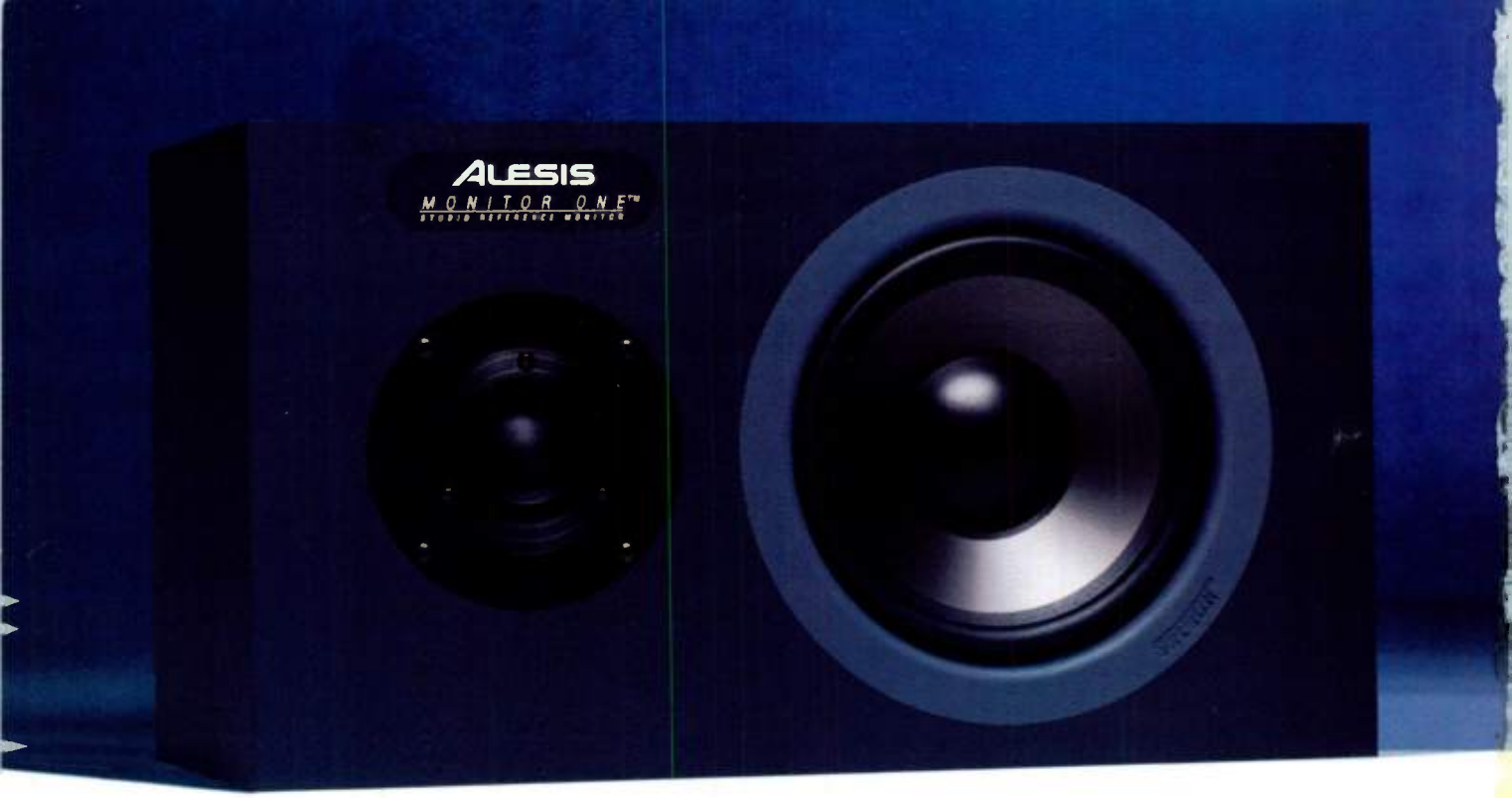
DIGITAL AUDIO SEQUENCERS

Four Mac Powerhouses Face Off

ENCORE 3.0 VS. FINALE ALLEGRO

BUILDING BETTER VOCAL TRACKS



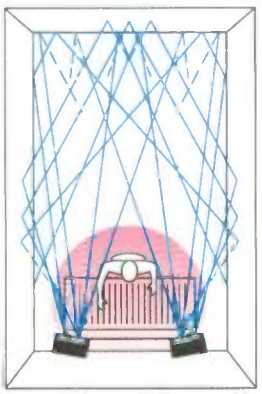


The Truth From

The truth...you can't expect to find it everywhere you look, or *listen*. But when mixing music, hearing the truth from your monitors will make the difference between success and failure. You'll get the truth from the **Alesis Monitor One™ Studio Reference Monitor**.

Room For Improvement

Fact: most real-world mixing rooms have severe acoustical defects. Typical home and project studios have parallel walls, floors and ceilings that reflect sound in every direction. These reflections can mislead you, making it impossible to create a mix that translates to other playback systems. Trying to solve the problem with acoustical treatments can cost megabucks and still might not work. But in the near field, where direct sound energy overpowers reflections, reverberant sound waves have little impact, as shown in the illustration. The Monitor One takes full advantage of this fact and is built from the ground up specifically for near field reference monitoring.



Does your living room double as your mixing suite? The pink area in the illustration shows where direct sound energy overpowers reflected waves in a typical mixing room. The Monitor One helps eliminate such complex acoustic problems by focusing direct sound energy toward the mixing position, instead of the love seat.

Working close to the sound solves the room problem but creates other problems, such as high frequency stridency and listener fatigue (typical of metal-dome and composite tweeter designs). Our proprietary soft-dome pure silk tweeter design not only solves these problems, but delivers pure, natural, incredibly accurate frequency response, even in the critical area near the crossover point (carefully chosen at 2500 Hz).

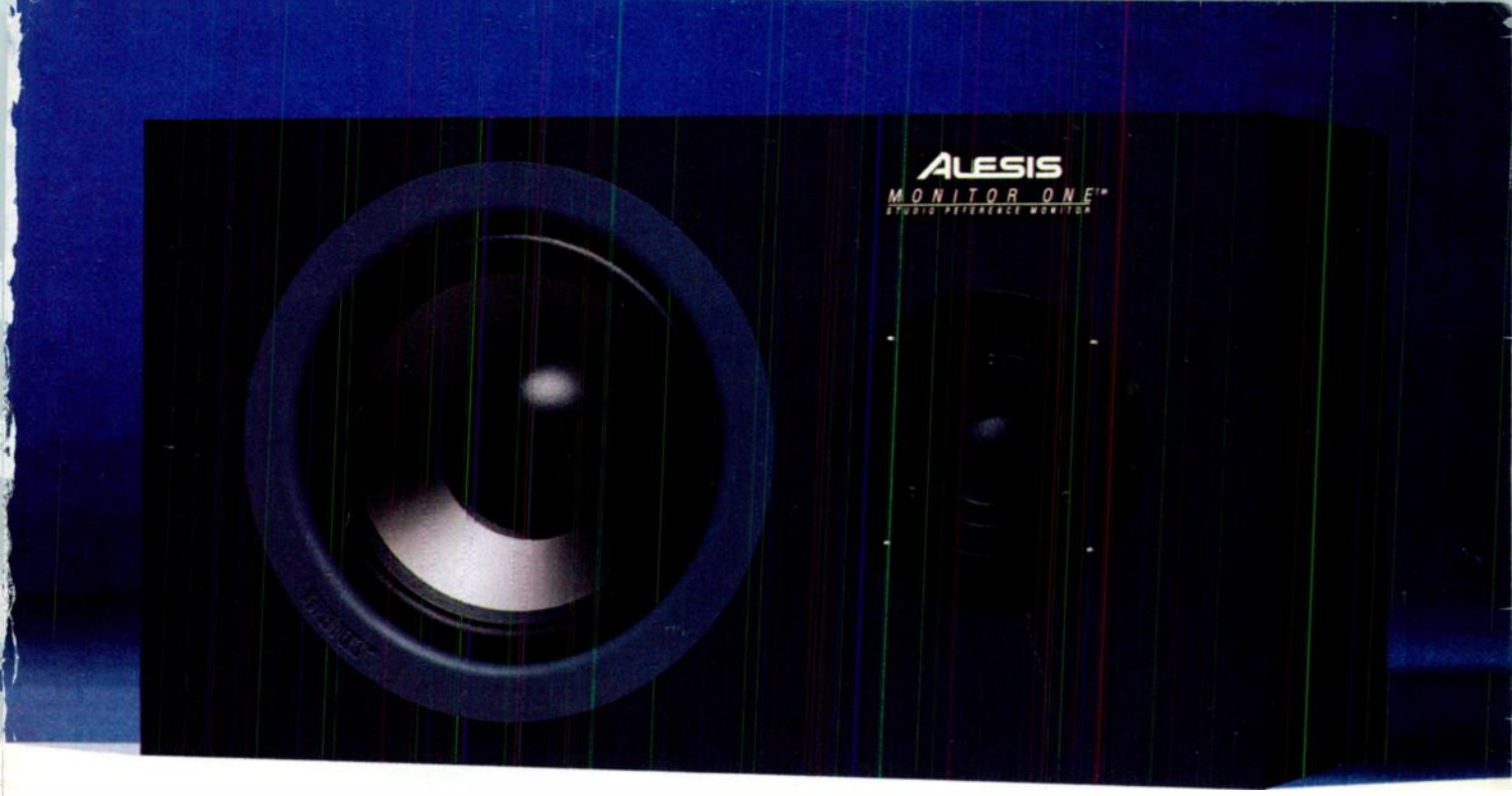
The Truth From Top To Bottom

The Monitor One gives you all the truth you want in the mids and highs, but what about the low end? You probably know that the inability to reproduce low frequencies is the most common problem with small monitors. Most of these speakers have a small vent whose effect at low frequencies is nullified by random turbulence, or they're sealed, which limits the amount of air the driver can move. Such speakers give disappointing results in their lowest octave.

The Monitor One overcomes wimpy, inaccurate bass response with our exclusive SuperPort™ speaker venting technology. The ingenious design formula of the SuperPort eliminates the choking effect of small diameter ports, typical in other speakers, enabling the Monitor One to deliver incomparable low frequency transient response in spite of its size.

Alesis SuperPort™ technology gives you the one thing that other small monitors can't: incredibly accurate bass transient response. No, the SuperPort doesn't have a blue light, but it makes the picture look cool.

The result? A fully integrated speaker *system* that has no competition in its class. You'll get mixes that sound punchier and translate better no matter what speakers are used for playback. Whether you mix for fun or for profit, you want people to hear what *you* hear in your mixes. The Monitor One's top-to-bottom design philosophy is a true breakthrough for the serious recording engineer.



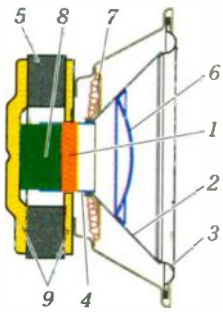
Left To Right

Power To The People

High power handling is usually reserved for the big boys. While most near field monitors average around 60 watt capability, the Monitor One handles 120 watts of continuous program and 200 watt peaks...over twice the power. Also, its 4 ohm load impedance allows most reference amplifiers (like the Alesis RA-100™) to deliver more power to the Monitor One than they can to 8 ohm speakers. That means the Monitor One provides higher output, more power handling capability, and sounds cleaner at high sound pressure levels.
If you like to mix loud, you can.

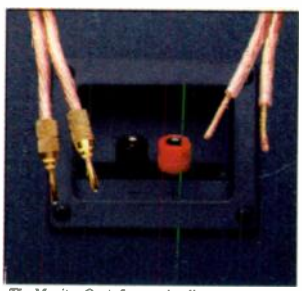
The Engine

Our proprietary 6.5" low frequency driver has a special mineral-filled polypropylene cone for stability and a 1.5" voice coil wound on a high-temperature Kapton former, ensuring your woofer's longevity.
Our highly durable 1" diameter high frequency driver is ferrofluid cooled (costly, but it's the best way to cool a tweeter), to prevent heat expansion of the voice coil which inevitably leads to loss of amplitude and high frequency response. Combined, these two specially formulated drivers deliver an incredibly accurate, unhyped frequency response from 45 Hz to 18 kHz, ±3 dB. The five-way binding posts provide solid connection, both electronic and mechanical. We even coated the Monitor One with a non-slip rubber textured laminate so when your studio starts rockin', the speakers stay put. Plus, it's fun to touch.



A cross section of the Monitor One's proprietary Alesis-designed 6.5 low frequency driver.

1. 1.5" voice coil.
2. Mineral-filled polypropylene cone.
3. Damped linear rubber surround.
4. Kapton former.
5. Ceramic magnet.
6. Dust cap.
7. Spider.
8. Pole piece.
9. Front and back plates.



The Monitor One's five-way binding posts accept even extra-large monster wire banana plugs and spade lugs. Hookup is fast, easy and reliable.

The New Alesis Monitor One™

You don't design good speakers by trying hard. It takes years and years of experience and special talents that only a few possess. Our acoustic engineers are the best in the business. With over forty years of combined experience, they've been responsible for some of the biggest breakthroughs in loudspeaker and system design. The Monitor One could be their crowning achievement. They're the only speakers we recommend to sit on top of the Alesis Dream Studio™.

See your Authorized Alesis Dealer and pick up a pair of Monitor Ones. Left to right, top to bottom, they're the only speakers you want in *your* field.

The Monitor One is the speaker for the Alesis Dream Studio™. Need more information about the Alesis Monitoring System? Call 1-800-5-ALESIS. See your Authorized Alesis Dealer.

Alesis Corporation 3630 Holdrege Avenue Los Angeles CA 90016

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NEW PRODUCTS!

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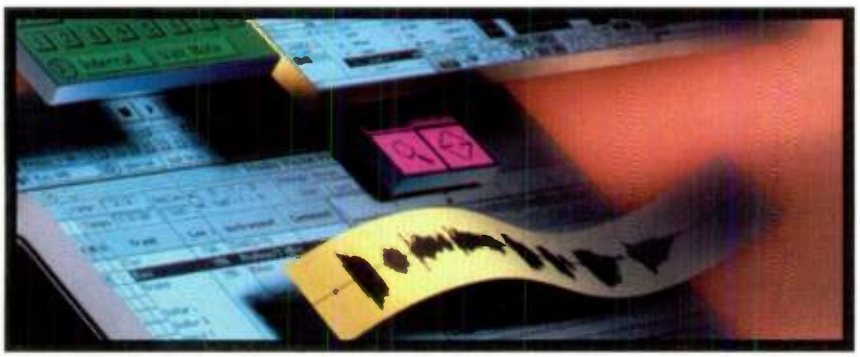

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Cover: Photo by David Bishop. Special thanks to Emagic, Opcode, and Steinberg.

Soap Box Time

"I'm sorry, you must have mistaken me for someone else..."

PEGGY SUE AMISON

I have Italian and Hungarian blood coursing through my veins, so I tend to get really mad at something for approximately 90 seconds, then forget why my face is red. Life is too short to waste time being angry. (And all that grimacing can cause unsightly worry lines around the eyes.) But I have to admit that I can get downright peevish when some misinformed individual calls **EM** a "MIDI book."

I only mention this because it happened a couple of times at the recent NAMM show, and I'm feeling a little guilty about getting uptight. Hey, *intellectually,* I understand a consumer-driven society's need to put everything (including people) into easily identified "target" markets. And I certainly don't mind that **EM** *is* one of the foremost authorities on MIDI tools and technology. We've worked hard for that status, and we'll certainly maintain it.

Why do I get so, um, testy when we're narrowly cast as a MIDI mag? Just take a look at our table of contents. We are not simply a black-and-white journal about computers and MIDI. Music production is a diverse field, and we cover the entire spectrum of music technology. We were one of the first magazines to identify, embrace, and support home recordists. A substantial percentage of our monthly coverage remains devoted to recording applications. And as the digital age puts even more power into personal recording environments, **EM** is right there to help musicians get the best these systems have to offer. Also, I believe that we were *the* first gear mag to see the potential of multimedia, both as a creative medium and a commercial market for music.

And we're working harder to make our coverage more comprehensive, more relevant, and more *vital.* For example, several readers expressed dissatisfaction with last year's buyers guides, because they didn't offer evaluative insights. Hey, we're listening! For 1994, we've initiated product "face offs" that deliver the goods about what's cool and what's not. (Thanks to reader PCBACH—see this month's "Letters"—for noticing!) This doesn't mean that we want to become the "Geraldo Rivera" of product reviews, using the mantle of investigative journalism to "get the dirt" on unsuspecting gear. We are simply standing by our readers: Evaluative surveys *are* more valuable than mere spec lists. Check out "All For One," this month's comparison of digital-audio sequencers on p. 30, and let me know how we're doing.

I'd also like to introduce two "human" resources that further improve **EM**'s breadth of coverage. Our new associate editor Michael Brown is a visionary multimedia reporter who aims to beef up our "Multimedia Musician" and "Computer Musician" columns. Michael is the author of "Desktop Video Production" (Windcrest/McGraw-Hill) and was formerly a contributing editor at *New Media* magazine. I've heard that he sneaks a few turns at his daughters' Sega games, which makes him all right in my book. In addition, Lawrence Ullman—who wrote this month's "From The Top" on Dolby Surround—is now a contributing editor. Lawrence is an industry stalwart who has been group technical editor of Music Maker Publications, editor of *Audio Video Interiors,* and a Roland product specialist. He also plays a mean bass sackbutt in Renaissance and Baroque chamber groups.

Well, I'm glad I got that off my chest. And, true to form, the matter has receded into the mists of my memory. But please, if you see me out in the world, don't slap me on the back and say, "Love that MIDI mag, man!"

Michael Molenda

Electronic Musician

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Printed in the USA.

BPA INTERNATIONAL

NOW GREG MACKIE WILL HAVE TO WAIT LONGER FOR HIS 8•BUS CONSOLE.

Flip reverses inputs between ch. strip & MIX-B/monitor section.

6 AUX Sends. Pre-fader/post-EQ, or post-fader/post-EQ. **SHIFT** changes AUX 3/4 to 5/6; **Source** selects from ch.strip or cn.'s MIX-B/ monitor section.

Fully parametric **HI-MID EQ** with 1/6 to 3-octave bandwidth & ultra-wide 500Hz-18kHz sweep. ±15dB boost/cut.

Triple-bussed Tape Outputs feed three 8-track machines without re-patching, 2 independent **Headphone Sections**, separate **Monitor** and **Talkback** sections, built-in talk-back mic, **switchable +4dBu/ –10dBV** tape outputs and returns.

Mackie **32•8** Recording/ PA console. $4995*. Optional **MB•32** meter bridge, $895*.

Demand for our 8•Bus Series console system has been unexpectedly strong and some people are having to wait for delivery. Because we're committed to supplying our customers first, Greg Mackie is one of the people who still doesn't have a 24•8 or 32•8 8•Bus console.

Now we've won Music & Sound Retailer Magazine's 1994 "Most Innovative Product of the Year" and "Most Innovative Mixer/Console" Awards.

We've also received very favorable reviews in both MIX and Electronic Musician magazines. So Greg is probably going to be waiting even longer to get his very own 8•Bus console.

Lo-Mid EQ with 45Hz-3kHz sweep; **Hi** and **Lo** shelving EQ at 12kHz & 80Hz; **Lo Cut Filter** at 75Hz.

Optional stands for 16•8, 24•8, 32•8 and 24•E consoles. $295*. Extremely low-noise, low-distortion design.

24•E Expander adds 24 complete ch. strips, attaches in minutes via a single cable to the 24•8 or 32•8. Multiple 24•Es can be added for 72, 96 or even 120 chs. as your needs and budget grow. $2995*. Shown with MB•E meter bridge, $695*.

The Mackie **8•Bus Sidecar.** 11 rack spaces for patchbays & equipment + rear cable trough. $295*.

Independent **MIX-B/monitor section** with pan, level & source.

Split EQ assigns HI & LO EQ to MIX-B.

MIX-B Source routes mon. section to an extra stereo output for 2-tk. taping or broadcast feed.

Constant-power buffered **Pan** pot for rock-solid panning.

Hyperactive –20 **Activity** & **Overload** LEDs

Selectable **Solo** with **Channel Metering** allows soloing in full stereo perspective, displays soloed ch. operating level on master L/R meters.

Mackie's exclusive **Accurate-Taper** 100mm faders for smooth fades.

Electronic Musician, February 1994

"The board's price may put its primary market in the personal studio and small project studio, but it's crammed with truly professional features. Home recordists can stay with the Mackie 8•Bus as they upgrade from semi-professional to professional gear, thanks to the board's ability to run either +4 dBu or –10 dBV operating levels. Everyone (and I mean everyone) who saw the 8•Bus wanted one, and the desire was intensified if they stuck around to hear it."

MIX Magazine, February 1994

"With excellent sonic quality, frequency response, harmonic distortion and crosstalk specs, number of inputs, plenty of headroom, good-quality mic preamps, and the upcoming automation package, the price of the Mackie 24x8 seems insignificant."

*Suggested retail price. Actual price, like everything else in life, may vary. Slightly higher, (also like everything else in life) in Canada.

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Mac Revolution

The ultimate interface circa 1985

Almost ten years ago, shortly after the introduction of the Apple Macintosh computer, Opcode Systems released the first commercially available MIDI interface for the Mac.

Since that time we've sold more Macintosh MIDI interfaces than any other company in the world.

Today, Opcode has the most comprehensive line of OMS compatible interfaces for computer hobbyists, semi-pro home studios, portable systems, and professional large-scale, studio setups.

Get yourself an Opcode MIDI interface, for the ultimate connection.

See your local dealer today or call Opcode for free literature. 1-800-557-2633 ext. 214

The Studio 3 has 2 INs and 6 OUTs, 32 MIDI channels, MIDI activity LEDs, serial thru switches and SMPTE to MTC conversion. This is the interface that countless sessions depend on every day.

Studio 3™
$319.95

The Translator Pro is the brand-new successor to the Studio Plus with 2 INs and 6 OUTs, 32 MIDI channels, MIDI activity LEDs, and a serial thru switch. No power supply is necessary.

Translator Pro™
$99.95

The MIDI Translator II has 1 IN and 3 OUTs, 16 MIDI channels, MIDI activity LEDs, and a serial thru switch. No power supply is necessary. The evolution of the essential.

MIDI Translator II™
$59.95

Mac Evolution

The Studio 5ix is the top of the line interface with 15 INs and OUTs, 240 MIDI channels, MIDI activity LEDs, serial thru switches, and SMPTE to MTC conversion. It has unlimited merging, on-board MIDI Processing, and stand alone patcher capabilities. You can network up to six together for the ultimate connection.

Studio 5ix™
$1195

The Studio 4 has 8 INs and OUTs, 128 MIDI channels, MIDI activity LEDs, serial thru switches, and SMPTE to MTC conversion. It has unlimited merging, virtual instruments, and MIDI Processing with the Macintosh active. You can network up to four together for multiple racks.

Studio 4™
$495

Tim Myer, one of the systems designer at Hydra Tech, knows what musicians need. *"I've installed Opcode interfaces exclusively for years — they're reliable, and there's always a model to fit the need, with the features musicians want. Since day one, it's been easy to communicate with Opcode, the people are great."*

Hydra Tech studio and tour support credits include: Janet Jackson, Bruce Hornsby, Michael Jackson, Greg Phillinganes and Chuck Leavell with Erit Clapton, Don Henley, Lionel Richie, Elton John, George Harrison, Michael Bolton, Chick Corea, The Moody Blues and many, many others.

OPCODE SYSTEMS INC

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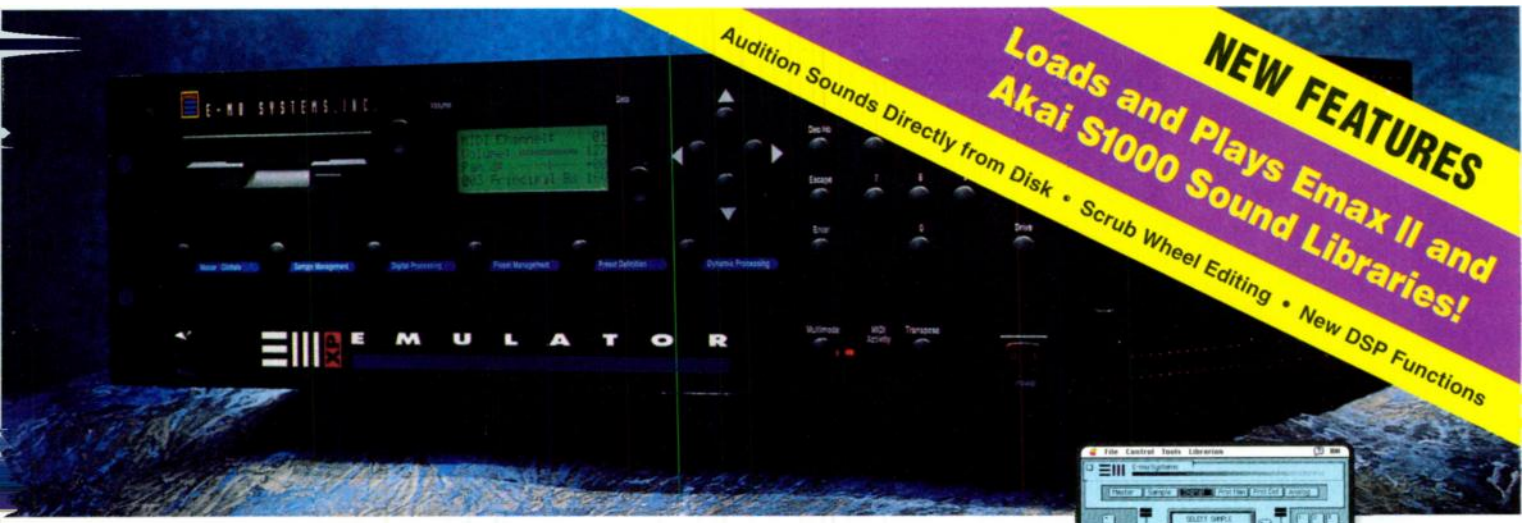
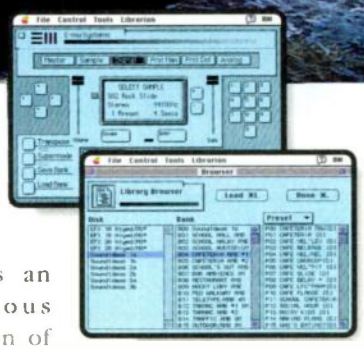
The Emulator IIIx Series of Professional Digital Samplers.

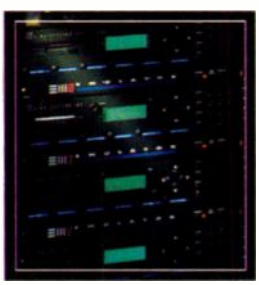




Its Power Is Only Surpassed By Its Simplicity.

Whether you're a professional musician or a sound designer for film or video post production, you don't have a minute to waste. You're on a continuous search for that perfect audio tool that will maximize your productivity. Well, look no further. Introducing audio tools from E-mu that combine high-end functionality with down-to-earth, time-saving ease of use—the EIIIx series of professional digital samplers.

As you would expect from the company that pioneered digital sampling, the EIIIx series features true 16-bit resolution for the purest audio quality possible. Proprietary DSP technology gives you pitch transposition capabilities over an incredible 10 octave range without aliasing, imaging or clock noise.



But incredible sound is only half of the story. The EIIIx series offers an impressive complement of features beginning with 32-voice polyphony, 32 digital resonant lowpass filters and 8 MB of RAM standard (expandable to 32 MB). And with AES/EBU digital I/O and eight balanced polyphonic outputs, the EIIIx series is ready for any mix environment. Dual SCSI connectors make it easy to link multiple EIIIx modules and to access a variety of mass storage devices. Add a long list of sample processing functions and you've got both power and versatility at your fingertips—all accessible through the industry's clearest user interface.

Optional Remote Controller/Librarian software allows you to control all EIIIx functions from the screen of your Macintosh and easily catalog, search and retrieve sounds from your entire library in seconds. You can even configure and load custom sound banks into your EIIIx with a simple click of your mouse.

All EIIIx series samplers are compatible with the ever-expanding EIII sound library. Over 16 gigabytes in size, the EIII library includes virtually every instrument on earth as well as an enormous selection of sound effects—all brought to you by E-mu and the industry's leading third-party sound developers.

EIIIx series samplers are available in a variety of configurations. For sampling live, or from analog source material, the EIIIxs features two channels of 64x oversampling sigma/delta analog-to-digital conversion. Remove analog sampling and you've got the EIIIxp—ideal for sampling within the digital domain or as a voice and memory expander when linked to other EIIIx units. Both models are available as Turbo versions featuring 32 MB of RAM and an internal 120 MB hard drive.

But with all these features, the most impressive one may be price. EIIIx models start at $3,995. Visit your nearest E-mu dealer for a demo and consider your search for the perfect audio tool over.

FREE CD ROM
Hundreds of megabytes of great sounds with every EIIIx

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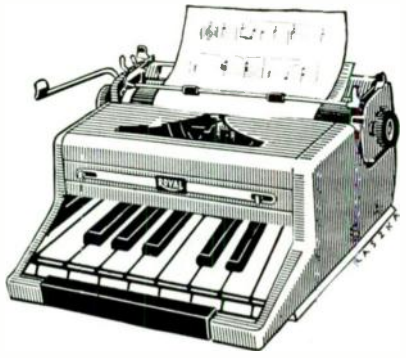
LETTERS



HEY! CHANGE THAT FORMAT!

Regarding Michael Cooper's "Maximum FX" article in the February 1994 **EM:** Hey, a comparative review instead of one of those "buyer's guide tables" with stats and no opinions! I am happy to see this. I've criticized **EM** for some time for table-based reviews that list features but don't give subjective impressions of how products work and sound. I hope this is a move in the right direction.

PCBACH
(from the EM SIG on the PAN BBS)

I agree with the sentiments expressed by David Tcimpidas ("Letters," December 1993). The most helpful product reviews would be the ones that explain which software programs do what functions better or worse than their competitors. I'd like to see more specific product comparisons than has been the norm so far.

Rich Maness
Rancho Cordova, CA

GIVE BAD SEEDS THE BOOT

I wish every musician would read Mr. Molenda's article concerning engineers ("Working Musician: Hiring an Engineer," February 1994), especially the sections headed "The Audition" and "Bad Seeds." In my many years of playing and recording, it seems that I often ended up working with a bad seed. With hindsight being 20/20, I realized it was mostly because I failed to properly audition the recordist. As far as to why these jerks keep working, it's because no musician is willing to hold his own demo in the air and shout "This stinks!"

In the year since I opened my little 8-track studio, I can't count the times that a prospective client has played me a demo recorded at "such and such studios" and engineered by "blah-blah producer" only to say, "Well, he had all this gear, but we weren't happy in the end. We heard the demo you did for so and so, and it sounds so much better than ours." Needless to say, the bad seeds don't have many kind words for me.

The best advice to musicians is to research, research, research, and *never* settle for second best.

Russell Diamond
Raintree Productions
Lebanon, PA

A UNISYN SIN

I would like to correct an error in my review of Mark of the Unicorn's *Unisyn* program that appeared in the January 1994 **EM**. I stated that if you try to reorganize banks or do other editing operations without first turning on your MIDI system, *Unisyn* repeatedly gives a warning message that there is no response from the MIDI interface.

Although true, the way to avoid the problem in the first place is to go into the MIDI setup dialog box and disable the MIDI interface. After this, *Unisyn* happily lets you go about your business and doesn't give a fig if there's no MIDI response.

Sorry for the confusion. I was looking for a specialized function and tripped over the obvious.

Jim Pierson-Perry
Elkton, MD

REELING IN THE MIXDOWN

Thanks for the article on industrial video ("Training Reels," January 1994). I'm a little foggy concerning mixdown options, and I hope you can answer a few questions.

If you wish to mixdown to videotape, is it necessary to have two machines, one as a playback source with the video signal and SMPTE or VITC, and the second to record? Or can a mixdown be accomplished with one machine that plays back video and sync signal to drive the sequencer, while simultaneously recording on the audio tracks?

The article mentions professional ½-inch VHS decks as the most common in the industrial field, but I also note that in the two example production studios, the machines are ¾-inch. Would an audio mixdown to a pro VHS or ¾-inch machine provide adequate sound quality to be considered a good master mix?

Ken Trevillian
Heathsville, VA

Ken—Boy, you sure ask a lot of questions in one short letter. In regard to mixing to videotape, how you do it depends on what equipment have. Unless your VCR has a third audio track that's dedicated to time code, which is common in many pro decks, it would be impossible to "layback" an audio track onto the VCR that's supplying the time code. And even if you attempted to do a "wild" (nonsynchronous) layback—say of music or non-lip-sync narration—there's another problem: Although some consumer VCRs have an audio-dub feature (where new audio can be recorded, without affecting the picture), this procedure can only occur on the low-fi linear audio tracks, and not *on the hi-fi tracks, which must be recorded* simultaneously *with picture. In higher-end productions, the audio is usually mixed to time-code DAT or analog 2-track with center-track time code; later, the audio is synched and rerecorded back onto the video master.*

The question of whether the ¾-inch or VHS formats offer adequate quality for your production is one that only you can answer. If you're doing an instructional piece for a local business or cable program, it's probably fine, but if you're looking at doing network-quality work, then VHS or ¾-inch won't cut it.—George P.

ERGO, WE GO

I found your article on ergonomics ("A Place For Everything," December 1993) very disheartening. I

continued on p. 138

BRIAN RASZKA

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Studio 5lx/4/3
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Cakewalk Pro Windows
Steinberg Jones
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Voyetra
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The Jazz Guitarist, The Pianist

Cool Shoes
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Education
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Piano Works 1&2
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Roland
SCC-1, RAP-10
Music Quest
PC MIDI Card, MQX-32M
MIDIEngine 2Port/SE
Mark of the Unicorn
MIDI Express PC
MIDI Time Piece II
Key Electronics
MS-101, MS-124
Voyetra
V22, V22m, V24s, V24sm, VP11

Sound Modules
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WHAT'S NEW

By Steve Oppenheimer

▲ ANIMOTION MCS SOUNDTRAK

Animotion has released *MCS SoundTrak* ($59.95), a WAV-file recording, editing, and playback utility that works with any *Windows*-compatible stereo sound card. The program features QSound audio processing, which essentially manipulates phase, timing, and amplitude (at selected frequencies) to let you locate a sound anywhere in a 180-degree horizontal arc in front of the listener. Other *MCS SoundTrak* effects include chorusing, flanging, and echo.

The program can reverse samples, pan, amplify, fade, convert from mono to stereo, and change sampling rates (11, 22, and 44.1 kHz are supported). *SoundTrak*'s WAV-file editor provides cut-and-paste editing and lets you process (offline) and combine multiple sound files. Animotion Development Corp.; tel. (800) 536-4175 or (205) 591-5715; fax (205) 591-5716.

Circle #401 on Reader Service Card

▶ KURZWEIL PC88

Kurzweil introduced the PC88 Performance Controller ($2,295), an 88-key, weighted, Velocity and Channel Pressure-sensitive, MIDI master keyboard with onboard sounds. The PC88 offers four independent, overlapping zones, each of which can access the pitch and modulation wheels, four continuous control pedals, two footswitches, four front-panel sliders, and three momentary switches. The controllers can generate positive or negative values. An onboard arpeggiator can operate across all four zones and can be synched to MIDI Clock.

The sample-playback sound source offers 48 factory preset sounds, including Kurzweil's new Grand Piano (from the MicroPiano module), Fender Rhodes, FM electric pianos, Clavinets, harpsichord, Hammond organ, and Kurzweil Orchestral String Ensemble. The sounds cannot be edited. The synth is 32-note polyphonic and 16-part multitimbral. The user can store an additional 64 custom setups, including splits, layers, and MIDI control configurations. An onboard stereo effects processor provides 48 presets, comprising various combinations of reverb, chorus, and delay.

An optional, 32-note General MIDI upgrade board (price tba) provides 374 additional sounds and a second stereo effects processor. Kurzweil Music Systems/Young Chang; tel. (310) 926-3200; fax (310) 404-0748.

Circle #402 on Reader Service Card

▶ AKAI MPC3000

After a 6-year run, Akai has replaced its popular MPC60 sampling drum machine with the 32-voice polyphonic MPC3000 MIDI Production Center ($3,699), which incorporates the 16-bit, 44.1 kHz, stereo sampling features of Akai's S3000. The unit comes with 2 MB of RAM, expandable to 16 MB. It has dynamic, lowpass, 12 dB/octave, resonant filtering, with a filter envelope for each voice. A mono Voice mode causes a voice to end and restart when played repeatedly.

The onboard effects processor includes a 64-channel effects-send mixer. A new sound-assignment system allows up to 24 Programs (drum sets) to be held in memory at once, each containing 64 sounds assigned from a common band of 128 sounds in memory.

Four pad banks permit 64 unique sound assignments from the sixteen front-panel Velocity- and Pressure-sensitive pads. A Note Variation slider adjusts decay, attack, tuning, filter, or filter frequency for each note recorded to a drum track and can be assigned to any pad.

The sequencer can hold approximately 75,000 notes, twenty 256-step Songs, and 99 sequences of 99 tracks each. The record resolution is 96 ppqn. Sequencing features include timing shift of events independent of timing correction, global reassignment of drum notes between sounds, and global editing of Note Variation data. It can sync to SMPTE, MTC, MIDI Clock, and FSK.

The MPC3000 includes two footswitch inputs and a 1.44 MB floppy-disk drive. It can read and write Standard MIDI Files and can read S1000/S3000 sample data and MPC60 files. The optional SCSI/ Digital Sampling interface (price tba) provides AES/EBU digital I/O and access to SCSI storage devices. Akai/IMC; tel. (800) 433-5627 or (817) 336-5114; fax (817) 870-1271.

Circle #403 on Reader Service Card

continued on p. 17

Please,
shelter the women,
nail down the furniture,
tie up the dogs,
and just to make sure,
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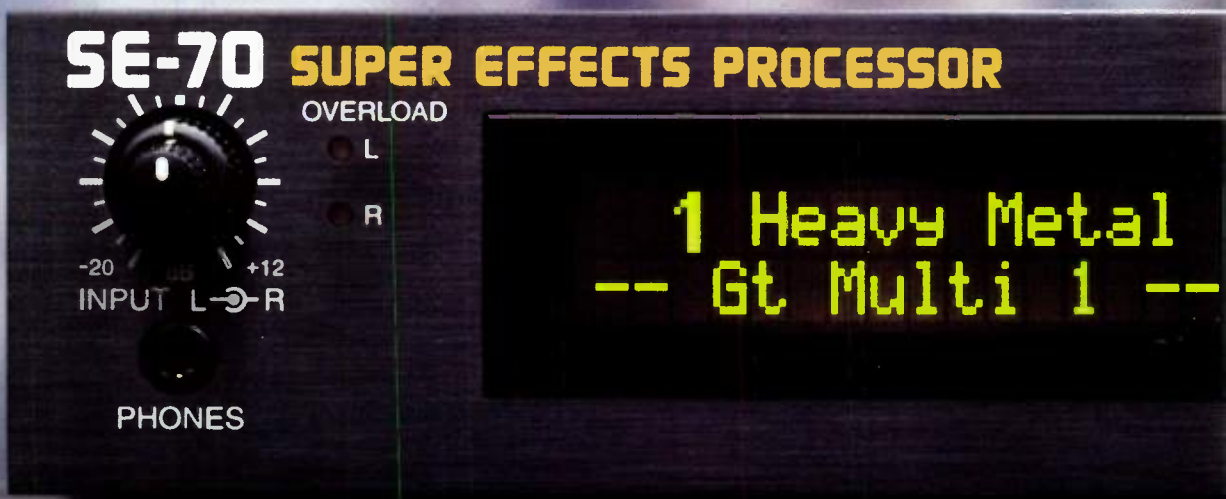
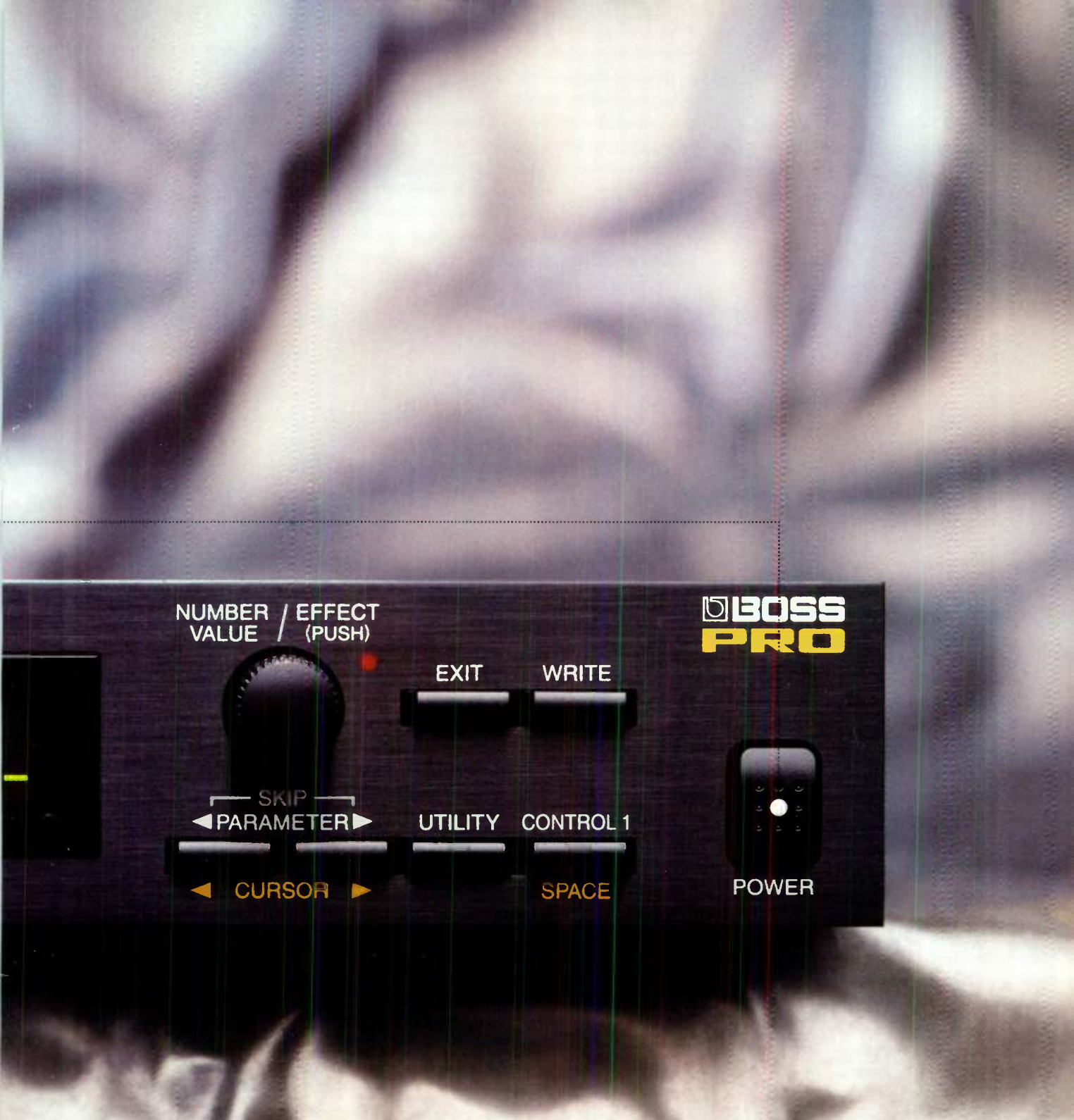
before pressing this button.



	BOSS SE-70	Ensoniq DP/4	Rocktron Intellifex	Yamaha SPX 990	DigiTech DSP-21 Legend	DigiTech TSR-24	Zoom 9050
List	$895	$1495	$1159	$1199	$799	$799	$799
Max Simultaneous Effects	16	12	3	4	10	Limited by Memory	9
Guitar Pre Amp	Analog	Digital	n/a	Digital	Analog	n/a	Digital/Analog
Independent Effects per Input	Yes	Yes	No	Yes	No	Yes	No
Delay Taps	20	16	8	6	4	4	4
Pitch Shift	12 part	8 part	4 part	3 part	n/a	6 part	4 part
Hum Cancel	Yes	No	No	No	No	No	No
Vocoder	21 Band	Yes	No	No	No	No	No
Guitar/Bass Synth	Yes	No	No	No	No	No	No
Guitar Tuner	Yes	No	No	No	No	No	Yes
Metronome	Yes	No	No	No	No	No	No
Special Functions	Rot. Spkr Feedbacker Slow Gear Rev. P Shift Vocal Cancel Duck Delay Sampler	4 Ins/Outs Rotary Speaker	Intelligent Noise Reduction Ducking Delay	XLR Ins/Outs	Foot pedal included	2ST Ins/4 Outs Expandable (est.$250-275) Sampler	Rotary Speaker Ducking Delay Slow Gear

Specifications drawn from manufacturers' literature or customer service personnel. Prices and specifications may vary. n/a = not available



Because this button activates a 16-bit effects processor with truly unequalled performance and sound quality. The SE-70 functions as a full-blown guitar processor complete with analog distortion and 15 other simultaneous effects. It has guitar and bass synth modes, a 20 tap delay, 60 cycle hum canceller, 12 part pitch shifter, vocoder, rotating speaker, vocal canceller and true discrete parallel processing per input – as well as pristine reverbs, an extraordinary chorus circuit, and algorithms for all instrumental and vocal applications. It even comes with some free advice: some masking tape will keep those valuable paintings from shaking off the wall.

