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Electronic Musician

May 1994

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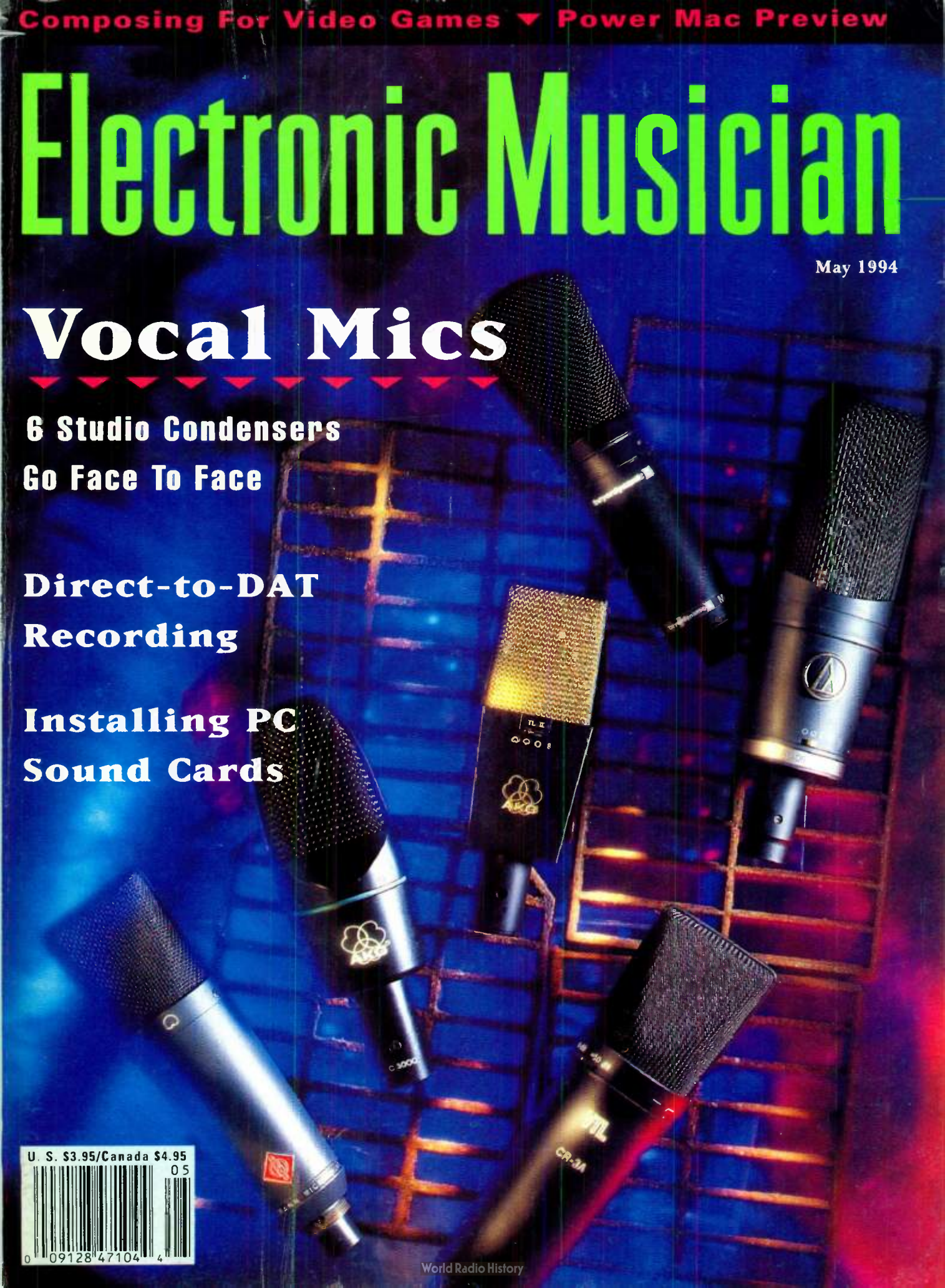

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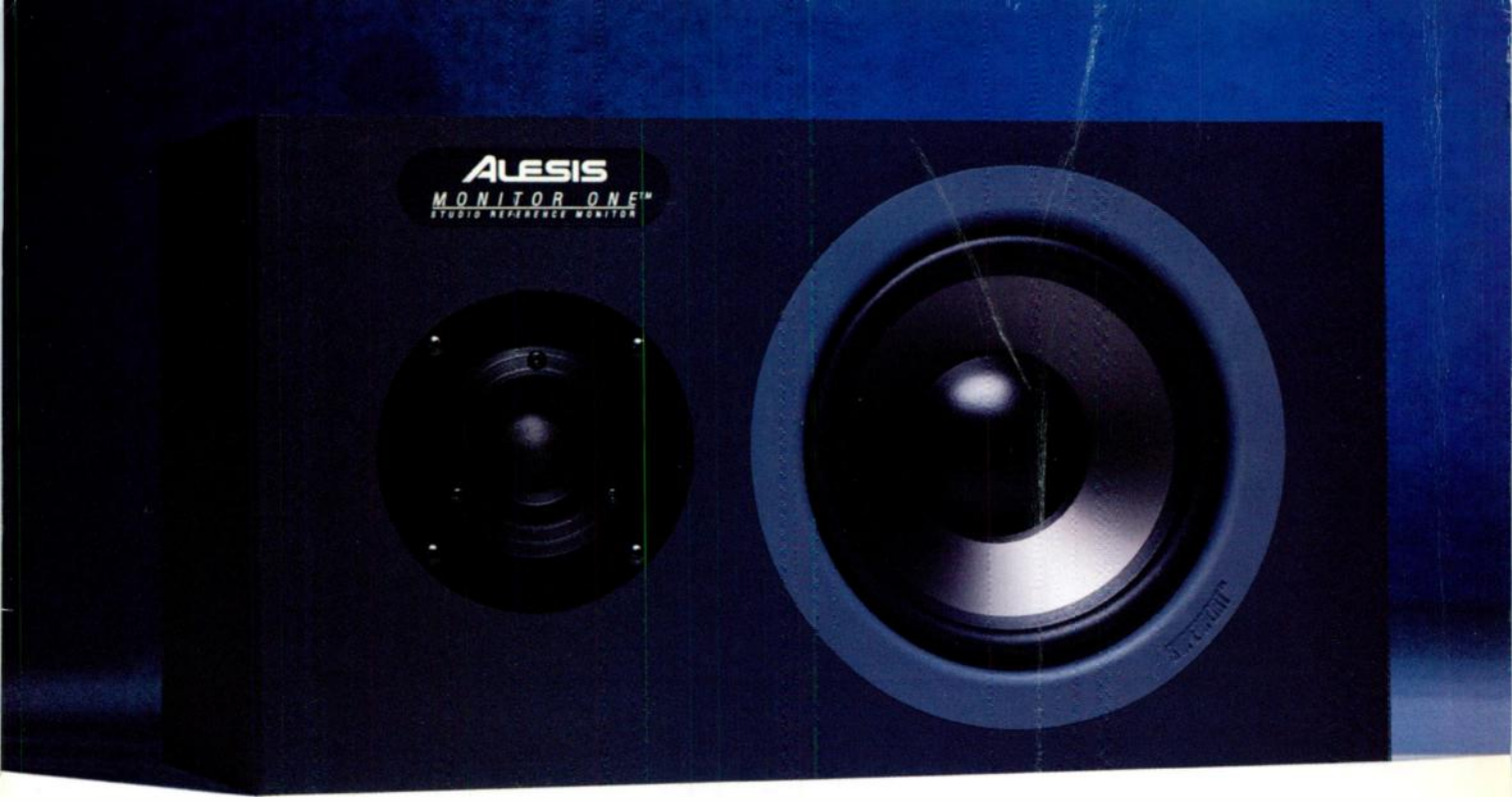
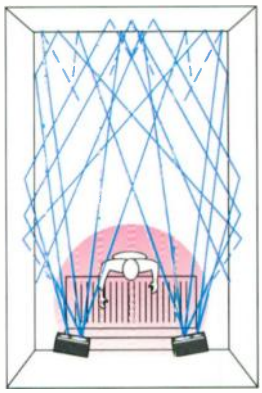


The Truth From

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).