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▲ SONY HR-MP5

Sony Electronics unveiled the HR-MP5 multi-effects processor and HR-GP5 guitar effects processor ($695 each). Both units offer a 48 kHz sampling frequency, twin 18-bit ADCs per input, a built-in tuner, jog/shuttle dial for quick editing, 100 factory presets, and 100 user memory locations. Any four parameters can be controlled in real-time via MIDI.

The HR-MP5 offers 51 effects and 40 algorithms derived from Sony's DPS-series processors. The unit offers two independent effects blocks, arranged in series. Each block consists of one effect and a 2-band parametric equalizer that can be either pre- or post-effect.

Effect 1 can be any of a host of modulation effects, such as chorus, flanger, phaser, vibrato, tremolo, auto-pan, etc. Alternatively, it can be a ducked or multitap delay, dynamic exciter, amp simulator, dynamics processor, intelligent pitch shifter (±2 octaves), ring modulator, rotary speaker, and more. Effect 2 includes such algorithms as delay, reverb, distortion, dynamics processor, 4-band EQ, dynamic exciter, and dynamic filter.

The HR-GP5 guitar processor can produce up to seven simultaneous effects, which can be configured in any order. Effects blocks include compressor, distortion, EQ, amp simulator, reverb, and two modulation blocks. The latter provide a variety of chorus, flanger, pitch shifter, phaser, and delay effects.

Sony also offers the HR-RC5 ($249), an 8-pedal MIDI remote controller that is powered from either HR-series processor or an optional AC adapter. The HR-RC5 can transmit Program Changes and Control Changes. Sony Electronics; (800) 635-SONY or (201) 930-1000; fax (201) 930-7633.

Circle #404 on Reader Service Card

▶ YAMAHA VL1

Yamaha is shipping the VL1 Virtual Acoustic Synthesizer ($4,995), a duophonic (the VL stands for Virtual Lead), keyboard instrument that emulates the sound and acoustical behavior of woodwind, brass, and stringed instruments. The 4-octave, unweighted keyboard is Velocity and Channel Pressure-sensitive.

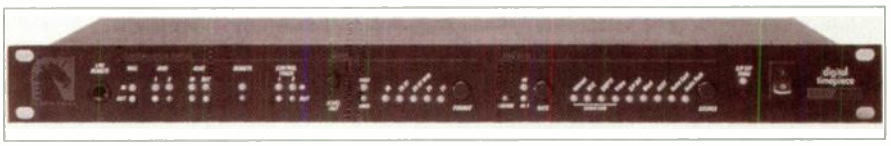
The sound simulation begins with a basic physical model that can be altered with external controllers such as breath controller, foot controller, sliders, etc. For instance, with a woodwind sound, the controllers can affect the throat, pressure, growl, embouchure, tonguing, pitch, scream, damping, and absorption parameters.

The sound can be further affected by modifiers such as a Harmonic Enhancer, multimode (highpass, lowpass, bandpass) dynamic filter, 5-band parametric EQ, and wet/dry balance. An Impulse Expander and Resonator work together to simulate the effect of an instrument's resonant cavity or sound box. The Impulse Expander is useful for metallic resonances (e.g., brass and metal-bodied woodwinds) and the Resonator for wooden instruments.

An onboard effects processor supplies reverb, distortion, modulation effects, and a speaker simulator. There are 128 RAM locations and a high-density floppy-disk drive. Yamaha Corporation; tel. (714) 522-9011; fax (714) 522-2680.

Circle #405 on Reader Service Card

▶ MOTU DIGITAL TIME PIECE



Mark of the Unicorn introduced the Digital Time Piece ($995), a digital audio synchronizer that provides conversion of several sync formats, MIDI Machine Control, and SMPTE time code, allowing multiple digital-audio products to lock to each other with sample-accurate resolution. The device can convert any format SMPTE LTC input to word clock and has an internal timebase that can simultaneously generate SMPTE, MMC, and word clock.

The Digital Time Piece generates sample-accurate timing from MTC, SMPTE, video, S/PDIF, word clock, ADAT sync, and DA-88 sync, or from its internal timebase. SMPTE time code is converted to or from digital-audio sample address for ADAT sync, SMPTE, Sony 9-pin, and MTC. MIDI Machine Control can be routed to the Mac serial port, ADAT, Sony 9-pin, and MIDI.

The Digital Time Piece allows remote location of an Alesis ADAT without a BRC, or a Tascam DA-88 without an RC-848 or SY-88 sync card. An Alesis LRC remote input is included on the front panel. It is the only device that will simultaneously lock all these sources, including direct, sample-accurate track sync between the ADAT and DA-88. The device lets you lock audio to picture without dropping samples and can burn in a genlocked time-code window. Mark of the Unicorn; tel. (617) 576-2760; fax (617) 576-3609.

Circle #406 on Reader Service Card

▼ E-MU SYSTEMS ULTRAPROTEUS

E-mu has introduced the UltraProteus ($1,795) and Proteus FX ($749) sample-playback synths. The new synths replace the original Proteus/1 Pop/Rock, Proteus/1 Plus Orchestral, and Proteus/3 World, which have been discontinued. (The Proteus/2 Orchestral and Procussion remain in production.)

The single-rackspace UltraProteus features 16 MB of ROM samples that are similar to those in the Proteus/1, Proteus/2, and Proteus/3. The unit's 512 preset sounds include both emulations and synthesized instruments. The new synthesizer is 32-voice polyphonic and 16-part multitimbral.

The biggest news, however, is the inclusion of 32 digital, resonant, 14-pole filters and Z-Plane morphing synthesis, which were recently introduced in E-mu's Morpheus synth. A program RAM/ROM card slot is provided on the front panel.

Additional features include dual stereo effects processors, polyphonic portamento, alternate tuning tables, six audio outputs, and extensive modulation capabilities.

The 32-voice, 16-part multitimbral Proteus FX offers 8 MB of ROM samples that are similar to those in the Proteus/1 and Proteus/2 and 512 preset sounds. A new grand piano sample (from the updated Proformance piano module) has been added. An onboard signal processor produces 24 programmable effects. E-mu Systems; tel. (408) 438-1921; fax (408) 438-8612.

Circle #407 on Reader Service Card

▲ ACOUSTICAL SOLUTIONS AUDIOSEAL

Acoustical Solutions' Audioseal Sound Barrier ($472/roll or $2.25/sq. ft.) is a dense, limp-mass barrier material that blocks the airborne transmission of sound. Made of tough, high-temperature-tolerant, fused vinyl, Audioseal can be used in new or existing construction for soundproofing walls, floors, and ceilings. It comes in 60-foot-long, 54-inch-wide rolls and can be cut with scissors or a utility knife. Acoustical Solutions; tel. (800) 782-5742 or (804) 346-8350; fax (804) 346-8808.

Circle #408 on Reader Service Card

▶ L.R. BAGGS MOBILMIX

The L.R. Baggs MobilMix Personal Monitor Preamp ($395) is a 2-channel, portable mixer for acoustic instruments. The unit lets you monitor via headphones, which are not included. There is one ¼-inch, stereo input jack with one channel for piezo or magnetic pickup and the other for a high-impedance (100 kΩ), internal guitar mic. There are separate ¼-inch outputs for the pickup, mic, and mixed signals; individual channel volume controls; a headphone volume control; and a master volume control for the mix output. The headphone amp has 2-stage limiting for safety and an auxiliary input that accepts an external monitor feed.

The MobilMix provides phantom power for the mic, 3-band EQ (at 200 Hz, 1 kHz, and 10 kHz), and phase-reversal for each channel. A 6-position Contour control adjusts the low-frequency rolloff characteristics of the mic circuit and the high-frequency rolloff characteristics of the pickup circuit. This assures optimal mixing of the two sources. It operates with AA batteries or any AC or DC (12V to 18V) external power supply. The 4¾ x 3⅛ x 1¾-inch unit includes a belt-clip attachment. L.R. Baggs Co.; tel. (805) 929-3545; fax (805) 929-2043.

Circle #409 on Reader Service Card

▶ ALESIS QUADRAVERB 2

Alesis announced the QuadraVerb 2 dual-channel multi-effects processor ($799). Despite its name, this is an all-new device. Eight simultaneous effects can be combined in any order, in series or parallel. Each effects block can be a stereo or mono chorus or flanger; multiband parametric, resonator, highpass, or lowpass EQ; pitch shifter (±2 octaves); mono, stereo, ping-pong, or multitap delay; or hall, plate, room, or reverse reverb.

The unit has 100 program memories. In addition to ¼-inch analog I/O, it has ADAT multichannel, optical, digital I/O. The QuadraVerb 2's custom LCD displays routings as "patch cords" drawn between blocks. Alesis Studio Electronics; tel. (310) 558-4530; fax (310) 836-9192.

Circle #410 on Reader Service Card

1994 WINTER NAMM SHOW ▲ ▲ ▲ ▲ ▲

As the City of Angels lay prostrate in shock, just four days after a devastating earthquake, the National Association of Music Merchants carried on its annual winter equipment extravaganza. The convention's Anaheim location was not visibly damaged, and although attendance was 20 to 30 percent down, the serious buyers braved the aftershocks to place their annual orders. Most manufacturers reported that sales were good. Many earthquake victims brought their young children to the show, and the kids were well-behaved.

Naturally, much of the casual conversation revolved around the recent disaster, which was centered in nearby Northridge. Northridge-based JBL/Soundcraft suffered extensive damage to both the plant and employee homes, importer Steinberg/Jones got clobbered, and Alesis reported as many as twenty homeless employees. (Alesis bragged that thanks to their nonslip surface, the company's Monitor One speakers stayed in place while everything around them hit the floor.) Yet these and numerous other L.A.-based companies pulled themselves together, scrambled to help their employees, and through it all put on an outstanding NAMM show. Their courage and professionalism were impressive and inspiring. Three cheers!

With a few exceptions, this was not a show for breakthrough products. Mostly we saw maturing product lines, upgrades, software ported to new platforms, and continuing development of technology that was unveiled in the latter half of 1993.

The most noteworthy exceptions were two quite different physical modeling synthesizers. (For information on physical modeling synthesis, see "Model Music" in the February 1994 **EM**.) Yamaha's VL1 synth, which is now shipping, is described in the main section of this month's "What's New" column.

In a special demonstration to elicit suggestions, Korg showed a modeling synth that is still on the drawing board. No price or shipping date was discussed. Tentatively dubbed the X-230, this percussion instrument is based on Korg's DSP synthesis technology (discussed in the "Model Music" article). It uses a standard, 10-inch snare head mounted in a solid wooden body and secured by a detachable steel rim. Beneath the drum head is a set of piezo-electric pickups. Additional pickups are mounted on the rim. Beneath this whole assembly is a pressure-sensitive sheet, and below that is the electronics.

Korg X-230

The drum head and rim may be struck with a stick, fingers, brushes, or the whole hand. The acoustic waveform of the vibrating head is picked up by the piezos and transferred to the DSP-based tone generator. Thus, hitting the pad in a different place, with a different stick, or changing the drum head will alter the sound. A supplemental Rim Input lets you use rimshots or an external piezo-based impulse source.

Most of the sounds were traditional percussion models, but several synth sounds were shown, too. Pitch and Decay knobs emulate the tuning and damping of acoustic drums. The prototype included 100 presets, and Korg expects to allow additional programs to be loaded via MIDI. All editing parameters can be changed via MIDI or Korg's REI remote editor. The actual performance data is based on an acoustic waveform, so it cannot be saved to a sequencer. However, if Korg were to implement an output from the piezos (which was not included in the prototype), you could save the audio data to a tape recorder or DAW.

Last year, a number of mixer manufacturers offered low-cost, 16-channel "Mackie Killer" boards intended to compete with Mackie Designs' CR-1604. This year, several companies—notably Soundcraft and Tascam—showed impressive 8-bus mixers in an attempt to compete with Mackie's 8•Bus consoles. Undaunted, Mackie Designs was alive and well, displaying their consoles, automation systems, and outrageous sense of humor.

Last, and least in terms of music production and performance, a lot of companies jumped into the wearables market. Kurzweil, Roland, Yamaha, Peavey (who has long recognized this potential gold mine), and others showed company hats, t-shirts, sweatshirts, and jackets.

SOUND CARDS ▲ ▲ ▲ ▲ ▲

▲ CREATIVE LABS

Creative Labs has added QSound 180° surround-sound audio technology to the Sound Blaster 16 ASP (upgrades $9.95). QSound's Application Program Interface (API) will be made available to registered developers. Creative Labs also announced Sound Blaster 16 MultiCD ($249.95; $299.95 with ASP) and Sound Blaster 16 SCSI-2 ($279.95; $329.95 with ASP). The former adds support for double-speed CD-ROM drives from Creative/Panasonic, Sony, and Mitsumi, including the Sony CDU31A and Mitsumi FX001 and LU005.

Sound Blaster 16 SCSI-2 features an Adaptec controller chip that handles SCSI-1 and SCSI-2 support, eliminating the need for a host adapter board. It comes with Adaptec's *EZ-SCSI* software, which scans the SCSI bus and automatically installs the appropriate drivers for connected devices. The company claims data throughput four times faster than Media Vision's SCSI-compatible boards. Creative Labs; tel. (408) 428-6600; fax (408) 428-2394.

Circle #411 on Reader Service Card

TURTLE BEACH SYSTEMS

Turtle Beach Systems released MultiSound Monterey ($399), a new member of its MultiSound series of PC audio cards. In addition to the same 16-bit recording capabilities of the original MultiSound, the new card offers the Wavefront, a 32-voice, 16-part multitimbral, GM-compatible, sample-playback synth created by Turtle Beach.

MultiSound Monterey's most remarkable new feature is SampleStore, which provides slots for KB up to 4 MB of sample RAM, using standard SIPPs. (RAM is not included.) This lets you use any WAV file as a MIDI instrument. The sound card also includes an effects processor.

The card comes with synth patch-editing software; an application for system-level synth control; Turtle Beach's *Wave SE* sample-editor; and *MousePlayer*, which lets you audition synth sounds with the mouse.

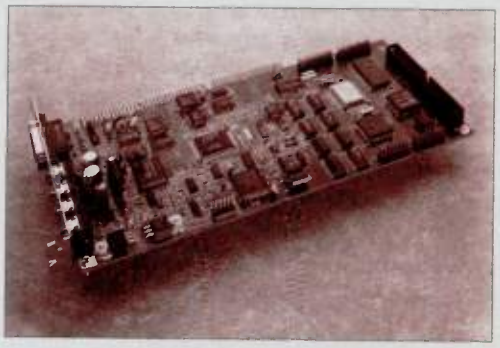
Also new from Turtle Beach is the Rio synth upgrade card ($149), which provides a Wavefront synth and SampleStore technology. It is pin- and form-compatible with the Creative Labs WaveBlaster and Turtle Beach's Tahiti audio card, so it can be installed on these or any sound card or motherboard with a WaveBlaster expansion port. Turtle Beach Systems; tel. (717) 767-0200; fax (717) 767-6033.

Circle #412 on Reader Service Card

▼ AZTECH LABS

Aztech Labs announced the Sound Galaxy WavePower ($169), an MPC Level 1 wavetable synthesis upgrade card for the Aztech Sound Galaxy NX PRO 16 Extra ($219) and Sound Galaxy Basic 16 ($189) 16-bit sound cards for PC-compatibles. WavePower uses a 32-voice polyphonic, 16-part multitimbral Ensoniq synth chip and contains 2 MB of compressed, 16-bit, ROM-based samples, producing 128 preset GM sounds. It is bundled with *Midisoft Studio for Windows* sequencing software. Aztech Labs; tel. (800) 886-8859 or (510) 623-8988; fax (510) 623-8989.

Circle #413 on Reader Service Card



▲ LOGITECH

Logitech announced the SoundMan Wave ($349), a stereo sound card for the PC that features 16-bit, digital-audio recording (at sampling rates from 4 to 44.1 kHz) and Yamaha's OPL-4 wavetable and FM synthesis chip. It includes controls and drivers for both DOS and *Windows*, and the two drivers share settings. The card has an unpowered line-out jack and a 4W/channel, stereo power amp for driving headphones or small monitors. Mic and line inputs are provided.

SoundMan Wave offers 24-voice polyphonic, GM-compatible wavetable synthesis, with 2 MB of ROM-based samples. The sound chip also provides 20-voice polyphonic FM synthesis. The card features 100% Sound Blaster and AdLib compatibility, a 5-channel stereo mixer, and a SCSI CD-ROM interface. A MIDI interface is optional ($49.95).

The card has a MIDI interpreter that lets you use the wavetable synth with games that don't directly support it. It is bundled with Midisoft *Recording Session* and Animotion *MCS MusicRack*. Logitech; tel. (510) 795-8500; fax (510) 792-8901.

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ALESIS STUDIO ELECTRONICS

PRO FILE

Tracking A Legend

Nick Martinelli produces Diana Ross.

By Michael Molenda

Diana Ross has one of the most identifiable voices in pop music. Put a Supremes song on the radio and baby boomers everywhere stop in their tracks to muse about teenage desire and a Motown that manufactured both American iron and joyous backbeats. After Ross left the Supremes in the 1970s, she reinvented herself as a hitmaking solo artist, actress, and disco diva. But one thing has remained unchanged throughout her 30-year ride in the entertainment business: Diana Ross' status as an international superstar.

So when I learned that veteran R&B producer Nick Martinelli got the call to produce three new songs on Ross' boxed set *Forever Diana: Musical Memoirs,* I had to ask: "How do you produce a legend?"

"Well, I certainly didn't tell her how to sing," laughs Martinelli. "She knows her stuff. Luckily, I've always had a good rapport with singers. Some producers tell the artist exactly what to sing, but I'm just not that aggressive. I like to hear what the vocalist wants to do. With Diana, I directed her toward a certain feel. We'd discuss the song's direction and then get the best performance."

Although he's not exactly a legend, Martinelli has logged an impressive string of number one hits with artists such as Teddy Pendergrass, Gladys Knight, Regina Belle, and Stephanie Mills. This year, Martinelli reached the pinnacle of a producer's clout and commercial success: He started his own record label, Watchout Records.

But the three tracks on the boxed set posed a problem for even someone as experienced and creatively savvy as Martinelli. Ross wanted the new songs to encapsulate her entire career. Because she has a definite style, the songs ("The Best Years Of My Life," "Let's Make Every Moment Count," and "Your Love") had similar musical structures.

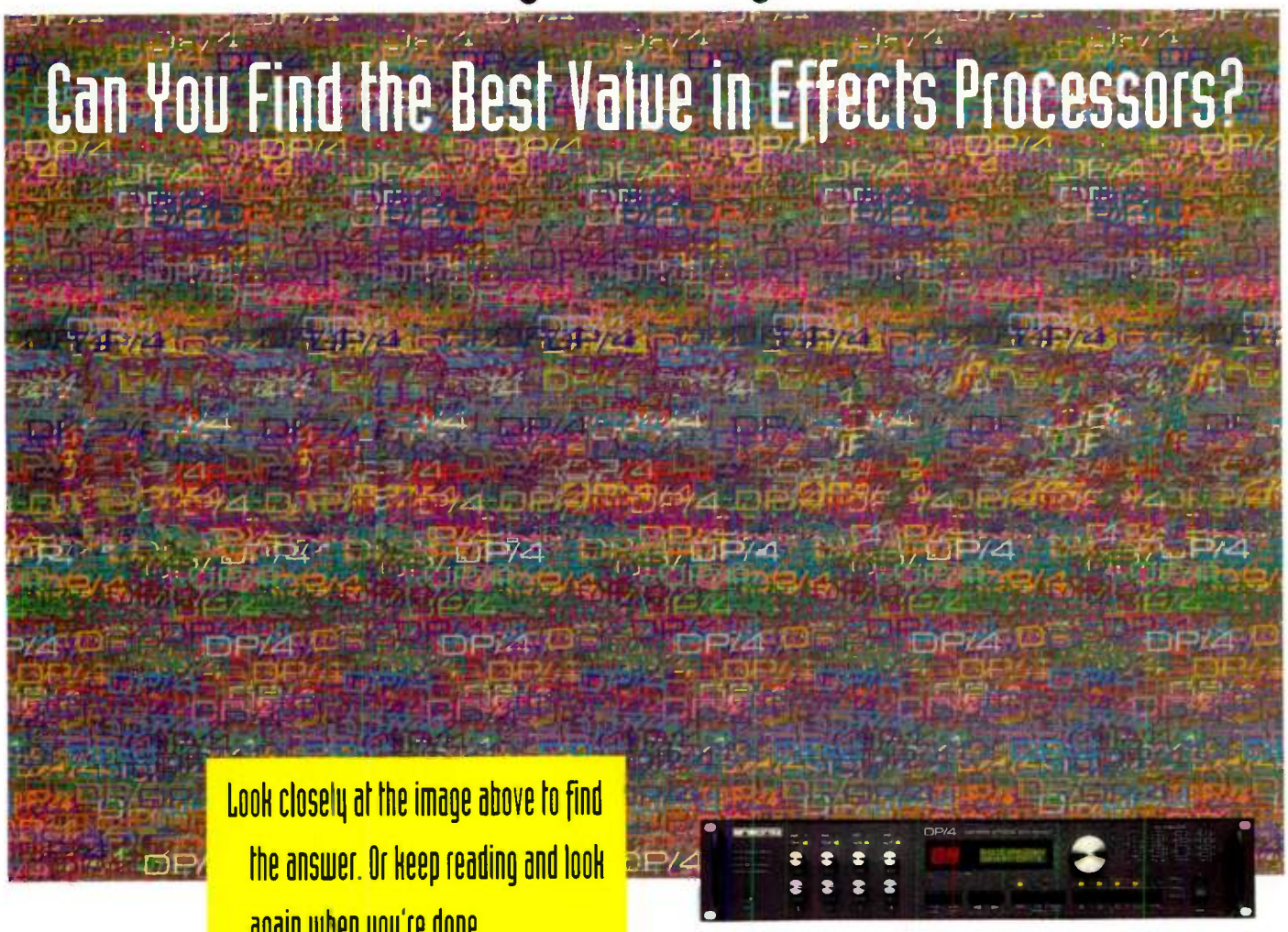
"I normally cut with live rhythm sections," explains Martinelli. "But because the songs tended to sound the same, I wanted to dress each one in a different style. If I cut live, I have that guitar, bass, and drum thing going, which locks you into a certain sonic bag. It was easier for me to tailor the sound spectrum for each tune by sequencing the basic tracks."

Martinelli and programmer Scott Alspach worked hard to make the sequenced tracks sound as hot as live tracks. "The vibe has to be there from the basic track, or you've got a problem," he says. Ross sang to the basic tracks through a Sony C-800 tube mic. All the tracks were recorded directly to Martinelli's personal rack of eight Alesis ADATs, and the vocals were processed by a Massenberg mic preamp, a Neve EQ, and a dbx 160 compressor.

"I'm partial to the old style of recording vocals as complete performances," says Martinelli. "I've never been into punching in, because you can lose a lot of emotion. But it's funny, you can take all the care in the world, and if the song doesn't fly, you're just working for nothing. That's why I always take incredible pains to find great songs. It took more than a year to find the [new] songs for this boxed set. I don't think anything replaces a good song."

Nick Martinelli

Can You Find the Best Value in Effects Processors?



Look closely at the image above to find the answer. Or keep reading and look again when you're done.

We've used this image to make a point: the DP/4 Parallel Effects Processor stands out from the crowd in flexibility, quality, and value.

To find the hidden 3D image:
Diverge your eyes as if looking at a distant object. The two dots will fuse, forming a third central dot. Allow your eyes to "space out" and gaze through the image. Now relax and hold your gaze steady while observing the rest of the image in your peripheral vision. When you hold the patterns overlapped and fused long enough your brain will decode the computer-created image in the patterns.

Or:
Hold the image so close to your eyes that it touches your nose. Relax your eyes and allow them to space out looking through the image. Slowly move the page away from your face, holding it level. When the image is several inches away you'll sense depth in the picture. Relax, staying spaced out as you gaze through the image. The 3D image will develop like an instant photo.

Four processors in one
Only the DP/4 has four independent 24-bit processors, with the flexibility to combine them to fit any situation. If you need four different reverbs for a mixing session, you've got them. Need a fast digital compressor for a bass track? Just dial it in. From reverbs, chorus, delays, pitch shifting and EQ to multi-effect chains for guitar or vocal processing — the DP/4 has it covered.

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No matter what effect or combinations you use you'll always get the highest fidelity sound. Never again compromise sound quality by choosing some effects from column A and some from column B. It's why reviewers say *"sounds amazing"*[1], *"so perfect that no further processing was necessary"*[2], and *"I love this box, I love this box, I love this box."*[3]

Much more for less
Along with four effects processors *(with four inputs/outputs)*, the DP/4 has a built-in digital patch bay and submixer — for a fraction of the cost of separate gear. You can instantly change setups — for example, from enhancing a single instrument with all four effects to processing up to four separate signals at once. And use advanced MIDI control to automate changes from your sequencer or MIDI keyboard. It's an obvious value when you look at how many *"budget"* effects processors you'd have to buy to get the same result.

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[1] *EM, December 1992*
[2] *Sound on Sound, October 1992*
[3] *EM, September 1992*

HARRISON FUNK

CREATIVE SPACE

By Michael Molenda

Hot television composer Jonathan Wolff gets thematic in his digital project studio.

Musicians don't need much of a reason to trash something. We're a jealous, egotistical, and paranoid community of jaded malcontents. (Although I'm sure there are exceptions!) But let's face it, the music on network television is usually fair game for vicious pot shots. Most TV theme music and sitcom underscores are so homogenized that keyboardists can identify every sound module *and* preset patch used to create a score.

Then came *Seinfeld*. This was theme music from Mars:

finger snaps, tongue clacks, and lip smacks wrapped around comedian Jerry Seinfeld's opening monologue. The theme perfectly encapsulated the air of smug whimsy that helped make the NBC series a cultural phenomenon.

The composer responsible for this wackiness is Jonathan Wolff, a thirty-something multi-instrumentalist who has toured with Tom Jones, Diana Ross, and Marilyn McCoo. Wolff's experience as an arranger—as well as his session work in the top Los Angeles studios—led to some television-orchestration gigs. His big break came when Paul Shaffer left the team of the sitcom *Square Pegs*, leaving Wolff to compose the incidental music for the show. Since then, Wolff has become one of the busiest composers in television; successful enough to open a beautiful twin-studio production house in Burbank, California. His Music Consultants Group, Inc., currently produces scores for such sitcoms as *Married...With Children*, *Dave's World*, *Good Advice*, *Girl in Progress*, *The Good Life*, and *The College Years*.

"People often say that my TV shows have their own sound," says Wolff. "That's great to hear because I like to design the music specifically for each show. To accomplish this, we create and design most of our samples in-house. If I used the [preset] sounds straight out of the popular synth modules, the music would sound just like everything else. But presets aren't the sole impediments to producing unique scores. After all, there are only so many practical traditional instruments and combinations that a composer can use. Many of these combinations have already been used quite well by great composers. Samplers offer additional choices. We can design sounds that have never been heard before."

Although the *Seinfeld* theme is composed of sounds that *have* been heard before, the concept is certainly novel. Comedian Jerry Seinfeld—who personally offered Wolff the scoring gig—asked for a catchy signature to underscore the monologue that opens his sitcom. That request posed two major problems. First, the monologue changes each week, making it difficult to compose a static, "all-purpose" theme. Second, a melodic hook would clash with Seinfeld's vocal inflections and diminish speech intelligibility.

"Luckily, I came up with the idea of using Jerry's monologue as the melody line—the theme is basically a musical accompaniment for his voice," says Wolff. "That's why the music is bass-heavy; it doesn't compete with the frequency range of his speech. Likewise, the finger snaps and lip pops were used because conventional percussion sounds interfered with his voice."

Wolff tackled the problem of adapting the theme to the constantly changing monologues by recording all the elements of the score into Pro Tools. The hard-disk system allows Wolff to manipulate the elements of the theme into modular blocks for facile rearrangement.

"Pro Tools is the heartbeat of what we do here," he explains. "I compose everything to picture using SMPTE. First, I create a tempo map of Jerry's monologue using Auricle Control Systems' *Auricle III* time-processing software. Once the tempo of the routine is es-

WOLFF'S "TV" STUDIO

Recording Gear	Digidesign Pro Tools (8-channel system), JVC DS-DT900 time-code DAT, Sony VO-5800 ¾-inch video recorder, Trident Model 65 mixing console
Monitor Speakers	Dahlquist ALS-3, JBL 4311B, Klipsch Cornwall II, Tannoy System 8
Microphones	AKG C414, AKG C425, Electro-Voice PL-20, Neumann KM 84, Shure SM57, ShureSM58
Signal Processors	Alesis Quadraverb, A.R.T. SGE, Roland SRV-2000
Sound Modules	Alesis D4, E-mu Proteus/1, E-mu Proteus/2, Korg 01R/W, Korg M1R, Roland D-550, Roland JD-800, Roland MKS-80, Roland U-220, YamahaTX802
Computers	80386 PC, Atari Mega 4STE, Macintosh Quadra 950
MIDI Software	C-Lab *Notator*, Opcode *Cue*, Opcode *Galaxy Plus Editors*, Opcode *Studio Vision*.
Synchronization	JLCooper Synapse (MIDI/SMPTE), Opcode Studio 5 (MIDI/SMPTE), Digidesign Video Slave Driver and SMPTE Slave Driver (digital audio)
Sampling/Editing	Digidesign *Sound Designer II*, Digidesign Sample Cell and Sample Cell II
Time Processing	Auricle Control Systems *Auricle III* (PC)
Back-up and Library Management	Alpha Software *Alpha 4* (PC), Claris *ClarisWorks* (Mac), Grey Matter Response Mezzo dataDAT system

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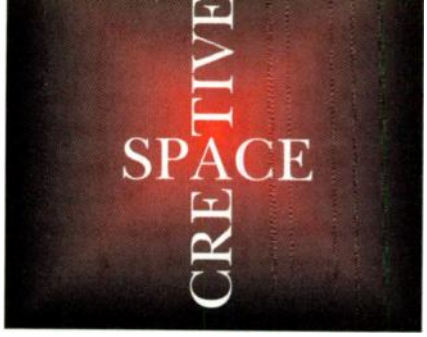

tablished—which is typically 110 beats per minute—*Auricle III* assigns a musical beat to each event in the monologue, revealing spaces where I can place the score. Then, I use Pro Tools to move around the blocks of music. On the odd occasion where I have to alter licks or add something, I go back to the original sequence on *Studio Vision* to make revisions."

Hard-disk recorders and digital-audio workstations (DAWs) are a major benefit in the television scoring business. *Seinfeld,* for example, is an "overnight" turnaround. Wolff receives the current episode on ¾-inch video tape on Wednesday night, and must rearrange the main theme and place up to 30 transition cues before delivering the fully scored show on Thursday morning. To make these brutal deadlines, Wolff often has both production rooms working simultaneously.

"We work on several projects at once," he says. "The workstations in each room are connected by Ethernet, and two music editors can work on separate acts of the same episode at once. On *Seinfeld,* I can work on the monologue, while one of my editors places the transition cues. I couldn't imagine doing this job without DAWs. For example, Pro Tools offers automated mixing, and the mix data can be saved to the hard disk. This means I can instantly switch from *Married...With Children* to *The Good Life* and pick up right where I left off, or revise things without having to reconstruct the mix. In addition, I can do rapid alternate mixes, change program length easily, assemble a detailed database of each series' music cues with instant access, and make changes at the last minute without causing production delays."

Wolff also stresses that the random-access capabilities of hard-disk recorders are a major creative benefit.

"This may be the weeniest reason for going totally digital," he admits, "but I'd rather spend time on musical energy than waiting for a tape transport to rewind. Sometimes I'll get a flash of an idea, and I know that if I waited for a tape to rewind I'd lose that split-second inspiration. With Pro Tools, I can hit a button and record instantly."

But all is not rosy in the digital domain. Hard-disk systems are notoriously prone to crashes, and losing a few hours work on a tight deadline can thrust a composer into the heart-attack zone. To diminish the chance of crashes, Wolff uses a single manufacturer—Opcode—for his music software to ensure compatibility. Integration between his MIDI sequencer (Opcode's *Studio Vision*) and hard-disk recorder (Digidesign's Pro Tools) is assured, because the systems are designed to work together.

"I have one staffperson whose primary job is making sure the Mac gear works flawlessly," says Wolff. "The systems still crash occasionally, so it's standard procedure here that whenever an editor walks by a workstation, he or she hits Save. We also use Grey Matter Response's Mezzo dataDAT system that backs up in the background, so I can continue working while the data is saved. Mezzo works real fast and it's never failed us."

Of course, operating two production rooms with near-identical equipment also helps ease nerves. If a catastrophic crash or hardware problem develops, Wolff can simply bump the editor working in the other studio.

"For the most part, there have been more benefits than problems since we went totally digital," he says. "It took a while to get things right, but now the digital gear actually lets me do more work in less time. I love my job, but I don't want to spend 24 hours a day in the studio. I can thank the DAWs for giving me more time to spend with my incredible wife."

Although Wolff mixes to removable magneto-optical disk for his personal archiving (all multichannel digital data is maintained), the standard delivery format for the audio-post industry remains time-code DAT. And believe it or not, until last year, most post-production houses favored 4-track, ½-inch *analog* masters.

"I'll be happy when multitrack digital formats such as the ADAT improve their synchronization capabilities," says Wolff, "because they seem like a more flexible delivery medium. I don't like being limited to two tracks on DAT. If I want to have a separate track for a featured instrument so I can duck it in and out of the main mix, I'm stuck."

One thing that Wolff is not stuck for, however, is gigs. The success and mystique of *Seinfeld* is a powerful draw for television producers. Wolff is currently one of the elite "first call" composers in the TV sitcom strata. But it wasn't always so easy.

"I used to do a lot of demos on spec," admits Wolff. "A producer will call and ask you to compose a theme song—for free. Unfortunately, he or she may have asked 50 other composers for the same thing. The producer often uses the 'free' demos to get an idea of what he or she wants, then they call an established composer to do the actual score. The spec system is a total abuse of composers. Only once in my entire career did I get hired after competing in these cattle calls."

Because Wolff's success also brings a measure of creative clout, he often asks to be included in the development phase of a sitcom.

"I prefer to be hired while the show is still on storyboards, or even in rough script form," he says. "Then, as the characters develop, so can the music. It's great when a theme or score can be hashed out to something wonderful, instead of merely being finished in time to meet a deadline. I like to compose a theme hoping that I may have to listen to it for the next ten years."

EM *editor* **Michael Molenda** *has only watched* Seinfeld *once and is on the verge of becoming a social outcast.*

Wolff's quirky theme for the NBC sitcom *Seinfeld* is an antidote for the tired, uninspired TV score.

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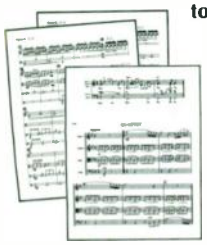

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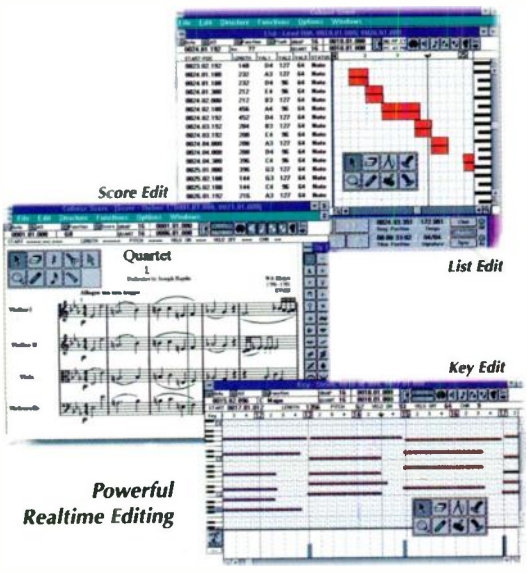

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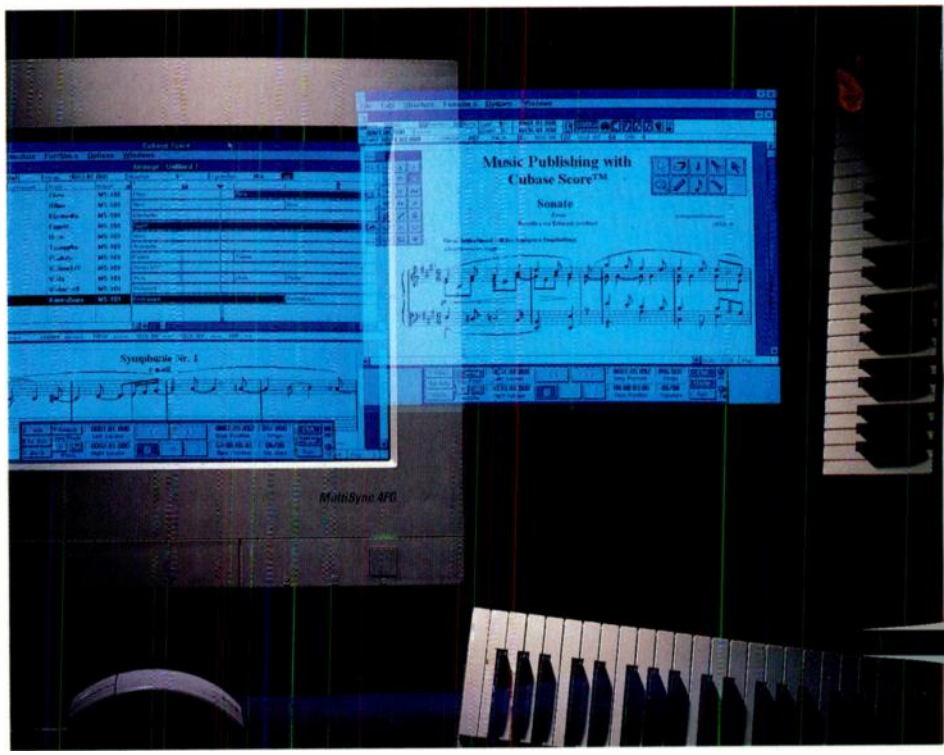

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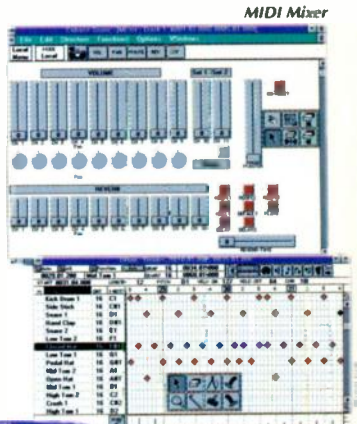

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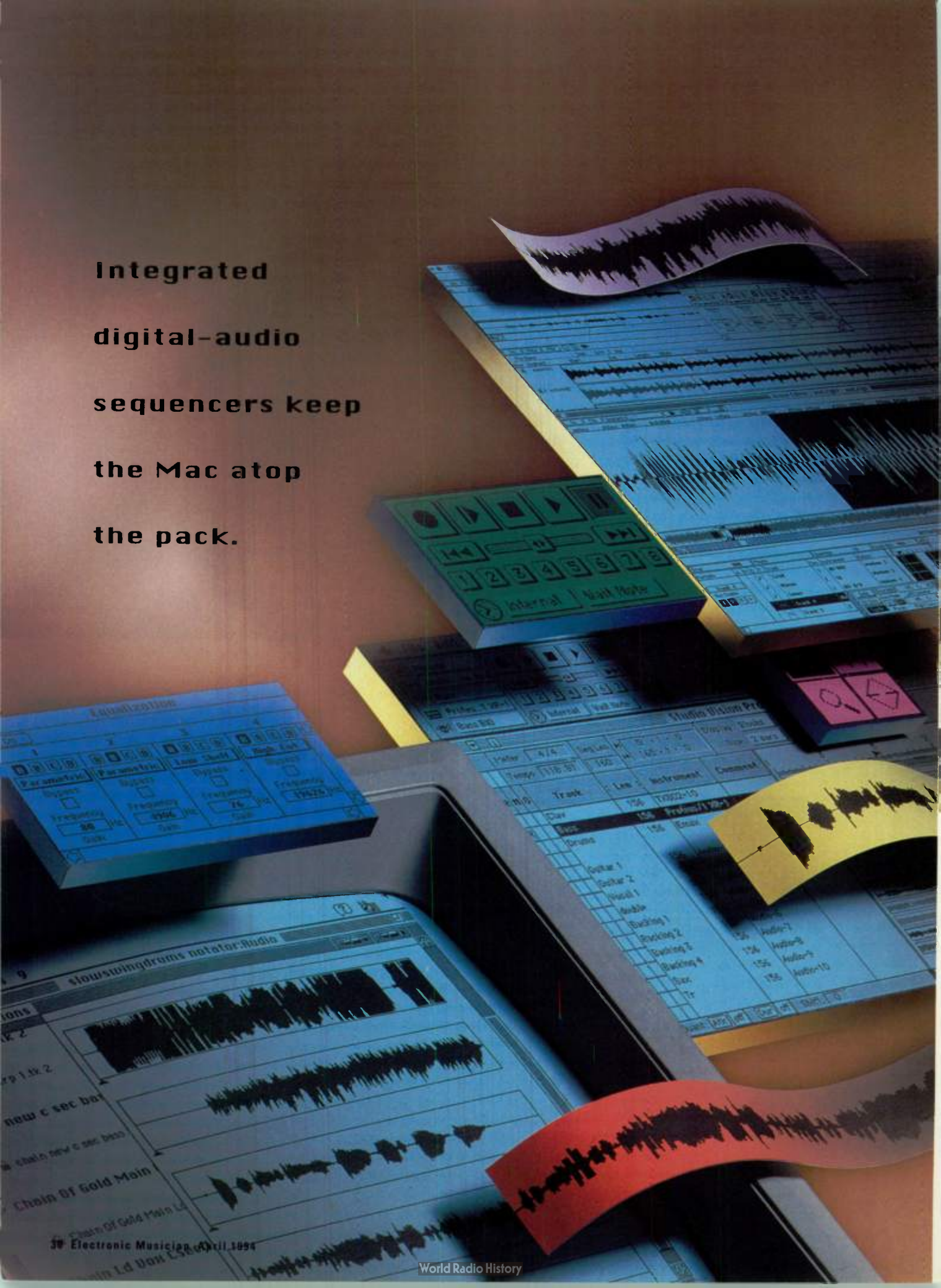

ALL for ONE

Photograph by David Bishop

PC and Atari users will not like reading this, but the Apple Macintosh is still the only personal computer offering a true selection of professional programs that integrate MIDI sequencing and multitrack digital-audio recording. Users of other platforms can choose any fully integrated program they wish, as long as it's Steinberg's *Cubase Audio*.

Currently, there are four main contenders in the Macintosh digital-audio sequencer (DAS) market: Emagic's *Logic Audio*, Mark of the Unicorn's *Digital Performer*, Opcode's *Studio Vision*, and Steinberg's *Cubase Audio*. An alternative approach is offered by OSC's independent, but well-integrated, *Deck* hard-disk recorder and *Metro* sequencer (see sidebar "OSC Deck and Metro").

None of the programs are inexpensive—the usual downside of Macintosh products—and all require a considerable investment in hardware: a fast Mac, a DSP card, and a large hard drive. *Cubase Audio* lists for $999, *Studio Vision Pro* for $995, and *Digital Performer* for $895. On the slightly less painful side, *Logic Audio* lists for $699, and *Studio Vision AV* is just $595.

However, because these are professional tools, it is unwise to rate a program by price alone. What you *get* for the price is a more valid consideration. The goal here is to compare and contrast the strengths and weaknesses of these programs. For more specific details on these programs, please read the reviews (see **Table 2** "EM Reviews Digital-Audio Sequencers").

By Peter Freeman

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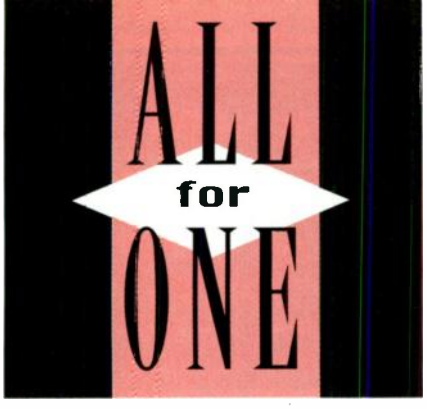


VERSION AFTER VERSION

Constant change and improvement are facts of life in the software world. At press time, the current versions of *Logic Audio* and *Studio Vision* were 1.7 and 1.5, respectively. While writing this article, I was also able to examine the features of *Logic Audio* 2.0 and *Studio Vision Pro* in prerelease versions. Both updates should be shipping by the time you read this article.

The current version (at press time) of *Cubase Audio* Mac is 1.2, while *Digital Performer* is at version 1.41. *Cubase Audio* 2.0 has been announced (see the February 1994 "What's New"), but was not available in time for this article. Likewise, Mark of the Unicorn has announced an upgrade of *Digital Performer*, but a version number and release date were unavailable at press time.

All four programs have been reviewed in **EM**, although *Studio Vision* had a major overhaul since its review, emerging as *Studio Vision Pro*.

AUDIO HARDWARE

For the most part, all four programs have similar Mac and audio hardware requirements (see **Table 1**; all support Digidesign's audio hardware). However, there are some noteworthy differences.

Because *Digital Performer* does not use Digidesign's Digital Audio Engine (DAE) software to address its hardware, it does not take full advantage of the hardware's capabilities. Fortunately, DAE support will be included in the next upgrade. Even without DAE, MOTU's proprietary software engine gives owners of Sound Tools II hardware four independent channels of audio playback and recording.

In addition, the upcoming release will include SCSI transfer of audio via SMDI (explained in the June 1993 "Computer Musician") and support for the Akai DR4d hard-disk recorder. Unlike the other three companies, Mark of the Unicorn does not claim support for 16-channel Pro Tools systems.

In addition, MOTU has an exclusive agreement with Yamaha ensuring that for one year, *Digital Performer* will be the only Mac program that supports Yamaha's long-awaited CBX-D5 hard-disk recording hardware. The CBX-D5 (which should be shipping by press time) will provide four channels of digital audio, and two units can be chained together for eight simultaneous channels.

Studio Vision AV should also be available at press time. This new version of Opcode's program provides four channels of audio (plus MIDI sequences) on the Mac Quadra 840AV or a Quadra with an ARTA-compatible, AT&T 3210-based DSP card such as Spectral Innovations' NuMedia. Between two and four channels are available on the Quadra 660AV, but solid performance is uncertain beyond two tracks. There is no word yet on a version of *Studio Vision Pro* for PowerPC.

Steinberg is not writing an AV version of *Cubase Audio* but is working on a native PowerPC version. Emagic has not committed to AV support, but expects to ship *Logic Audio* for PowerPC by the fourth quarter of 1994.

Any digital-audio recording program that supports the new version of DAE can support Digidesign's Session 8 hardware. Emagic already supports Session 8, and Opcode has announced support.

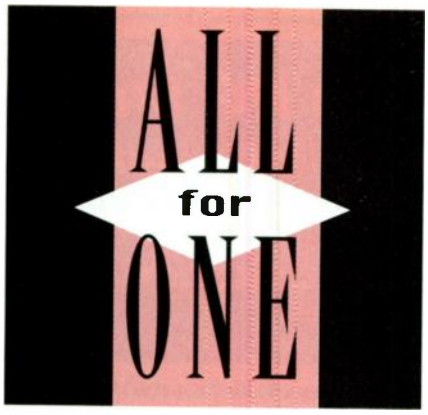
BASIC FEATURES

Except for recording resolution, the

Table 1: Audio Playback Tracks

PROGRAM	AUDIOMEDIA I/II	SOUND TOOLS I	SOUND TOOLS II	PRO TOOLS
Emagic *Logic Audio* 2.0	2/4	2	4	4-16*
MOTU *Digital Performer* 1.41	2/4	2	4	4
Opcode *Studio Vision Pro*	2/4	2	4	4-16*
Steinberg *Cubase Audio* 2.0	2/4	2	4	4-16*

*= Not tested above eight tracks.



four programs offer similar basic recording and editing features. *Logic Audio*'s 960 ppqn resolution leads the pack, followed by *Digital Performer* and *Studio Vision Pro* at 480 ppqn and trailed by *Cubase Audio* at 384 ppqn.

User interfaces universally include editing in an event list, graphic "piano-roll" window, and via music notation (see **Fig. 1**). Overall designs are primarily linear or pattern-oriented, but as we'll see, the lines between the two approaches are less clear than they once were. In fact, a casual look at some of these programs might lead you to believe that they are almost the same. Dig deeper, however, and you discover many differences.

In the "look and feel" category, *Logic Audio, Digital Performer,* and *Cubase Audio* provide user-definable graphic faders and knobs that send out any desired type of MIDI data. *Studio Vision Pro* has faders (but not knobs) that send any message except System Exclusive. These controllers can be useful not only for manipulating MIDI devices, but for changing the volume and pan position of audio tracks.

However, *Logic Audio, Digital Performer,* and *Cubase Audio* have more sophisticated and better implemented controls. For example, you can create faders and knobs with different shapes and sizes. The response varies, too. Compared with *Logic Audio* and *Cubase Audio,* I found the response and "feel" of *Digital Performer*'s controls a bit sluggish.

There also are differences in how data is displayed. *Logic Audio* provides an immediate, real-time visual display of MIDI data or digital audio during recording, which is immensely helpful. The other programs display music or audio only after leaving Record mode. (Although they let you drop in and out of Record at will and scroll during playback.) In practice, this is not a hugely important difference, but I'm spoiled by *Logic Audio*'s method. There's something reassuring about seeing your music appear onscreen as it is being recorded.

In addition, *Logic Audio*'s method of working with user-specified setups of windows onscreen (Screensets) provides the simplest and most powerful way of quickly obtaining many simultaneous, multilevel views of a song. This feature makes Emagic's program ideal for working on a complex and detailed piece of music. *Logic Audio* and *Studio Vision Pro* employ color especially well, which helps you see exactly what's going on.

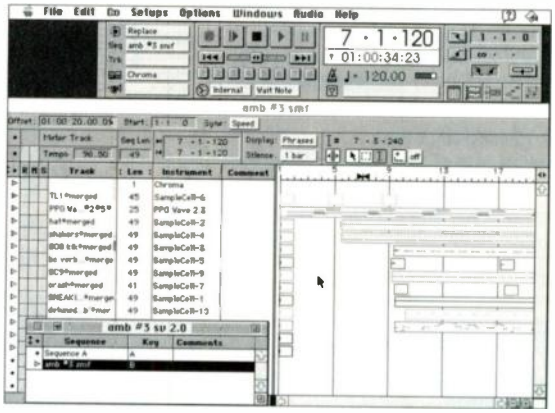


FIG. 2: In its new overview display, *Studio Vision Pro* can show audio and MIDI tracks as 1-bar blocks or as actual-length musical phrases.

OMS SUPPORT

The *Opcode MIDI System* (*OMS*) system extension has been adopted by many software companies as a shared method of communicating information about a user's MIDI setup. Using the *OMS* Studio Setup document (a file containing a simple diagram of your MIDI studio), compatible sequencers can be "aware" of what MIDI devices you have in your setup, which ones are controllers, on which interface ports and channels they transmit and receive, and whether they receive or transmit time code.

Emagic recently added full *OMS* support to *Logic Audio*. Support for the current version of *OMS* (1.2) is particularly important for owners of Opcode's powerful Studio 4 and Studio 5 and Mark of the Unicorn's MIDI Time Piece MIDI interfaces, because *OMS* allows compatible programs to fully address the interfaces' unique capabilities.

OMS 2.0 (renamed the *Open Music System* to reflect the involvement of other software developers), currently in a late stage of development, will provide far more benefits. An extremely important addition is interapplication communications (IAC), which allows MIDI data to be routed between programs. Equally important, version 2.0 will provide a common timing clock for *OMS*-compatible applications. It also will support serial-port independence. Finally, it will allow any compatible sequencer to access synth patches directly from Opcode's *Galaxy/Galaxy Plus Editors* programs.

Steinberg will add *OMS* 2.0 support in *Cubase Audio* 2.0. *Digital Performer* does not support *OMS*. However, now that a large number of software developers—including OSC, Digidesign, and PG Music—have committed to making *OMS* a standard, MOTU may eventually join the party.

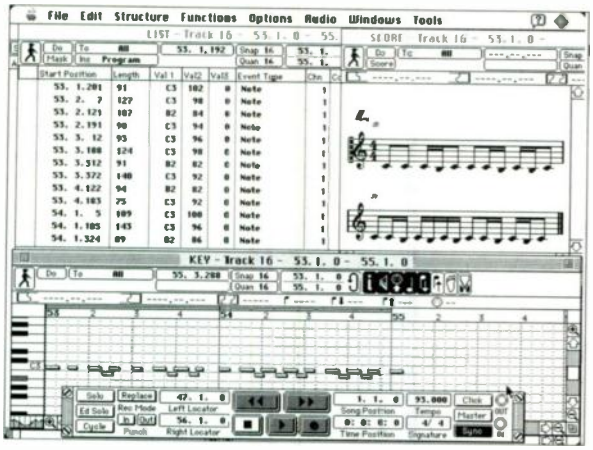


FIG. 1: All four digital-audio sequencers can display music in an event list, piano-roll screen, and standard notation. Shown above is Steinberg's *Cubase Audio*.

AUDIO HANDLING AND EDITING

All four programs provide numerical (event list) and graphic editing of MIDI and digital audio. However, the implementation of these capabilities varies. I'll focus mainly on audio-related functions, as the MIDI editing capabilities are detailed in the reviews.

The four programs also have a similar group of menu commands for

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While we admit that it's an elegant looking machine, it's tough to see its finest asset. The tape transport. Designed and manufactured by TASCAM specifically for the DA-88, it's fast, accurate and solid. And that's what counts in production — in personal studios, project studios or in those demanding high-end facilities.

You'll notice it uses superior Hi 8mm tape, giving you a full 108 minutes of record time. What's more, the transport is lightning fast and yet so quiet you'll barely hear it blaze through a tape.

We didn't stop there. Because production environments are notorious for constant, if not abusive, shuttling, punching, 24-hour operation — you get the idea — the transport was designed and built to take a beating.

Even more impressive is the transport's responsiveness. Take a look at the front panel. Notice the shuttle wheel? Turn it just a bit and the tape moves at one fourth the normal play speed. Turn it all the way and it flies at 8 times faster. Do it all night if you want. It's quick, smooth and it's precise. Need to get to a location quickly? Accurately? Shuttle a bit and you're there. The location is easily viewed on the DA-88's 8-digit absolute time display — in hours, minutes, seconds and frames. With the optional SY-88 sync card it displays timecode and offset, too.

Adding the optional SY-88 synchronizer card is as easy as changing a Nintendo® cartridge. With it you're SMPTE and MIDI compatible. And no matter how many DA-88s you have locked up, you need only one sync card. Other optional accessories include AES/EBU and SDIF2 digital interfaces allowing the digital audio signal to be converted for direct-digital interfacing with digital consoles, signal processors and recording equipment.

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Unlike other digital multitrack decks, the DA-88 works logically and is simple to operate. Like your analog deck. All functions are familiar and easily operated from the front of the deck.

s Machine

Take punching-in and out, for example. You have three easy ways to do it. You can punch-in and out of single tracks on the fly. Just hit the track button at the punch-in point. Hit it again to punch-out. You can use the optional foot switch, if you like.

Or, for multiple tracks, simply select the track numbers you want to punch, push play, and when you're ready, hit record to punch-in, play to punch-out.

Finally, for those frame accurate punch-ins, you've got auto punch-in and out. In this mode you can rehearse your part prior to committing it to tape.

No matter which way you choose, your punch-in and out is seamless and glitch free due to TASCAM's sophisticated variable digital crossfade technology.

That's not all, you also can set your pitch (+ 6%), sample rates (44.1 or 48K), as well as crossfade and track delay times. All from the front of the DA-88.

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Listen To The Rest

Of course, the sound quality is stunning. With a flat frequency response from 20Hz to 20kHz and dynamic range greater than 92dB, it delivers the performance you expect in digital recording.

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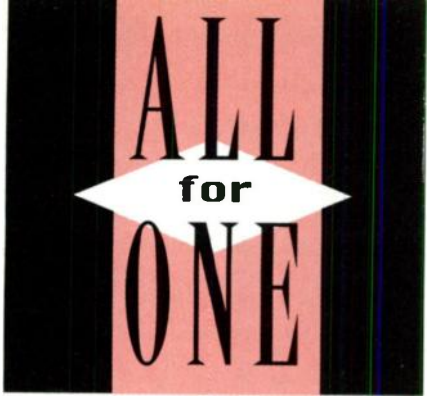

managing digital-audio files. At the most basic level, these include the ability to import audio files into the current song, delete audio temporarily or permanently, and select all unused audio in the current song to reclaim hard-disk space.

Because the goal of digital-audio sequencers is to provide *integrated* digital-audio handling within a MIDI sequencer environment, allowing the user to view and edit the two types of information side-by-side is of critical importance. The graphic overviews in *Logic Audio, Cubase Audio,* and *Studio Vision Pro* allow audio data to be repositioned easily in relation to MIDI data in real time, without having to open a specific audio-editing window. These views help speed things up considerably. In fact, the addition of a graphic overview is the most significant new feature in *Studio Vision Pro* (see **Fig. 2**).

Digital Performer allows real-time movement and editing of audio in its Audio Graphic Editing window—albeit one track at a time—and in the Track Overview window. Unfortunately, the Track Overview window only shows the

DIGITAL-AUDIO SEQUENCER MANUFACTURERS

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fax (916) 477-1052

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fax (617) 576-3609

Opcode Systems
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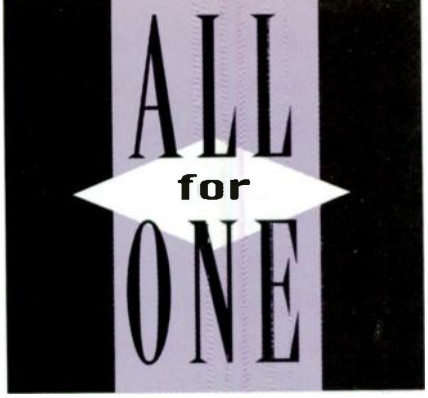
fax (415) 856-3332

Steinberg/Jones (distributor)
tel. (818) 993-4091
fax (818) 701-7452



parts as 1-bar blocks. These blocks don't reflect the actual lengths of musical phrases, making it difficult to instantly see the positional relationship between specific audio regions and accompanying MIDI data. The other programs can accurately display audio waveforms and MIDI parts (see **Fig. 3**).

Logic Audio, *Cubase Audio*, and *Studio Vision Pro* also offer the ability to perform sample-rate conversions, in case you import an audio file that was recorded at a different sample rate than the rest of the audio in the song. *Studio Vision Pro* has a handy "Where is..." function to search for particular pieces of audio on your hard disk at any time during a session, which is something the others should add.

When it comes to more in-depth audio manipulation, the programs vary quite a bit. *Logic Audio* and *Cubase Audio* are the only ones that allow fairly extensive, *Sound Designer*-like digital signal processing of audio data. Both programs offer Normalize, Trim, Fade In/Fade Out, Silence, and Reverse commands and allow extreme zoom magnification when editing audio (down to single-sample resolution).

Digital Performer has Trim and Normalize, but the latter can only be applied via a button in the "Mix..." dialog box. This is a bit clunky, because the program assumes you're mixing the Normalized file with another audio file to create a new file. When Normalizing a single file, *Digital Performer* presents you with a standard Save dialog box, prompting you to rename the file. MOTU has promised more elaborate waveform editing functions in the next upgrade.

All four programs allow two audio files to be digitally mixed together into a single new file. They also share the capability of removing silence from audio files to conserve disk space.

In addition, Opcode, Emagic, and Steinberg are planning support for third-party TDM DSP plug-ins for their audio editors (for more on Digidesign TDM-compatible plug-ins, see "Virtual Effects" in the March 1994 **EM**). This is a smart idea, as it will allow other software developers to create specialized modules of code (such as EQ and digital effects processors) that can greatly extend the programs' audio manipulation power. Because *Digital Performer* is not DAE-compatible, it cannot support TDM, but this will change with MOTU's next upgrade. Unfortunately, as of this writing, Digidesign had not released TDM.

QUANTIZING

The ability to quantize audio data is very important, especially for grooves and rhythmic experimentation. *Cubase Audio* and *Logic Audio* lead on this score. Both programs provide movable markers in their audio editors that let you specify the point in a particular piece of audio that will be aligned with the nearest quantize subdivision.

One of the benefits of movable markers is that you can specify that a word in a vocal performance lands on the next downbeat. You simply position the marker (called a Q-Point in *Cubase*

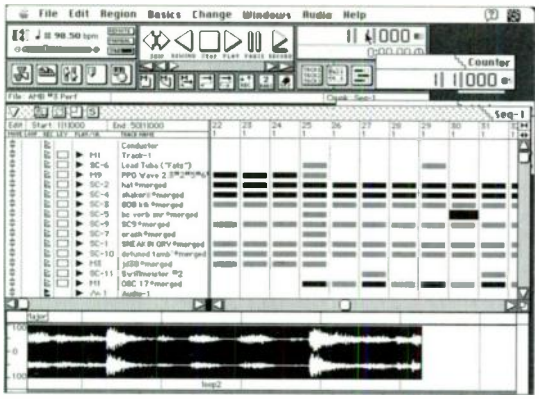


FIG. 3: *Digital Performer* lets you see MIDI and audio tracks only as 1-bar blocks. The waveforms are displayed in a separate audio-editing window, shown in the background.

Audio and an Anchor in *Logic Audio*) at the start of the desired word and quantize away.

An important development in sequencing is Groove Quantization, where specific "feels" (rhythmic relationships) can be defined or extrapolated from musical performances and used to quantize other sequenced tracks. This capability first surfaced in Atari versions of *Notator* and *Cubase* and has found its way into *Logic Audio, Cubase Audio,* and *Studio Vision Pro.* However, each company implements the feature differently.

Cubase Audio allows 1-bar sections of any MIDI track to be used to quantize other tracks via a special Match Quantize tool. Although *Cubase Audio* cannot make editable Groove Templates from MIDI tracks, the program allows you to graphically edit its preset Grooves and store and recall the results.

Studio Vision Pro allows MIDI performances of any length to be used to make Groove Templates. Duration and Velocity information from the source performance can be used independently of rhythmic information to affect the destination MIDI tracks. The Grooves are stored in a file called Vision Grooves, which acts as a "Groove storehouse." Grooves must be saved to this file before they become available for use.

Logic Audio Grooves are similar to those in *Studio Vision Pro.* They can be made from MIDI performances of any length and can include Velocity and duration data. *Logic Audio* also can import *Cubase* DNA Grooves. However, a unique, mind-bending, cool feature of *Logic Audio* is its ability to make a Groove Quantize template from an audio region. You can choose a favorite sampled drum loop, for example, and *Logic Audio* extracts its specific feel (the rhythmic relationships between the individual drum hits) and creates a Groove Template that can be used to quantize MIDI sequences. This remarkable innovation will mean a lot to those working with groove-oriented music.

BUILDING A GROOVE

Linear sequencers allow you to work with your music as a continuous entity, navigating as if the program were the ultimate multitrack tape recorder, freely cutting, copying, moving, and pasting parts from different tracks. Pattern-oriented sequencers allow independent sections of music to be created

and assembled in essentially the same manner as most drum machines construct rhythm patterns.

However, the line between these two designs has blurred. *Studio Vision Pro*, a pattern-oriented program, also makes it easy to work in a linear format by using one sequence for the entire composition. Conversely, *Cubase Audio*, *Logic Audio*, and *Digital Performer* are linear programs but allow groups of musical parts to be handled as single entities. This feature lets you easily rearrange sections in a manner similar to pattern-oriented programs.

The desirability of either method depends on your working style and the type of music you do. For example, my music is often groove-oriented and rhythmically complex. Some of my best work happens when I can put together a groove or rhythmic backdrop very quickly, elaborating on it only after the basic ideas are laid down. This process must be allowed to happen as quickly as the ideas occur, with the absolute minimum of fuss or fiddling around with the program.

I often loop a short section of music—usually four or eight bars—adding and changing elements "on the fly" until I'm satisfied. To accomplish this effectively, the sequencer must facilitate repeating—while the music is playing—a desired range of bars whose boundaries can be easily changed. I want to be able to edit everything: change the pitch, position, length, Velocity, and other aspects of single or multiple MIDI and audio events. And all edits must be enacted smoothly, without having to stop recording or playback. It's a definite plus if the program displays the music in a simple, easy-to-grasp way, so that making changes is as effortless as possible.

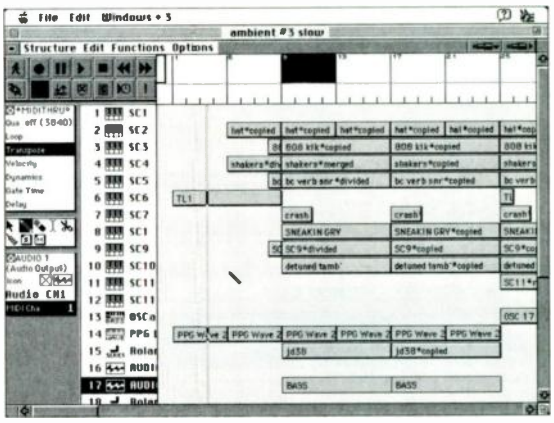


FIG. 5: In many ways, *Logic Audio*'s Arrange window resembles that of *Cubase Audio*. The movable Toolbox (at left) lets you manipulate MIDI and audio data with the Scissors, Glue, Mute, Solo, Text Entry, and other tools.

Steinberg's *Cubase Audio* and Emagic's *Logic Audio* fulfill all the criteria and offer similar implementations. For example, the two programs have similar Arrange windows (see **Figs. 4** and **5**), which are the centerpieces of their linear architectures. This window provides the main graphic overview of the entire song, with all its MIDI and audio tracks and their contents.

The programs employ left and right Locators (loop points), set at bar/beat/clock positions to determine the boundaries within which a section of music will cycle. In both programs, these Locator points can be changed quickly at any time, whether playing/recording or not. *Logic Audio*'s Locators are represented by a black bar along the top of the Arrange window, the length of which represents the range between the Locator points. This can be changed not only by numeric entry, as in *Cubase Audio*, but also by dragging the black bar to a new location. It's easy to do things like move a 4-bar cycle range to a different four bars of the song.

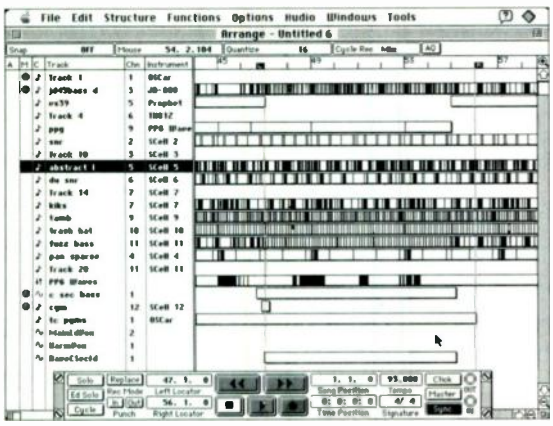


FIG. 4: The Arrange window is the focal point of *Cubase Audio*. The left and right Locator points determine the boundaries within which a section of music will cycle. They can be changed quickly and easily by typing the new values into the Transport display (bottom).

Besides the Locator-oriented design, another key feature of both programs is the Toolbox. This palette of simple tools, such as Scissors, Glue, Mute, Solo, and Text Entry tools (they vary a bit between the two programs) allow fast, direct manipulation of MIDI and digital-audio parts of any length. The Toolbox makes working with musical ideas quick and intuitive. Both *Cubase Audio* and *Logic Audio* are excellent choices for working with groove-oriented music, because they allow you to clearly see and edit your music as you create it.

Does this mean that you couldn't accomplish the same musical tasks with *Digital Performer*, or a pattern-oriented program like *Studio Vision Pro*? Of course not. Sequencer jockeys create grooves quite effectively, albeit differently, with *Performer*, *Vision*, and *Studio Vision Pro*. The vital issues are the speed, fluidity, ease of use, and immediate, detailed, visual feedback a program provides.

SCORING TO PICTURE

Like many other musicians who use these programs, I compose and do sound design for television commercials. These jobs often involve grooves and repeating musical patterns, but a commercial could also consist primarily of nonmusical sounds accompanying specific visual events.

In either case, there are nearly always musical or purely sonic events that occur only once or twice during the course of a 30- or 60-second spot. For this reason, when working to picture, it is of primary importance that the position and length of all events (both MIDI and audio) can be displayed relative to SMPTE time code. It is also essential that these events can be adjusted quickly and easily, using either bars/beats/clocks, or absolute SMPTE times. These capabilities allow specific visual cues to be "hit" (emphasized) by matching musical/sonic events to their

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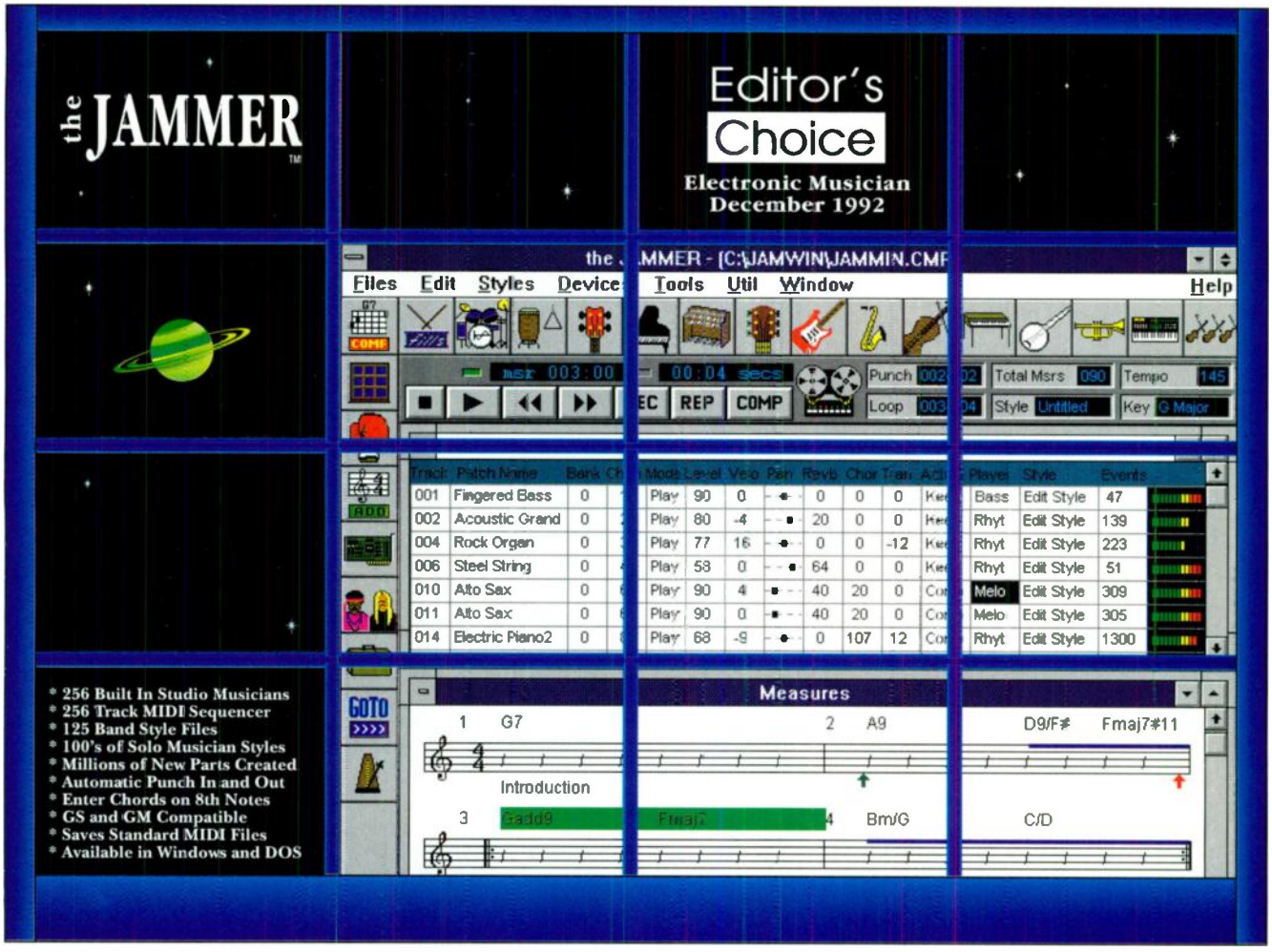

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TG500 TONE GENERATOR
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-Jim Presley, Yamaha-

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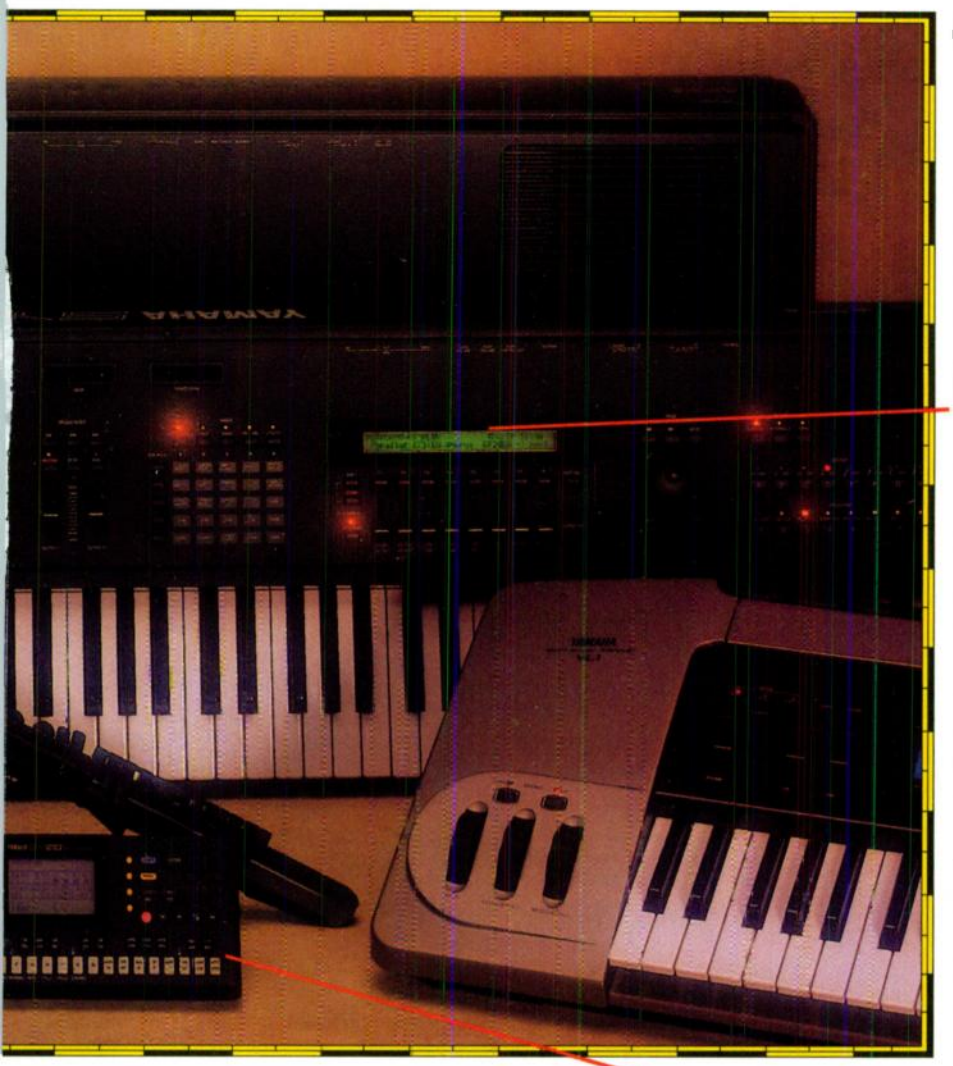

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SMPTE addresses.

In this scenario, I have found that *Studio Vision Pro*, *Cubase Audio*, and *Logic Audio* suit the task nicely. All three provide informative, easy-to-read graphic overviews of the entire piece of music and allow manipulation of MIDI and audio data within the overviews. They

OSC DECK 2.1 AND METRO 2.41

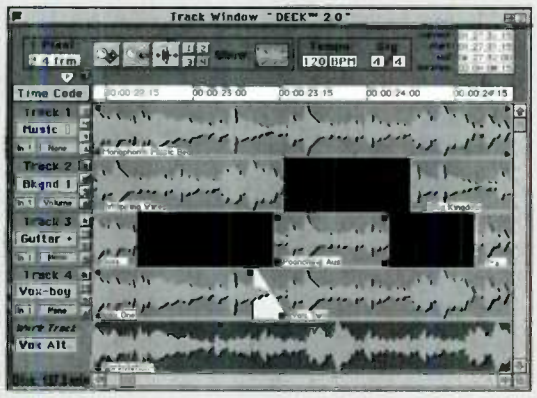
Though not a single, integrated program, OSC's *Deck II* 2.1 hard-disk recording/editing program ($399) and *Metro, Deck II*'s companion MIDI sequencer ($225), offer another way of accomplishing many of the same tasks as one integrated program. The programs were reviewed in depth in the March 1994 issue, so I'll just skim the surface here.

Deck II 2.1 is the latest version of OSC's original *Deck*, the first low-cost, direct-to-disk recording program (reviewed in the December 1990 **EM**). It uses a user-friendly, ministudio-like interface to provide four tracks of hard-disk recording on a Digidesign Audiomedia II or Sound Tools II card and eight tracks on a Pro Tools card or ARTA/AT&T-based system (e.g., the Quadra 660AV and 840AV). The *Deck II* program offers visual waveform editing, including cut/copy/paste, Normalize, Trim, and Reverse commands. The program allows you to map volume envelopes and crossfades, has an enhanced zoom function, and imports/exports playlists.

Because it can play *QuickTime* movies synchronized with audio tracks, *Deck II* 2.1 is an excellent audio tool for multimedia production. You can import a *QuickTime* movie at any frame rate, either ignoring the built-in audio track, leaving it in the movie for playback via the Macintosh's sound chip, or importing it into a track in *Deck II*. *Deck II* can then save the mix as a *QuickTime* file.

Metro began life in 1989 as Dr. T's *Beyond* (reviewed in the October 1990 **EM**) and has since resurfaced with a new look and several new features. Its main advantage is its ability to work in conjunction with *Deck II* to provide synchronized MIDI sequencing and digital-audio recording.

The two programs use inter-application timing architecture developed by OSC, which allows them to sync to each other without an external time-code source, using one command. You can launch and quit the programs as one, and opening and saving documents in one program automatically opens and saves in the other, even when it is in the background. *Deck II* 2.1 can also set its base tempo to that of an open file in *Metro*, so that the bar and beat numbers correspond.



***Deck II* 2.1 uses a user-friendly, ministudio-like interface and can play *QuickTime* movies in sync with audio tracks, making it especially useful for multimedia authors.**

Finally, the programs fully support *OMS*, and *Deck II* is compatible with Digidesign's DAE. Although *Deck II* does not directly support DAE (it uses a proprietary driver), it will support Digidesign TDM plug-ins.

—Steve Oppenheimer

also let you group MIDI tracks into independent objects for easy movement within a song. Unfortunately, *Cubase* doesn't allow digital audio to be included in these groups, which could be a significant drawback if you're pattern-oriented. *Logic* not only allows this, it lets you scrub two tracks of audio and all your MIDI tracks simultaneously. *Studio Vision Pro* lets you scrub either a mono or stereo audio track, or MIDI tracks, but not both.

The primarily linear orientation of *Logic Audio* and *Cubase Audio* is well suited for scoring to picture. (After all, the visual narrative of film and video *is* linear.) But if you prefer a pattern-oriented animal, *Studio Vision Pro* is the clear champ.

Studio Vision Pro's pattern-oriented design gives it a unique advantage: It allows you to trigger independent sequences (sections of MIDI and/or audio) from the Mac keyboard or via MIDI, while locked to SMPTE, and record the triggered events. This feature lets you compose as many independent subsequences as you like and position them relative to picture "on the fly," a tremendously useful capability.

For many musicians, the appeal of working with independent, instantly accessible musical sections is considerable. To illustrate this, consider the common situation of writing and arranging a song. It's often useful in this context to create many variations of different parts of the composition and freely experiment with playing and/or chaining them together in different ways. *Studio Vision Pro* allows this with complete immediacy through the use of its Sequences and Subsequences. The ability to assign, for example, the A, B, and C sections of a song to the A, B, and C keys on the Macintosh keyboard is highly intuitive and a considerable selling point for *Studio Vision Pro*'s design.

Although *Digital Performer* does allow positioning of events by SMPTE addresses, its Track Overview is not as intuitive as the graphic overviews offered by the other programs. The biggest difference is the far more detailed information the overviews convey in the other three digital-audio programs.

On the other hand, one of *Digital Performer*'s strengths, particularly for doing TV commercials, is its ability to change tempo in a wide variety of ways. For example, in all four programs, you can specify a start and end tempo for a region of time and interpolate automatically between the two; however, only *Digital Performer* lets you interpolate between them using a selection of different tempo change curves. (*Logic Audio* 2.0 also is expected to have this capability.) The start and end points can be specified in SMPTE addresses or bars/beats/clocks. These features can be very important when scoring to picture, particularly when fitting a particular musical cue to a precise time frame.

Studio Vision Pro has similar tempo-change features, but does not go to the same degree of depth, lacking *Digital Performer*'s multiple tempo-change curves and randomization capabilities. All four DAS programs allow tempo changes to be recorded in real time, either by tapping along on a MIDI controller (tap tempo), or by changing a numerical display.

UP THE LEARNING CURVE

As elsewhere in the software world, most music-software developers place an increasing emphasis on improving the user interfaces. For new users, a big factor is the program's overall learning curve. Good documentation is important here; it can help get you rolling, while bad documentation leaves you cursing in the dust. Even veterans need to consider how easy is it to get around the program's controls and menus.

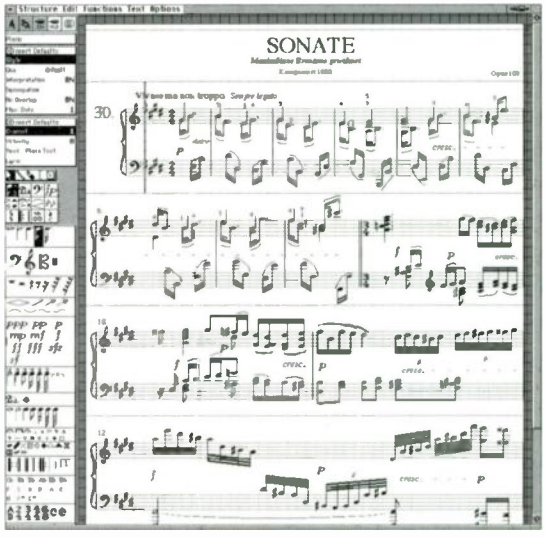


FIG. 6: Arguably the most powerful notation features of any digital-audio sequencer are found in *Logic Audio*'s Score Editor window.

Cubase Audio may well be the fastest and easiest program to learn and use, as a result of its intuitive design and well-written manual. Its many powerful, sophisticated features make it suitable for almost any conceivable musical situation, including extensive Groove Quantization. This is a friendly, musically designed program.

Logic Audio, while sharing some of *Cubase Audio*'s strengths, is oriented a bit differently. It goes deeper in terms of sophistication of viewing and editing music than any other program. However, it has a learning curve to match; this program is not mastered rapidly. Fortunately, the program's documentation is getting a complete rewrite, and a new, helpful tutorial manual ships with the current version. Emagic has also produced a tutorial video.

The learning curves for *Studio Vision Pro* and *Digital Performer* are moderate. I much prefer Opcode's graphics-packed manual, though, which seems

Table 2: EM Reviews Digital-Audio Sequencers

PROGRAM	ISSUE REVIEWED
Emagic *Logic Audio* 1.7	February 1994
MOTU *Digital Performer* 1.41	September 1993
Opcode *Studio Vision* 1.0	February 1991
Steinberg *Cubase Audio* (Mac) 1.01	December 1992

friendlier and less intimidating than Mark of the Unicorn's 874-page tome. Fortunately, MOTU is working on a new manual and offers a comprehensive instructional video for *Performer*, though the latter doesn't cover the audio features.

NOTATION

Notation features are arguably less crucial in a digital-audio sequencer than the audio and sequencing sections, so their implementation varies widely among the programs. *Studio Vision Pro* and *Digital Performer* offer simple notation as an alternative view of the sequence, with no frills (such as lyrics) and minimal editing. *Studio Vision Pro*'s music-notation capabilities are similar to the modest features in Opcode's 16-track *Musicshop* (reviewed in the September 1993 **EM**); unlike *Musicshop*, however, *Studio Vision Pro* supports up to 99 tracks, with multiple meters and key signatures.

The scoring features are far better in *Cubase Audio* and *Logic Audio*. Based on the versions I saw, *Logic Audio*'s notation features (see **Fig. 6**) appear the strongest, but Steinberg claims *Cubase Audio* 2.0 evens the score. Although neither is comparable to a top-flight, dedicated notation program, such as Coda's *Finale*, they seem competitive with midlevel scoring programs.

CONCLUSIONS

Digital Performer's main advantage is that if you are a veteran *Performer* user, you will feel right at home. However, it is weaker than the other three programs in features and, ironically, in performance. Mark of the Unicorn has already announced it is working on a major upgrade, which hopefully will make the product more competitive.

On a more upbeat note, with the release of *Studio Vision Pro*, Opcode takes a step toward the future. Though the company has not kept up with the Europeans feature-for-feature, it has shown willingness to progress, as it must do to maintain its leading position in the digital-audio sequencer market.

Opcode and MOTU have been hugely successful with their nonaudio sequencers, and if you are already using the nonaudio versions of these programs, you will be comfortable working with their audio incarnations. Currently, *Studio Vision Pro* dominates the market, mostly because Opcode was

the first by over a year to ship a digital-audio sequencer and offer a quality program from the start.

On the other hand, Steinberg and Emagic are established Atari developers, and Steinberg also offers *Cubase Audio* for *Windows*. They have taken advantage of their relatively recent move to the Mac to add next-generation capabilities. For this reason, even if you are comfortable with your current sequencer, you may want to consider switching when you upgrade to audio.

If you like to work in a linear manner, and having incredible control over your MIDI and audio tracks is important to you, *Cubase Audio* and *Logic Audio* are your best bets. From a design standpoint, I prefer these two programs. When it comes to choosing between them, it's completely a matter of your musical needs and style of working.

It can take a while to get up to speed, but once learned, *Logic Audio* proves a potent, flexible tool. This is the right program for you if you like having a heavily customizable window environment, the ability to create Groove Templates from audio files, unlimited tracks, multiple songs open at once, full-featured notation editing, and the highest resolution of any commercially available program.

It should be apparent that I favor *Logic Audio*. Not everyone requires *Logic Audio*'s impressive capabilities, though, and some will not be eager to deal with the learning curve. Obviously, I'm not satisfied with the current version of *Digital Performer*, although if you're already a *Performer* user, it might be just what you need. There are excellent reasons to choose *Studio Vision Pro* or *Cubase Audio*. Each is capable and lets you accomplish particular tasks quickly and efficiently.

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

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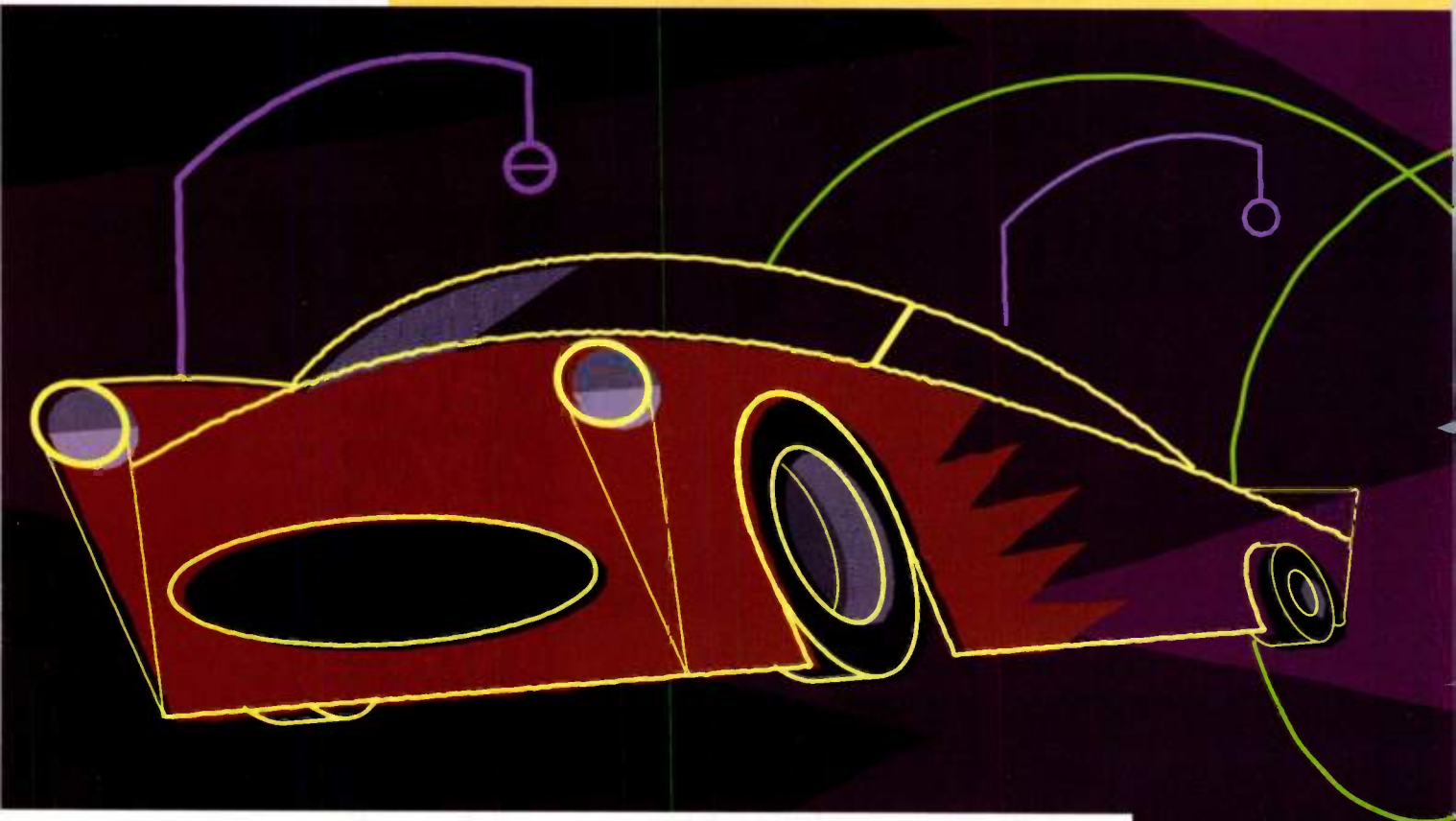
Cruising the Internet

Recently, "electronic superhighways" in general and the Internet in particular have been the subject of mass-media publicity and hype. Like the early U.S. road system, this path to "cyberspace" is partially unpaved and sometimes unreliable, and most people have no idea where the "on" ramp is. But it has character and provides access to vast resources, including much of interest to electronic musicians.