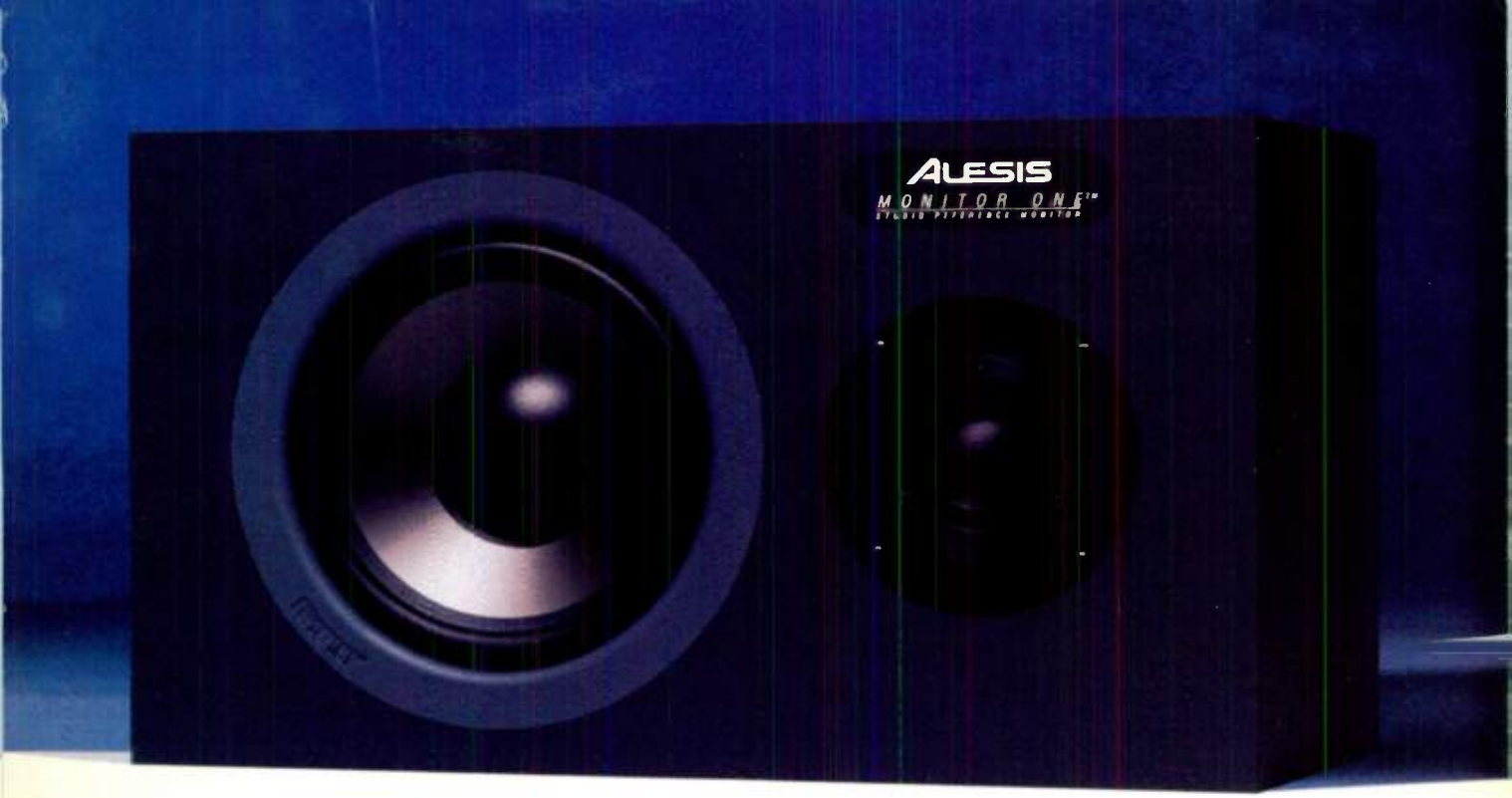
The Truth From Top To Bottom

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.