Take a wild ride on the electronic superhighway.

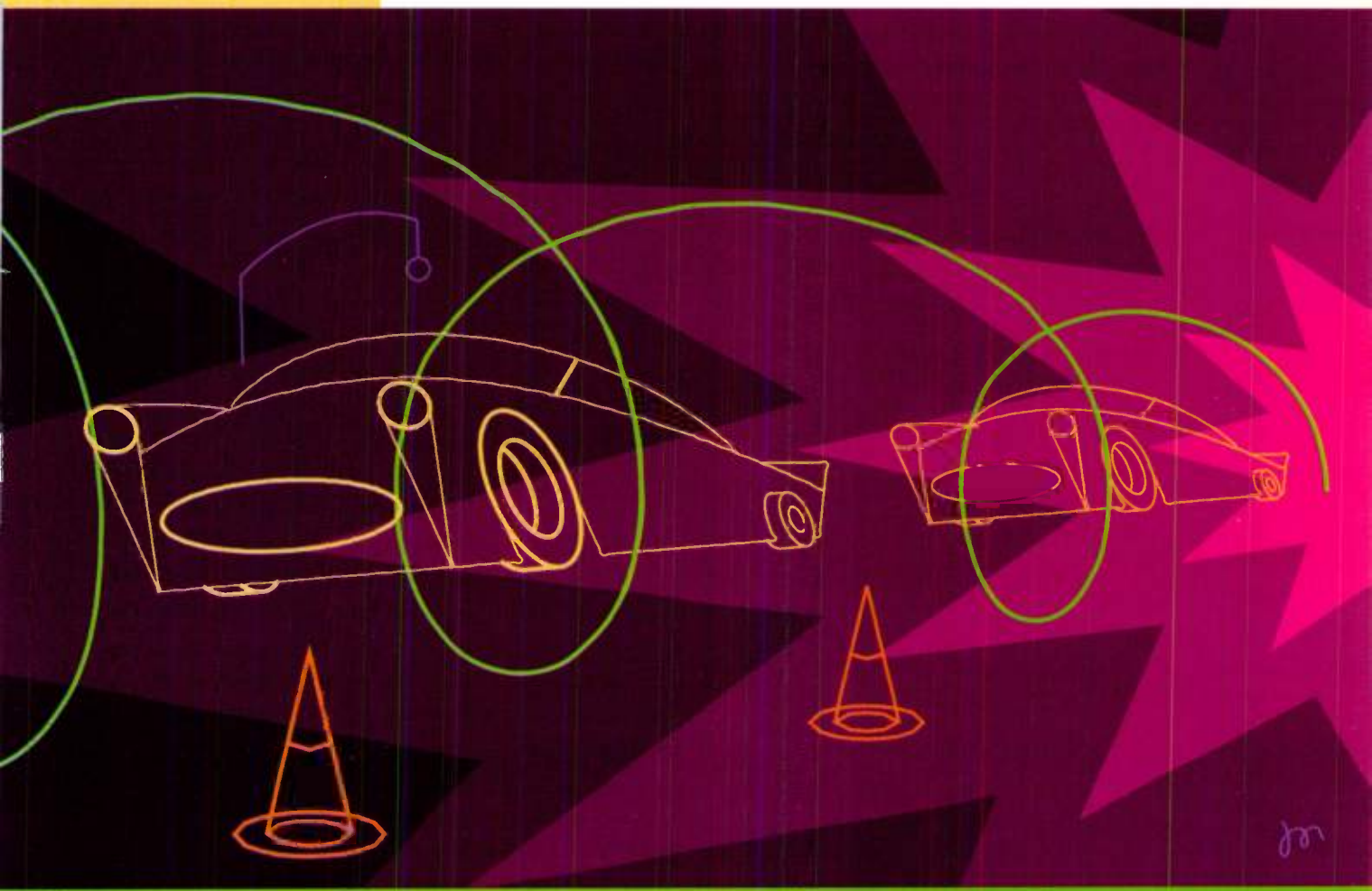
By Nick Porcaro and Sarah Rosenbaum

Illustration by Greg Mably

Originally developed by the U.S. government as a fail-safe communications system, the Internet has evolved into the largest computer network on the planet. On the Internet, you can search library catalogs in Australia, send electronic mail to the Czech Republic, download sound files from an archive in Boston, and conduct netwide searches for files containing the word "MIDI." You can conduct real-time discussions with other users, read discussion groups on thousands of topics, and search for the e-mail addresses of long-lost cousins in Italy.

For visionaries, the Internet is an endless, ever-expanding web of information and global communication that could contribute to world peace and higher consciousness. For pragmatists, it's a cheap way to send electronic mail. For the uninitiated, it can be a frustrating maze of road blocks and unfamiliar commands. For the long-time user, it's a way of life.

We'll give you enough background to get started on the Internet and will provide several pointers. We assume the reader has at least a basic understanding of the Macintosh or DOS/*Windows*, as well as knowledge of telecommunications software and how to log in to a BBS. (To get up to speed, read

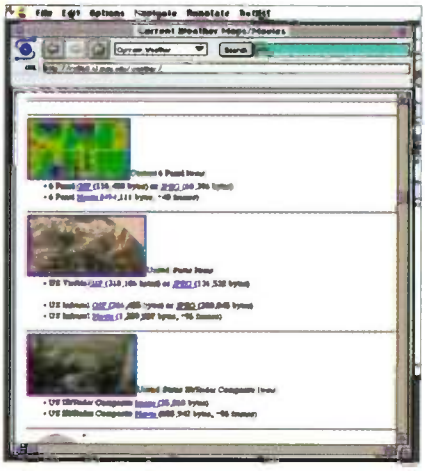


"Going Online: A Guide to Electronic Bulletin Board Systems" in the November 1990 **EM**. Back issues are available from Mix Bookshelf; tel. [800] 233-9604 or [510] 653-3307; fax [510] 653-5142.)

NETWORK OF NETWORKS

The Internet is a worldwide network of computer networks connected using a common set of communications protocols. Educational institutions, government agencies, corporations, and individuals are all part of this massive network. Some sources claim the Internet is experiencing an astonishing growth of 1,000 new computers every day! There are many reasons for this explosive growth, including lower communications costs, cheaper computers, and the recent opening of the Internet to commercial and individual users.

The networks that make up the Internet vary in size from a few computers connected in a local-area network, to hundreds of machines connected at a university. In the United States, major networks are connected via high-speed links called *backbones*. The connections are implemented by a variety



When you know where to look, you can find just about anything on the Internet. For example, this series of satellite-image movies shows current global weather patterns.

of mechanisms: modems through regular or leased phone lines, ISDN (Integrated Services Digital Network; see "London Calling" in the March 1994 **EM**) lines, microwave links, and local-area networks using twisted-pair or coaxial cabling.

Without a common language or *communications protocol*, the Internet would be nothing more than a high-tech Tower of Babel. Just as MIDI allows communications between different types of synthesizers and controllers, TCP/IP (Transmission Control Protocol/Internet Protocol) serves as the Internet's *lingua franca*.

TCP/IP is a direct result of the Internet's origin as a Cold War communications tool. In 1969, the U.S. Department of Defense Advanced Research Projects Agency (ARPA) initiated the creation of a computer network called the ARPANET, which eventually evolved into what is now known as the Internet. A goal of the ARPANET was to create a computer network capable of sending messages despite severed connections. A protocol capable of using multiple routes in the presence of failures was developed to increase the probability of successful transmissions; this became TCP/IP.

FORWARDING ADDRESS

On the Internet, as in the "real" world, locating something is easier if you know its address. An Internet address has two parts, separated by the "@" symbol. A typical example might look something like this: nick@ccrma.stanford.edu. On the left side of the "@" is the *user name*, usually selected by you or assigned by the system administrator. The right side is the *domain name*, which identifies a particular computer (ccrma) on a network (Stanford University). The rightmost component of the domain name serves as a broad category description and is often referred to simply as the *domain*. Here are examples of common domains:

edu	educational
com	commercial
gov	government
net	Internet service
sf.ca.us	geographically based

Data is transmitted over the network in chunks called *packets*, which consist of the sender and receiver addresses followed by the actual data. Connection speeds range from 2,400 baud dialup connections to 45 megabits/second, high-speed digital connections. In the future, 1 gigabyte/second speeds may be possible using fiber-optic cables. These numbers are ideal and may be lower depending on network traffic. Faster speeds will enable inexpensive transmission of large volumes of text, as well as multimedia information, including high-quality audio and real-time video.

MAKING THE CONNECTION

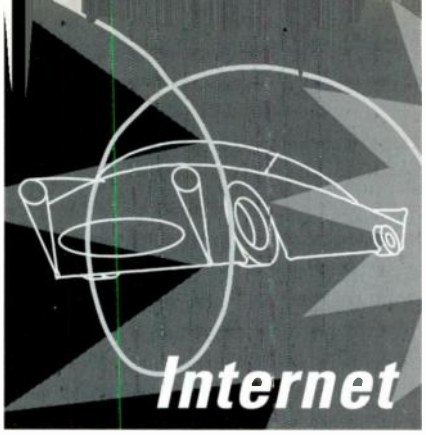
To get started on the Internet, you'll need a modem, communications software, and an account. If you are affiliated with a university or other institution, Internet accounts are usually free for the asking and are set up for you by a system administrator. If you do not have such access, an Internet *service provider* must be used for a dialup (modem) connection, either through standard phone lines or ISDN lines. **Table 1** lists phone numbers for some service providers.

The cost of dialup connection accounts varies widely, so compare prices. A few other points to compare include monthly and/or hourly fees, long-distance fees, disk-usage fees, service upgrade fees, and availability of services (especially *ftp*, *telnet*, *Gopher*, *pine*, and *tin*, which should be considered minimum requirements).

Dialup connections are either terminal-based, using UNIX commands, or graphically based on a local machine configured to run TCP/IP over a modem. Various applications are available to access Internet resources. These range from elegantly designed,

TABLE 1: Internet Service Providers

Provider	Area of Service	Phone
AlterNet	U.S. & International	(800) 488-6383
BARRNet	Northern & Central California	(415) 723-7003
CERFnet	California & International	(800) 876-2373
CICNet	IA, IL, IN, MI, MN, OH, WI	(313) 998-6104
EUnet	Europe, N. Africa, former U.S.S.R.	+31 20 592 5109
fONOROLA	Canada	(613) 235-3666
InterNEX	ISDN provider, S.F. Bay Area	(415) 473-3060
MIDnet	AR, IA, KS, MO, NB, OK, SD	(402) 472-7600
NEARnet	CT, MA, ME, NH, RI, NY, VT	(617) 873-8730
NETCOM	U.S.	(408) 554-8649
NorthWestNet	AK, ID, MT, ND, OR, WA	(206) 562-3000
NYSERNet	NY	(315) 453-2912
PAN	U.S. & International	(215) 584-0300
PSINet	U.S. & International	(800) 827-7482
SESQUINET	Texas, Mexico	(713) 527-6038
SURAnet	Mid-Atlantic, Southeast, Puerto Rico & S. America	(301) 982-4600
Westnet	AZ, CO, southern ID, NM, UT, WY	(303) 491-7260
WELL	U.S. & International	(415) 332-4335



graphical navigation tools such as *Mosaic*, to scary hacks like the *rn* newsreader. Unless you have a computer with a graphic interface (for example, Macintosh or *Windows*) and the proper applications software, you will be limited to applications with inconsistent, terminal-based (text only) interfaces. However, most of these have online help and are fairly straightforward to learn.

We'll mention several graphical Macintosh applications; similar PC programs also exist. These applications require certain protocols, such as SLIP (Serial Line Internet Protocol) and PPP (Point to Point Protocol) to support the graphical TCP/IP-based connections. We recommend using Compressed PPP, a variant of PPP.

A 14.4 kilobaud modem is the minimum recommended speed for PPP connections. Although a 2,400 baud modem will work for simple UNIX accounts, if you can afford $100 to $200 for a 9,600 baud or 14.4 kilobaud modem, you'll be much happier. ISDN lines do not require modems but need special interfaces that can cost hundreds of dollars.

The more you're willing to pay, the faster the connection. PPP software is free or inexpensive, but hard to set up, and you'll have to watch your usage, as the online charges can add up quickly. UNIX commands are difficult to learn, but UNIX dialup accounts are cheap to use. On the other hand, no matter how proficient you are at UNIX, graphical interfaces are more efficient for certain tasks. Fortunately, these tradeoffs will evaporate when ISDN lines become widespread, making it economical to use PPP (with a modem) or a direct digital connection (no modem required).

So just how much can you expect to pay? One way to access the Internet is through a Personal Network Connection account from NETCOM. This account provides both UNIX access and graphical access using Compressed PPP. The cost is approximately $18/month plus $2 per hour for PPP connect time, with no connect fee for UNIX.

TABLE 2: Basic UNIX Commands for Internet Access
Required arguments are in boldface; optional arguments are in italics.

Internet Resource Commands	
telnet **host**	Remotely login to **host** (e.g., **well.sf.ca.us**)
ftp **host**	Connect to **host** to transfer files
gopher	Hierarchical menu-based navigation tool
mail	Old, terse, but common e-mail program
pine	Better e-mail program
tin	Threaded USENET newsreader
File Management Commands	
cd ***dir***	Change directory to ***dir***
emacs **filename**	Edit file **filename** using the emacs editor
ls	List contents of the current directory
mkdir **dir**	Create a directory named **dir**
pwd	Print path of the current directory
rm -r **dir**	Remove directory named **dir**
rm **filename**	Remove file **filename**
rz **filename**	Receive file from UNIX machine (Z/YMODEM)
sz **filename**	Send file to UNIX machine (Z/YMODEM)
vi **filename**	Edit file **filename** using the vi editor

HITTING THE INFO HIGHWAY

After dialing in, you'll be prompted to enter a user name and password. Next, you will be presented with the UNIX prompt. (UNIX commands are similar to DOS commands: short nonwords followed by a carriage return. **Table 2** presents a summary of UNIX commands needed for navigating the Internet.) Welcome to the 'net!

Electronic mail (e-mail) is the most common usage of the Internet. E-mail messages consist of text and can have attachments such as sound, graphics, or other binary files. E-mail is transferred between machines using TCP/IP

▼

The Internet is an endless, ever-expanding web of information and global communication.

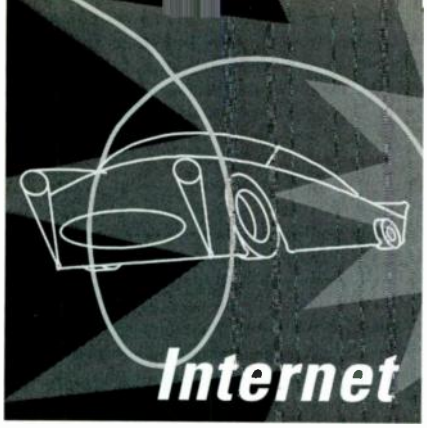
or other protocols and is stored in a private area for each user. However, e-mail is far from being completely secure, so avoid using it for sensitive information.

There are three primary e-mail programs in UNIX: *mail, elm,* and *pine. Mail* is the most universal, but we recommend *pine* if it's available. *Eudora,* a graphical e-mail application, may also be available.

As an example, let's send e-mail to request an updated list of Internet service providers. Type the following at the UNIX prompt (user keyboard input is indicated by **bold** type; system responses by regular text):

mail info-deli-server@netcom.com
Subject: **pdial**
Please send me the list
.

Be sure to include the period on the last line. The string: "info-deli-server@netcom.com" is referred to as an *e-mail address.* It is composed of a user name followed by the domain name of the machine. In a few minutes, you should receive a reply that will contain an exhaustive list of Internet service



providers. You can check for the message by typing **mail** at the UNIX prompt. When the message arrives, you'll see something like this:

Mail Thu Jul 23 13:52:20 PDT 1992
Type ? for help.
"/usr/spool/mail/freeband": 1 messages 0 unread
N 1 info-deli-server@netcom.com Tue Jan 11 13:50:20 Re: pdial
&

Hit a carriage return at the & prompt and the message will be displayed. Save the message by typing

s <message number> <filename>

at the & prompt. For example, typing **s 1 pdial-list** would save message number 1 into a file named "pdial-list." Typing **q** brings you back to the UNIX prompt.

Try starting *pine* by typing **pine** at the UNIX prompt. *Pine* has help and is easier to use than *mail*. If *pine* is not available, try *elm* by typing **elm** at the UNIX prompt.

In addition to e-mail, the Internet offers USENET newsgroups. These are similar to electronic bulletin boards, but with broader distribution. As of this writing, approximately 5,000 newsgroups existed. For many people, USENET is the most important Internet resource. From the UNIX prompt, we use *tin*, a threaded newsreader ("threading" refers to the ability to follow an ongoing series of questions and responses on a particular topic, or

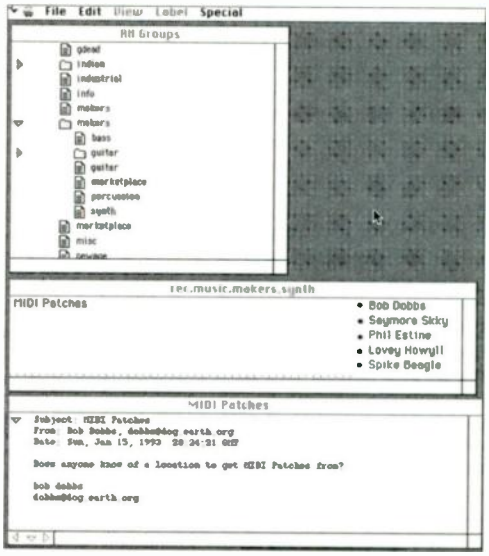


FIG. 1: A graphical glimpse inside a news conference. In the top window, files indicate topics or "conversations," while folders hold groups of related topics. One thread inside the "synth" topic is a request for MIDI patches (bottom). Four people have responded (cen-

TABLE 3: FTP Sites

You're on your own here; we have not installed this software. Be aware that directory locations are subject to change.

SITES FOR MACINTOSH APPLICATIONS

Application	FTP Host	Directory
Eudora	ftp.qualcomm.com	/mac/eudora
Fetch	ftp.dartmouth.edu	/pub/mac
InterNews	ftp.dartmouth.edu	/pub/mac
MacTCP	From Apple Computer/*Internet Starter Kit;* see references.	none
Mosaic 1.01	ftp.ncsa.uiuc.edu	/Mac/Mosaic
NCSA Telnet	ftp.ncsa.uiuc.edu	/Mac/Telnet
PPP 2.0.1	merit.edu	/pub/ppp
TurboGopher	sumex-aim.stanford.edu	none

SITES FOR WINDOWS APPLICATIONS

Mosaic	ftp.ncsa.uiuc.edu	/PC/Mosaic
PC Starter Kit	tbone.biol.scarolina.edu	/pub/kit

OTHER FTP SITES

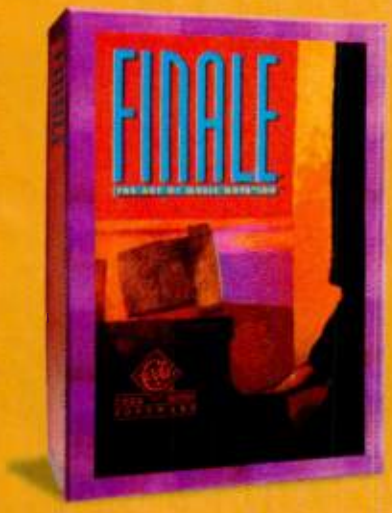
Description	Host	Directory
art	amanda.physics.wisc.edu	/pub/art
astronomy	dftsrv.gsfc.nasa.gov	/pub/images/gif
images	wuarchive.wustl.edu	/multimedia/images/gif
MIT Media Lab	media.mit.edu	none
music software	ccrma-ftp.stanford.edu	/pub
sounds	sumex-aim.stanford.edu	/info-mac/Sound
soundhack	mills.edu	/ccm
wiretap	wiretap.spies.com	none

"The ultimate choice!" *Electronic Musician* 12/93
"No product on the market can match Finale." *MacWorld* 12/93

WHAT DO

Jurassic Park, The Baptist Hymnal,
Malcolm X, *The Chicago Symphony*, **Frank Zappa,**
The Tonight Show, **Sesame Street Songbook,**
Hal Leonard Publishing ***and*** **A Few Good Men**

HAVE IN COMMON?



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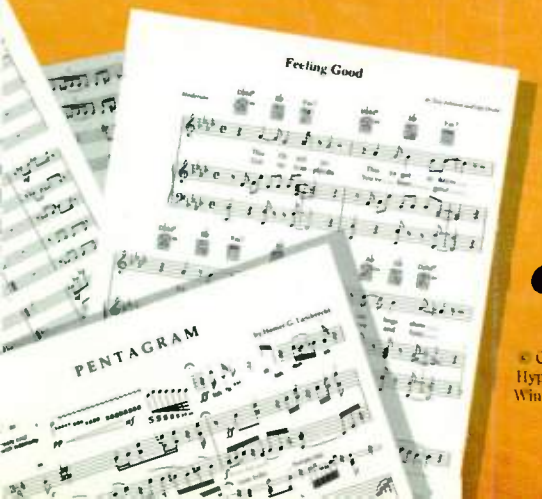

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CALL 1-800-843-2066 x304

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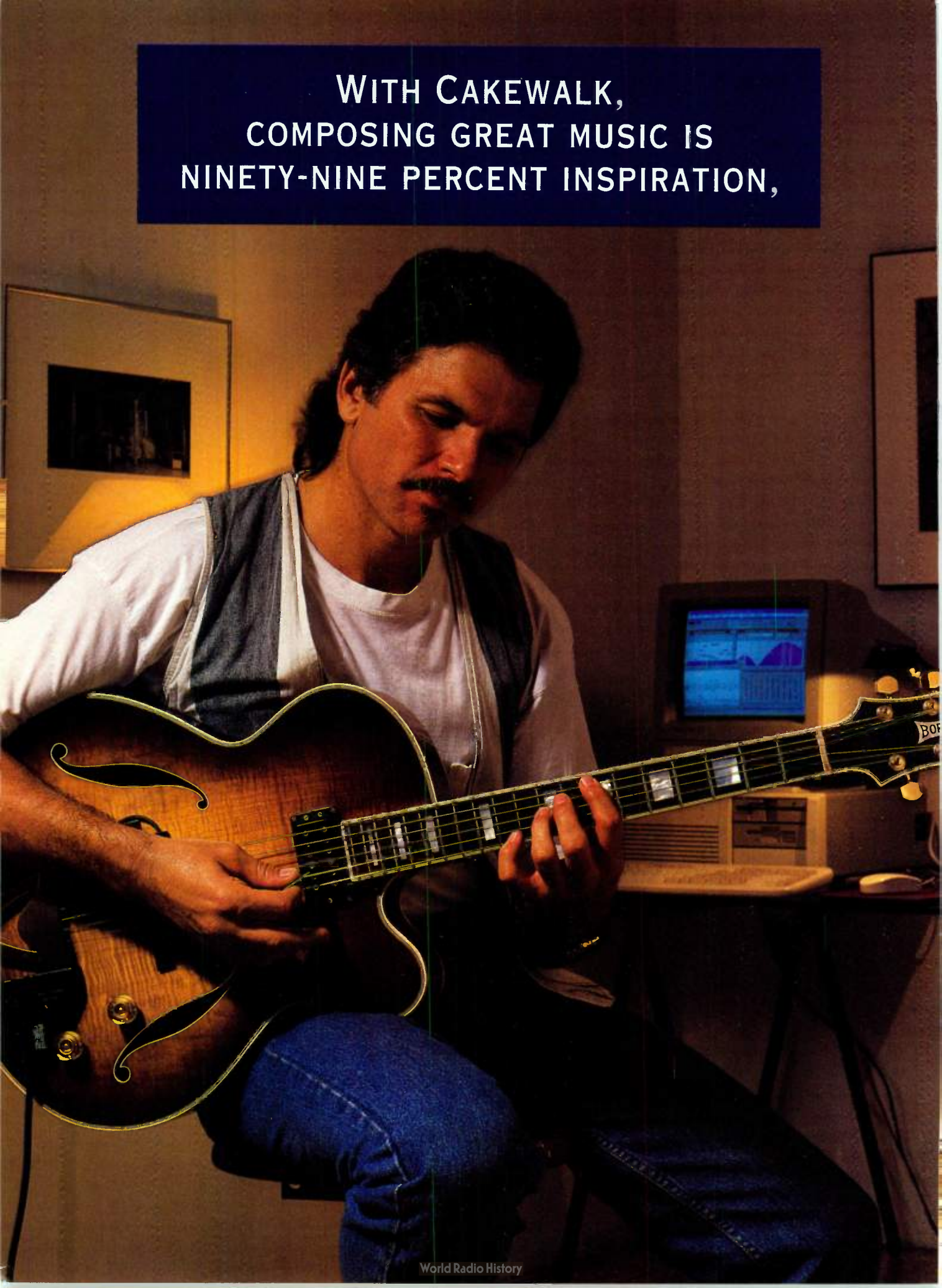

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MAKE A NOTATION OF THIS.

Cakewalk Professional works in concert with you every step of the way. In fact, new version 2.0 not only helps you create your compositions, it also prints them. The multi-track Staff view lets you edit and print up to 16 staves in multiple key signatures, as well as title, performance instructions, author and copyright information. It even displays and prints triplets. All in the font size you select.

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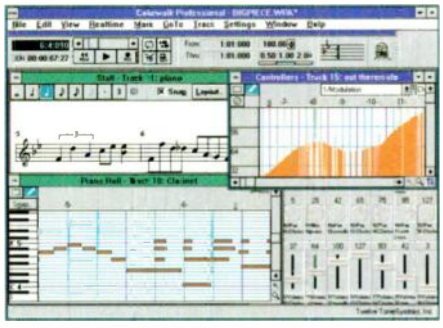
With Cakewalk Professional, composing music is an aural and visual experience. You can use the Piano Roll view to insert, resize and move notes in a grid. The detailed Event List view lets you edit MIDI and multimedia events on multiple tracks at once. Use the Track/Measure view to assign track parameters like MIDI channels, instrument patches and key offsets, even in real-time.



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for Windows

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- Remote control from MIDI keyboard
- "Hot Key" macros
- Loop record
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Twelve Tone
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System Requirements: IBM PC with 10 MHz 80286 or higher, 2 MB of RAM, mouse; Microsoft Windows 3.1. Supports any combination of up to 16 MIDI ports on devices with Multimedia Extensions drivers (including Roland MPU-401 compatibles and Music Quest MQX interfaces). Cakewalk Professional for Windows is a trademark of Twelve Tone Systems. Other products mentioned are trademarks of their respective owners.

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*The new **MicroPiano** – The half-rack module features 32 Presets including Kurzweil's new Grand Piano samples, Strings, Hammond® Organ, Electric/Electronic Pianos as well as 16 superb digital multi-effects*

Musicians have always envied those who have had the legendary sounds of a ***Kurzweil*** at their command – especially our grand pianos, electric pianos, strings and organs. With the new $499 ***MicroPiano*** sound module, *you* can now add all these great sounds (and others) to your keyboard setup.

The *MicroPiano* features 32 of the most sought-after keyboard sounds with full 32-note polyphony (*64-note with two MicroPianos in the exclusive Link Mode*). In addition to keyboard sounds, Kurzweil's lush string section, played solo or layered with another sound, creates a gorgeous orchestral ambiance. Some sounds are based on the proprietary samples from the award-winning *K2000*, but many are brand new, available only in the *MicroPiano*. If you don't have a nine-foot concert grand and a great recording engineer, you need the *MicroPiano*.

Besides the acclaimed Kurzweil samples, the compact, half-rack module offers the kind of playability a keyboard player expects, with 16 superb, crystal-clear digital multi-effects, useful MIDI control capabilities and fully–functional soft, sostenuto and sustain pedal response. The user interface is straightforward, easy-to-use and includes Tuning and Transposition as well as Stereo Outputs.

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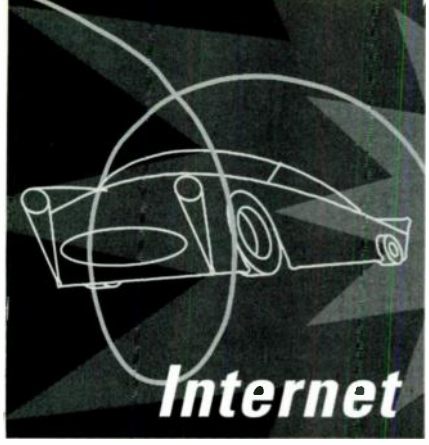


thread) with a fairly good terminal-based interface. If you are connected graphically, try *NewsWatcher* or *Nuntius* (see **Fig. 1**).

Accessing USENET is easy. Simply type **tin** at the UNIX prompt, and a screen will appear containing a list of newsgroups. Let's read one for new users.

Type / followed by **news.announce newusers** and then a carriage return. Use the arrow keys to select an article and a carriage return to read it. Type **h** anywhere in *tin* for help. Spend some time reading the articles in this group to get oriented. If *tin* or a graphical alternative is not available, you'll have to try using *rn*, or *nn*, in which case you'll almost certainly need to get one of the books listed in the "References" sidebar.

GOPHER IT!

Gopher is a menu-based application for navigating the Internet. Each menu item in *Gopher* is linked to a file or directory. Menu items linked to files are called *file titles*, and menu items linked to directories are called *directory titles*. Once in *Gopher*, you are connected to a *gopher server*. All *Gopher* servers that are connected on the Internet via TCP/IP are referred to collectively as *Gopherspace*.

Any machine can have a *Gopher* server, but not all of them do. All *Gopher* servers are capable of communicating—except when they can't. This points out a problem, or feature, of the Internet, depending on your viewpoint. You won't always have the ability to access any resource at any time, because there is no central control over the Internet. Each individual system administrator decides what is publicly accessible and when machines are up.

To start *Gopher*, type **gopher** at the UNIX prompt. Graphical versions of *Gopher* can display several screens simultaneously. *Gopher* is navigated using arrow keys, or by typing the menu entry number followed by a carriage return. Instructions are available at the bottom of the *Gopher* screen.

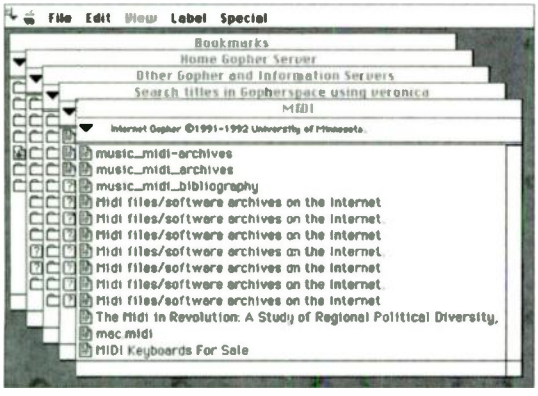


FIG. 2: The results of a *TurboGopher* search for the keyword "MIDI" produced this list. Items may be located on computers anywhere in the world.

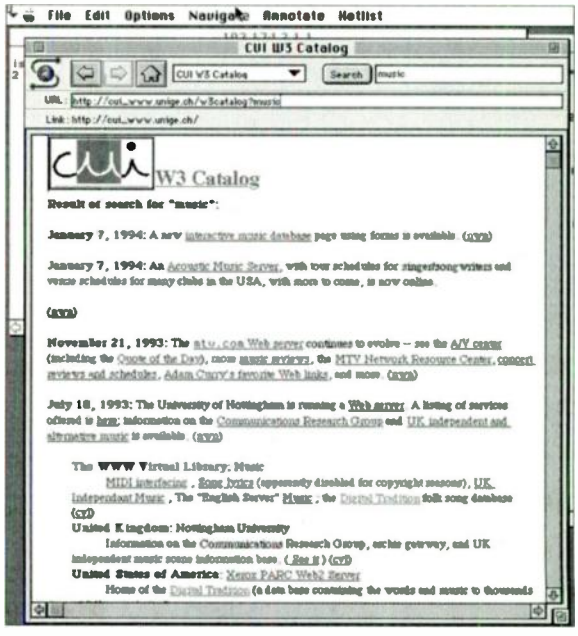


FIG. 3: The *World Wide Web* (*WWW*) uses a powerful hypertext approach to searching. In this screen, a graphic interface to *WWW* called *Mosaic* was used to search for the keyword "music." Clicking on any of the underlined words or phrases takes you directly to that item.

Now let's venture into Gopherspace by selecting "Search titles in Gopherspace using Veronica." *Veronica* is a network-searching program. The results of this search may lead anywhere in the world. Once in the *Veronica* screen, you can choose "FAQ: Frequently-Asked Questions about Veronica" to get help. FAQs are posted throughout the Internet; always read them when in unfamiliar territory. More help on *Veronica* is available by selecting "How to compose Veronica queries."

Try a *directory title search* by selecting any menu item labeled "Search Gopher Directory Titles..." Be aware that searches only look for keywords in *Gopher* menu titles; they do not delve into the actual contents of the underlying files. You will be asked for keywords; enter **MIDI**. A list of directory titles containing the word "MIDI" should appear. Try another location if you encounter any connection problems.

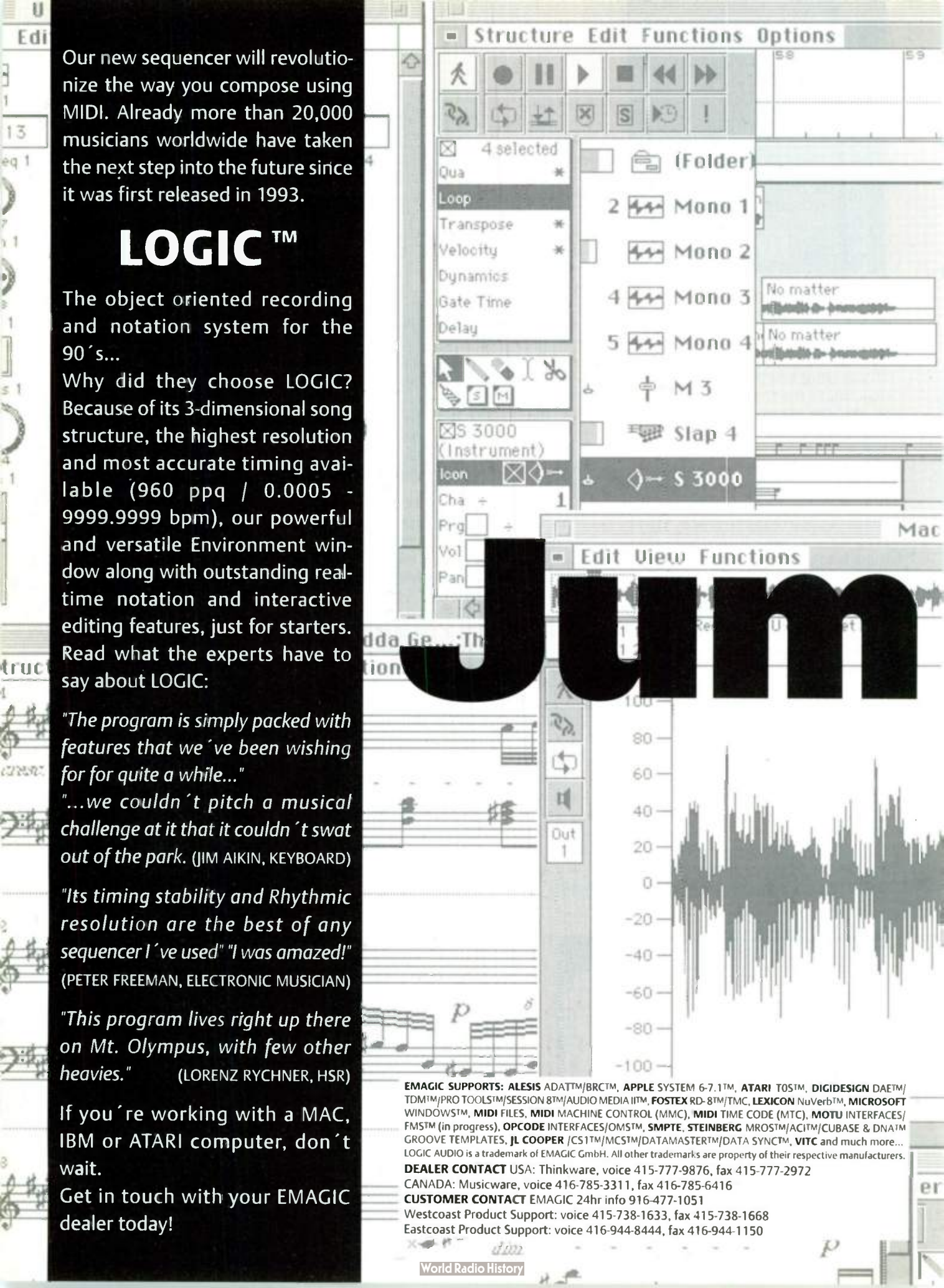
For broader Gopherspace searches, select one of the "Search gopherspace at..." items. These searches should produce both file and directory titles. A search we conducted using *TurboGopher*, a graphical version of *Gopher*, led us to a directory called "ftp.cs.ruu.nl directory/ pub/ MIDI" (see **Fig. 2**). In it, we found Ensoniq ESQ-1 and Korg M1 patches.

Cut loose and just surf *Gopher* for a while! Try to find *Jughead*, a more sophisticated *Veronica*.

Before we leave the topic of Internet navigation tools, we must mention the *World Wide Web* (*WWW*). Potentially more powerful than *Gopher*, although not as widespread, *WWW* offers a hypertext (linked text) approach. To access the *WWW*, type **telnet ukanaix.cc.ukans.edu** at the UNIX prompt, and then log in as **www**, with no password. *Mosaic* is a powerful graphical interface to *WWW* (see **Fig. 3**).

FILES OVER THE NET

FTP is an application for transferring files across the Internet. Many sites allow public access to certain directories. For example, there is a machine at the Stanford University Center for Computer Research in Music and Acoustics (CCRMA) called *ccrma-ftp.stanford.edu*. You can retrieve files from this machine by typing: **ftp ccrma-ftp.stanford.edu** at the UNIX prompt.



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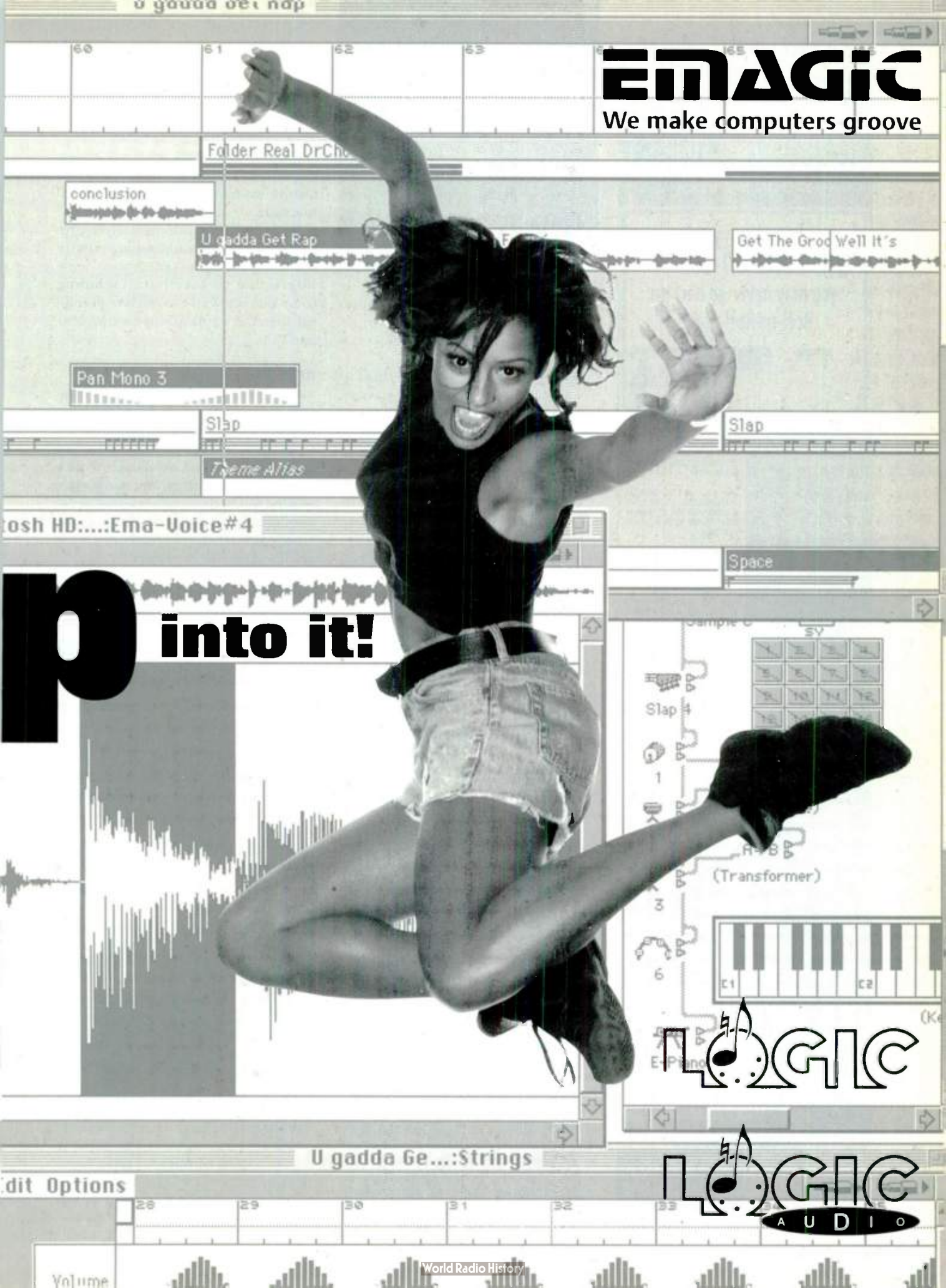
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p into it!
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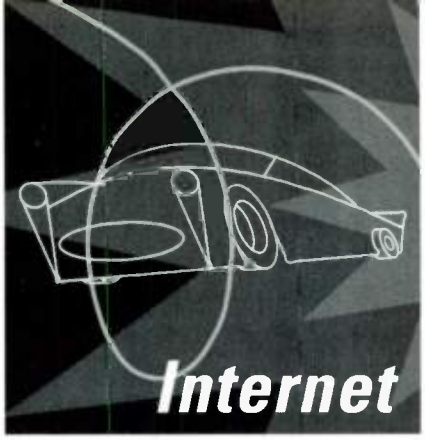

When asked for a password, enter **anonymous** and give your e-mail address as the password. This process is called *anonymous ftp*.

Once connected to ccrma-ftp.stanford.edu, you'll see a prompt: *ftp*>. Type **help** at this prompt, but be aware that the help file is terse. To get a document describing files available at ftp-ccrma.stanford.edu, type the following commands from the *ftp* prompt:

```
cd pub
get CCRMA.README
q
```

These commands switch to a directory called "pub," retrieve a file named "CCRMA.README," and exit from *ftp*. Now you'll be back at the UNIX prompt and can read CCRMA.README by typing **more CCRMA.README**. You can also download this file to your local machine.

Fetch provides a graphical alternative to the pedantic *ftp* and supports more advanced features. **Table 3** gives some interesting *ftp* locations, including some that allow you to retrieve graphical Internet applications for the Mac and PC.

REMOTE LOGON

Telnet is an application that allows you to remotely log on to machines anywhere on the Internet, including library catalogs, *Gopher* servers, databases, and your personal accounts on different machines. For the average user, knowledge of *telnet* will become unnecessary as *Gopher* and the *World Wide Web* become more comprehensive. *NCSA Telnet* is a graphical version of *telnet*.

Let's give it a whirl. Type **telnet is.internic.net** at the UNIX prompt. You will be asked for a user name; type **gopher**. We are now connected to the *InterNIC Gopher*, an extremely important resource for Internet users. Surf around; you'll learn more about the Internet from *InterNIC* than we can possibly cover here.

The most important thing to get from the *InterNIC Gopher* is the table of contents, from menu item "InfoSource Table of Contents." We can't stress enough how important *InterNIC* is; with this article and *InterNIC*, you're on your way. Be sure to look at the information regarding file compression, which you need to understand if you plan to retrieve files via *ftp*.

Now that you know about the *InterNIC Gopher*, look for information on the following topics: *LISTSERV*, *WAIS*, *CARL*, and *ERIC*.

Learning how to find what you need is part of the challenge and fun of the 'net. But we must warn you that cruising the Internet is almost too much fun. Remember to get some work done, too!

(Special thanks to Pat Scandalis and Lawrence Ullman.)

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Big Dummy's Guide to the Internet, FTP: gopher.uchicago.edu. Directory: /nonuoc/internet/guides/eff.

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INTERNET Research, Vol. 3 No. 2, Summer 1993, pp. 69-87.

Internet World Magazine, ISSN #1064-3923, E-mail: meckler@jvnc.net.

Online Access Magazine, ISSN #0898-2015.

Zen and the Art of the Internet, FTP: ftp-nop:ftp.cs.widener.edu. Directory: /pub/zen.