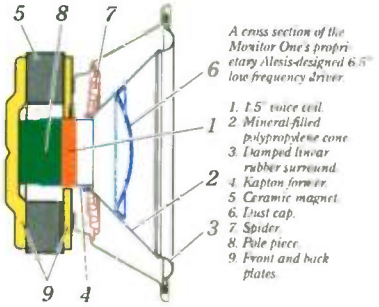
Left To Right

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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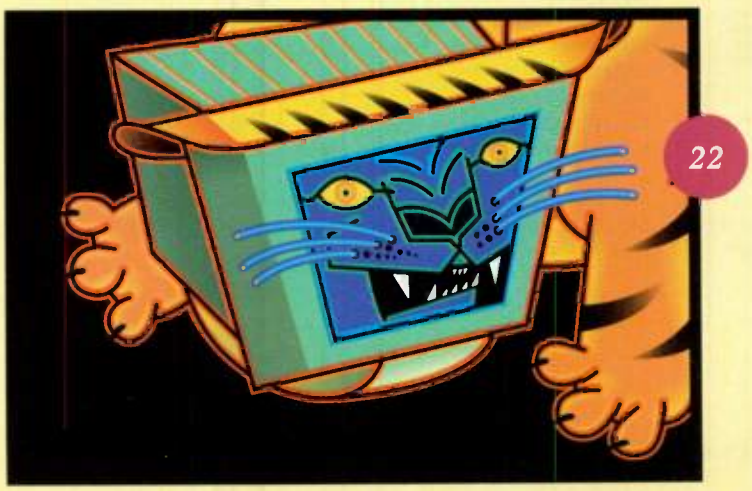
STUDIO ELECTRONICS

INSIDE

FEATURES



DEPARTMENTS

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MAY 1994 VOL. 10, NO. 5

COLUMNS

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REVIEWS

Cover: Photo by Adrian Ordeñana.

Special thanks to AKG, Audio-Technica, beyerdynamic, Langevin, and Neumann.

Artistic Symmetry

Like the lyrics and music of a song, a magazine is not text alone.

PEGGY SUE AMISON

When the *Ballets Russes* opened in Paris in 1909, audiences were nearly blinded by a multimedia explosion of dance, music, and set and costume design. Everything was bold, exotic, and daringly sexual. (The legendary *danseur* Vaslav Nijinsky was so over-the-top that he often finished his leaps by soaring into the wings.) Artistic scandals were common, as were shouting matches and fisticuffs during performances. What bliss, to be part of an era where people were so passionately affected by art that the position of a dancer's torso or an atonal crescendo of brass could incite riots.

Sixty-five years after its collapse in 1929, the *Ballets Russes* still teaches volumes about art and culture. For me, the company proved that a carefully forged symmetry of art, word play, and pizzazz is powerful and seductive. This is partly the reason subtle changes have crept into the magazine since the February issue. To pump up the pizzazz factor, we've increased the number of full-color pages. A typical issue now has at least three beautiful, 2-page color spreads for feature openers, a color title page for "What's New," a rainbow-washed "Pro/File," and selected columns rendered in brilliant hues.

In this issue, the changes are not so subtle. We've expanded our table of contents to two pages and redesigned our columns. The 2-page TOC allows us more punchy prose to get subscribers and newsstand browsers charged up about our editorial offerings. Artistically, we hope that the enlarged format is a more inviting portal to the wonders within. Column openers now evoke the clean, visually precise screen interfaces of interactive media. An icon-driven logo, designed by Jack Mortensbak, greets the reader at the top of each column. Photos and informational graphics have been moved to the bottom of the page to allow more fact-filled captions.

I think the magazine has never looked better. Art Director Linda Birch and Associate Art Director Patsy Law are tremendous talents. I wish readers could get some sense of how fun it is to work with them. We don't just toss images on a page, we really sweat to energize words with pictures. Thanks to our in-house graphic artists, Dmitry Panich and Chuck Dahmer, and our freelance illustrators, we've been able to render some terrific openers that stand up as separate works of pop art.