Nick Porcaro *and* **Sarah Rosenbaum** *teach Internet classes in the San Francisco Bay Area. E-mail: freeband@netcom.com.*

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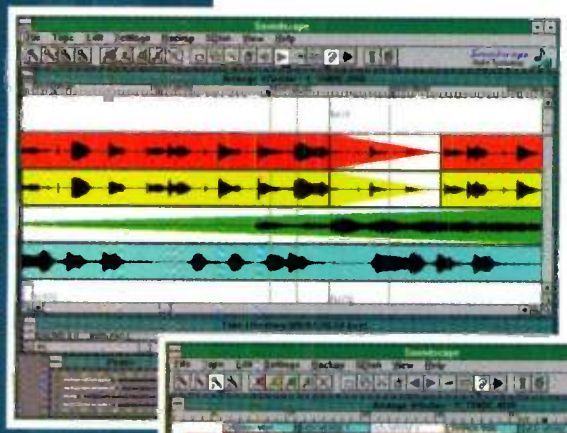
Soundscape is a high quality 16 bit digital audio recording and editing system, and is capable of expanding your studio with 4/8/12/16 or up to 64 tracks. The system can be used in a recording/composing environment and has extensive non-destructive audio editing facilities.



Operation is from an IBM PC™ or compatible and runs under Windows 3.1™. Software allows up to 64 virtual tracks to be recorded in stereo, edited (non-destructive) and digitally mixed down to four outputs. As the system is modular, several Soundscape units can be synchronised with full sample rate accuracy and used together giving up to a maximum of 32 inputs and 64 outputs.

If you are looking for a Hard Disk recorder/editor with "Open" architecture that can be totally integrated with any Windows™ sequencer or editing package, is random access to the disk, expandable beyond 8 tracks and offers full "chase lock" synchronisation to analog/video tape machines then the next stage of the digital revolution starts here.

2U 19" rackmounted unit.

Physical tracks: 4

Sampling rate: 22.05/32/44.1/48KHz

Data format: 16 bit linear

Signal processing: 24-bit internal

Data storage: IDE hard disk 18mS, fitted in the rack unit (not supplied), size depends upon recording time required, e.g. 130MB gives 25min 45sec total @ 44.1KHz, 1gB gives 3 hours 22 minutes

2nd internal IDE drive can be fitted.

A/D conversion: 16 bit sigma-delta 64 x oversampled

D/A conversion: 18 bit sigma-delta 64 x oversampled

Synchronisation: Master or Slave, MTC with full chase lock, MIDI song pos.pointer + clock

Analogue in: 2 x RCA/cinch, unbalanced – 10dBv/+4dBv (2 tracks in)

Analogue out: 4 x RCA/cinch, unbalanced + 4dBv (4 tracks out)

Digital in: 1 x RCA/cinch, S/PDIF format (2 tracks in)

Digital out: 2 x RCA/cinch, S/PDIF format (4 tracks out)

Input S/N Ratio: > 93dB un-weighted

Output S/N Ratio: > 113dB un-weighted

Wow and Flutter: Un-measurable

Pro-Audio Option: XLR balanced Analogue inputs and outputs, AES/EBU Digital inputs and outputs (XLR)

Host Interface: IBM-AT: parallel via PC expansion plug-in card (ISA). Supports 2 x 4 track rack units.

MIDI: in, thru, out

Back-up medium: DAT-recorder with digital i/o, or via the PC (e.g. to a SCSI optical drive or any logical PC drive)

Software features 8 real time parametric EQ's per rack unit assignable to any of the 4 tracks

Software allows easy start up and control of multiple units and allows efficient storage of songfiles and arrangements

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Teach your Children

By Scott Wilkinson

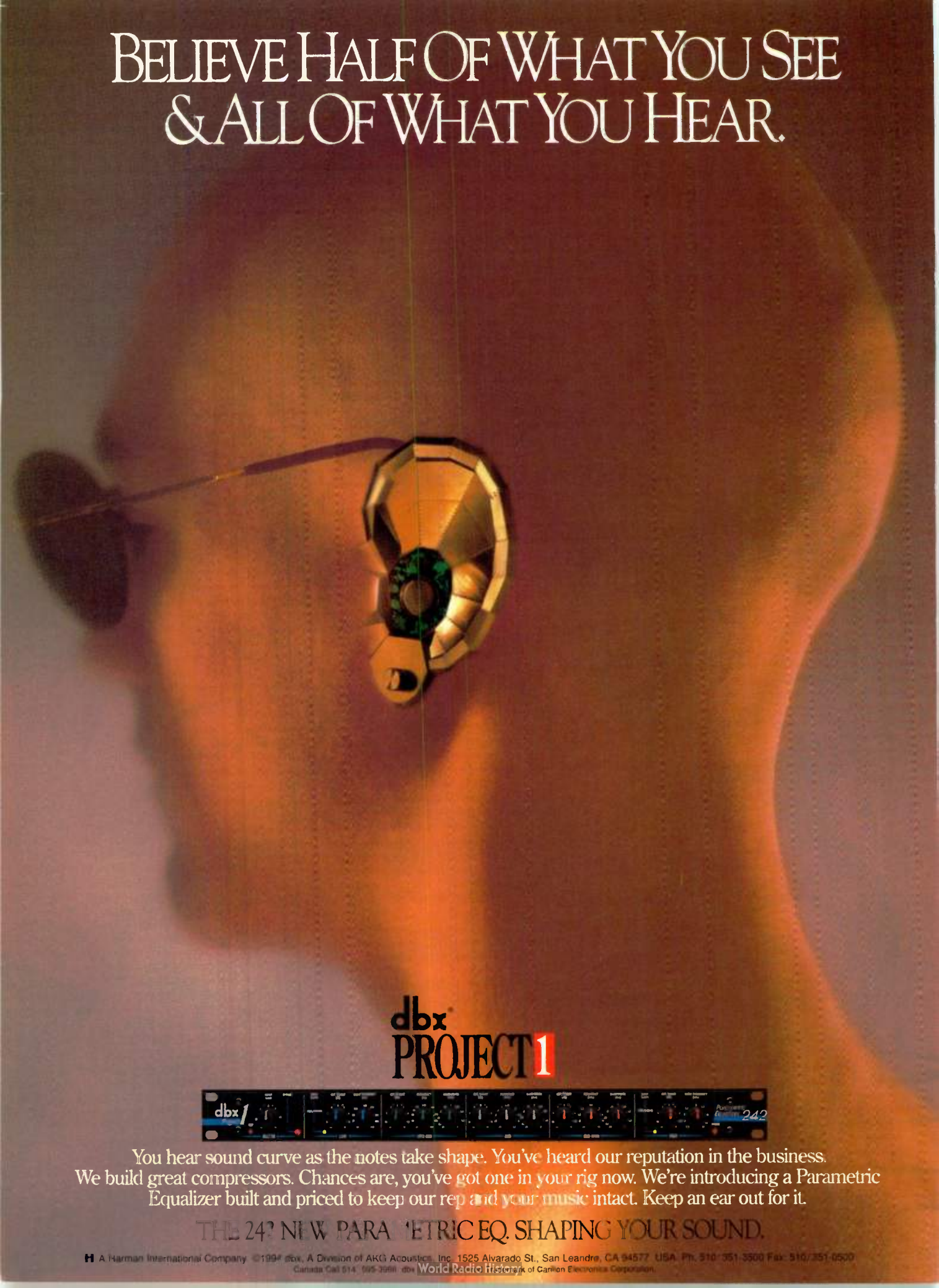
Like any caring parent, you probably want to share your interests with your kids. As an EM reader, those interests include music and technology. Fortunately, you can use the technology you enjoy to teach your children about music. This approach has many advantages. For one thing, kids respond well to computers and synths; these are familiar musical tools used by most of their favorite groups. Technology also makes practicing more fun than when I was learning to play trumpet. As a result, children are motivated to spend more time learning.

Use the technology you love to teach your kids about music.

Illustration: Marcos Sorensen


TRASH

BELIEVE HALF OF WHAT YOU SEE & ALL OF WHAT YOU HEAR.



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Another important consideration is the state of music education in the schools. Many school music programs are going the way of the dinosaur due to budget cutbacks. Those that have survived are starting to use computers and MIDI gear, which provides another reason to install music-education software on your home computer: Your kids can continue their studies at home with similar tools.

EQUIPMENT REQUIREMENTS

As an **EM** reader, you probably already have most of the equipment you need to teach your children. To start with, music-education software requires a computer. Most programs are written for the Macintosh and/or PC compatibles running DOS or *Windows*. Several titles are available for the Atari and Amiga, and a few developers have catalogs for the Apple IIe and IIGS thanks to their significant penetration into schools. Most Apple II programs also work on a Macintosh LC 520 with the Apple IIe emulation card.

Most programs have MIDI capabilities, which means they can use an external sound module to play musical examples, exercises, and accompaniments. This requires a MIDI interface. Most PC programs can also use an internal sound card, such as the Roland SCC-1 or the Creative Labs Sound Blaster, which typically include a MIDI interface and an audio input for a microphone. A few programs require such a card. Many Mac, Atari, and Amiga programs can also use the computer's internal sound generator, although the quality and polyphony will be lower.

Students interact with the programs in several ways. Of course, the computer keyboard is essential, and most programs rely heavily on a mouse or other pointing device. If the program has MIDI capabilities, it's important to have a MIDI keyboard or other controller for playing exercises. Some programs let you play notes with the mouse on an onscreen musical keyboard, or directly from the computer keyboard, but these options are far less effective than real instruments.

One of the best things about computer-based music education is the ability to change the tempo of an example without changing the pitch. This lets kids slow down a riff so they can learn it, slowly increasing to performance tempo.

In this age of multimedia, more and more programs are published on CD-ROM. This allows the developer to combine CD audio, MIDI files, enhanced graphics, and software code in an easily distributed form. Naturally, this type of software requires a CD-ROM drive.

WHAT TO LOOK FOR

Music-education software includes three basic types of activities: lessons, exercises, and games. Another type of software includes dictionaries of scales or riffs that are displayed on the screen for kids to learn. Most software incorporates several of these activities in one program or a coordinated series of programs. Many programs also include a record-keeping function that tracks one or more students' progress.

There are several essential attributes to look for in music-education software. The material must be factually accurate, and the program must provide appropriate responses that are positive and nonjudgmental. The skill required to operate the program must be consistent with the skill level of the material being taught. Onscreen instructions must be clear, concise, and complete, and the objectives must be readily apparent.

Technically, the software must be free of bugs, and the use of color and graphics must be appropriate and clear. Audio and instructional pacing needs to be under user control, except when they are an integral part of the teaching strategy. Expected student responses must be consistent, and unanticipated responses must be handled smoothly without disrupting the program. The operation and display screens must correspond to the documentation, which must also include system 0 procedures and instructions for use.

Beyond these minimum requirements, there are several desirable attributes to look for. For example, it's nice to have multiple levels of difficulty that are automatically selected according to the skill demonstrated by the student. These levels should also be manually selectable. The program's responses to student errors should be helpful in guiding them to the correct answers. The student should remain in control of the program and actively involved in the learning process.

Other desirable attributes include a way to select specific parts of the program and the ability to bypass instructions at will. The student should be able to correct a response before the software evaluates it, and help screens should be available from any part of the program. Students should be able to exit the program from any point and return to that point directly from the beginning of the program, without losing track of their progress.

The documentation should include a description of objectives, skills to be taught, and prerequisite skills. Other desirable information includes expected time to complete the program, suggestions for using the program in various settings, representative screen shots, and a tutorial if the program is complicated.

Some music-education software products shine as examples of excellence. These programs use innovative approaches and foster creativity in students. Alternate methods of presentation provide cyclic reinforcement of concepts. Truly excellent programs present material not easily provided by other methods or engage the student in experiences not readily duplicated

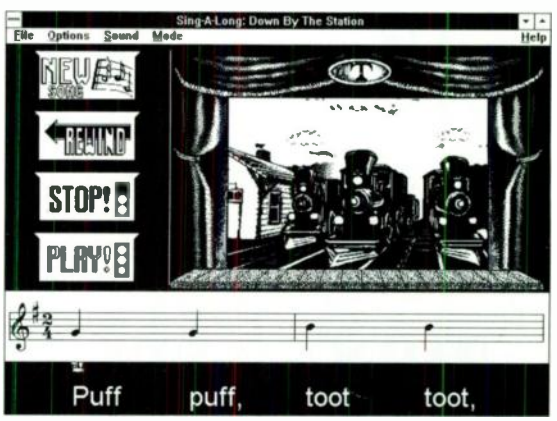

FIG. 1: Dr. T's *Sing-A-Long* provides big, onscreen control buttons that are hard for young kids to miss. Each song is accompanied with animation, music, and lyrics.

in the real world.

All of these attributes are applicable to computer-aided instruction (CAI) software for home or classroom use. If you're a music teacher, most of the programs described here are also appropriate for use in the classroom or private teaching lab, as well as at home.

YOUNG CHILDREN

As with any language, the younger children are when you start exposing them to music, the easier time they have learning it. There are several products on the market aimed at young children. For example, Dr. T's *Sing-A-Long* ($29.95; *Windows;* see **Fig. 1**) is an animated karaoke program for kids ages 3 to 10. The program is available on 3.5-inch floppy disks or CD-ROM. Children sing along as cartoon characters perform 26 classic children's songs. You can even add a microphone to hear your kid's performances through the sound system. A Little Kids mode prevents the youngest children from inadvertently accessing other programs.

For children ages 3 to 9, Howling Dog Systems offers *Mr. Drumstix' Music Studio* ($69.95; *Windows*). The software depicts several animated characters, including Mr. Drumstix, Guitar George, and Ms. Florida Keys, all of whom introduce various instrumental concepts and play the kids' own musical creations. A karaoke song player includes twenty popular children's songs, and kids can control the player by changing instrumentation and tempo. They can even create their own rhythm parts in a grid-based rhythm editor. Six games foster musical memory, pitch discrimination, instrument identification, chord recognition, and phrase matching.

Opcode recently started a new multimedia division called Opcode Interactive. Among their first products is *The Musical World of Professor Piccolo* ($69.95; CD-ROM; *Windows*) for ages 8 to adult.

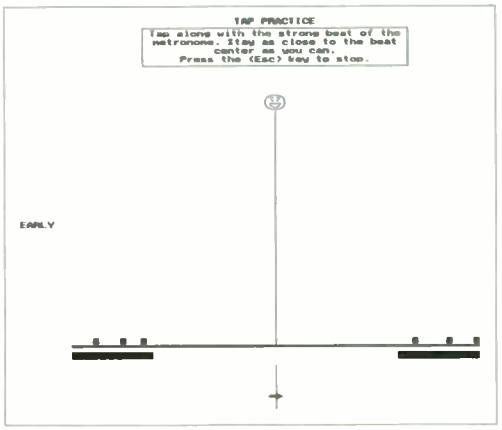

FIG. 2: In this screen from TAP's *Rhythmaticity*, you can see how early or late you are for each beat you tap.

The fun starts in Music Town, depicted on the screen as several buildings: Symphony Hall, Jazz Club, Rock Club, Library, Game Arcade, Church, and Music School. Double-click on any building to enter it and learn about the type of music played there, including musical form and instruments. You can look up musical terms and instruments in the Library, take lessons at the Music School, and test your knowledge in the

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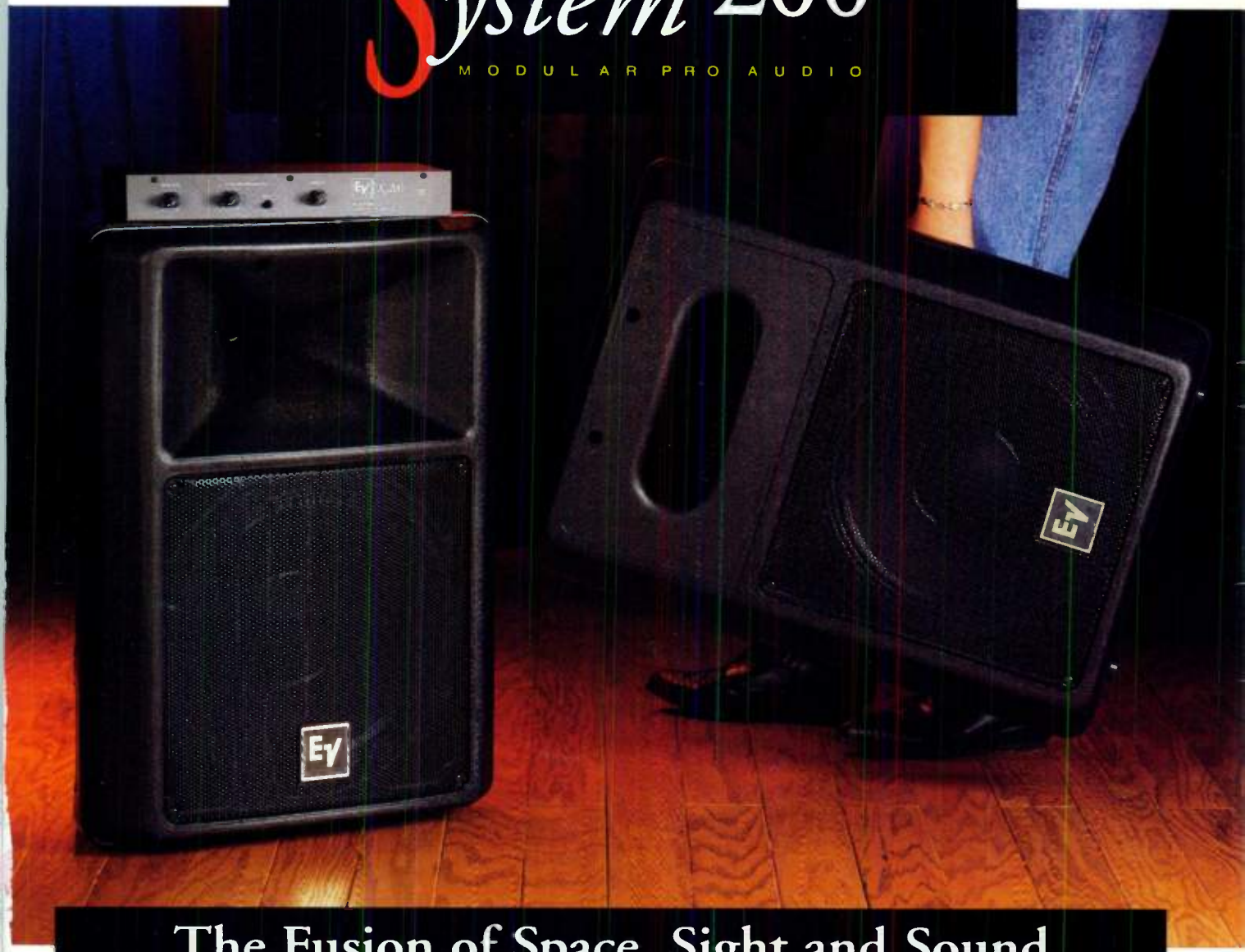

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Game Arcade. Skills addressed by the program include reading and notating music, musical styles, music theory and history, song forms, and musical instruments.

Movie giant Paramount has gotten into the act with Paramount Interactive's *Lenny's MusicToons* ($49.95; *Windows*), which is available on floppy disk or CD-ROM. Lenny is a penguin who lives in New York City. His penthouse apartment is the scene of various musical adventures. For example, your kids can assemble musicians and props to jam in Lenny's Theater and create their own music videos for PTV (Penguin Television). Pitch Attack, Puzzle Book, and Matching Game provide hours of fun while children learn about composition, harmony, sound, stage performance, note reading, and creative musical expression.

Binary Zoo has created an interesting product for ages 7 to 14 called *Rock and Bach Studios* ($34.95; DOS). Computer companion Edison leads kids through the program's various rooms and studios. The Sound Library includes many sounds to play and modify, such as breaking glass, airplanes, and voices. The Harmony Room exposes kids to different types of chords, riffs, and orchestrations, while the Drum Room lets them wail on rock, jazz, and latin drum sets. The Music Library includes biographies of famous composers and samples of their work, and the Instrument Room offers a wide variety of instrumental sounds. Kids can even produce their own music videos, complete with lighting and dancing. Videos are assembled with onscreen musicians, instruments, and musical phrases, and the finished product can be saved to disk and played back without the program.

GAMES

A wide variety of musical games appeals to a broad range of ages and musical abilities. For example, Ibis Software offers *RhythmPlay*, *EarPlay*, and *NotePlay* ($49.95 each; DOS), which provide the opportunity to practice rhythm, ear training, and keyboard skills, respectively. (*NotePlay* is also available for *Windows*.) These products are described in "From the Top: A Disk for Teacher" in the January 1993 **EM**.

Temporal Acuity Products (TAP) provides many music-education games for the Apple IIe and IIGS. They currently offer a package deal that includes all titles from their Master Edition software collection and a 40 MB SCSI hard disk for $999, which represents a savings of $1,700 on the original price of the software alone. TAP also offers two levels of rhythmic games in *Rhythmaticity Basic* and *Advanced* ($90 each, $155 for both; DOS; see **Fig. 2**). Students tap displayed rhythms on the computer or MIDI keyboard and receive feedback on how accurate they were.

A well-known distributor of music-education software for a variety of computer platforms is Electronic Courseware Systems (ECS). Among the newest titles offered by ECS is *Musicus* ($29.95; *Windows*, Macintosh), a fast-paced game in which students maneuver "rhythm blocks" into specific meters. This program offers the option of hearing the completed line at

MUSIC-EDUCATION SOFTWARE DEVELOPERS

Alfred Publishing
tel. (818) 891-5999
fax (818) 891-2182

Ars Nova
tel. (800) 445-4866
or (206) 889-0927
fax (206) 889-0359

Binary Zoo
tel. (518) 298-2740
fax (514) 846-1171

Coda Music Technology
tel. (800) 843-2066
or (612) 937-9611
fax (612) 854-4631

Dr. T's Music Software
tel. (617) 455-1454
fax (617) 455-1460

Electronic Courseware Systems
tel. (800) 832-4965
or (217) 359-7099
fax (217) 359-6578

Electric Theater
tel. (215) 379-4538
fax (215) 667-3477

Emagic
tel. (916) 477-1051
fax (916) 477-1052

Fast Finger Music
tel. (800) 327-0209
or (516) 536-0298
fax (516) 536-0298

Howling Dog Systems
tel. (613) 599-7927
fax (613) 599-7926

Ibis Software
tel. (415) 546-1917
fax (415) 546-0361

Imaja
tel. (510) 526-4621
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Lil' Johnny Enterprises
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or (804) 359-5917
fax (804) 353-8405

Lyrrus, Inc.
tel. (215) 922-0880
fax (215) 922-7230

MiBAC Music Software
tel. (507) 645-5851
fax (507) 645-2377

Midisoft
tel. (206) 881-7176
fax (206) 883-1368

MPower
tel. (415) 393-1470
fax (415) 393-1488

Musicware
tel. (206) 881-9797
fax (206) 881-9664

Opcode Interactive
tel. (415) 494-1112
fax (415) 494-1113

Opcode Systems
tel. (415) 856-3333
fax (415) 856-3332

Paramount Interactive
tel. (415) 812-8200
fax (415) 813-8055

PG Music
tel. (800) 268-6272
or (905) 528-2368
fax (905) 577-4704

Six String Software
tel. (206) 631-5855
fax (206) 631-5855

Software Toolworks
tel. (800) 234-3088
or (415) 883-3000
fax (415) 883-3303

Take Note Software
tel. (415) 431-9495

Temporal Acuity Products
tel. (800) 426-2673
or (206) 462-1007
fax (206) 462-1057

the end of the game. *Ear Challenger* ($39.95; *Windows*) is an aural/visual game in which players must remember increasingly longer series of pitches.

GENERAL MUSICIANSHIP

CAI software that fosters general musicianship abounds with titles to teach music theory and provide practice in ear training, rhythm, and sight reading. Some of these products are also described in "From the Top: A Disk for the Teacher," including Ibis Software's *Play It By Ear* ($99.95; DOS) and *Rhythm Ace* ($99.95; DOS, *Windows*), Midisoft's *Music Mentor* ($149.95; *Windows*), Imaja's *Listen* ($99; Macintosh), Ars Nova's *Practica Musica* ($125; Macintosh), Take Note Software's *Take Note* ($79; Amiga, Atari, *Windows*), and Alfred Publishing's many titles for various platforms.

MiBAC Music Software's *Music Lessons* ($119; *Windows*, Macintosh) includes drills in note names, key signatures, scales, intervals, rhythm, and ear training for all skill levels from beginner to advanced. Tutorials on all appropriate musical concepts are available in a series of help screens. The program also keeps track of students' progress and drill scores.

In addition to the titles available from their interactive division, Opcode Systems publishes *Claire: The Personal Music Coach* ($129.95; Macintosh; see **Fig. 3**). This program is designed to develop the fundamental skills of ear training, sight reading, and music theory using the voice or any instrument. Sophisticated pitch-recognition technology accepts vocal or instrumental input from the Mac's microphone or external digitizer and provides immediate feedback as students play or sing exercises. Over 500 exercises are included, and optional plug-in modules provide additional material and sounds from specific instruments. Progress through the exercises is automatically adjusted for each student's abilities and needs. An "intelligent assistant" guides the student through the material, providing or eliminating on-screen aids as required.

Although they are best known for their sequencing, notation, and digital-audio software, Emagic also publishes *HearMaster* ($99; Macintosh, Atari). This program offers listening exercises for intervals, chords, scales, melody, and rhythm. You can define the level of difficulty at which you want to practice, and exercises are generated randomly. Your children's progress is tracked and available at all times. The program is bundled with *MIDI Master*, a MIDI diagnostic and educational tool.

Electric Theater's *Keys to Music* series currently includes two volumes: *Learn to Read Music* and *Learn to Write Music* ($59.95 each; Amiga); three more volumes are planned. *Learn to Read Music* is designed to complement musical-instrument instruction, covering terms, note names, accidentals, note values, and basic rhythm. *Learn to Write Music* covers key and time signatures, as well as scales, in preparation for writing music. The series uses voice synthesis, graphics, text, and musical examples, as well as games, drills, and quizzes.

IMPROVISATION

PG Music is well known for *Band-in-a-Box* ($59, standard; $88 pro version;

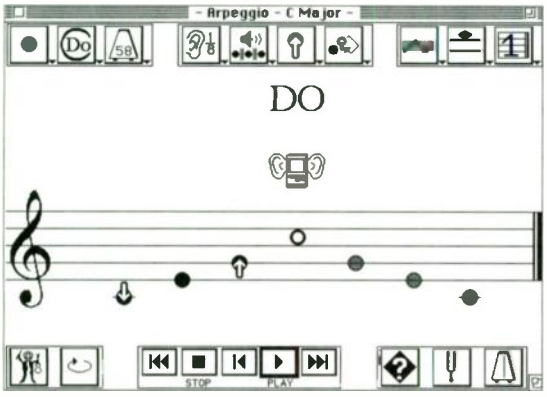

FIG. 3: In this example from Opcode's *Claire*, the student sang the first note too high (the arrow indicates the student must sing a lower pitch), the second note just right, and the third note too low. The program is waiting for the student to sing the fourth note.

DOS, *Windows*, Macintosh, Atari), which creates an entire MIDI accompaniment (bass, drums, comping parts) played with the chord progression and style you specify. The progression is displayed on the screen so you can solo along with the accompaniment. Many styles are included with the program, and you can buy additional libraries of songs and styles ($29 each). This makes it a lot of fun to learn standards and practice improvisation.

In the same vein, MiBAC software offers *MiBAC Jazz* ($125, Macintosh) to help kids practice improvisation. Based on the chord progression, style, form, and tempo you specify, the software generates MIDI performances for the keyboard, bass, and drums while displaying the progression on the screen. Twelve jazz styles are available, including Jazz 4/4, Jazz 3/4, Latin, and slow 4/4 (12/8). The tune can be repeated as many times as you want using different comping patterns in each chorus.

INSTRUMENTAL SKILLS

MIDI makes it relatively easy to teach keyboard skills via computer. Three popular products were reviewed in the April 1992 **EM**: TAP *Piano Works* ($129; DOS), Fast Finger Music *Fast Fingers* ($49.95/volume; DOS), and Software Toolworks *Miracle Piano Teaching System* ($299, Nintendo Entertainment System; $399, DOS; $419, Macintosh).

Another keyboard-skills program is Musicware's *Piano* ($129.95; *Windows*). This software encompasses a full year of piano lessons and takes the student from the most basic level through 2-hand competency, with exercises in sight reading, ear training, rhythm, and music-theory fundamentals. It also tests and tracks the student's progress. A 4-octave MIDI keyboard and sound card with a MIDI interface are required.

PG Music offers *The Pianist* ($49; *Windows*, Macintosh, Atari), which includes over 200 MIDI performances of "classical" piano pieces by world-class concert pianists in Standard MIDI Files (SMFs). An onscreen keyboard depicts the music, which you can play back at any speed—even one note at a time—as you learn the piece. *The Jazz Pianist* ($49; *Windows*, Macintosh, Atari) is similar, with SMF performances of more than 60 jazz standards by top players in a variety of styles. The *Windows* version displays the piano part in standard music notation and chord symbols. Both programs feature trivia and guess-the-song games, program notes, biographies, a music dictionary, and much more.

If you have high-school-age children at home, there's a good chance you're also living with at least one guitar. Due to the popularity of this instrument, there are several programs designed to help aspiring guitarists improve their skills. PG Music's library of software includes *The Jazz Guitarist* ($49; *Windows*, Macintosh, Atari), which includes over 60 jazz standards played on MIDI guitar with combo accompaniment in SMF format. This program is similar in all respects to *The Jazz Pianist*, including guitar tablature, as well as standard

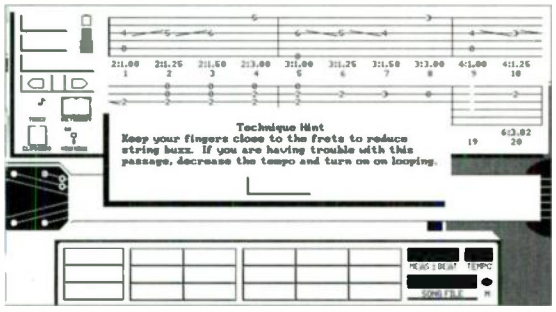

FIG. 4: Six String Software's *GuitarWorks* provides hints and displays the guitar part in tablature and fretboard formats.

notation and chord symbols.

Six String Software's *GuitarWorks* ($79.95; DOS; see **Fig. 4**) includes several built-in utilities, such as a tuner, chord dictionary, and MIDI sequencer. Fingerings are displayed on a fretboard, standard chord diagrams, and tablature. Two add-on products are also available: *How to Play Guitar* and *Scales & Riffs* ($14.95 each). *How to Play Guitar* includes a 125-page book and over 130 disk-based exercises, while *Scales & Riffs* teaches fretboard basics, scales, and chord fundamentals. It also includes many licks in different styles that students can learn. Each add-on is equivalent to nearly six months of private lessons.

MPower's *MusicPower for Guitar* ($79.95; *Windows*) teaches rock guitar by example. Several popular rock songs, such as Talking Heads' "Burning Down The House" and U2's "Angel of Harlem," have been licensed and recorded into SMFs. As you play each song, the guitar part is displayed in three forms: fretboard, standard notation, and tablature. You can tell the computer to play all parts, all parts except the guitar, or the guitar only. The sequence of songs is designed to progress from simple chords and rhythms to more advanced riffs and leads. Additional albums of twelve songs are available for $29.95 each.

Lyrrus has taken a slightly different approach. Their G-Vox system ($399; DOS, Macintosh) includes a special pickup that mounts temporarily (using suction cups) on virtually any guitar and connects to a belt-pack interface. The belt pack is then connected to the computer's serial port. The basic package includes Lyrrus' *Riffs* software, which plays prerecorded riffs from various artists and displays them in three ways: standard notation, tablature, and fretboard. It also displays what you play, letting you compare it to the original. Lyrrus has compiled eleven dictionaries of riffs from artists such as Steve Morse, Greg Davis, and Adrian Legg ($16.95 to $24.95 each).

Also from Lyrrus, *Chords* ($79) identifies any chord you play and lets you save it to a dictionary. It can also be used to write and print chord charts. *Tour* ($59) teaches fretboard basics while depicting the life of a guitarist in animated form, from street-corner jams to club and arena dates.

For those with kids who are into the blues, Lil' Johnny Enterprises offers *The Solo Assimilator* ($29.95; any platform). This is a collection of backing tracks and blues guitar solos played on a MIDI guitar. The tunes are stored in SMF format for use in any sequencer. These files can also be loaded into PG Music's *Band-in-a-Box* (version 5), which creates full accompaniments with bass, drum, and comping parts. Each solo consists of several phrases that can be isolated and looped for practicing.

Ibis Software's latest offering is *Soloist* ($59.95; DOS, *Windows*). Simply plug a microphone into the sound card, and you can practice with any instrument, including your voice. (This is one of the few programs that does not support MIDI, which isn't a problem, as it is intended for acoustic instruments.) You select the instrument you are playing from a menu, and the program creates exercises for that instrument, showing you where you are right and wrong as you play. It has a game mode with 36 levels of difficulty, and it comes with an integral chromatic tuner.

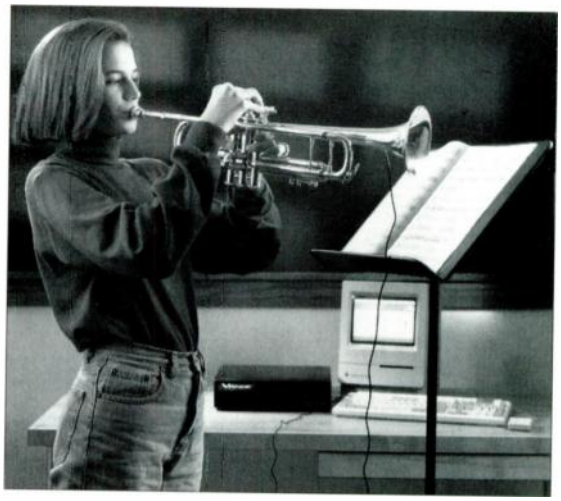

FIG. 5: Coda's Vivace system lets young music students practice any instrument with a full orchestral or combo accompaniment that follows their tempo in real time.

Coda Music Technology has come up with a unique practice tool for children of well-heeled parents: Vivace Personal Accompanist ($2,295; *Windows*, Macintosh; see **Fig. 5**). This hardware/software combo includes a microphone with fasteners to attach it to any instrument; an interface box with a 32-voice, 32-part multitimbral, sample-based synthesizer and digital reverb; and *Intelligent Accompaniment* software.

The system plays prerecorded accompaniments for a large number of solo pieces. Remarkably, the Vivace system listens to the student play and adjusts its tempo to match that of the student in real time! You can also turn this feature off if your kid needs to practice at a specific tempo. Separate cartridges (starting at $29.95 each) include accompaniment files in a variety of styles for each band instrument. The repertoire is extensive and growing all the time, and it includes selections for every skill level. The software also helps kids study rhythm and intonation. The Vivace system should be shipping by mid-1994 with Macintosh software, and a *Windows* version is planned for release shortly thereafter.

LESSON OVER

The good new is, technology provides important tools for musicians to realize their ideas without relying on others. The bad news is, this tends to isolate them from the synergy of working together. The good news is, technology can also be used to teach musical concepts that help kids make music with their friends and classmates. The bad news is, once you get them up and running with music-education software, they may never relinquish your studio again.

The best news is, you can establish an important connection with your children by sharing a common interest in music. If you play or sing, jam with your kids. Many of the programs described here can play accompaniments as you play duets or alternate solos. You can greatly improve your communication with your kids and build their self-esteem by encouraging them to succeed in an activity you love. Participate with them as they use these programs. Who knows? You might learn something.

EM *tech editor* **Scott Wilkinson,** *values the music he played as a child with his parents.*

Composite Vocals

By Michael Molenda

Use your multitrack to construct "perfect" performances.

The House Jacks, a premier San Francisco a cappella group, used composite vocals extensively on their *Naked Noise* album. "Singers deliver better performances if they aren't worried about punching in," says the album's producer, Buddy Saleman.

Eons ago, in the dark ages of pre-multitrack recording, musicians had just one shot at getting it right. Complete, live-in-the-studio performances were cut directly to the wax master used to make vinyl records. If someone biffed a note, the wax was tossed out, and the musicians started again from the top. The concept of overdubbing was still playing hide-and-seek in Les Paul's dreamworld, and engineers never said, "Don't worry, we'll fix it in the mix."

Of course, multitrack recorders changed all that. A recording evolved from a documentary rendering of linear musical events to a medium where minute elements of a performance could be auditioned, agonized over, and re-recorded. This capability was especially welcome for vocalists, who no longer risked marring a hot performance with one flat note. Punching in (or re-recording) to fix mistakes is now standard operating procedure for vocal sessions.

Unfortunately, punching-in can be incredibly frustrating. Few singers enjoy the constant "play, punch, stop, rewind, listen, stop, rewind, replay, punch" cycle of repairing bum notes. Because the process is so tedious, punched-in vocals can ruin the all-important "vibe" of a performance by sounding stiff and unnatural. But that's where the multitrack comes to the rescue again.

The concentration-killing, start-and-stop methodology of punching-in can be avoided if the vocalist sings several complete versions of a song onto separate tracks. When an adequate number of good takes are recorded, the best parts of each performance can be used to assemble a near-flawless vocal track. The end result of this manufactured perfection is called a *composite* vocal track.

PIECES OF GREAT

Composite tracks are constructed by submixing the desired elements of several different performances to a single track (see **Fig. 1**). Obviously, you need enough open tracks to record a number of vocal takes *and* a track to assemble the final composite version.

Hard-disk recorders are ideal for constructing composite tracks, as they have almost unlimited virtual tracks (with instant access), cut-and-paste editing capabilities, and internal mixing. However, if you work in the analog realm, you can still construct killer composites with a good quality multitrack and mixer. In fact, the mechanics of composite tracking are pretty much the same for both digital and analog mediums.

First, record as many complete performances as it takes to get some great vocals on tape. Now the real work begins. Critically assess every take to determine the best performance of each lyrical phrase. If you're lucky, one take will be pretty amazing throughout and can be used as a foundation. All you need are a few lines from the other takes to create a truly exemplary track. Unfortunately, the typical scenario is that brilliant lines are scattered helter-skelter over several takes. Because of this, I usually try to limit the number of vocal takes to three or four. (It's difficult to do my best work while in a state of sensory overload.) However, braver engineers and producers often record ten or more takes of each song section (verse 1, prechorus 1, chorus 1, and so on).

Once you've identified the desired elements of each take, you can assemble the final vocal "performance" by combining (or submixing) the elements to a single track. On hard-disk

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Digital recording in a sampling/sequencing workstation.

The ASR-10 Advanced Sampling Recorder is more than just a powerful sampler. Inside this unique keyboard and rack-mount are all of the features of a digital recording studio—for a fraction of the cost.

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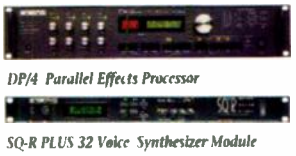

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recorders, you can cut and paste elements at will to create your composite track. It's a little trickier in the analog world. The procedure is basically the same as bouncing tracks: Simply assign the appropriate tape tracks to one of your subgroups, so you can record the submix to an available track. (Remember that bouncing to adjacent tracks can produce a feedback loop.) The difference is, rather than bouncing a series of complete performances to an open track, you will be taking excerpts from several tracks. This requires muting and unmuting the assigned tracks as needed. After all, you only want the best performance excerpts to find their way onto the final composite track.

Let's say you have three tracks of vocals from which to compile your composite track. For a 4-line verse, track three has the best introductory line, track one has a great second and third line, and track two has the coolest final line. During the submix you'll have tracks one and two muted for line one, with track three being the sole track recorded onto the composite track. For lines two and three, track three must be muted and track one unmuted. Finally, on line four, track one is muted and track two is unmuted. Keep in mind that all these mutes and unmutes must be done smoothly to ensure that the final composite track sounds like a natural, "one take" performance from start to finish. Believe me, if you don't have automated mixing, you'll wish you did. And believe it or not, this example is child's play: Some engineers assemble composite tracks *word by word!*

After you have assembled the entire composite track, take a short break. When you return to the session, play the track and listen critically to see if it fools you. As previously stated, the track should sound like a natural performance. You should listen for clipped words (the result of an anxious mute or a lazy unmute); doubled phrases (you forgot to mute a track and two different takes were bounced together); and erratic jumps in signal level (you didn't adjust the individual levels of the tracks being submixed).

If you think this procedure is too intense (it is!), buy a hard-disk recorder. Although cutting and pasting is time consuming, it's less nerve-wracking than punching mutes in and out, in real time, with the tape running. And even then, you still haven't experienced the ultimate horror of composite tracking: Matching vocal timbres.

THE MATCH GAME

Composite tracking is not for messy recordists. If you record a bunch of vocal takes without practicing strict audio hygiene, the assembly process will be a living hell. The reason is obvious. You are combining pieces of several different vocal takes onto a single track, which is supposed to sound like a contiguous performance. If each take is recorded at a different signal level, compression parameter, or EQ setting, you'll have an extremely hard time getting the timbre of words and phrases to match. In short, you're dead.

It's essential that all vocal takes are recorded with the same microphone, in one room, with all other parameters

Even with vocalists as remarkable as Whitney Houston, producers often use composite tracks. "With Whitney any [complete] take could be *the* take," admits David Frazer, engineer for multiplatinum producer Narada Michael Walden. "But Narada looks for that perfect expression of feeling, which may require assembling the best phrases from several different takes."

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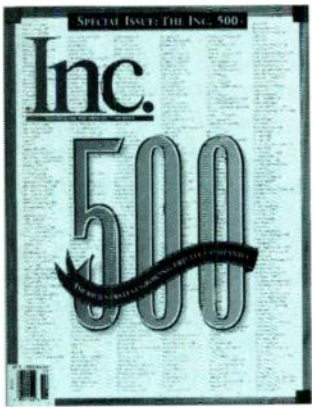
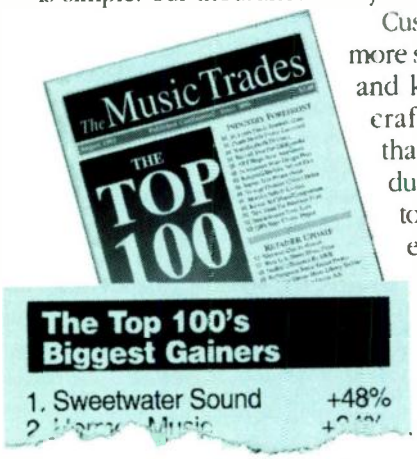


In its October 1993 issue, *Inc.* magazine announced "The Inc. 500," a listing of America's 500 fastest growing companies. Sweetwater made its first appearance this year at number 126 with an astounding growth rate of 1,732% for the years 1988 through 1992. And when the music industry trade magazine *The Music Trades* ran a list of the top 100 retailers, there was Sweetwater, ranking first among the fastest growing music retailers in the country. The reason for this phenomenal success is simple: our thousands of loyal customers.



Customers are becoming much more sophisticated in their needs and knowledgeable about their craft, so it's really no surprise that everyone in the music industry has to work harder just to keep up with them. Customers are no longer interested in *just* getting the best price; they want their dealer to be on top of the latest technology. And considering how fast the technology is changing, retailers have to put in the extra hours and make the extra effort to really know their stuff. Here at Sweetwater, "knowing our stuff" has made us one of the fastest growing companies in the country.

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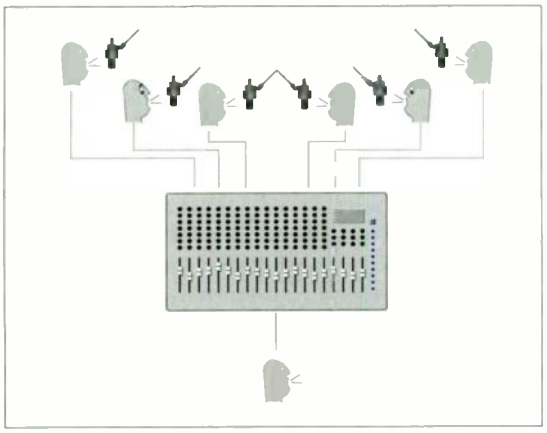

FIG. 1: A composite vocal is constructed by identifying the best parts from a number of different performances and combining them to produce a single, "perfect" vocal track.

such as mic position, EQ, and compression remaining unchanged. This is where a notebook can save your project. Copious notes aren't much of a concern if you record every vocal take at the same session. However, if the vocals are recorded over several different days, you'll need accurate details on how to re-create the same environment for each session.

I list the session date, mic used, compression and de-esser settings, and whether a foam and/or nylon windscreen was employed. I also draw a simple diagram of the vocal-miking position—including an approximate distance, in inches, of how far the mic is from the singer's mouth—and where the mic was placed in the room. Sometimes, I even jot down what the vocalist ate for lunch or dinner (some foods, such as diary products, affect vocal timbre) and whether they seemed fatigued or energized. I don't bother writing down the vocal EQ settings, because I record everything flat to facilitate easier tonal matching. If I want to change the vocal timbre, I'll EQ the composite track *after* the final assembly process is completed.

Now, some recordists have a hard time avoiding the EQ knobs during tracking, but I strongly recommend that you leave them alone if you want your composite tracks to sound natural. Let's say that you unconsciously tweak one take by boosting 7 kHz approximately 5 dB. Two takes later, the vocalist is warmed up and pushing more air, and the sound is a bit shrill. Now, instead of returning the 7 kHz tweak to its flat position (which would be bad enough), you *cut* 7 kHz by 3 dB. Of course, in the heat of tracking you forget to write these adjustments down.

So what happens when it's time to assemble the final composite track? Obviously, some vocals will sound bright and some will sound dull. If you take one half of a line from a "bright" take and the other half from a "dull" take, you'll need to re-EQ to find a common timbre. Soon you're re-EQing every take, because nothing matches. Believe me, you don't want life to get this complicated. Keep your hands off those EQ knobs until the final mix! (Do I also need to mention that you shouldn't change compression settings, mics, or mic positions between takes?)

Finally, one of your most valuable resources for composite tracks is a lyric sheet. This is the road map that logs

During the recording of U2's *Achtung Baby*, vocalist Bono (second from right) experimented with several different stylistic renditions of each song. The final composite vocal tracks were often compiled by mixing and matching these disparate elements.

which takes are used for which lyrical lines (or words or syllables). Do yourself a favor and cleanly type each lyric sheet with a least three or four carriage returns between lines. The more space for notes, the better. Run off a generous supply of photocopies, so that if you make a mistake you don't have to run back to your printer (or retype the document). It also helps to have extra copies available if you're working with another engineer or producer.

To identify which takes are used where, I typically assign a different color highlighter to each take. For example, when I choose a specific take for a lyric line, I highlight the line on the lyric sheet with the color assigned to that take. Likewise, I mark the mixer channels that return each take with their corresponding color code. Color coding greatly simplifies the final assembly process. I follow the lyric sheet as the tape rolls and make sure that only the channel with the matching color is routed to the composite track.

CLEAN UP

Once you've assembled and approved the final composite track, be sure to erase all your vocal takes. Obviously, you don't want valuable tape tracks surrendered for vocal takes you no longer need. But you also don't want to worry about "ghost" vocals popping in and out of the final mix. Cleaning your tracks minimizes the chances of these little surprises.

In addition, if you carefully record

and submix the numerous vocal takes, your composite track shouldn't need more than a little compression, a hint of EQ, and the signal enhancement of your choice (reverb, delay, etc.). The value of all the preliminary work pays off when the final mix is a breeze. I've seen too many recordists slack off on the fundamental details of a track and end up turning the mixdown into a comedy of errors. Don't let this happen to you.

PUNCH DRUNK

Many musicians are highly critical of composite vocals. I constantly hear producers and engineers complain, "If he/she could really sing, I wouldn't have to do all this ridiculous stuff." Now, few musicians argue that popular society's worship of the personality cult has foisted nonsingers and nonmusicians onto the charts simply because they have the right "look" or "sound." And if it wasn't for composite tracks and other studio gadgetry (pitch shifters, samplers, etc.), many of these pop stars wouldn't have a prayer of delivering tolerable performances. But that doesn't mean composite tracks are just a crutch for people who can't sing.

Yes, assembling composite tracks is a drag for engineers. You've read this column, so you know how much work is involved. And yet, composite tracks offer the vocalist a wonderfully freeform way of delivering a fresh, uninhibited performance. Because experimentation is encouraged, you might be lucky enough to record an amazing "instant inspiration" rendition that would never have surfaced using the conventional punch-in-and-repair method.

The tyranny of the punch-in may also be the major reason most vocalists are uncomfortable in the studio. Every singer has done a session where a producer had them punch in a line so many times that every shred of passion and confidence was destroyed. I'm one of those people that believe the singer *is* the song. (I also believed that Gary Cooper was a real cowboy, but that's another story.) If letting a singer deliver ten takes allows him or her to produce snippets of grandeur, I'm more than happy to spend the time sorting those snippets into one single exquisite vocal performance. In the end, it's the Work, not how much work was put into it, that stands the test of time.

Scoring for the Small Screen

By Michael Molenda

Putting music to Kaleidosonics' *changing panorama of videoscapes.*

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There is no orchestra set up in front of a huge movie screen. No conductor with rolled shirt sleeves awaiting the click track. No nervous rustling of charts, no creaking chairs. It's just you, your computer screen, and a rack of sound modules. Scoring for multimedia doesn't exactly evoke the golden age of Hollywood. It doesn't have to. For ambitious composers, the multimedia industry can be The Land of Opportunity, Dante's *Paradiso,* and Easy Street all plopped on a single patch of fertile real estate.

"Multimedia is like a secret boomtown," says renowned interactive-media composer Rob Wallace. "There are a lot of opportunities, but most musicians don't want to score computer games, because they don't consider the process—or the medium—artistically gratifying. That's fine with me. It *is* difficult composing for sound cards that sound bad and having to constantly hustle multimedia developers for gigs. But the bottom line is, I'm making a great living making music."

Wallace was an early convert to multimedia and is currently one of the industry's leading composers. He has produced music for a number of hit projects, including *The Miracle Piano Teaching System* (Software Toolworks), *Snoopy's Game Club* (Accolade), *Tom Landry Strategy Football* (Merit Software), *MIG 29* (Spectrum Holobyte), and *Wayne's World* (Symtus).

Recently, Wallace teamed up with graphic artist and programmer John Ratcliff, to produce *Multimedia Kaleidosonics* (Masque Publishing), an interactive music CD-ROM for the PC. *Multimedia Kaleidosonics* blends Wallace's jazz fusion and new-age scores into a continuously metamorphizing pastiche of video clips.

But the program is more than just a visually agile screen saver. Users can interact with the designs to create an infinite number of visual effects. Some of the graphics routines have variables that can be assigned to key strokes, allowing users to create 2D and 3D visual effects in real time. However, the program's interactivity is restricted to graphic elements. Unlike some other interactive music titles such as Todd Rundgren's *No World Order* and Peter Gabriel's *Xplora 1,* users cannot manipulate audio tracks or remix elements of Wallace's score.

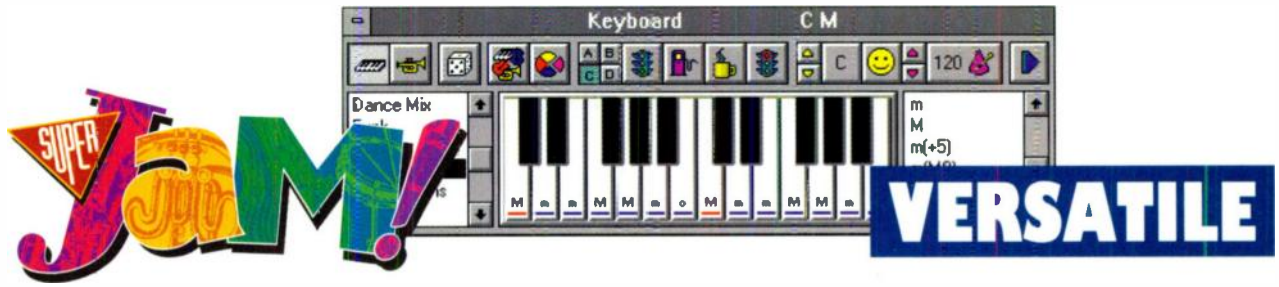
"Basically, *Multimedia Kaleidosonics* is an audio CD with a data track," explains Wallace.

AUDIO PRODUCTION

Wallace composed the music for *Multimedia Kaleidosonics* in his comfortable, but spartan, home studio. Although many film and video composers utilize racks and racks of gear for their productions, Wallace used just two sound modules on the project: a Kurzweil K2000RS and a Roland SC-55 (the external version of the Sound Canvas). An Ensoniq EPS keyboard was employed solely as a controller. The completely MIDI production was sequenced using Voyetra *Sequencer Plus Gold* on a PC and saved as Type 1 Standard MIDI Files (SMFs).

An old Fostex Model 450 8 × 4 × 2 console ("The weak link in my signal chain," Wallace admits) was employed for the final mix, and most of the signal processing—typically reverb and chorus effects—was done internally with the onboard DSP of the sound modules. Additional depth and ambience was added with a Yamaha SPX900 multi-effects processor. To enhance sonic impact and tame dynamics, the

STOP, LOOK, LISTEN!



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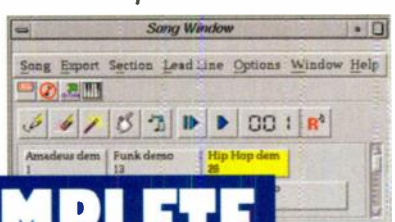

Each style contains several grooves and embellishments, like intros, fills, breaks and ends. Plus, you can modify any existing style or create your own with **SuperJAM!**'s extensive recording and editing tools.

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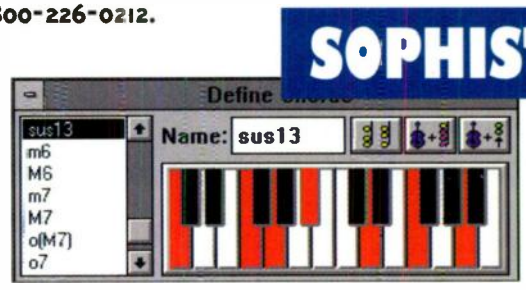

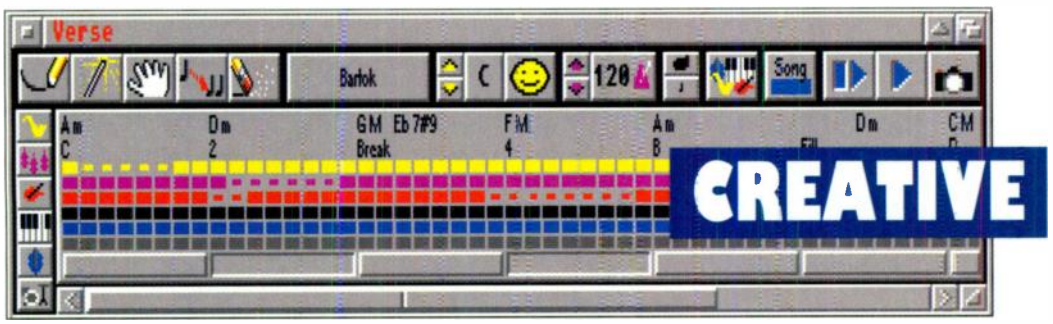

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entire mix was compressed by inserting a dbx 144 into the console stereo bus. (Compressing the stereo mix before it reaches the mastering deck is one of my favorite tricks for "punching up" a mix. A well-compressed mix also helps your cassette copies sound better because you can record hotter levels to tape.) Final mixes were laid to DAT, using one of the professional standards: Panasonic's SV-3700.

PLAYING CARDS

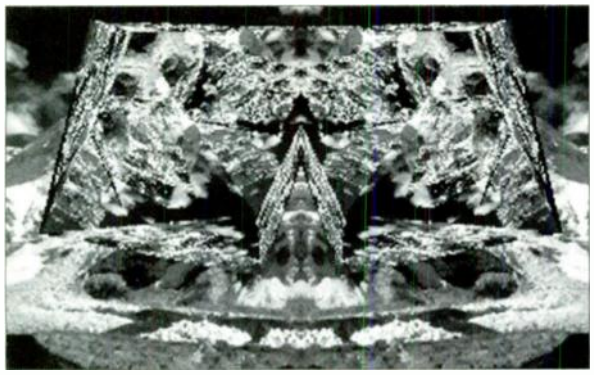
Many musicians find producing an audio master stressful enough, but scoring for multimedia often requires the composer to develop MIDI files and drivers that can work with popular sound cards. For *Multimedia Kaleidosonics*, Wallace produced three different versions of each and every composition.

"In the multimedia world, you usually have to do multiple versions to ensure that the end user gets the best sound possible," he says. "You can't just produce a digital-audio master, because some users will only listen to your work through sound cards."

▼ Scoring for multimedia means scoring for sound cards.

According to Wallace, a Sound Canvas version is essential, because it's the authoring standard for heavyweight multimedia composers and follows the General MIDI specification. He also likes the way it sounds. Wallace used his SC-55 to compose the score for *Multimedia Kaleidosonics*, so a Sound Canvas version was already in the can. He was less enthusiastic about authoring a version for the myriad FM-based cards on the market.

"I hope FM goes away," says Wallace. "It's a cheese-ball way of getting sound out. The strings and percussion are pretty lame, and the overall sonic palette is very limited. They're only really cool for sci-fi sound effects. I actually think the sound quality of FM cards is why more



Multimedia Kaleidosonics **allows users to create endless 2D and 3D visual effects by assigning interactive-graphics routines to key strokes.**

musicians don't get into scoring multimedia projects and games. It's demoralizing to compose a great piece of music and then hear it played back on a bad FM card. Thank goodness the public is starting to demand better sounds. They don't want bleeps and bloops anymore."

In the best cases, however, scoring for sound cards often means accepting a few artistic compromises. Multimedia composers must conceptualize their work as sounding good on a sound card, rather than letting the muse lead them on an unfettered tour of the audio spectrum. Unfortunately, creative limitations are standard operating procedure.

"Sometimes you spend more time tweaking your MIDI files than writing music," sighs Wallace. "In some cases, you can only use eight notes at once, or the system crashes. Obviously, a melody line and bass line are essential, so that leaves you with just six notes to create a rich-sounding score. Then, you've got note quantization because most sounds on a card don't have decay or sustain. Start times and note durations must be very precise, which can be somewhat antimusical. For example, all four notes of a 4-note chord must end at exactly the same time. Believe me, without being masked by sustain, four notes lifting off at different times sounds terrible. Also, you're in mezzoforte all of the time, which limits expression due to the lack of dynamic range. To author a successful score you've got to learn to simplify your ideas and utilize your resources."

A good example of utilizing resources occurred when Wallace was scoring a war game. The Sound Canvas version used a complex timpani roll to underscore a tense part of the game's action. However, when Wallace began to develop the FM version, he came to realize that the card's percussion sounds would not be visceral enough to produce the same tension-filled effect.

"On the FM version, the timpani went bye-bye," he says. "I kept the kick and snare part of the percussion pattern, because they sounded pretty good on the FM chip. But I replaced the timpani with a low, dissonant organ tone to evoke the ominous feeling that the game needed. So you see, composing for sound cards doesn't just mean allowing for the fact that a string or percussion patch sounds different on the FM version as opposed to the Sound Canvas version. The score itself may be completely different. Melodies may change and counterpoint lines may disappear. You have to do whatever it takes to make the score work on the card it's being played through."

JOBS OFFERED (REALLY!)

Want a gig? Rob Wallace plans to offer subcontracts to at least three composers this year. Projects under development include video game and interactive titles. Wallace requests that you submit a resume and a cassette with a few short examples of your work. He would also appreciate a 3½" disk with your best Type 1 SMFs, but this is not required. Send your submissions to:

Rob Wallace
Wallace Music & Sound, Inc.
PO Box 393
13635 North 59th Ave.
Glendale, AZ 85304
tel. (602) 979-6201
Internet: 29220@ef.gc.maricopa.edu
CompuServe: 71042,1410

Rob Wallace in his home MIDI studio

NEW MEDIA

Although it is marketed as an interactive music production, *Multimedia Kaleidosonics* is also a "solo project" that showcases Rob Wallace's talents just as any conventional music release would. (Consumers who do not own CD-ROM drives can purchase *Multimedia Kaleidosonics* on floppy disk and send for an audio CD or cassette of Wallace's score.) In fact, the whole *Kaleidosonics* project turned into a quest to secure a "record deal" for Wallace.

John Ratcliff, the designer and programmer of *Multimedia Kaleidosonics*, calls himself an official Rob Wallace groupie. So when the program became a reality, Ratcliff actively pursued publishers that would produce a Rob Wallace album "with *Kaleidosonics* software as visual accompaniment."

The fact that the title exists proves that the multimedia industry can be used as an alternate distribution system for ambitious musicians. With video games and interactive titles captivating children of all ages, it may not be too long before multimedia releases overtake conventional audio CDs as the preferred medium for experiencing music.

Already, popular artists such as Peter Gabriel, David Bowie, and Todd Rundgren are diving into interactive projects. If such involvement from the artistic community continues to increase, and the public embraces interactive media, productions such as *Multimedia Kaleidosonics* may presage the demise of music-only releases.

"The CD-ROM may be the next distribution system for music," says Wallace. "Let's face it, being limited to an audio experience may not be exciting enough for future consumers. People already listen to music differently than my generation did, and as an entertainment medium, video games are definitely the hot thing. The time may come when the public demands interactive audio/visual experiences that allow the user to create total 'virtual entertainment' environments. When that day comes, composers who don't understand the interactive market probably will not be writing music for that audience." ●

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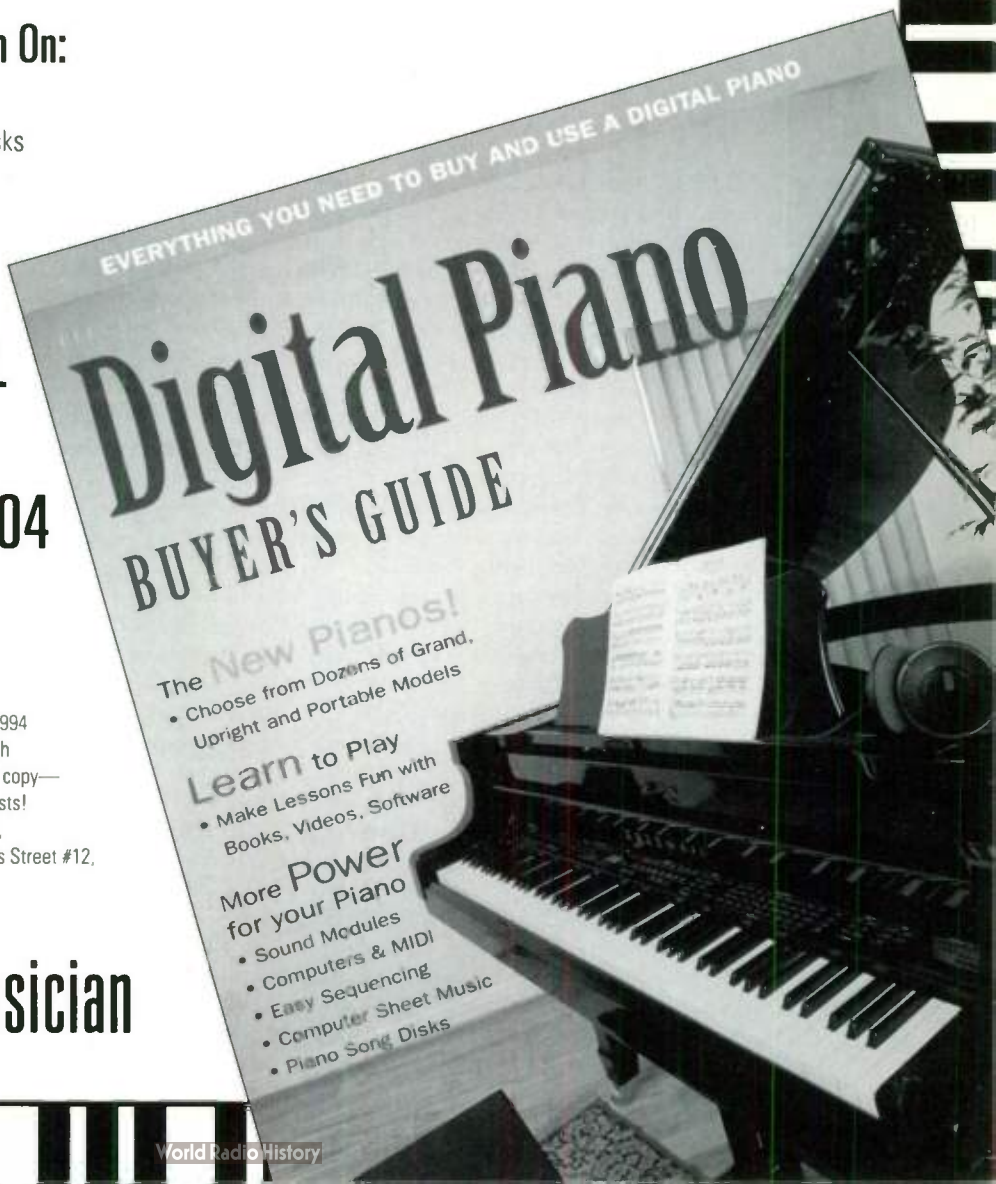

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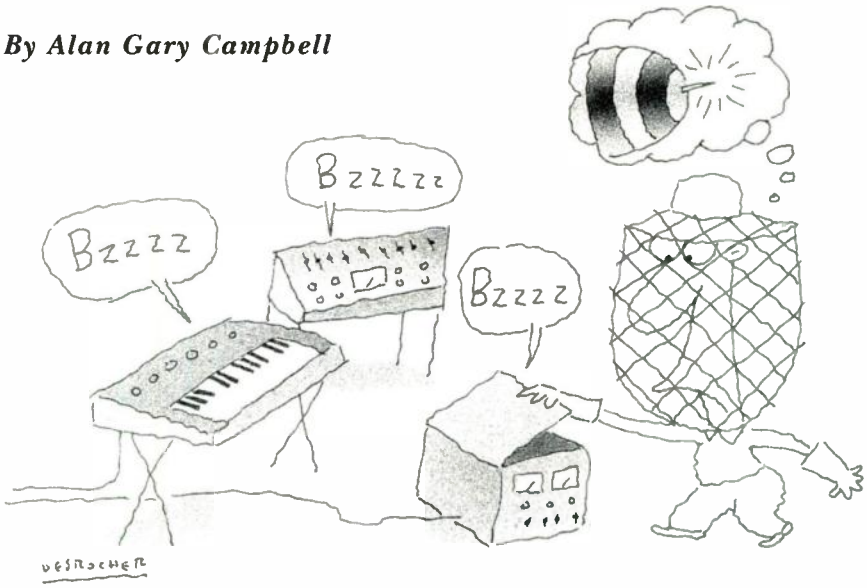
Electronic Musician

Questions & Answers

By Alan Gary Campbell

The service seer suggests solutions for shielding speakers and power-transformer problems.



Q. I have several pieces of equipment in which the power transformers buzz annoyingly. Is there a way to quiet these down?

A. Many power transformers hum as a matter of course, and it can be difficult to get them to stop. Often the mounting hardware is simply loose, but take care not to overtighten. For larger power transformers that are bolted in place, it is sometimes effective to dismount the transformer and add some rubber washers over the mounting bolts and between the mounting brackets and equipment case. (Use small faucet washers, which can be obtained from a hardware store.) Adding washers sometimes makes the buzzing worse, though.

Q. I have a Yamaha DX7 synth (original type) that won't power up. A local technician who is sharp but doesn't specialize in keyboards says the transformer is bad. How can I be sure this is correct before I install a new one? Is there a simple test?

A. To test a power transformer, simply measure the AC output voltage(s) on the secondary, or low-voltage, side with a digital multimeter (DMM). Refer to a service manual for correct voltage values. In the most common failure modes (open and/or shorted windings), a bad transformer will provide very low secondary voltages or zero volts. If a short somewhere in the instrument is drawing so much current that the measured secondary voltages are pulled down, there will be other indications, such as a pronounced smoke plume and a quickly blown fuse!

A blown transformer, when disconnected from both the AC power line and the instrument circuit, will usually give a reading of "infinite ohms" (an open circuit) when the secondary continuity is checked. (Use a DMM set for resistance measurement.) A good transformer will have very low primary and secondary resistances.

Caution: *Potentially lethal, exposed sources of high-voltage alternating current are present inside electronic equipment. Do not attempt to perform AC voltage measurements unless you are properly trained and adequately experienced. Always refer the work to a qualified technician.*

If a unit won't come on, don't forget to check, or to have the technician check, the primary fuse.

Q. I'd like to adapt my gear to run on the higher voltages that are used overseas. The local tech says I just need to replace the internal power transformers in the gear. My tour manager is adamant that we should use an external, step-down transformer instead. Which is best?

A. Replacing the transformer is the most elegant, technically correct way to adapt equipment for overseas operation, but the line cords and other hardware often must be replaced as well, and not all manufacturers offer replacement transformers for their gear. Few maintain transformer stock for older gear. Moreover, many replacement transformers do not have switchable, dual primaries, so the old transformer must be reinstalled if the unit is to be used again with U.S. line voltages.

Practically speaking, your tour manager is correct. In addition, external line-voltage converters based on ferroresonant transformers or other fault-tolerant technology can compensate for line-voltage deficiencies and can gobble up glitches, as well.

Q. I have a JVC consumer Hi-fi stereo VCR that I use for home-studio mastering. Unfor-

JACK DESROCHER

tunately, the infrared remote has stopped working, which is a major inconvenience. Is there a simple way to test to see if the laser diode or some other component of the remote is bad, or if it's the detector on the VCR or some other problem?

Q. Is there a way to modify the front-panel controls of consumer VCRs, EQs, etc., to work with a do-it-yourself wired remote? All those interacting wireless remotes are a pain.

A. Radio Shack carries a nifty, entirely passive test gizmo, catalog number 276-099, that lights up when infrared electromagnetic energy impinges upon it. This straightforward device can only determine whether the remote is emitting infrared (IR) energy, not whether the signal is unmodulated or carries garbled data. Borrowing an identical or similar remote known to be good is a nearly definitive test. And not to belabor the obvious, but don't forget to check the batteries!

Testing the VCR receiver transducer is often straightforward, but disassembling many of these units is not, and the job is best referred to a qualified technician. Tips for improving wireless-remote performance were discussed in the August 1992 "Service Clinic."

It is sometimes possible to modify an IR-remote unit to work with a do-it-yourself wired remote. Basically, the transport controls are duplicated with an equivalent array of switches in a small project box. The DIY device then "talks" to the unit via small-diameter multicable, which is tack-soldered to the appropriate PC-switch terminals behind the unit's front-panel controls. Possible problems include erratic or dysfunctional operation due to capacitive loading by the cable and increased electromagnetic interference, both radiated and received. And again, getting inside a VCR or other device safely is often not trivial.

I have had mixed results with such experiments, and this sort of thing is only recommended for the advanced do-it-yourselfer who can afford to sacrifice gear to science.

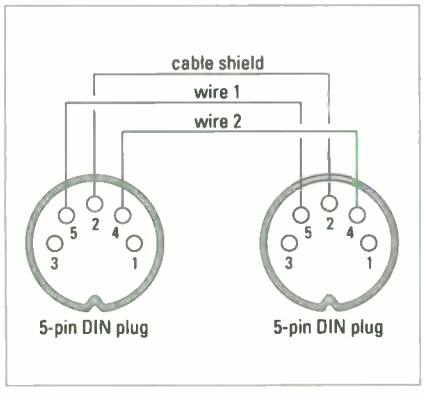


FIG. 1: MIDI cables have male MIDI connectors at both ends. The shield connects to pin 2 at both ends and the twisted pair conductors to pins 4 and 5. Pins 1 and 2 are not used.

Yamaha DX7 FM synthesizer

Q. How can I shield my home-studio speakers from the hum induced by my computer monitor? I tried a lead-lined dental apron, but that didn't help.

A. Hum is radiated, 60 Hz (plus harmonics), electromagnetic interference. It can only be stopped by shielding made of ferromagnetic materials, e.g., iron and steel sheet metal. Try placing a piece of galvanized sheet metal that is slightly larger than the speaker-enclosure cross-section between each speaker and the monitor. (You should be able to obtain suitable pieces of scrap from a sheet-metal shop at low cost.) It may help to ground each piece of shielding. Use some 18- or 20-gauge zip cord and the appropriate hardware to connect to a water pipe, outlet-cover screw, or other safe, low-impedance ground.

With the burgeoning popularity of multimedia workstations, more shielded speakers are becoming available, though most of the little, affordable ones have limited fidelity. For a quick fix, try headphones.

Q. I'd like to make my own MIDI cables, and I can get the plugs at Radio Shack, but where can I get the special cable?

Q. When wiring MIDI cables, is it correct that the shield connects at one end only?

A. MIDI cable material isn't necessarily "special"; it's just high-quality, low-capacitance, 2-conductor (twisted pair), shielded cable with a high shield density and good flexibility. (On second thought, perhaps that is special.) Although there is a bewildering array of high-tech (and high-priced) cable available from professional electronics suppliers, high-quality microphone cable makes a reasonable and readily available substitute for do-it-yourself projects. Often such cable does not employ a twisted pair, but if the shielding is good, this should not affect short cable runs significantly.

The MIDI-cable shield connects to pin 2 at both ends. According to the *MIDI 1.0 Detailed Specification*, pins 1 and 3 are not used (see **Fig. 1**). The shield contact is left unconnected inside all devices' MIDI inputs to avoid ground loops.

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

Dolby Surround

By Lawrence E. Ullman

Dolby Surround has become an essential studio tool.

DMITRY PANICH

Unless you've been totally sequestered in your studio for the past few decades, you've probably heard recordings that were mixed using the Dolby Surround process. Since its introduction in the mid-1970s, almost 4,000 feature films have been recorded in Dolby Surround. In fact, since *Star Wars*—the first film released in the format—it's hard to name a major motion picture that doesn't have a Dolby Surround soundtrack.

Surround sound is not limited to the movie house. Lately, a growing number of television shows, from *Arsenio* to *Zorro*, are broadcast in Dolby Surround. Even music-only CDs are not immune; numerous Surround-encoded titles are now available, in categories ranging from rock to jazz to classical. And if that's not enough, Nintendo games have begun appearing in Surround.

Obviously, Dolby Surround has taken hold in a big way, both in the professional world of the cinema and in millions of homes. This presents new challenges and many opportunities for recording musicians, especially those who wish to do film or video work. Even if you're experienced in the world of audio recording and electronic music, you may not know the ins and outs of Dolby Surround, which some consider the next logical step beyond 2-channel stereo.

EARLY ORIGINS

Although we tend to think of surround sound as a relatively new phenomenon, multichannel sound formats actually date back to Walt Disney's *Fantasia* (1940). However, multichannel sound didn't really catch on until the early 1950s, at a time when movie theaters were adding wide screens and "Stereophonic Sound" to compete with the nascent medium of television. Unlike the 2-channel format eventually adopted for home stereo, movie soundtracks incorporated—and continue to incorporate—at least four discrete audio channels.

From the start, it was clear that two speakers were not enough. Due to the width of the movie screen, a separate *center-channel* speaker is necessary to keep the dialog localized to the center of the screen, especially for viewers seated off-center. A fourth channel, initially called "effects" and used for such gimmicks as the "Voice of God" in biblical epics, was eventually used more subtly to "surround" the audience with ambient effects, drawing them further into the film. The *surround channel* of the soundtrack is reproduced by an array of speakers placed along the sides and rear of the auditorium.

Dolby's contribution came in the mid-1970s, with the introduction of a new technology for 35 mm film prints called "Dolby Stereo." Instead of the multiple magnetic tracks used by previous movie formats, Dolby Stereo is based on the optical soundtrack method that had been used to put mono sound on film since the 1920s.

To retain compatibility with mono and 2-channel stereo theaters, Dolby found a way to squeeze a 4-channel soundtrack into the same space on the film print occupied by a mono track. They use two narrow optical tracks for the main left and right channels, and encode them with two additional tracks (center and surround) using a *matrixing* process similar to the ill-fated quadraphonic home-stereo format.

When the film is played back in the theater, a Dolby Stereo *decoder*, or "cinema processor," reads the two encoded optical tracks, extracts the four original

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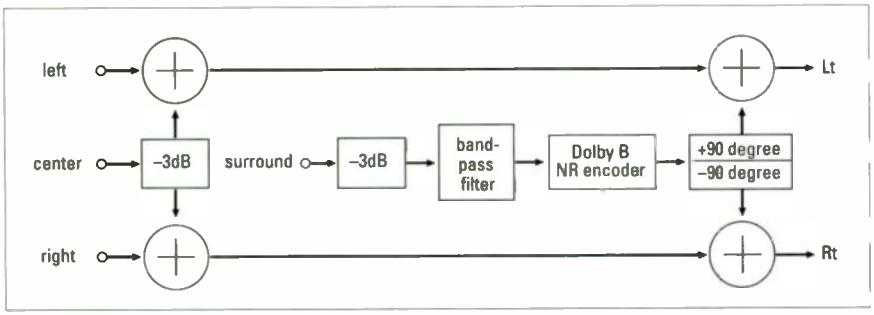

FIG. 1: In a Dolby Surround encoder, the C input is reduced by -3 dB and mixed equally into the L and R signals. The S input is sent through a bandpass filter, encoded with a modified form of Dolby B noise reduction, and split and phase-shifted by ±90 degrees relative to the S input signal.

signals, and directs them to the appropriate amplifiers and speakers.

THE MAGIC MATRIX

The process of taking four channels, encoding them to two channels, and decoding them back to four channels is the basis of the Dolby Motion Picture (MP) Matrix. Conceptually, the process is quite simple. The MP Matrix encoder accepts four input signals—left, right, center, and surround (L, R, C, and S)—and manipulates their amplitude and phase characteristics to produce two output signals, left-total and right-total (Lt and Rt; see **Fig. 1**). The result is a 2-track encoded master, sometimes called an *Lt-Rt master*, which can be put onto 35 mm film prints, videotapes, laserdiscs, Nintendo cartridges, etc.

The next step is to decode, or extract, the four original signals. In the theater, this is done with a professional Dolby Cinema Processor; in the home, a Dolby Pro•Logic decoder is used. In both cases, the result is identical: two signals (Lt and Rt) go in, and four signals (L, R, C, and S) come out.

Consumer decoders first appeared in 1982. They were called "Dolby Surround" decoders, but they lacked a center-channel output. In addition, they used simple, passive circuitry, so they tended to suffer from crosstalk problems; dialog from the front channels often leaked into the surrounds. In 1987, a new active decoding system called "Dolby Pro•Logic" appeared for home use and quickly became a worldwide standard.

A direct descendant of the professional Dolby Cinema Processor, Pro•Logic decoders include a dedicated center-channel output and use an active circuit called an *adaptive matrix* to direct, or "steer," each channel to the appropriate output, resulting in greatly improved channel separation (see **Fig. 2**).

SURROUNDING YOUR STUDIO

Let's say a well-known director has called and asked you to produce the music for her next blockbuster epic, and she wants it in Dolby Surround. What do you need? First, you need a mixing console with at least four separate outputs; a stereo console with at least two spare aux sends will do.

To monitor your surround mix, you need five loudspeakers (left, center, right, and two surrounds) and five channels of amplification. Actually, four will do, because the surround channel is mono, so a single amplifier channel can drive both surround speakers, as long as you avoid overloading the amp with a combined speaker impedance that's too low. This allows two stereo amps to drive the full speaker array (see **Fig. 3**).

Ideally, the left, right, and center speakers should be identical and driven by equal amounts of amplifier power. Resist the temptation to skimp on the center speaker; it does the lion's share of work in a surround setup. The surround speakers can be more modest, although they should be as close in sonic character to the front speakers as possible (for example, a smaller version of your front speakers).

Many companies now make integrated home-theater speaker systems designed for surround-sound use. As with any speaker purchase, let your ears be your guide. Some of these systems are highly colored, with an emphasized midrange and boomy bass.

The three front speakers should be mounted at a consistent height, with the center speaker located directly above or below the video monitor. Any speaker located adjacent to a video monitor should be magnetically shielded to prevent interference. The surround speakers should be mounted above ear level toward the back of the room, or at either side of the monitoring position.

Next, you'll need a Dolby Surround decoder. If you're serious about equipping your studio for surround projects, there's only one choice: the Dolby SDU4 Surround Decoding Unit ($2,200). In addition to balanced XLR connections, this single rack-space unit has a mode switch that lets you check your mix for stereo or mono compatibility. Less expensive consumer-grade Pro•Logic decoders abound, but Dolby will not provide an encoder or allow its logo to be used on a project

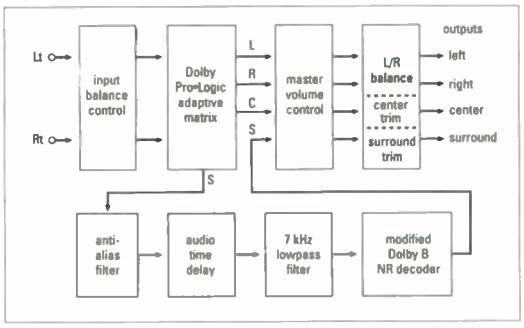

FIG. 2: In a Dolby Pro•Logic decoder, the encoded signal is routed through the adaptive matrix. Signals that are equally present in both the L and R channels are sent to the C output. Signals present in both L and R that are 180 degrees out of phase are processed through a 7 kHz lowpass filter, an audio time delay, and a modified Dolby B decoder, and sent to the S output.

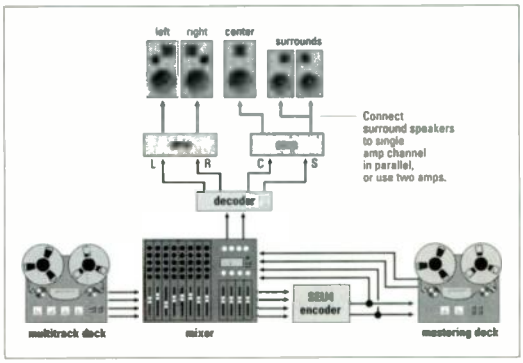

FIG. 3: A studio equipped for Dolby Surround mixing includes a mixer with four output channels, an encoder, a decoder, and five speakers with four or five channels of amplification.

unless an SDU4 is in place.

With all of the aforementioned gear installed, you're ready to call Dolby Laboratories to secure the use of a Dolby SEU4 Surround Encoding Unit. Encoders are rented on a short-term basis for the duration of your project, or they can be leased by facilities that produce surround projects on an ongoing basis (encoders are *not* for sale). The terms of the rental or lease are highly variable, depending on the project. A Dolby Surround consultant will come to your studio, assist with the installation of the encoder, perform alignment of the encoder, decoder, and monitor system, and instruct you in the use of the equipment as part of the deal.

SURROUND MIXING

Mixing for Dolby Surround is an art form that extends far beyond the limits of this column, but a couple of basic factors should be considered by anyone involved in a Surround project. To hear what your mix will sound like when it's played back in Dolby Surround, you must monitor it "through the process." In other words, it must be routed through the Dolby encode/decode cycle during production and mixing and monitored through the full 5-speaker array.

There is a quick and dirty workaround for composers who simply want an idea of how their stereo mix will sound in Surround: Feed a stereo output from your mixer into a consumer-grade Pro•Logic decoder and monitor its output through the five speakers. Such decoders can simulate a multichannel signal without an encoded input. Without an encoder, you won't be able to place sounds in the surround channel (at least not deliberately), and the results will be *very* approximate. If you do get a consumer decoder, look for one with line-level preamp outputs that can be used to drive external amplifiers; the built-in amplification in many of these units is often wimpy.

When listening to your mix, be especially aware that sounds panned too close to center will be "sucked" to the center channel only. In this situation, a mix that sounds fine in stereo can collapse to mono when encoded. To prevent this, it is a good idea to pan things farther right and left than you would for a stereo mix. Also note that some synth patches or other heavily processed sounds may tend to collapse to the center or be pulled into the surrounds.

CONCLUSION

In just a few short years, Dolby Surround has moved well beyond its origins as a film-sound innovation. Thanks to the home-theater craze sweeping the consumer electronics industry, Dolby Pro•Logic is now firmly established in millions of homes. With new digital surround systems already in theaters and with HDTV on the horizon (which will have digital multichannel sound out of the chute), now may be a good time to emerge from your stereo hideout and equip your studio—and yourself—for surround sound.

For more information, contact Dolby Laboratories, 100 Potrero Ave., San Francisco, CA 94103; tel. (415) 558-0200; fax (415) 863-1373.

The former editor of Audio/Video Interiors *magazine,* **Lawrence E. Ullman** *shares his home with more technology than any sane person should.*

Insuring Your Gear

By Mary Cosola

The crucial question is: Can you really afford not to?

Your home studio may seem safe now, but one cruel twist of fate could have your gear, and your bank account, in disarray.

While researching the subject of insurance for musical gear, I went to the source: musicians. To my chagrin and amazement, most of the musicians I know (and they are many) don't insure their equipment. I heard two excuses: "I can't afford it," and "My stuff is so old, insurance isn't worth it."

If the above seems like Alice in Wonderland logic, it is. Replacing lost, stolen, or damaged gear is way more expensive than most insurance policies, no matter how outdated your equipment. If you wait too long to get your equipment insured, you could be out some big bucks.

WHO NEEDS IT?

One friend who has "planned" on insuring his rig for years said, "I consider my big, mean german shepherd as insurance enough." I wonder if his german shepherd can put out a fire or push the equipment under a doorway during an earthquake.

Insurance is the classic betting game. Some people think they can beat the odds and avoid disaster. But as in most gambling, they're betting on something they can't control. Can you be sure that your upstairs neighbor won't fall asleep with a cigarette in his hand and burn down your building? Is your band's van, full of equipment, really safe for just ten minutes parked in the alley behind the club? A colleague relates the story of a roadie for a rock band who kept the band's instruments in his garage *for one night*. Guess what? The next morning there was an empty garage and an unemployed roadie.

Mother Nature also has a way of skewing the odds. Witness the historic Midwest floods of 1993, hurricane Andrew, or Los Angeles' recent deadly temblor. There were plenty of musicians wringing out soggy circuit boards and piecing together shattered guitars.

Are you scared yet? If you don't have much equipment, or if you have an angel on your shoulder, you probably don't need to worry. But if you have a sizable investment in your equipment or you play out, thus exposing yourself to more risk, you may want to investigate a few of the insurance options open to you.

SPIN THE WHEEL

Insuring your instruments or studio setup isn't as daunting a task as you might think. Most insurance companies offer special riders to homeowner's or renter's policies to cover special items of any kind, not just musical equipment. Some policies even cover gear that is stolen or damaged outside of your place of residence.

Rates for homeowner's insurance and riders vary widely. If you belong to any professional organizations, ask if they offer a musical-equipment insurance policy. In general, such group plans offer a better rate than individual insurance plans. Group plans are cheaper for insurance companies to administer, and they are spreading risk over a larger population.

THE UNION LABEL

Members of the American Federation of Musicians (AF of M) should look into the union insurance plan. Administered nationally by Albert Wohlers Insurance Company, in Park Ridge, Illinois, the policy is specifically tailored to professional musicians. Some union locals offer their own insurance plans; contact your AF of M local for a brochure and/or application.

The AF of M insurance plan is an "all risks" policy. Policy holders are covered

PHOTO GEORGE PETERSEN

worldwide, whether at home, at a gig, or on the road. This coverage includes theft from a locked vehicle, fire, natural disaster, and physical damage. Deejay and karaoke equipment are also covered. Instances that are not covered include wear and tear (i.e., standard deterioration), theft from an unlocked vehicle, war, and nuclear explosion. (If I survived a nuclear war and my gear didn't, I wouldn't kick up too much of a fuss.)

Rates for the AF of M policy are $2.20 per $100 of value, up to $1,500 of value. After $1,500 the premium is $1.00 per $100 of value. The deductible is $100 for each incidence, and equipment is insured at replacement cost.

As with any legal agreement, the union plan has a few particulars. For individual items valued at $10,000 or more, you must submit a bill of sale or a written appraisal before the item can be added to your policy. Also, policy holders are responsible for providing the insurance company with specific records and information. For a brief summary of the necessary record keeping for equipment insurance policies, see the sidebar "The Fine Print."

SERVICE ORGANIZATIONS

Membership in a professional service organization offers many benefits. Some offer their members health insurance, credit unions, bulletin-board services, job listings, and so on. One such organization, Chamber Music America (CMA), offers an equipment insurance plan to its members.

Based in New York City, CMA has 6,000 members nationwide, including musicians, presenters, and managers. Their equipment insurance plan is offered through Clarion Associates, in Huntington Station, New York.

Because CMA is for chamber musicians, Clarion doesn't insure large amounts of electronic gear under the CMA policy. They won't totally exclude electronic equipment from their policies, but instead prefer to evaluate it on a case-by-case basis. For musicians with extensive electronic rigs, Clarion offers individual policies, which are available to non-CMA members.

The coverage offered through the CMA plan is much like the AF of M policy: Equipment is insured at replacement value, and every type of loss, with the usual exceptions, is covered, worldwide. The minimum yearly premium is $250, and that covers up to $30,000 worth of gear. After $30,000, the additional premium is $0.75 per $100 of value. The deductible is $250 per claim.

OTHER OPTIONS

What type of insurance is available to you if you don't belong to a special musician's organization? You have plenty of options, mostly via homeowner's or renter's insurance. In most cases, musical equipment is covered under a separate rate for "scheduled properties." Such properties are specifically itemized possessions that don't normally fit within the confines of a standard homeowner's insurance policy.

THE FINE PRINT

Whatever type of insurance you choose, you should keep an impeccable record of your equipment. Your insurance company will give you a specific list of the paperwork they need from you, but the following tips should help you get started.

Documentation. Record the name, model, and serial numbers of each piece of equipment. Once insured, new equipment purchases must be reported within a specified time period; check with your agent for your policy specifications. Also, if you need to file a claim, your insurance company will probably require a police report.

Photos and receipts. Store individual color photos or video of each piece of gear, bills of sale, and appraisals in a safe place. You may want to store them in a safe-deposit box. If a fire, flood, or earthquake gets your gear, chances are it will get all of your paperwork, too.

Appraisals. If you do not have bills of sale for some of your equipment, get written appraisals. An appraisal is also necessary if you want to insure your gear at replacement value, rather than at the cost you paid for it.

Barry Schiller, manager of public affairs for the California State Automobile Association (CSAA), says that their homeowner's policies don't really limit the amount of equipment you can insure, but if there is a large investment in equipment, especially if it is used professionally, a rider is required.

The rates also vary depending on how much equipment you insure and whether you are insured as an amateur or a professional. If you use your equipment professionally, you must schedule it. Also, a home studio operated as a commercial enterprise probably won't be covered under homeowner's insurance, even with a separate rider. You'll most likely need coverage through the commercial division of your insurance company.

With some plans, equipment insured as scheduled property is covered for loss outside the home. Schiller advises, "It may be more advantageous for a musician to schedule equipment, even if it is covered under a regular homeowner's-type policy. With a rider, the equipment will be covered for a wider range of perils than under a standard policy." He adds that such items are only covered if out of the home temporarily, not permanently stored elsewhere.

▼ Insurance shopping is less of an ordeal than losing thousands of dollars in equipment.

John Kozero, Fireman's Fund public relations director, says of their policy rider, "You can schedule items of almost any value on the policy, however for items valued at $10,000 or more, we must have a written appraisal."