On the editorial side, we are striving to make our articles more probing, more definitive, and more lively. In fact, we strove too hard this issue and totally blew it: Everyone wrote novels. Oops. We had to reschedule a feature article and a column to fit everything in. I don't think you'll mind, however, especially when Steve Oppenheimer's preview of the Power Mac ("Power For The Rest of Us," p. 54) is perhaps the most comprehensive tome on the subject that you'll read for months.

Normally, I wouldn't spout off about creative goals, except that I recently heard a story that validated the whole concept of artistic symmetry. (It might even be true.) A manufacturer, who never actually cracked the pages of this magazine, called one of our reps and gushed with praise. What made this person finally check us out? The March "Virtual Studios" cover caught his eye and enticed him into our world. Nuff said!

Michael Molenda

Electronic Musician

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VORTEX™
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Audio Morphing™ You Haven't Heard This Before!

Vortex is the most radical piece of digital signal processing gear you've ever heard. Among the innovations in Vortex is its ability to "*morph*" from one effect to another, allowing you to create something totally unique along the way.

Lexicon's unique **Audio Morphing™** effects technology creates a complete parametric and algorithmic restructuring of two completely independent stereo effects (*like those ads where the car transforms into a tiger...*). The "*morph*" can be anywhere from 0.01 to 10 seconds. Or, use your expression pedal to morph in real-time. What's more, it all takes place in a very easy-to-use single rack space device. What does **Audio Morphing™** sound like? *Incredible.*

Dial-up any of our **32** built-in stereo effects and the first thing you'll ask yourself is: "***What's going on here!?***" All of the Vortex effects come alive in response to your playing. For example, on some effects, as you play louder the echo level decreases. On others, as the sound fades away, modulation increases. **Vortex's** controls give you fast and easy access to the *dimensional*, *rhythmic* and *dynamic* aspects of each effect – including two LFO's with independently variable *Rate*, *Depth* and *Resonance*. Two independent echoes allow you to set-up polyrhythms which can be synchronized to your music with the *Tap Tempo*. With Vortex's A/B (Morph) switch you can even remotely change channels on your amp!

In addition to our **32 Presets**, you can create **32 User Registers** of your own, morph between any pair and set-up custom register "chains". And, of course, **Vortex** features that crisp, clean Lexicon sound at a price that's nearly as incredible as the effects themselves.

Get into an authorized Lexicon dealer today and check it out. Then listen to what real insanity is like when you hook **Vortex** up to our **Alex** and **JamMan** processors. But, be careful, once you get caught-up in a **Vortex**, you might not want to get out...

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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 5LX 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 5LX™
$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 Eric Clapton, Don Henley, Lionel Richie, Elton John, George Harrison, Michael Bolton, Chick Corea, The Moody Blues and many, many others.

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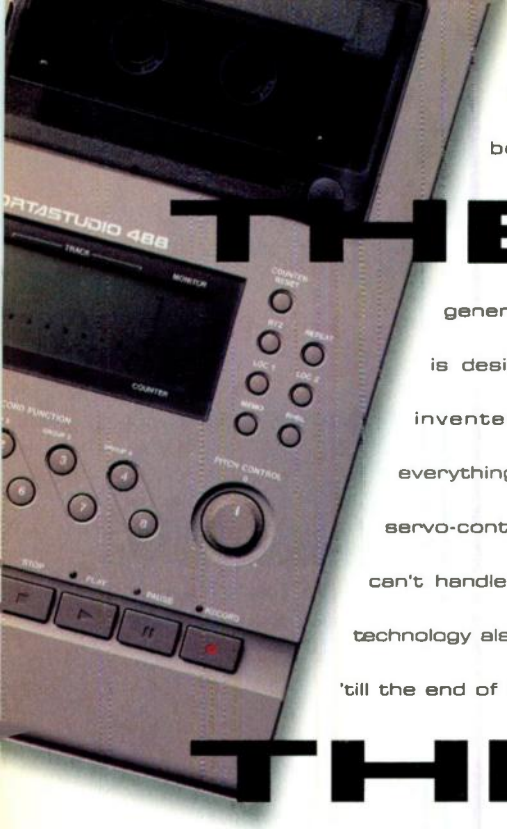


It's time to get serious about laying tracks and making that killer demo you've been talking about. Get your hands on the 488 PortaStudio — the third