Kozero adds that an additional benefit of scheduling items is that you can choose to insure your equipment at replacement cost, because you decide how much insurance you want. When an item is scheduled, although there is an extra premium, there is no deductible if the item is lost or destroyed.

Most companies insure on an all-risks basis, but Kozero says that term can be misleading, because there are always exclusions on a policy. He advises, "Check your policy so you don't have any surprises at claim time." For the most part, the Fireman's policy rider covers standard damage and loss claims in and outside the home; as with most policies, wear and tear is not covered.

NOW WHAT?

I won't tell you that evaluating and choosing an insurance plan, then getting the necessary paperwork together, isn't a hassle, but it is certainly worth it. The time and money you spend now will pay off the next time Mother Nature decides to flex her muscles, at the expense of your roof and everything under it.

Mary Cosola *is senior assistant editor of* Electronic Musician.

(Read this in a low voice with reverb)

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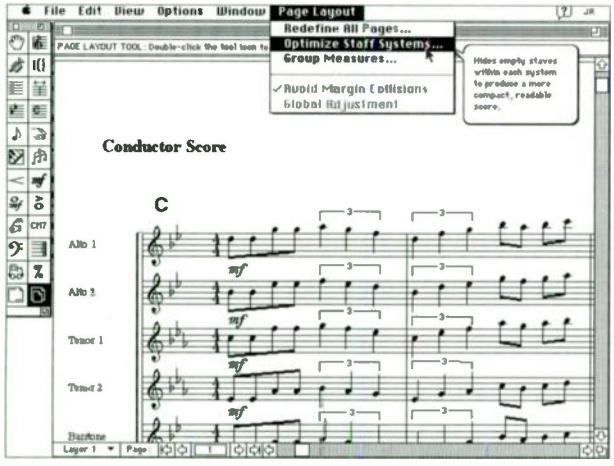
Coda Finale Allegro/ Passport Encore 3.0

By Burt Goldstein

Two midlevel Mac notation programs square off.

Few types of music software are more in demand than scoring packages. Unfortunately, few types of music software are more difficult to develop at a level that will satisfy the demanding user. At the entry level are programs such as Passport's *MusicTime*, which has a stripped-down feature set and emphasizes ease of use. At the high end, Coda's *Finale* reigns supreme, with virtually every feature you can imagine and some you never even dreamed of.



Coda's *Finale Allegro* essentially is a major upgrade to the now-discontinued *MusicProse*. Although not as powerful as the company's top-of-the-line *Finale*, it has more than enough features for most users.

But a lot of users have needs that fall somewhere in between. *Finale Allegro* 1.0 by Coda and Passport's *Encore* 3.0 are upper midrange music-notation programs, but they are aimed at different audiences.

Encore is intended for straightforward traditional music and doesn't cater to early music, avant garde, or highly complex compositions. The $595 program's biggest selling points are fast handling and a user-friendly interface.

Intended for any type of music that uses standard notation, *Finale Allegro*'s feature set positions it between Coda's *MusicProse* (see the review of the *Windows* version in the November 1992 **EM**), which it replaces, and *Finale* 3.0, the company's somewhat intimidating, state-of-the-art scoring program (reviewed in the December 1993 issue). *Finale Allegro* retails for $349, which is credited against *Finale*'s $749 retail price should you decide to upgrade. Except for one odd limitation—you cannot enter durations shorter than a 32nd note—*Finale Allegro* has so many features that most users won't need to upgrade.

Neither notation program takes the place of a sequencer. If you compose mainly by improvising parts until things sound right, you need a sequencer in addition to either of these programs.

In selecting the best product for you, first consider whether the program has the features and power you need (see **Table 1**). But remember: Without an effective user interface that you are comfortable with, the impressive laundry list of features will only result in frustration. Try before you buy.

TWENTY QUESTIONS

Entering pitches and durations is half the work of notating a piece. *Encore* and *Finale Allegro* share four methods of note entry: selecting note durations from the computer keyboard and placing them on the staff via click-and-drag; from the computer keyboard and MIDI controller together; real-time entry from a MIDI controller; and transcribing a Standard MIDI File. In addition, *Finale Allegro* offers a fifth method, in which both durations and pitches are selected from the computer keyboard. This last method, once learned, is the fastest way to enter notes without MIDI.

Sorting out the many note-entry options poses many questions. Are you a good typist? *Finale Allegro* turns your computer keyboard into a music typewriter. The three rows of letters on the computer keyboard become three octaves of pitches. To enter a note, you click on a bar, which causes an editing frame to appear around the selected measure. You then type a letter key to indicate the pitch, followed by a key

on the computer keyboard's numerical keypad (if your keyboard has one) to indicate duration, and the note appears. Do you play a little and type with one finger? In *Finale Allegro,* you can click on a bar, causing an editing frame to surround it. You then play a key on a MIDI instrument to define the pitch and type a number on the computer's numerical keypad to set the duration. You can easily enter chords this way, but only on one staff at a time. In *Encore* the process is similar, but simpler, and there is no editing frame.

How are your performance skills? Both programs offer real-time MIDI entry. This is especially useful if you are scoring music with lots of chords, such as piano, harp, or guitar parts, as entering chords is difficult with computer-keyboard entry. *Encore*'s ability to quantize selected measures is a big plus, and the program lets you Revert to the original MIDI performance data, so you can keep going back and requantizing. In *Finale Allegro,* once you have a notated score, you can't easily change its quantization without reentering the notes.

Finale Allegro's HyperScribe feature lets you beat time with a sustain pedal or similar controller, freeing both hands to play. This helps if you want your score to play back with realistic tempo changes. And because you can slow way down for the difficult passages and play the easy parts as fast as you can, entry errors are greatly reduced over normal real-time entry, where you operate under the tyranny of the metronome.

Do you use a sequencer to capture your performances? Both programs can transcribe (and export) Standard MIDI Files. But this method is no panacea. Although both programs give fairly good results as long as the music is simple, both had trouble transcribing quantized rhythms imported from Opcode's *Vision* sequencer. Passport's representative noted that upgrading *Encore*'s ability to guess rhythms is a major focus of their work.

Finale Allegro has many more options than *Encore* for guessing the correct durations as you import a MIDI file. But *Encore* lets you "reguess" the durations for any selected music; *Finale Allegro* doesn't. This is awkward, because you may work on a piece for a while before deciding it would look better quantized some other way. *Finale Allegro* makes you reimport the MIDI file, quantize it the new way, and then cut and paste sections into the first file. This is an extremely time-consuming process. I prefer *Encore*'s ability to select discontiguous bars and apply a new quantization to just those bars.

Do you write a lot of piano music? No program knows how you want to stem a staff with several layers of music on it. *Finale Allegro* will guess at making a second voice for you, *Encore* will not. In either case, you can expect a lot of manual labor.

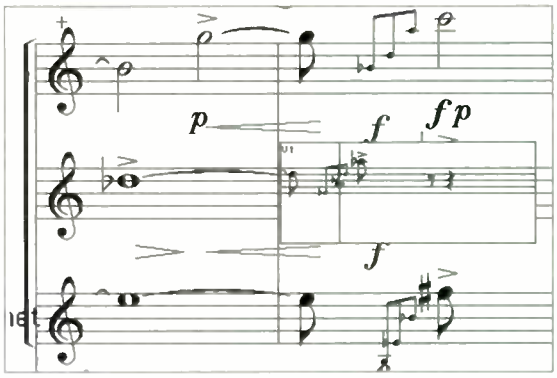


FIG. 1: When zoomed in or out, *Finale Allegro*'s editing frame alters the size of objects inside in relation to other measures. At a 100% display setting, the frame partially obscures other measures.

Do you write music with many key changes or chromatic alterations within a key, or worse yet, atonal music? Neither program deals with these automatically, so you will have to change a lot of accidentals by hand.

EDITING OPTIONS

Alas, no program automatically turns your performance or MIDI file into a perfectly notated piece of sheet music. You must know the conventions of notation, and you should be prepared to spend many hours preparing a score. After importing a MIDI file, you still need to manually enter dynamics, articulation marks, tempo and character indications, lyrics, chord symbols, instrument names, and titles. Then you have to lay out the page, which includes such things as adjusting the spacing between notes and beats, changing bar widths, placing page turns, and choosing fonts. Thus, editing and page-layout features are a major consideration.

Encore allows you to enter and move notes and marks more directly than *Finale Allegro.* To move a note in *Encore,* you simply click and drag it. In contrast, *Finale Allegro* first puts a frame around the bar. There are two advantages to this approach. First, it allows you to edit every item in a measure, even if the measure extends beyond the onscreen display. In addition, the frame lets you edit at 100% size, even when you are viewing the score at reduced size (e.g., to see a full score onscreen at once).

Unfortunately, using the frame takes a bit of time, and because the frame acts like a distorting lens, lining things up exactly with other objects on the page becomes very difficult (see **Fig. 1**). The problem gets more grotesque as you zoom in or out. Even at 100% it is an irritant, as the frame not only distorts the size of objects inside but sometimes hides objects in other bars.

Encore doesn't have this problem, because it has no editing frame, which is a relief. But it has no zoom capabilities at all, which is a drag when you want to adjust tiny details in the score close-up. You pay your money and you take your choice.

Finale Allegro's editing features suffer from a tendency to put a box of some kind between you and your music. For example, Coda gave the program "smart" articulations that are automatically positioned, so you shouldn't have to manually adjust their positions. But if you have to move a note expression,

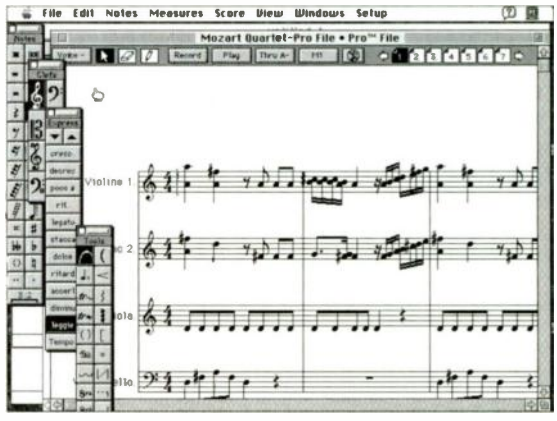


FIG. 2: *Encore* offers movable palettes containing a wide variety of symbols, which can be entered via click-and-drag.

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such as an accent or articulation mark, you must first click the tool that entered the mark, then click the note the mark is attached to. This causes a "handle" to appear next to the mark. Now you can move the expression by clicking and dragging the handle, which partly covers up the mark, making placement more difficult.

On the other hand, *Finale Allegro* makes up for these problems with a more powerful set of tools than *Encore*. You can make any articulation appear on all notes within a selection. You can even specify marks to appear only on notes within a certain range of durations. In a single piece, you might have to place hundreds of marks by hand in *Encore*, which you could place in an instant using *Finale Allegro*.

Expressive marks such as dynamics or tempo indications can be instantly reformatted in *Finale Allegro*. In *Encore*, each instance of the word "crescendo" would have to be selected to change its font or size. This is a drag, especially if you have unwittingly used a non-PostScript font that looked great on your DeskWriter but won't print on a Linotronic typesetter.

Graceful, sweeping slurs are easy to draw in *Finale Allegro*. *Encore* requires patching two slurs together to shape a long slur properly. Both *Encore* and *Finale Allegro* let you flexibly open, lengthen, and place hairpins and provides guidelines that help you line up expressive marks. *Finale Allegro* also lets you tilt hairpins, which you can't do in *Encore*.

Copying your music from one place to another is implemented differently in each program. Say you have entered a score with eleven staves. Now you decide to insert a copy of bar 2 before bar 202. In *Encore*, you take the traditional Macintosh approach: click on bar 2, scroll down through the eleven staves, and shift-click to select the intervening bars. *Finale Allegro* lets you select a range by typing in a dialog box, which comes in handy.

You also might need the ability to shift your music over by one or two beats, reflowing it into subsequent measures. *Finale Allegro* has problems doing this with some rhythms; *Encore* can't do it at all.

In addition, *Encore*'s Undo feature is severely limited. For instance, *Encore* won't let you Undo after splitting staves, or adding or deleting bars, so you have to save often and Revert to the saved version in a pinch. *Finale Allegro* lets you Undo almost anything.

TABLE 1: Feature for Feature

FEATURE	FINALE ALLEGRO	ENCORE
Staves per score	32	64
Voices per staff	8	8
Enterable note values	Double-whole to 32nd	Double-whole to 128th
MIDI channels	32	32
Automatic extraction of parts from score	yes	yes
Transposition	yes	yes
Single-line percussion staves	yes	yes*
Large size output to lino	yes	yes
Tiling of large pages	yes	yes
Files port to PC version of program	yes	yes
Auto-transposition of parts	yes	yes
Harp pedal chart	yes	no
Guitar fretboard interactive graphic	no	yes
Tablature staff interacts with regular staff	no	yes
Resize notes for cues	variable %	70% regular size
Requantizing selected bars	no	yes
Automatic beaming	more extensive	yes
Stems flip with key change	yes	no

* limited rhythm staff

LAYOUT AND SPACING

Both programs strongly encourage you to enter all your notes and lyrics first, then apply layout tools, before you add staff or note expressions. So both programs limit how you think. You are punished for changing your mind halfway into the piece and rewarded if you have a finished pencil copy of the score before you start.

If you mess with a layout after you finish the complete score, expressions move around and have to be individually repositioned, which can be a disaster in terms of time. *Encore* randomly truncates text expressions (including words such as "cresc." and "dim.") when you increase the number of bars per line. Each one has to be individually resized. (Passport's representative said this has been fixed in version 3.0.7.)

Finale Allegro has more tools for affecting spacing globally, so you have more chances to press a button and see everything spaced almost perfectly than with *Encore*. You can adjust the spacing between beats in *Finale Allegro* by selecting some bars, holding down a key, and double-clicking. After a short time, the music is respaced according to rules. A fixed amount of space can be added or subtracted to all selected bars. *Encore* has a Spacing default under the Setup menu, where you can save thickness of beams, set the spacing between notes, and many other functions.

Finale Allegro will fit as many selected bars per line as you wish. You can adjust spacing within bars and the width of the bars and prevent overlapping of accidentals and notes. In addition, you can adjust the spacing between beats automatically for all staves of any bar. By loading spacing libraries, you can further customize how tightly notes will be squeezed together when an autospacing tool is picked.

Encore offers two autospacing options: Mathematically Perfect and Engraver's Spacing. Neither prevented accidentals from overlapping previous notes in some cases. This is because these tools only respace within existing bar widths. You have to change each bar's width manually. You can, however, have *Encore* automatically create any number of bars per line for a section. (*Finale Allegro* also has this capability.) In general, *Finale Allegro* comes out the winner here for most users.

Both programs can extract parts from a score. *Encore* simply makes a separate file for each part you want to extract—a file you then have to lay out. *Finale Allegro* gives you three ways to extract parts. You can use the Extract Parts command to create a separate file for each part, each with its own layout. With Special Parts Extraction, the parts are kept in the same file as the score; Page View displays the parts and Scroll View shows the score. In this version, the parts remain linked to the score; therefore, changes made to a part automatically appear in the score. The third method is Print Parts, which provides a quick printout without tweaking a layout.

One function that may be unique to these two programs is the ability to automatically place multimeasure rests in extracted parts. This can be a real time-saver.

SYMBOLICALLY SPEAKING

Both programs include a wide collection of symbols (see **Fig. 2**). *Encore* allows you to make up to 48 custom text expressions, and you can create graphic objects with a drawing tool. Passport's program puts its marks on palettes, ready when you want them.

Finale Allegro doesn't limit the number of text expressions and offers many options for customizing symbols. Expressive markings at the score or staff level (e.g., dynamics or tempo marks) can be picked by the user from any font. An unlimited number of dynamics, rehearsal letters, and tempo/character markings can be added to those provided. Unfortunately, these cannot be programmed to appear in a default position. Eight staff and eight note expressions can be programmed to appear with a mouse-click; these can be reprogrammed at any time and can be saved as a template. However, the remaining expressions must be picked from a long list in a small window.

Both programs allow MIDI playback, and symbols such as hairpins, accents, articulation marks, and repeat signs can be set to affect playback. To a limited degree, both programs let you enter chord symbols and play them back via MIDI, and a wide variety of chord names are available. *Finale Allegro* provides three methods. Manual chord

TABLE 2: Speed Tests
(Time in Seconds)

OPERATION	*Finale Allegro*	*Encore*
open file	93	12
save file	36	5.5
cadd 1 m. before m.1	69	2
undo adding 1 bar	108	x
cadd 1 bar at end	5	1
screen redraw	4.5	0.1
copy 1 bar, 11 staves	18.5	3
copy & insert 4 bars	131	15
copy & paste 4 bars	55	1
respace	223	18
transcribing large SMF	960	20

All speed tests were conducted on a Quadra 650 with 8 MB of RAM, of which 2 MB were allocated to the program and 4 MB were free. I maintained 26 MB free hard-disk space. Files were 572 KB and contained modern music of medium density. Eleven staves were used unless otherwise mentioned. B&W mode was used to speed up *Finale Allegro; Encore* was run in Color mode, as this only slowed it slightly. Almost all operations caused *Finale Allegro* to write to disk, slowing it.

Product Summary

PRODUCT:
Finale Allegro 1.0
PRICE:
$349
SYSTEM REQUIREMENTS:
Macintosh Plus with 2 MB of RAM (68030-based Mac with 4 MB RAM recommended); hard disk; System 6.07 or higher
MANUFACTURER:
Coda Music Technology
6210 Bury Dr.
Eden Prairie, MN 55346-1718
tel. (800) 843-2066
or (612) 937-9611
fax (612) 937-9760

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

entry is cumbersome; it asks you to specify the chord with nonintuitive numbers for root and chord type. With MIDI Input, you simply play the chord, and *Finale Allegro* names it for you and places it on the score. Finally, with 1- or 2-Staff Analysis, you click on a stack of entered notes, and *Finale Allegro* names the chord they form.

Encore lets you highlight a note onscreen and play a chord on your keyboard, which it places onscreen. The Arrow key takes you to the next note, letting you pop in chords quickly.

An important consideration in producing an attractive score is the fonts. *Finale Allegro*'s music font, Petrucci, is a bit more attractive than *Encore*'s Anastasia, but both are professionally acceptable. *Finale Allegro* lets you use any font to create an unlimited set of user-defined expression marks. *Encore* can only use its own font. Of course, you can get around this with a font-editing program such as Altsys' *Fontographer*.

RELATIVE SPEED

Finale Allegro is much slower than *Encore* (see **Table 2**). The most dramatic speed difference between the two programs is in transcribing MIDI files: The same large MIDI file took twenty seconds to transcribe in *Encore* and 960 seconds in *Finale Allegro!* But there are factors that help *Finale Allegro* make up for its basic slowness. Turning off the Undo feature accelerates its physical speed. You also can set the program up to use a RAM disk, which reduces disk access and speeds things up.

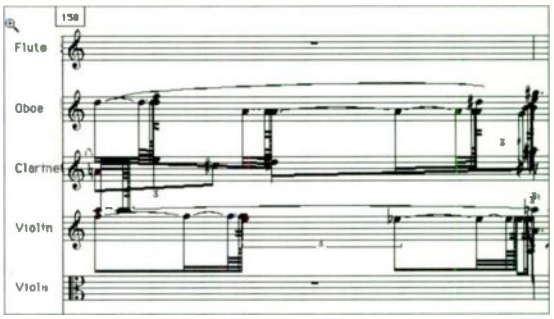

FIG. 3: *Finale Allegro* sometimes runs into problems when you try to transcribe dense, highly complex MIDI files. Fortunately, with most music, this kind of mess is rare.

In terms of getting work done quickly, I've already mentioned that note expressions (e.g., accents, bowings, and articulation marks) can be globally applied and text expressions (cresc., dim., etc.) globally changed. In addition, *Finale Allegro* allows you to set a number of general features as preferences: abbreviate common and cut time, display left bar line, and slash flagged grace notes. *Encore* approaches this a bit differently: While these preferences are not saved as a program default, they can be saved in template files.

Finale Allegro also handles lyrics more effectively, letting you import text from a word processor and automatically attach syllables to notes. You must first separate the syllables with dashes, which can take some calculation, but it works. Very cool.

ASSORTED QUIRKS

Finale Allegro has several quirks. As an example, when transcribing triplets, *Finale Allegro* sometimes puts the "3" in the middle of the stem. Repositioning

must be done individually. In a 200-bar, 10-stave score there are 2,000 bars; there could easily be 500 numbers to move. At fifteen per minute (my rate), this takes 33 minutes. It is also normal to use a bracket when the first triplet in a group is a rest, but there is no way to do this globally.

Finale Allegro also requires a great deal of space on your hard disk for "temp" files, which can lead to problems. I know several users who have lost files because they were confused by how *Finale Allegro* acts when there's not enough space on a disk to save a file. The program warns you, but it saves an unusable, smaller version of the file anyway. If you think you've saved your work and throw out other copies, you've lost your music. Coda estimates that you need twice as much RAM and four times more free disk space than the size of your file.

But the most serious problem with *Finale Allegro* is that there are several ways to ruin your score beyond recovery. When transcribing music, or when redrawing barlines, you can get insanely complex rhythms that you may have to redo one at a time (see **Fig. 3**).

Encore 3.0 seems a more stable program than *Finale Allegro* and runs smoothly. In over three months of heavy use, I never had a crash. Other than one or two quirks I've already mentioned, the only odd behavior was when the program told me there wasn't enough memory to paste eleven staves into the clipboard, even though I had plenty of free RAM. Considering the program's early reputation, this is especially heart-warming.

DOCUMENTATION AND SUPPORT

Finale Allegro comes with three manuals totaling 645 pages. More is not always better, but in this case I welcomed having the information in the *Reference* volume repeated, but organized alphabetically by musical terms, in the *Encyclopedia*. If you're looking at your computer screen wondering what a menu item does, you use the *Reference* volume. If you're looking at your music, wondering how the program handles first endings, or cue staves, you look in the *Encyclopedia*. The *Installation and Tutorial* volume is an easy, 123-page read that teaches you how to get around in the program.

Passport provides two spiral-bound books: a short "getting started" manual and a reference book that has 161 pages of main text and three appendices. The documentation is not as well organized or as detailed as *Finale Allegro*'s. For example, the instructions on fermatas show up in an appendix called "Advanced Topics."

CONCLUSION

There are over a dozen scoring programs currently available for the Macintosh. Great Wave, Electronic Arts, ECS, Pygraphics, and Ars Nova offer more basic programs, while Temporal Acuity Products recently released *Nightingale*, which competes directly with *Finale Allegro* and *Encore*. Opcode just announced a new scoring program, and several sequencers (notably those from Steinberg and Emagic) have surprising scoring capabilities. Nonetheless, whenever the subject of music-notation software arises, the two companies mentioned most are Coda and Passport. Of the two titans, which is best for you?

Finale Allegro comes closer to what a professional copyist needs and has more features that can make notation easier. You are less likely to get halfway through a piece and discover the program can't do something you have just realized is essential. And if you do, you can get credit toward the heavyweight *Finale*.

Finale Allegro's most serious quirks

Product Summary

PRODUCT:
Encore 3.0
PRICE:
$595
SYSTEM REQUIREMENTS:
Macintosh Plus with 2 MB RAM; hard disk
MANUFACTURER:
Passport Designs
100 Stone Pine Rd.
Half Moon Bay, CA 94019
tel. (415) 726-0280
fax (415) 726-2254

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

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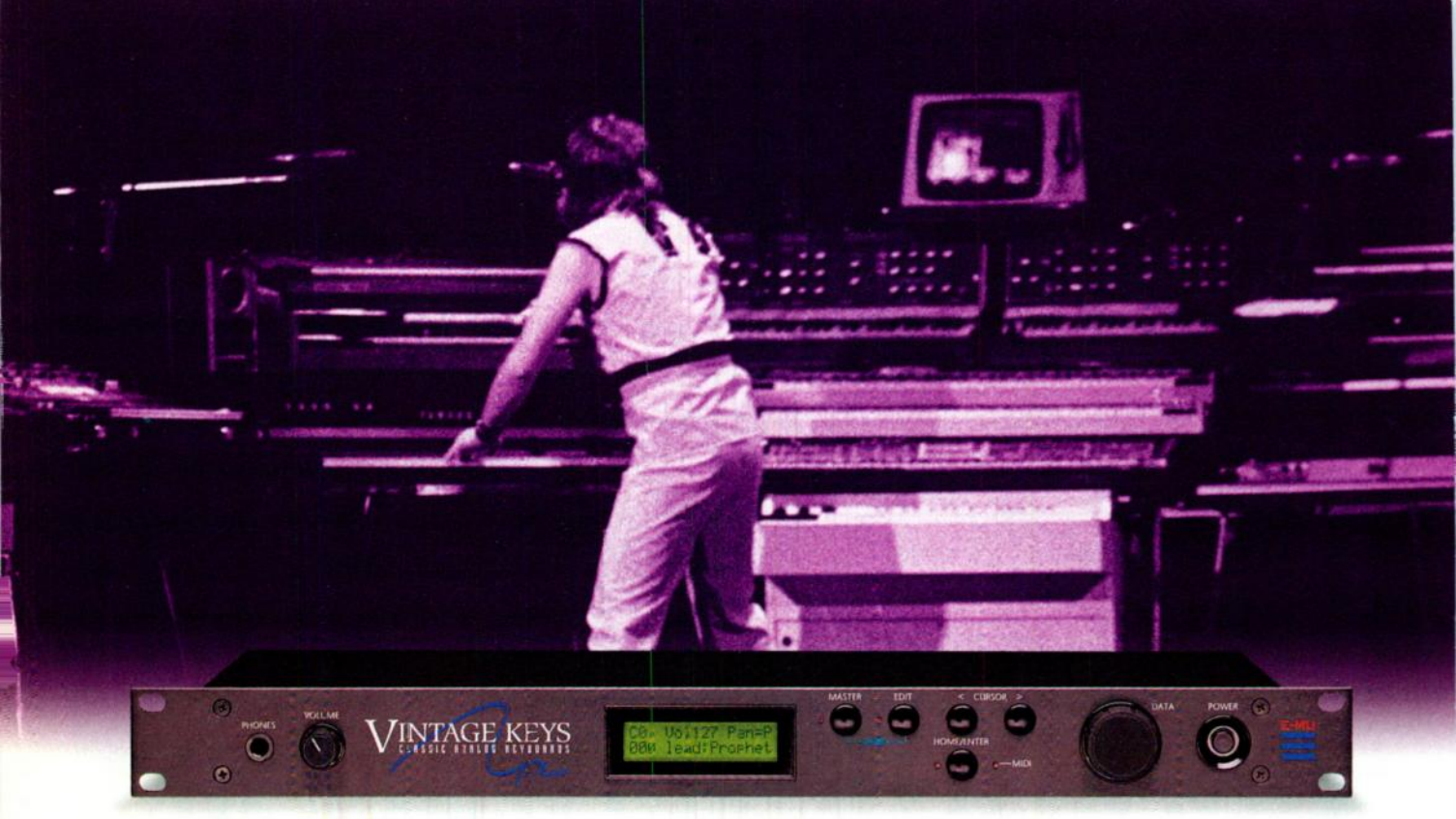

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probably won't bother you in projects where you are copying from an existing score and don't need to shift music over a beat, rebar music, change lots of time signatures in music already entered, or cut-and-paste huge chunks of music. Certainly songwriters will love the way Coda's program lets you automatically line up text and notes with one Option-click.

Encore is simpler, easier to learn, more stable, much faster in some respects, and has a more intuitive, point-and-move interface. If you have to rearrange the order of sections after you've entered the music, you will find *Encore* lightning fast in comparison with *Finale Allegro*. If you are doing a lot of work that requires tablature notation, *Encore* has tools that *Finale Allegro* lacks.

Although it has fewer features, *Encore* is the more expensive program. Essentially, if you go with Passport, you have an advantage in speed and ease of use. For many musicians, these are significant factors. For lead sheets, it's a tie between the programs. But if you are beginning a career as a professional computerized copyist, *Finale Allegro* gets the edge.

Burt Goldstein *composes and does Macintosh and MIDI consulting in Santa Monica. He has won awards from BMI, AMC, and NEH. He is currently finishing a Taper Foundation commission and writing about* Excel *for Prentice-Hall.*

Circle #437 on Reader Service Card

DigiTech TSR-24 Multi-effects Processor

By Michael Cooper

The king of algorithm programmability is crowned.

Until now, effects processors that offered "user-configurable algorithms" were decidedly limited in the configurability they offered. Typically, you could place the reverb either before or after the EQ, or chain a couple of effects in serial or parallel. But now, the DigiTech TSR-24 has upped the ante. The heart of

the TSR-24 is the S-DISC, a proprietary VLSI chip that gives the user *total* freedom to configure effects algorithms.

The manufacturer's specs for the TSR-24 are impressive. The ADCs employ an 18-bit, 128-times oversampled, Delta-Sigma design. The DACs are 18-bit PCM. The frequency response is 20 Hz to 20 kHz, ±0.5 dB, thanks to a generous 48 kHz sampling rate. The signal-to-noise ratio is greater than 90 dB, which is pretty standard fare these days and not as good as you might expect from an 18-bit machine.

BASIC ARCHITECTURE

The TSR-24 offers 71 different effect modules. The list includes normal and gated reverbs; mono, stereo, and multitap delays; chorus; flange; pitch shift (including detuning and arpeggiators); sampling; highpass and lowpass filters; graphic EQs with six, ten, and fifteen bands; parametric EQs with one, three, and five bands; tremolo; autopan; noise gates; and noise reduction. The effects are arranged into twenty factory algorithms. Up to 32 additional user algorithms can also be programmed and stored.

In a stock TSR-24, you can string approximately six effects together in an algorithm. (The exact number depends on the complexity of each effect in the algorithm.) However, DigiTech's user-installable Parallel Processing Card (PPC-200; $299) doubles the amount of RAM and adds another S-DISC chip. This allows twice as many simultaneous effects, or up to ten seconds of mono sampling (versus five seconds without the PPC-200).

In a stock unit, the programs change quite slowly, with a noticeable gap, but the PPC-200 provides gapless, seamless program changes. Not only that, the PPC-200 allows effects in progress to finish their cycle after a program change, even when the new program begins processing new audio signals. In the stock unit, effects in progress are cut off after a program change.

Effects programs are organized into 104 factory presets and 128 user-programmable locations. To create an effects program, you chain together individual effect modules (for example, stereo reverb and 4-tap delay) in any order and specify the routing between modules.

Effect modules (including redundant effects) can be linked in series or parallel at any point in the chain. Any of twelve mixer and splitter modules, with different configurations (e.g., 2 × 1, 4 × 1 and so on up to 16 × 2), can be inserted between effects, with independently programmable panning and level for each mixer input.

Each effect module's output level can also be programmed. Furthermore, you can route the unit's left and right input channels to totally separate effects for discrete dual-mono processing. (Mono and true stereo input are also supported.) The last effect modules in the chain can be routed to any of the TSR-24's four outputs for mono, dual-mono, stereo, dual-stereo, 3-out, or 4-out operation. Imagine each of four speakers receiving totally different effects, or reverb with different early reflection levels for the front and rear speakers. This is powerful stuff!

PUSH MY BUTTONS

The 1U rack-mount TSR-24 offers enough knobs, buttons, and displays to make any tweaker shriek with joy. However, having dozens of controls is a double-edged sword. It offers quick access to many features, but mandates considerable memorization. Overall, the TSR-24's learning curve is steeper than other black boxes of its ilk.

But this box offers many useful features. For instance, every time you call up an effects program, its input/output routing configuration is graphically represented by a small icon on the unit's 2-line, front-panel LCD. On the down side, different routings sometimes share the same icon. For example, the icons for dual-mono and stereo-out configurations look the same.

The main LCD also displays program and algorithm titles (their numbers are shown on a separate 3-digit LED

The DigiTech TSR-24's proprietary processing chip lets you configure up to six effects in any order, in series or parallel, including redundant effects. With its four outputs and expandable hardware, it's the leader in effects-processing flexibility.

display), the order in which effects are chained together, parameters (including MIDI), and various utility functions, all of which can be edited. This data is presented in a series of pages arranged in a wrap-around linear chain, rather than a hierarchy of menus and submenus. You can scroll through programs and parameters slowly or quickly via increment/decrement buttons or a large data wheel. In addition, four access keys can be programmed to provide instant access to the four most-used parameters for each program.

An effects program can include over five dozen different parameters. To avoid scrolling through tons of parameters you don't want to tweak, the front-panel FX Library buttons can skip directly to a particular module's parameters. They can also be used with the Test button to audition ROM preset versions of individual effect modules.

Rotary knobs control the left and right input levels. There's also a rotary knob for outputs 1 and 2 and one for outputs 3 and 4. The left and right input levels are monitored with separate 4-segment LED ladders. Other LEDs indicate MIDI activity, input-level overload, bypass (a Bypass button is also provided), and the current mode.

The Mono LED *should* light only when the current program is configured for mono input. However, my review unit (firmware version 1.2) prompted this LED to light even on some true stereo algorithms. (DigiTech says this has been fixed in version 1.3.) Another LED lights when the current program has been edited. This is especially useful because edits that haven't been saved are lost on power-down.

The TSR-24's rear-panel inputs and outputs are ¼-inch, balanced TRS phone jacks. Nominal levels are +4 dBu, but even when I plugged in an electric guitar I had no problems with distortion or insufficient gain. The rear panel is also home to a heat sink; detachable AC cord; footswitch jack; and MIDI In, Out/Merge, and Thru jacks (see "MIDI Implementation"). You can program any generic footswitch (with up to three separate switches) to bypass effects, trigger samples, or step

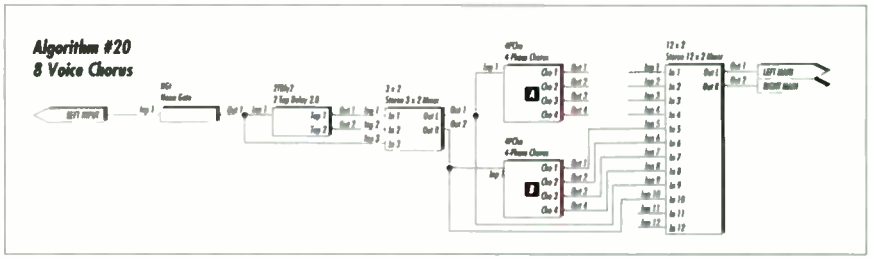

FIG. 1: The TSR-24's programming flexibility is obvious in this factory 8-Voice Chorus algorithm. From a mono input, the signal is processed with two 4-phase choruses in parallel, then mixed to a stereo output pair. Note the use of a 2-tap delay to enhance the stereo split.

through effects programs in any order you wish.

CREATING ALGORITHMS

Individual effect modules can be added to or deleted from an algorithm. Once you settle on the effects you want, you link them together in any order, then name and save the algorithm. Things can get pretty complicated with parallel routing and mixers, so anything but the simplest algorithm requires you to chart out a block diagram before programming the unit.

The only awkward aspect to linking modules is that "upstream" outputs are chosen for each input that follows in the chain, not the other way around. Hence, you're forced to think backward about the signal flow. Considering that the main display can only show one connection at a time, this can be confusing, especially with parallel routing. However, the programming flexibility is absolutely tremendous, and the manual offers helpful block diagrams of factory algorithms to get you started (see **Fig. 1**).

The TSR-24 walks softly but carries a big stick. For example, a cursory examination of available effects might lead you to conclude that choruses are limited to no more than four phases. (A 4-phase chorus has one input and four outputs, each with its own independent delay time.) However, because similar, or even redundant, effects can be chained together, you can build choruses with eight or more phases in a standard unit.

IN THE STUDIO

The TSR-24's nongated reverbs are not categorized according to type (plate, hall, etc.) and tend to have a "sameness" about them. Nevertheless, the unit is capable of convincing room ambiences. On vocals, the reverbs are warm and fairly smooth. To my ear, however, there is a slight lack of clarity that makes it difficult to properly "sit" vocals in the mix. On a more positive note, the unit provides excellent control over the shape, level, and spacing of early reflections, which allows subtle ambiences without cumbersome reverb tails. Gated reverbs sound thick and beefy on drums.

Swirling guitar echoes and thick, vocal multitap delays are a snap with the TSR-24's feedback-equipped delays. Mono 1-, 2-, and 4-tap delays offer up to five seconds of delay time. A single-tap true stereo (in and out) delay is also available, with up to two seconds of delay time. Delay-time increments are an exacting 1 ms, although you can increase the increments to 100 ms for faster editing.

The fundamental difference between the TSR-24's chorus and flange programs is that the flangers offer a feedback parameter not mentioned in the otherwise-excellent owner's manual. Aside from this difference, the parameters and delay-time ranges are exactly the same for both types of effects. Mono, 2-phase, 4-phase, and true stereo chorus and flange are available. All but the 4-phase chorus and flange offer a choice of four LFO waveforms for modulation. (The 4-phase versions of these effects have only a sine-wave LFO.)

LFO speed and depth are adjustable only for the entire module, not independently for each delay time. However, you can create a complex chorus or flanger by programming different modulations for separate chorus/flange modules that are chained together. A chorused electric guitar sounds wide and deep, but slightly glassy. The flange effects are present and clear on electric guitar, but they don't offer much headroom before distorting.

The unit includes a nonintelligent pitch shifter (up to two voices) and a detuner (up to four voices in the 4-output configuration), as well as mono and stereo arpeggiators. The pitch-shift range is adjustable over ±2 octaves, in semitone increments, although I could only shift three or four semitones on

Product Summary

PRODUCT:
TSR-24 Multi-effects Processor
PRICE:
$799
MANUFACTURER:
DigiTech
8760 S. Sandy Parkway
Sandy, UT 84070
tel. (801) 566-8800
fax (801) 566-7005

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

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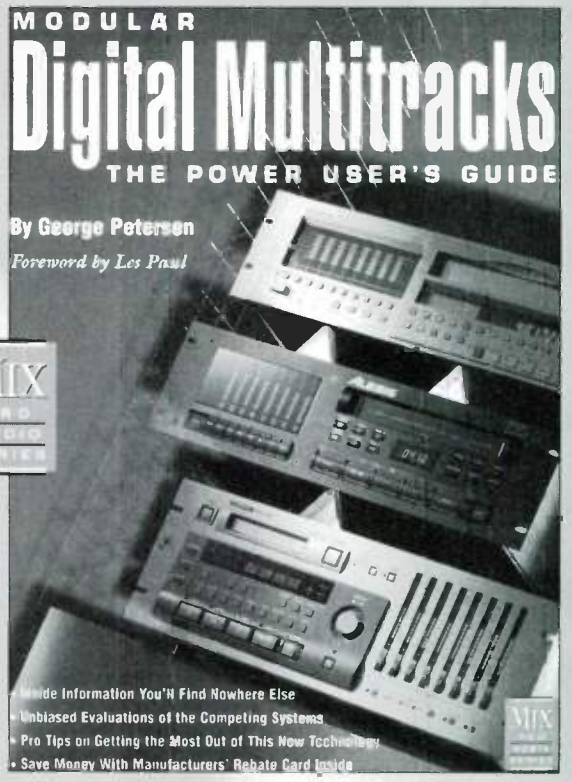

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vocals before running into obvious chipmunk or "Strawberry Fields" tonalities.

Pitch stability is excellent, and tracking is outstanding on both snare and kick drums; there is no audible delay across the entire pitch-shift range. After shifting the kick drum down two octaves and adding that to the dry signal, the kick became much fatter and punchier. Similarly, I added sizzle and snap to a snare drum by shifting the pitch up.

The TSR-24 offers a generous maximum sample time: 2.5 seconds in stereo or five seconds in mono at a pristine 48 kHz rate. Start and end points can be truncated, and the entire sample can be looped. Sample recording and playback can be triggered via footswitch, front-panel button, audio input above a specified threshold, or any MIDI Control Change message. (For continuous controllers, a value of 127 triggers the sample. To retrigger, you must resend a value of 127.)

Sampling and truncating a snare-drum sample from my Emax library was a cinch. By setting the TSR-24 to Audio Retrigger mode, it played the sample with each live snare-drum hit. Layering both sounds, the result was huge, but not without problems. Even with a rock-steady studio drummer, the input-trigger level was hard to dial in without dropping an occasional trigger or triggering the sample with hi-hat bleed into the live snare's mic. I also got an occasional flam on closely spaced snare hits. In addition, the sample is lost when you power down.

Next, I ran synth pads and guitar tracks through the unit's autopan effect, which offers separate speed and depth parameters. Even with the autopanner's depth cranked to the max while wearing headphones, the effect is not dramatic.

The TSR-24 offers fairly sophisticated mono and stereo noise gating, with separately programmable on and off thresholds, as well as attack, hold, release, and attenuation (i.e., how much signal gets through when the gate is closed). Although the fastest possible attack time is only 1 ms, you can delay percussive sound sources so that the gate opens before the leading edge of the sound occurs. Very hip. The Silencer noise-reduction modules are scaled-down versions of the noise gates.

MIDI IMPLEMENTATION

The TSR-24's MIDI implementation is extensive. Program Changes with MIDI mapping are supported, and the unit can map and send Program Changes for up to four other devices. The unit can merge MIDI data appearing at the MIDI In port with internally produced messages and send them to the MIDI Out/Merge port.

Perhaps most important, all effects parameters are controllable in real time via MIDI. Different Control Change messages can be globally assigned to any or all of the possible parameters. These assignments remain active no matter which program is called up. In addition, up to four parameters in each individual program can be separately controlled by any Control Change message. You can also define the range of parameter values that will be modulated by MIDI, and Channel Pressure can control parameter values, too. Program data can be exported and imported to and from a MIDI data filer or another TSR-24 with Bulk Data Dump and Load.

CONCLUSIONS

The TSR-24 is downright revolutionary in the unprecedented control it provides over configuring effects algorithms. The only drawback to all this power is that you must take some time to study algorithm design to use it most effectively. If you're in a hurry to plug it in and party, this box is not for you. On the other hand, programming fanatics will be in heaven.

If the reverbs were only clearer, the TSR-24 would be a killer processor. The chorus, flange, pitch shifting, and delay effects all sound quite good. The sampling quality and the amount of available sampling time are excellent for an effects box. The ability to step through any and all effects programs in any order via footswitch is a great live-performance feature. And four totally independent outputs greatly expand the unit's potential creative applications for live and studio applications.

That the overall sound quality does not rival high-end Lexicons and Dynacords is no surprise for a box in this price range. That it sets a new standard in programmability *is* a surprise, and a welcome one at that.

Michael Cooper *is owner and chief recording engineer of Michael Cooper Recording in Eugene, Oregon. He writes frequently for several music-industry publications.*

Circle #438 on Reader Service Card

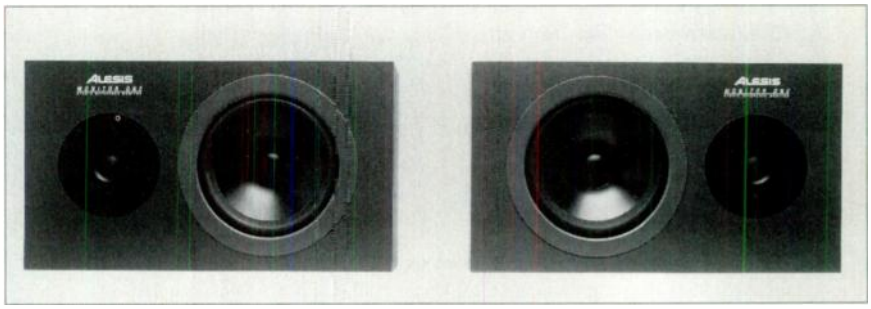
Alesis Monitor One Loudspeaker

By Larry the O

Quality sound at a budget price.

Most close-field monitors are like Nike shoes: They're don't have the Gucci aesthetic, but everybody runs on them. The small systems usually aren't bad, but compromises must be made to meet the desired price point and size constraints.

Given the many audio applications for small monitors and the uniqueness of each person's room and hearing, there's a large enough market for a number of manufacturers to succeed. Still, it is inevitable that there will be winners and losers. This is the



Alesis' Monitor One 2-way loudspeaker system delivers even, crisp highs and has a smooth, extended low-frequency response, thanks to a rear-firing port. Its soundstage imaging is good, but not stellar.

story of a winner.

I often express my dislike of the overwhelmingly popular Yamaha NS-10 monitor because of its exaggerated frequency response and nasty high end. Searching for a better alternative, I eagerly laced up a pair of Alesis Monitor One loudspeakers and took them for a run. (Actually, they have standard, 5-way binding posts, not laces, but it completes the metaphor.)

At first glance, the Monitor One certainly resembles the ubiquitous NS-10. Alesis' 2-way system has the same dimensions as the NS-10, except for being a few inches deeper. And at $399 a pair, the Monitor One is at the low end of the price scale, too. It even sounds like it has a bit of accentuation in the high frequencies. But there the similarities end.

FROM TOP TO BOTTOM

The Monitor One's ferrofluid-cooled, 1-inch diameter, soft-dome tweeter has a smoother quality than almost any other speaker I have heard that is near its price. The frequency-response plot on the Monitor One brochure (on which the smallest division is a hefty 9 dB, with the line representing the response being two divisions thick) shows a peak at around 10 kHz. The tweeters handle this gracefully, although vocal sibilance sounds quite present.

The high end of the Monitor One is generally even and sounds crisp and pleasing, as opposed to the fuzzy and aggressive highs often heard from inexpensive speakers. This quality was most evident on piano, cymbals, and acoustic guitar, although it was first revealed to me when mixing an album of Celtic harp.

Product Summary

PRODUCT:
Monitor One Loudspeaker
PRICE:
$399/pair
MANUFACTURER:
Alesis Corp.
3630 Holdredge Ave.
Los Angeles, CA 90016
tel. (800) 525-3747
or (310) 558-4530
fax (310) 836-9192

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

The tweeter crosses over at 2.5 kHz to a 6.5-inch, polypropylene woofer. The low-frequency response is extended with a rear-firing port, which sets the Monitor One apart from its competition. I'm not sure I could hear Alesis' claimed ±3 dB response down to 45 Hz, but its superior low end was obvious in A/B/C comparisons with several other small monitors, some costing up to 40 percent more. The extended low-frequency reproduction is an obvious plus for referencing drums, but its real importance is in giving the Monitor One a balanced sound, a feature that many small monitors lack.

This is not to say that the response is ruler-flat through the whole low range; vocals revealed a slight boxiness in the general area of 800 Hz. However, it is not much of a bump, and it didn't take much effort to ignore or get used to it.

FROM SIDE TO SIDE

Moving into grayer areas, the imaging of the Monitor One was good though not exceptional. The stereo soundstage was clearly audible, but it did not have a rock-solid center image. However, the speakers *do* have a wonderful punchiness. When I listened to a rock mix composed of a number of diverse instruments playing contrapuntal parts, the instruments remained distinct, and the mix had a great "in your face" sound. The sonic punch took on a different, but equally pleasing quality on the Celtic harp album, which also featured female vocals, acoustic guitar, mandolin, and flute.

FROM WHISPER TO SCREAM

When volume is needed, the Monitor One can get quite loud. Power-handling is rated at 120 watts continuous and up to 200 watts on peaks, which is much more than most monitors their size. That's a good thing, because their 4-ohm impedance means that your amplifier will deliver more power to them than to the more common 8-ohm speakers. And when they're cranking, they won't be moving around, because the textured rubber surface of the Monitor One provides a healthy amount of friction with the surface on which it rests.

Alesis' speaker system also sounds quite good at extremely low volumes. This is more important to me than playing loud, as I rely on low-volume

referencing to check mix balances. Every one of the sources I auditioned sounded good on the Monitor One. More important, the sessions I did with them sounded good when played back on other speakers.

SUMMARY

I am pleasantly surprised—and more than a little impressed—at Alesis' first transducer. Experienced speaker designers were employed in this effort (principally ex-UREI and Harman Electronics chief engineer Frank Kelly and ex-JBL and Gauss engineering manager Walter Dick), and they have done an excellent job at balancing priorities and tradeoffs. For example, in an ideal situation, I like to have two sets of monitors: a large, highly accurate pair and a smaller, more "real-world" set. However, many small studios can only afford one pair of speakers.

The Monitor One carefully rides the line, sacrificing finely honed perfection to keep the price down, but maintaining sufficient sonic integrity to be more than satisfactory as a studio's sole speaker system. To my ears, the Alesis Monitor One is the most satisfying speaker in its class.

Larry the O *performs and records with 11:11 and Ascot Jacket, as well as editing sound at Wave Group Sound for the ABC cartoon* Things That Go Bump in the Night.

Peavey Versamix Portable Mixer

By Ric E. Braden

Peavey enters the compact console competition.

Way back in the 1970s, I bought my first mixer: a Peavey 600S with a whopping six inputs and stereo outputs. It even had a built-in spring reverb that made the most amazing "choong" sound whenever someone bumped into the console. Well, it wasn't a *great* mixer, but it didn't cost much, and it was incredibly durable and extremely portable. (A leatherette carrying handle was a standard feature.)

However, times have changed since Peavey made the 600S. Today's compact mixer must accommodate multiple inputs from sound modules, mics, and outboard signal processors, while delivering specs capable of servicing the pristine resolution of modular digital multitracks. To meet the challenges of modern music making, Peavey has introduced the Versamix, a low-cost ($999.99), 16-channel mixer with lots of features aimed at a variety of mixing needs.

THE BASICS

The Versamix fits a 16 × 2 configuration into a clean, conservatively styled package. The black frame with easy-to-read white lettering is offset by an unusual—though not unappealing—color scheme of green and beige knobs. How the Versamix's rotating I/O panel is adjusted (more on this later) determines the mixer's actual working dimensions, but the standard footprint is 19 × 16 × 4 inches. The whole package weighs in at about nineteen pounds, including the external power supply.

Peavey states that the Versamix posts a frequency response of 12 Hz to 22.5 kHz (±1 dB). The distortion figures are 0.007% for the mic preamp section and 0.0085% for the line preamps, measured at 1 kHz.

CHANNEL SURFING

The Versamix has sixteen inputs, with switchable phantom power available for all channels. However, only the first six channels accept balanced XLR connections. All channels have ¼-inch inputs, of which the first six are balanced tip/ring/sleeve jacks. Channels 7 through 16 are unbalanced tip/sleeve jacks. Rotary trim controls adjust mic and line levels, offering up to 20 dB of gain. A handy center detent marks unity gain. I found the mic preamps very clean, although audible hiss appeared at maximum ranges. To monitor gain staging, each channel has a Limit LED that glows brighter as the signal gets hotter.

A rear-panel Patch section allows postfader insert points on channels 1 through 8, using ¼-inch TRS connectors. These points can be used to insert signal processors into the channel

signal path. Theoretically, you can also use the points as direct outs to feed a multitrack recorder. The manual describes three ways to use the patch points as direct outs: by inserting a TRS plug halfway into the jack (which seems questionable, because there's a lot of play in the jack); by fully inserting a mono, ¼-inch plug, which is supposed to deactivate the channel fader (it didn't); and by fully inserting a ¼-inch TRS plug with the tip and ring hardwired to each other. None of these are optimal solutions; a fourth way is to wire the insert points to a patch bay, splitting the inputs and outputs. Patch inserts are also available for the left/right master channels, but these are only useful as signal-processing loops, because the patch points are phase-reversed from signals at all other connections on the mixer.

▼

A steel case makes the Versamix extremely roadworthy.

The Versamix offers three bands of EQ with fixed center frequencies of 10 kHz (shelving), 500 Hz (peak/notch), and 50 Hz (shelving). Competing mixers in this class often put the high EQ at 12 kHz and the low EQ at 70 Hz, but I found the Versamix's configuration to be very good for filtering music. For example, because 10 kHz is a bit more in the practical range of most program material, I was able to shape the sound of a clarinet quite nicely. The rotary EQ controls are center detented. The high and low EQ offers 15 dB of boost or cut, while the midrange EQ delivers ±12 dB. (On the review model, the midrange EQ was incorrectly labeled as providing ±15 dB; the control has been relabeled on later models.)

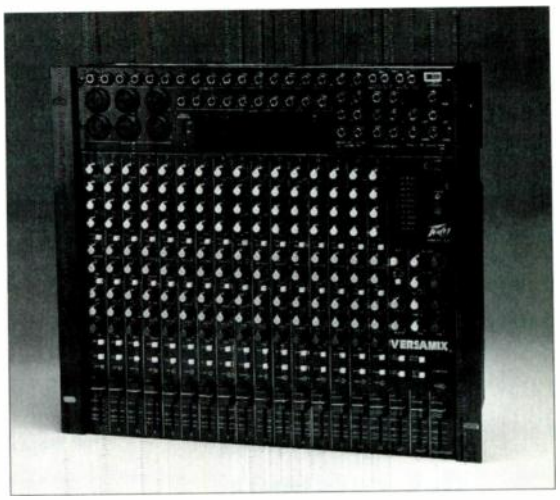
A total of six aux sends are available, although only four can be used at one time. With the flip of a switch, aux 1 can become a postfader, post-EQ aux send or a prefader, pre-EQ monitor send. Aux 2 is a dedicated postfader send. Shared controls are used for

(postfader) aux sends 3/5 and 4/6, with a switch to select whether sends 3 and 4 or 5 and 6 are active. This configuration is a little awkward—you can't simultaneously use sends 4 and 5, for example—so a little advance planning goes a long way.

A pan control, mute button, solo button, and 45 mm fader complete the channel configuration. Channel mutes are dual function: They not only kill the signal on the muted channel, they also route the signal to the alternate left/right outputs. (The pan setting on the muted channel determines the left/right placement of signals routed to the alternate outputs.) Although the muted signals are removed from the main left/right output, you can monitor them through headphones by pushing the Alt Solo button on the master section.

I couldn't find a practical application for this feature. Use as a separate recording bus is limited because the alternate outputs are unbalanced (the main outputs are balanced) and do not have a dedicated master level control. Some recordists utilize similar "alternate outputs" as sends for their sampler. Because the outputs from the sampler are monitored on available console inputs, the fact that the alternate mix is muted on the individual channels avoids feedback loops. But sending muted signals to a separate, unbalanced output section still seems like a rather arcane way to route signals.

The Solo function on the Versamix is in-place, which maintains pan and EQ settings when activated. Soloed signals are always audible through headphones and can be routed to the main left/right outputs with the push of a button. You have the option of soloing input channels, aux returns, or the alternate left/right output. An LED indicates when Solo is active, and the soloed signals replace the normal stereo levels on the output meters.



Peavey's Versamix console offers sixteen input channels; 3-band, fixed EQ; six aux sends; and true in-place soloing in a compact and flexible package. The jack panel can be rotated to allow a number of mounting options, with full access to all inputs and outputs.

I was disappointed in the faders. They are short-throw types and extremely sticky, which makes it difficult to perform smooth fades or manipulate several faders at once. The fader on channel 16 was particularly sticky; Peavey claims this was due to a manufacturing flaw and has been corrected.

MASTER SECTION

The master section provides four stereo aux returns, which can be used as mono returns by plugging a single cable into the left jack. Each return has level and center-detent pan controls, and returns 3 and 4 also have monitor

Product Summary

PRODUCT:
Versamix Portable Mixing Console
PRICE:
$999.99
MANUFACTURER:
Peavey Electronics Corp.
711 A St.
Meridian, MS 39302-2898
tel. (601) 483-5365
fax (601) 484-4278

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

sends. This feature came in handy during a rehearsal session, when I had to use returns 3 and 4 as additional inputs and could still include them in the monitor mix.

A unique interlocking switch allows the tape inputs and outputs to be plugged in simultaneously without risking feedback loops. A Play/Rec button on the master section lets the user select whether the left/right inputs or left/right outputs are active. The tape ins and outs are accessed through RCA connections and are -10 dBV. A dedicated tape-level control is also provided.

Lastly, the master section has separate left and right faders for the stereo mix and a fader for the headphone level. A 10-step LED ladder monitors the stereo output (or the level of soloed signals where Solo is activated). There's even a socket and switch for an optional minilamp.

VERSATILE POSITIONS

The Versamix's jack panel is designed for multiple applications and can be repositioned by removing a few screws. The panel can be rotated and faced to the rear for rack-mount applications where rack space is more important than jack access, or positioned under the mixer to angle the console for tabletop use. The panel can also be brought in line with the mixer chassis, so that the mixer lies flat (with the jacks facing to the back). Finally, if you *do* have a lot of rack space, you can mount the Versamix with the jacks rotated face up, as in a sound-reinforcement board, for maximum access.

Peavey's manual claims the panel can rotate into eight positions, but I only counted the four above. It is possible to leave the locking screws out, allowing the jack panel to float into various "in-between" configurations. But these aren't stable, so I can't imagine them being useful. Although rearranging the jack panel is cumbersome—I often had trouble getting all the screw holes to line up correctly—I appreciated the installation flexibility. And unlike some other mixers in its class, the Versamix also allows the trim controls to remain accessible no matter how the jack panel is configured.

CONCLUSION

Peavey's Versamix certainly lives up to its name. The mixer sounds good in

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APRIL 1994

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multiple applications and delivers a great deal of flexibility in a small package. The ergonomic layout is a bit tight—making it somewhat tricky to maneuver quick changes in a dark club—but this is typical of compact mixers.

Overall, almost every feature on the Versamix is useful and well thought out. The operating manual is thorough, includes a block diagram, and even illustrates four typical setups—small mono P.A. system, stereo P.A. system, 8-track recording session, and church installation.

A steel outer case makes the Versamix a sturdy and extremely roadworthy console, although a couple small details compromise its toughness. For example, the cable for the external power supply doesn't lock into place, which made me nervous in live situations. I even managed to knock the cable out *twice* while repatching connections in my studio. (Peavey designer John Roberts says that early models used off-the-shelf cables. All later production models have molded plugs that hold much better.)

It can't be easy building a quality mixer with multiple features at a reasonable price, but Peavey has done a decent job of delivering on the Versamix's promise. My only real complaint is the sticky faders. That said, the Versamix delivers a lot of punch for the money.

Ric E. Braden *is a graphic artist at* Mix *magazine and spends his days—and nights—surrounded by machines that say only Yes and No. He is very confused.*

Circle #440 on Reader Service Card

ECS Lime 2.22 (Mac)

By Geary Yelton

It's no lemon, but this scoring program is not yet ripe.

Ten years after the introduction of the Macintosh, musicians are still searching for the perfect software to produce printed music. *Lime,* from Electronic Courseware Systems, is one of the latest—though not greatest—offerings. Originally designed for music teachers and students, ECS is also targeting the current version of *Lime* at professional music copyists and musicians.

Of the many programs for scoring music, the best offer a unique approach to the task. *Lime,* which was originally developed on a mainframe computer almost twenty years ago, is especially good in its approach to setting up a score and in the way it handles guitar tablature.

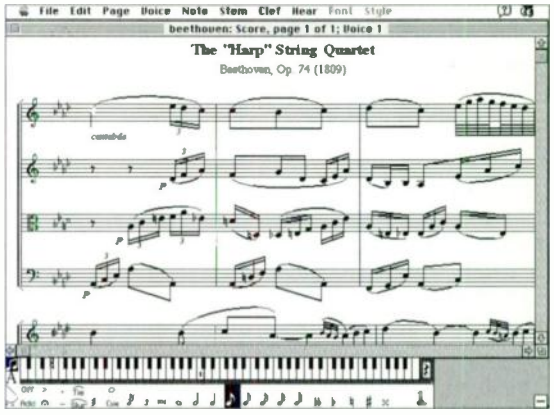


FIG. 1: *Lime*'s user interface features a complete set of tools for creating a printed score, without being overly complicated.

The program is complex, but not unnecessarily complicated (see **Fig. 1**). With a few exceptions, I was able to figure out most of the basics without having to crack the manual. Whether you use MIDI or not, *Lime* requires the problematic Apple *MIDI Manager.* It does not support *OMS* or multiport interfaces, so real-time MIDI playback is limited to sixteen channels.

Installation of the fonts Marl and Tufa is also required, along with Times and Symbol. You can substitute Sonata or Interlude for Marl and Tufa when printing or displaying a file, but Marl and Tufa must still be installed.

FORMATTING A NEW FILE

Before entering music, you have to format a new file. Several templates, which can be used as System 7 stationary, are included for accomplishing this quickly. ECS provides templates for piano, piano and voice, 4-part choral arrangements, orchestra in C, orchestra transposed, and other variations in 4/4, 3/4, and 6/8 time. Curiously, the templates are not discussed in the manual, nor is there a Read Me file on the disk for them. There's also no explanation of how to create custom stationary pads.

Creating a new file from scratch is a bit of an ordeal. When you choose New from the File menu, you're presented with a series of six dialog boxes. If you make a mistake and click Cancel in any of these boxes, you have to start all over again.

The next step is indicating the number of voices you want to use. Because *Lime* creates a staff for each voice you request, however, it should really be asking how many staves you want. If you want multiple voices per staff, you should request fewer voices at the beginning (to set the number of staves) and add more later. The number of staves and voices are limited to a generous 64 each, and each voice can be named.

Next, you assign clefs (from a palette of twelve) and key signatures to a single staff line, or to all the staves in the score. Each staff can have a different key signature and clef. You can specify transpositions for instruments that play in something other than concert pitch. Time signatures are wisely restricted to two whole-number digits. The program can handle multiple meters and have multiple open files.

If you enter music that exceeds the length of the score, the excess music is simply ignored, so be generous when selecting the total number of measures. You can manually add extra measures to the end of the score, but this is not helpful when composing in real time or importing a MIDI file. If you create more measures than needed at the outset, you can easily delete the unused measures later.

ENTERING MUSIC

You're finally ready to begin entering music. With most programs, the easiest way is to import a Standard MIDI File from a sequencer. Indeed, *Lime* can read a Type 0 SMF created by another program, but this isn't a simple matter of importing a file. Tracks must be imported one at a time. Track numbers, MIDI channels, and quantization resolutions must be specified for each track. Everything is fully quantized;

anything smaller than a sixteenth note is lost, along with tempo data and any other non-note performance parameters. Because Type 0 files contain no track data, you'll have to split up the tracks in your sequencer. This is pretty rough stuff and needs to change; most notation programs work much better with sequencers.

For the moment, let's forget SMFs and enter the data from the computer. Pitches are selected from an on-screen, 88-note piano keyboard and rests from a narrow strip beneath. An accidentals palette allows enharmonic spellings.

The rhythmic value of each note or rest is chosen from a note palette. Rhythmic values range from double whole note to 128th note. You click twice for dotted notes, three times for double dots. Clicking on icons produces tuplets, ties, slurs, grace notes, alternate note heads, and basic dynamic markings. Chords are knotted by either holding the Shift key as notes are entered, or by entering the first note, then clicking the Add icon and entering additional notes.

As you may have noticed, this form of entry requires separate steps for pitch and duration. It's not hard to do, but it's slower and less elegant than programs that let you click in a palette to choose duration and drag the note to the staff to choose pitch. Some programs at least let you type in pitch and duration simultaneously, with both hands; this one doesn't.

Step-time entry via MIDI is also provided. Rhythmic values can be chosen with the numeric keys, or by clicking on the duration icons in the Piano window, then playing the pitches one at a time. Play a chord, and a chord is transcribed. Pressing three adjacent keys on your MIDI keyboard indicates a rest, unless you've disabled that particular function.

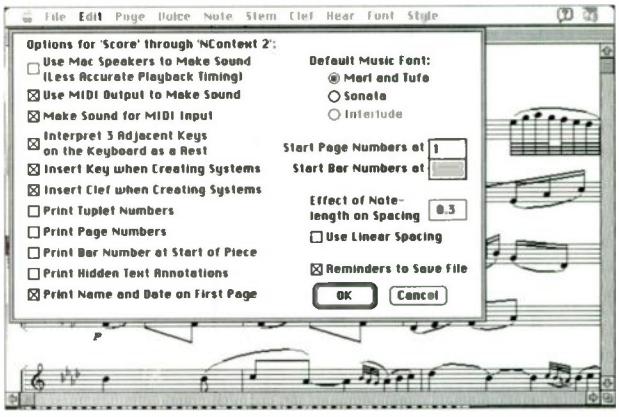


FIG. 3: *Lime* excels at providing controls for printing scores.

REAL-TIME ENTRY

The fastest way to enter music into a notation program should be to play it in real time on a MIDI instrument. With *Lime*, unfortunately, that's not so easy. Before recording, you adjust the smallest division of quantization to a quarter note, an eighth note, or a sixteenth note. You can enable triplets, but quantization to a resolution greater than a sixteenth note is impossible. Unfortunately, all note entry is quantized, and the program does not distinguish between the MIDI data and the displayed notation.

To get started, select a symbol in the measure where you want to begin recording, then select Record from the Voice menu. A Record window appears, and the metronome begins to run. You can ask the metronome to wait for the first note before recording, but it won't give you a count-in, so I found that feature pretty useless. Occasionally, there also appeared to be a time delay between the first and second beats at the beginning.

You can change the metronome's tempo and time base (quarter note, eighth note, etc.), but you can't change its pitch or MIDI channel. For example, if you want to assign the metronome to play a hi-hat cymbal on MIDI channel 10, forget it.

If you enable the Display MIDI Data function, a hexadecimal representation of the notes appears in the middle of the window as you play. But unless you can sight-read hex, what's the point? Why not just draw notation?

Lime is accurate at recording what you play, as long as you play within its quantizing limits. Only note values are recorded, however, not Velocity or other performance data. Unfortunately, when it's time to record subsequent parts, you'll discover you can't listen to previously recorded parts as you play. This is *Lime*'s greatest shortcoming as a real-time MIDI recorder.

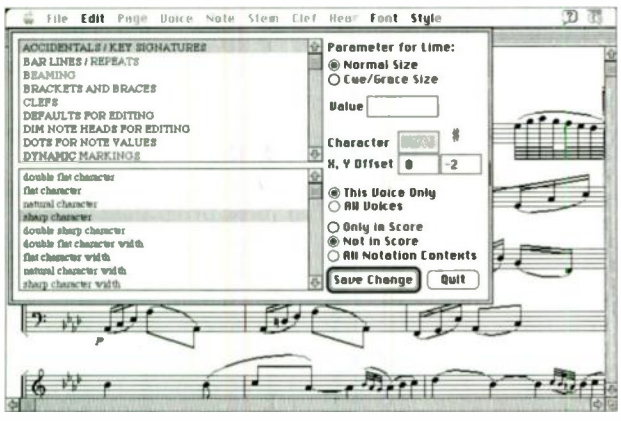


FIG. 2: The Parameters dialog box provides tremendous flexibility in formatting details.

ANNOTATION

There are three Annotation modes for entering dynamics, lyrics, and other non-note data. These can be selected with icons on the left side of the Piano window. Each annotation is connected to a note, which is the beauty of this approach. You can make major changes in the music, and an annotation will stick tenaciously to the intended beat. Annotations also can be copied and pasted from one note to another.

Attaching text annotations to notes makes especially good sense with lyrics. If you click the Lyrics Settings radio button, lyrics are centered below their respective notes and the notes automatically spread apart to allow room. (Oddly enough, the radio button doesn't change its appearance when you click it.) If you need to add a second line of lyrics, just click a note that already has lyrics beneath it. Hyphens between syllables can be centered with one command. The Font and Style menus affect the appearance of lyrics and other text. You can "hide" text, so that it does not print. Onscreen, hidden text is indicated by a dotted underline.

Dynamic markings are entered as text annotations in the Marl font and affect playback, even when hidden. The bottom row of the Mac keyboard ("z"

through "/") comes out as pppp through ffff. Other text can be included, but if an annotation unrelated to dynamics begins with one of these characters and is in the Marl font, playback volume will be affected.

Tempo markings are entered in the Marl font with the letters q, w, e, r, and t. These are equivalent to a whole note through a 16th note. You type the note value, the "=" sign, and the number of beats per minute (e.g., q=120). When the score encounters such a marking during playback, the tempo will be adjusted appropriately. Crescendo and decrescendo markings are drawn manually with hairpins and do not affect playback.

EDITING

Editing a complex score as easily as a writer edits text is what attracts composers to notation software. Before starting, note that *Lime* has no Undo command; you can use the Revert function to restore your last save, but that means you have to save constantly or lose other recent edits.

In *Lime*, you select notes for editing by pointing and clicking. Drag them left or right to create space, and the rest of the score will adjust itself to make room. However, you cannot drag notes up and down the page to change their pitch; instead, you must enter a new note with the Piano keyboard or via MIDI. Although notes can be transposed up or down an octave, there is no simple way to transpose a group of notes by any other interval. Compared to the flexibility in this area that most other notation software offers, *Lime* is severely limited.

To select multiple notes, you Shift-click or Shift-click-and-drag. Selected notes don't have to be contiguous; you can select one, skip a few, select a couple more, and so on. Multiple selected notes appear grayed out on the screen. A special command copies entire measures, but you may have to wait a moment if you're moving more than a few notes.

Music on multiple staves can be selected, but not copied to another set of staves. The selected notes can be octave-transposed or deleted, and you can specify the type of stem for the group, including stems across staves.

Selected notes are deleted by choosing Delete Note from the Note menu, or by pressing the Delete key on the

keyboard. But in the Edit menu, the Cut command is grayed out, and the Clear command is either grayed out, or says "Clear MIDI." Cut-and-paste operations, therefore, become copy, paste, and go-back-and-delete operations. Deleted notes are replaced by rests.

To change a note's rhythmic value, you select it, choose a value, and enter a new note. However, you can't change a note's value without first ensuring that there's enough time left in the measure. There's also no easy way to double or halve the rhythmic value of a given measure or phrase.

The Stem menu gives you flexible control over stem direction, beaming, ties, and slurs. Other note edits are accomplished in the Piano window. Grace notes are handled, well, gracefully. On the other hand, I was disappointed to discover that groups of notes, once entered, can't be converted to tuplets; they must be reentered.

A Parameters command, tucked away in the Clef menu, summons up a complex dialog box containing two lists (see **Fig. 2**). The upper list contains parameter categories, mostly names of graphical objects such as note heads, beams, ties, slurs, and so on. When you select an item from this list, the lower list displays edit parameters for that category. Select Ledger Lines, for example, and the lower list shows Ledger Line Length to Left of Note, Ledger Line Length to Right of Notehead, and Ledger Line Width.

Most of the other categories have similarly long lists of parameters. In this area, at least, *Lime* offers tremendous flexibility for working out the details of a printed score (see **Fig. 3**).

Another of *Lime*'s strengths is handling guitar tablature. Select Voice on Staff from the Voice menu, click the box that indicates tablature, specify how many lines you want to represent strings, and the staff instantly appears in tablature. If you don't like the fingering, you just change the string on which a note is played.

▼ **Once playback begins, there's no graceful way to stop it.**

PLAYBACK

Music can be played back either with the Mac's internal hardware, or through MIDI. A few important playback options are supported, including the ability to select the voices you want to hear, the percentage of the marked tempo, and whether or not repeats are ignored. Other critical options, however, are not supported. You can't, for example, listen to just a selected portion of the score. Amazingly, once playback begins, there's no graceful way to stop it.

As noted earlier, the program doesn't distinguish between the MIDI data and the displayed notation, so playback is strictly quantized. The only reason to play the music in *Lime* is to check the accuracy of the notation. If you want to record to tape, you should do all note entry, editing, and playback for recording with a sequencer and export the polished MIDI file to *Lime* for final notation layout.

PRINTING

Printing music is the primary purpose of scoring software. *Lime*'s most notable printing feature is a Notation Contexts command in the File menu. A Notation Context is a score setup, and each one contains which voices are used, system breaks, annotations, and so on. Different Notation Contexts make it possible to extract printed parts for individual instruments and ensembles. Once the original Score Notation Context is finished, you can create new Contexts by specifying which voices are to be included. The list of Contexts is saved as part of the file. Printing an extracted part is a simple matter of opening up its Notation Context.

Lime also offers music educators an easy way to copy music into a word processor. Hold down the Shift, Option, and Command keys, click and drag over the portion of the score you want to copy (including across staves, if the music is contiguous) and choose the Copy Rectangle command from the Edit menu. This is ideal for including musical examples in a text document.

CONCLUSIONS

For now, *Lime* looks green. Even the latest version (2.22) is not quite ready for market. There are a few features to recommend it, but just as many to warn you away. The process of reading Standard MIDI Files is especially tedious, and the program can't digest anything smaller than a sixteenth note. *Lime* ran a bit slow, too, even though I was using a Centris 610.

On the positive side, the program's capacity for handling lyrics is excellent. And if you're looking for a program that handles guitar tablature, *Lime* looks good. Finally, if you desperately desire the ability to control every printed detail of extracted parts, and you don't mind avoiding real-time MIDI input and sacrificing the Undo command, *Lime* may be just what you're looking for.

But if you're used to using another Macintosh notation program, you'll probably get frustrated with this one. In the past, the company aimed this program at university music students, and that remains its best application. Despite ECS' stated intention to market this version to professional music copyists and musicians, the program currently is not well suited to that type of user. My ultimate opinion: *Lime* needs time to ripen.

Geary Yelton *is currently mourning the death of Frank Zappa.*

Circle #441 on Reader Service Card

Product Summary

PRODUCT:
Lime 2.22
PRICE:
$295
MANUFACTURER:
Electronic Courseware Systems
1210 Lancaster Dr.
Champaign, IL 61821
tel. (217) 359-7099
fax (217) 359-6578

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

Media Vision Pro Audio Spectrum 16 (Mac)

By Lee Sherman

Sixteen-bit Macintosh audio at near-PC prices.

Computer users used to be impressed by the Macintosh's ability to record and playback audio with 8-bit resolution and 22 kHz quality, though it wasn't adequate for serious musical applications. But given the Macintosh's ubiquitous presence in recording studios, it didn't take long for companies such as Digidesign to come up with a range of 16-bit digital recording systems that satisfied the stringent requirements of musicians.

These systems are powerful, but they're also fairly expensive for the casual hobbyist. As a result, audio on the Mac has been economically polarized between musically unacceptable built-in sound and medium- to high-cost sound cards, mostly from a single source. Unfortunately, 16-bit audio cards hovered around the $1,000 and up range. Pro Audio Spectrum 16 (PAS 16), from Media Vision, finally changes that situation.

Media Vision has been developing products for the PC market for several years and is now making its second foray into the Mac market with Pro Audio Spectrum 16. The first version of this Mac product had serious bugs. Problems with 32-bit addressing prevented its device drivers from loading, its built-in FM synthesis didn't work, and numerous other gremlins intermittently caused the Mac to freeze. Fortunately, the new card, which is available for Macs with NuBus slots or LC slots, is much more stable. If you were one of the unfortunate people who bought that card before Media Vision pulled it off the market, contact Media Vision about getting a free upgrade.

BASIC FEATURES

Considering the price of the card, Pro Audio Spectrum 16 offers some impressive features: 16-bit, stereo, digital-audio recording at up to 44.1 kHz; 16-bit, stereo audio playback; MIDI In

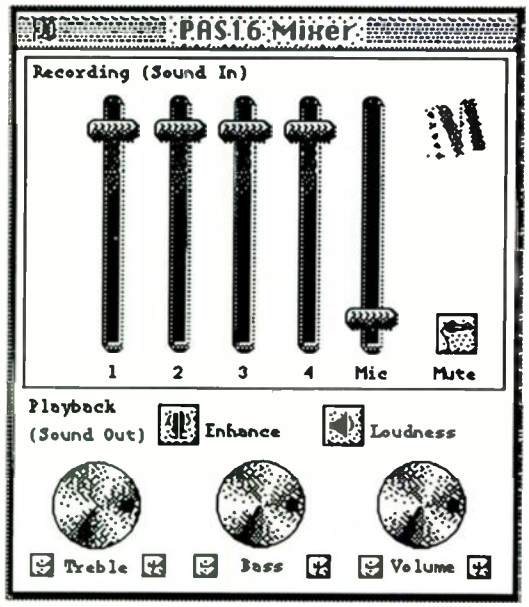


FIG. 1: The PAS 16's Mixer Control Panel blends four audio input channels. The Loudness button lets you boost the low bass, and the Enhance button uses phase shifting to produce a more dynamic "true" stereo, or a synthesized stereo from mono inputs.

and Out; and a 4-channel, software-controllable input mixer. The onboard FM synthesis (the pedestrian Yamaha OPL-3 chip) still doesn't work, which is no great loss.

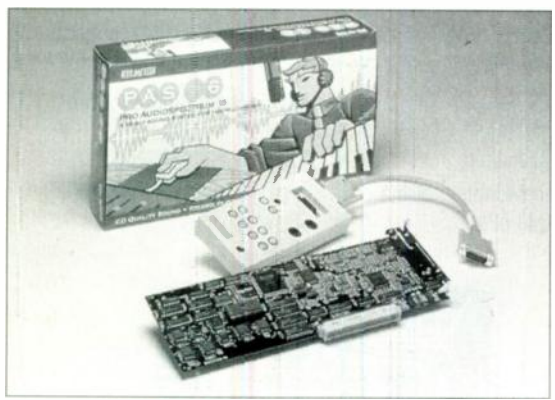
The Patch Panel, a hardware box that connects to the card's mounting bracket, is Pro Audio Spectrum 16's link to the outside world of audio and MIDI equipment. The Patch Panel admits signals via a ⅛-inch, mono microphone input, four RCA stereo input pairs (eight jacks), and one MIDI In port. It has a ⅛-inch, stereo headphone jack, a stereo pair of RCA outputs, and a MIDI Out. The card even has a 15-pin joystick port for game fanatics. The nature of these connections—RCAs and ⅛-inch minijacks—indicates the card's main target market is the entry-level musician, casual hobbyist, and gamer. But the budget-conscious electronic musician could also utilize such an inexpensive consumer product, at least for demos.

Installing the card is simple: Pop the lid off your computer, insert the card into a slot, close the top, and install the driver software. Once installed, Pro Audio Spectrum 16 becomes an integral part of your computer, and your music software should work with it as easily as it does with external MIDI devices.

SOFTWARE

The PAS 16 comes bundled with *SoundEdit Pro* 1.0.5, a basic sound-recording and editing package from MacroMedia (reviewed in the October 1992 **EM**); *Trax*, an entry-level MIDI sequencer from Passport Designs (reviewed in the December 1990 issue); and a pair of cheap stereo headphones. In my tests, conducted on a Mac IIci with eight megabytes of RAM, Pro Audio Spectrum 16 worked flawlessly with *Sound Edit Pro* and *Trax*.

Master and individual volume, bass, and treble are set using the *Mixer* control panel (**Fig. 1**), but I found it inconvenient to have to launch a separate program to access these functions. A Loudness button allows you to boost the lower bass frequencies of an audio source. A Stereo Enhance button uses phase shifting to produce a more dynamic "true" stereo, or a synthesized stereo effect from monophonic inputs. A Mute button silences all audio output.



Media Vision's Pro Audio Spectrum 16 sound card for the Mac offers consumer-quality, 16-bit, digital-audio recording for budget-conscious musicians.

SOUND MANAGER

Pro Audio Spectrum 16 takes advantage of Apple's *Sound Manager* 3.0 (system software that serves as a common denominator for add-on audio hardware), so the card integrates with the Macintosh at the system level. This means that it should work with any third-party music software that supports *Sound Manager*.

Thanks to *Sound Manager* 3.0, you can now use the Pro Audio Spectrum to run 16-bit audio samples directly through the Macintosh. The card supports a wide variety of sampling rates, including 5, 7, 11, 22, and 44.1 kHz. *SoundEdit Pro* saves in AIFF, *Sound Designer II*, System 7 SND, original *SoundEdit*, Resource, and Instrument formats. This provides tremendous flexibility, making it relatively easy to move sound files between different programs, or even between other types of computers.

Unfortunately, high-end, integrated, digital-audio/MIDI sequencing programs (e.g. Mark of the Unicorn's *Digital Performer*) will not currently operate with Pro Audio Spectrum 16, as they are designed to support Digidesign hardware. However, Pro Audio Spectrum 16 should eventually benefit from the generalized approach taken by *Sound Manager*, and hopefully high-end programs such as Opcode's *Sound Manager*-compatible *Studio Vision AV* will be able to take advantage of it.

The card also doesn't support MACE (Macintosh Audio Compression and Expansion, the audio compression element of *Sound Manager* 3.0). But if you want to achieve optimum audio

Product Summary

PRODUCT:
Pro Audio Spectrum 16
PRICE:
LC version: $395
NuBus version: $495
SYSTEM REQUIREMENTS:
Macintosh LC or Mac with NuBus slots; 4 MB RAM minimum, 8 MB RAM recommended; System 7.0 or later
MANUFACTURER:
Media Vision, Inc.
47300 Bayside Pkwy.
Fremont, CA 94538
tel. (800) 348-7116
or (510) 770-8600
fax (510) 252-4493

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

quality, you shouldn't use this type of compression anyway.

PERFORMANCE EVALUATION

A high sampling rate is only one factor in achieving good quality sound. Media Vision claims a dynamic range of 85 dB and signal-to-noise ratio of -85 dB for sampled audio, which is better than average for a low-end card. The PAS 16's inexpensive analog audio circuitry, however, produced mediocre sound. I considered the sound quality to be good enough for consumer audio and possibly demos, but I wouldn't bet a recording contract on it.

Interfacing MIDI from an external keyboard or sound module worked relatively well, but the PAS 16 card had an occasional problem tracking the audio. It didn't take much to get out of sync. Although I was able to play back samples recorded at up to 44.1 kHz, the computer ran out of memory and froze when I tried recording audio directly to disk at more than 29 kHz or so, despite the fact that my machine had the recommended eight megabytes of RAM.

NO MIRACLES

Pro Audio Spectrum 16 delivers most of what it promises. Media Vision has upgraded the bundled software, squashed most of the bugs in the original product (though it still doesn't handle low-memory conditions gracefully), and is more responsive to its Macintosh customers. The documentation that accompanies the Pro Audio Spectrum 16 is pretty thin, though. Even a product as affordable as this should come with more than a skimpy manual to guide you through the basics of working with digital audio.

This is a relatively low-cost audio and MIDI solution for Macintosh hobbyists. It certainly won't transform your computer into a professional, digital-audio workstation; Digidesign's Audiomedia is a better choice for serious recordists with a kilobuck to spend. But the Pro Audio Spectrum 16 is a good starting point for Mac-based musicians on a low budget.

Lee Sherman *is a San Francisco-based freelance writer specializing in music, multimedia, graphics, and publishing.*

Circle #442 on Reader Service Card

think the author failed to recognize that the other half of project-studio design is economics. I would think a good portion of your readers are working under pretty modest budgets, and I suspect the "solutions" offered to organize one's studio may have been a little unsettling to some. I would like to offer some hope.

I recently completed a project-studio design utilizing a custom-designed workspace, built from plywood and 2 × 4s, and finished with industrial-grade gray fabric. The whole thing, including the hardware, cost around $150, plus two days of cutting and assembling. I'm not a carpenter; it just took common sense and a tape measure. I would put my design's functionality and professional look against any of the products your article suggested.

Ergonomic challenges can be solved in a multitude of creative ways without sacrificing the look of a professional studio. Some tricks I've been using: a wire-mesh, closet-organizer kit that can be used to wall mount almost anything at adjustable angles; bicycle wall-mounting hooks that make great cable troughs; and custom-made blank rack spaces from thin sheet metal (cut with tin snips and spray painted any color). I think you get the point.

Save your money for good cabling and a properly installed electrical system. I'll see you at the hardware store!

Dave Redmore
Chicago, IL

UPSTART TOYS

I would like to comment on the current market of electronic toys. A couple of years back, all magazines seemed guilty of saying affordable digital recording would be many years off. Well, hats off to companies like Alesis. Up until the time the ADAT came out, I used a Tascam 4-track and loved how it sounded and worked. Recently, I upgraded to digital recording. How is it that a big company like Tascam, with their huge expertise in multitrack recording, couldn't come out with one first? Another example would be the introduction of Audio-Technica's 4033 microphone. Now, other companies have followed suit and come out with low-cost, high-quality, studio condenser microphones, such as the AKG C3000 and the Neumann TLM 193.

Do the bigger, well-known companies just hold back a little, making us buy only what they want us to? Surely, they could have designed this stuff years ago. Well, I love to watch the big companies squirm. Thank God for competition: We part-time, home recordists will surely benefit.

Joseph Van Orden
Union Beach, NJ

WHAT'S BETTER?

In your opinion, what are the advantages/disadvantages of built-in DSP chips (as in the Mac Quadra 840AV) versus an Audiomedia II card added to a Quadra/Centris 650?

Andy Brewer
Las Vegas, NV

Andy—I can see two main advantages to the built-in AT&T DSP3210 chip in the Mac AV models. First, it can accelerate compatible, nonmusic programs, such as Adobe Photoshop. *Second, it doesn't take up a NuBus slot. For musical purposes, you can use the AV for hard-disk recording with OSC's* Deck II, *Alaska Software's new* DigiTrax, *and Opcode's* Studio Vision AV. *Steinberg is working on a version of* Cubase Audio *for AV, too. However, the Mac AV chip appears a transitional technology and may disappear when PowerPCs take over the Mac world this year. Apple claims the PowerPC can do it all without a DSP chip, though this is unproven.*

Digidesign cards use the Motorola DSP56000-series chip, a proven technology that Digidesign has implemented specifically for audio applications. The Audiomedia II, Sound Tools II, and Pro Tools cards can be used with a greater variety of music programs than the AV, including all of the aforementioned except DigiTrax, *plus special applications, such as Digidesign's* Sound Designer II, *Jupiter Systems'* Infinity *sample-looper, and Arboretum Systems'* Hyperprism *effects processor.*

The analog-to-digital converters and DACs are better in the Digidesign cards, though the AV is good enough for most purposes. Spectral Innovations' AT&T 3210-based NuMedia NuBus card (see the February 1994 "What's New") has virtually the same functionality as the built-in AV chip, but with both analog and digital I/O, so you can use the converters of your choice.

The AV Macs are fine for the hobbyist, but for professional music production, I'd buy a fast, non-AV Quadra with a floating point unit (not a 68LC040), such as the 650, and add a Digidesign card. This is especially true if you don't care about accelerating Photoshop *or other AV-compatible programs. It might be even smarter to wait for PowerPC, but that is another story.—Steve O.*

HOTLINE RESOURCE

Have an interest in all aspects of the theremin? Information on history, compositions, performance technology, etc., abounds. Contact: Theremin User's Group, Mr. Eric Ross, 259 Oak St., Binghamton, NY 13905; tel. (607) 722-1457; fax (607) 785-6643; e-mail: cg seary@mailbox.syr.edu.

If you're in the Washington State area and seek a source for techno/electronic-music information and fellow thinkers, contact: The Northwest Elektro-Industrial Coalition, 539 Queen Anne Ave. North, Box 131, Seattle, WA 98109. Hotline: (206) 233-8420.

HISTORY REPEATS

Periodically, I reread older issues of **EM**, because there is so much information to absorb, and I can't assimilate it all in a single reading. Recently, I looked again at Dan Phillips' "The Virtuoso Synthesist" from February 1993. It has to be one of the most valuable and interesting articles I've read in a long time. How about considering an ongoing series in this vein? I know it could overlap with other features, but the specific focus on advanced (but basic) approaches to sound design could be a strong unifying factor and a very helpful one for all readers.

Jon Crystal
Burlington, VT

We welcome your feedback.

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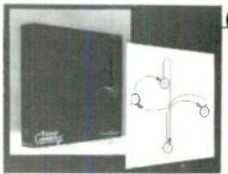

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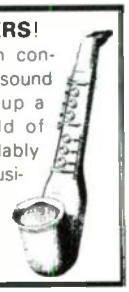

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TECH PAGE

Spaced Out

Growing superior semiconductors in space.

By Scott Wilkinson

As electronic musicians, we are dependent on integrated circuits and other semiconductor components. These components have long been made from wafers of semiconductor material, such as silicon, which are manufactured by allowing the atoms or molecules of the semiconductor material to form a crystal lattice, growing the wafer in much the same way natural crystals develop.

In the process of growing these wafers, however, the material can easily become contaminated with other atoms and molecules in the growth environment. One solution is to grow the wafers in a vacuum, which should harbor few contaminants. Unfortunately, our ability to create a vacuum on earth is limited, so scientists are now trying to grow wafers in space. Surprisingly, even the vacuum of space is not complete; stray atoms and molecules abound, so a way must be found to create an *ultravacuum* in which contaminants are minimized.

The first attempt to grow semiconductor material in a space-bound ultravacuum occurred during a flight of the shuttle *Discovery* in February of this year. The shuttle carried a stainless-steel disk, twelve feet in diameter, called the *Wake Shield Facility* (*WSF*) in its cargo bay.

The idea behind the *WSF* is to create an ultravacuum in its wake as it orbits the earth, flying free of the shuttle to minimize contamination. To accomplish this, the *WSF* disk must remain perpendicular to its direction of travel. The leading surface acts as a shield, deflecting any contaminants it encounters, which creates an ultravacuum immediately behind the trailing surface. This ultravacuum should be 1,000 to 10,000 times better than any vacuum created on earth.

The trailing surface consists of seven circular wafer templates measuring three inches in diameter and a series of small furnaces that heat gallium and arsenic samples to a gaseous state. Gallium and arsenic combine to form gallium arsenide, a semiconductor with better specs than silicon. For example, transistors made from gallium arsenide should theoretically operate more than eight times faster than silicon transistors and consume about one-tenth the power. However, current gallium arsenide components don't come close to these specs due to contamination.

The *Wake Shield Facility* is displayed by Alex Ignatiev, director of the Space Vacuum Epitaxy Center at the University of Houston and principal investigator for the *Wake Shield* project.

The molecules of gallium and arsenic are projected in beams from thin tubes that protrude from the trailing surface and bend back toward the wafer templates. The templates consist of a substrate of gallium arsenide, which encourages the gallium and arsenic molecules to find their optimum atomic positions and form a thin film of gallium arsenide between 10,000 and 50,000 atomic layers thick. This process is called *molecular-beam epitaxy*.

During the mission, the *WSF* was lifted out of the cargo bay with the shuttle's robot arm by Serjei Krikalev, the first Russian cosmonaut to fly on an American space mission. Unfortunately, a problem with the *WSF*'s attitude control was not solved in time to release the spacecraft as planned. Nevertheless, the experiment was performed while the *WSF* remained attached to the robot arm. To prevent contamination, shuttle astronauts had to avoid firing any thrusters or releasing any waste water for as long as possible.

Regardless of the difficulties, this mission is of paramount importance to the manufacture of all semiconductor components. Future missions—there are at least three more on the current shuttle schedule—will teach scientists a great deal about growing high-quality semiconductor material in space. This research will lead to faster, smaller processors, which should ultimately provide incredible DSP capabilities at a price that is unheard of today.

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The GSP-2101 Studio Tube, preamp processor is the only guitar processor that enables you to write your own effects algorithms and combine them with the tone of a true tube preamplifier. The processor is based on DigiTech's proprietary S-DISC technology and the analog stage features 12Ax7 tubes for that killer tone.The unit also features 64 user-definable presets and 128 factory presets, including many written by the legends of Rock.

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The new Whammy II offers all the features and effects of the original Whammy Pedal, however it also includes a new powerful 24-bit processor. The unit also features an entirely new chassis design and the presets may be accessed via the foot controller as opposed to the knob selector.

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