THE FIRST.

generation 8-track multitrack cassette available only from TASCAM. The 488 is designed and built like no other 8-track cassette. That's because TASCAM invented 8-track cassette. No short cuts here. We've put the best of everything into the 488. It's the only 8-track cassette using a high-performance servo-controlled transport complete with electronic breaking. Any other deck just can't handle the relentless demands of stop and go multitrack recording. Servo technology also maintains precise and consistent tape tension from the beginning 'till the end of the tape. That's why the 488 delivers the lowest Wow and Flutter of

THE ONLY.

any 8-track cassette. Which means it sounds better, too. Another exclusive is TASCAM's innovative split head technology. That's why the 488 delivers specs you won't find in any other deck at even twice the price. In fact, the 488 actually outperforms the original reel-to-reel 8-tracks. Of course, the 488 PortaStudio gives you all the important recording features you'd ever need. And with the right recording skills, you can do almost anything. In fact, some have used the 488 to record hit records and movie soundtracks. And that's great. But what you do with the 488 is your business. Check out the TASCAM 488. And let your

Using standard cassettes, TASCAM has invented the best sounding 8-track recorder in the world. And it's only available from TASCAM.

THE BEST.

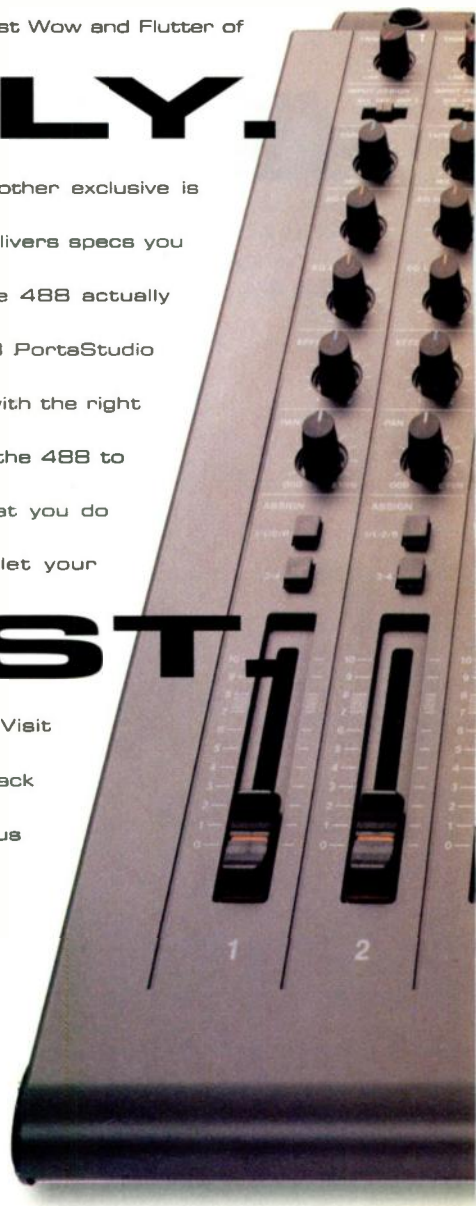
imagination wander. Like any PortaStudio, it's simple to use. Don't wait. Visit your local TASCAM dealer today. Have them set you up with the best 8-track cassette money can buy. The 488 PortaStudio. Because it's time to get serious about recording.

THE 488 PORTASTUDIO.

8 TRACKS ON CASSETTE.

ONLY FROM TASCAM.

ONLY $1,799.



The 488 features a servo-controlled transport and split head technology. It sounds great and is simple to operate. You won't find a better recording studio at this price. It's perfect for recording demos and sketching out tunes. Try it!

TASCAM.

Take advantage of our experience.

LETTERS

WHAT PAGE WAS THAT ON?

I just received my March 1994 **EM**. In "Letters," a reader asks about voice-to-MIDI converters. Because I've had an ad in **EM** for two years now, I was surprised that your editors decided my product is no longer available.

MidiVox is very much available. We have never been out of production since the original review in July 1992. We just upgraded everything for 1994 and replaced the original six-page manual with a new 150-page one, fully indexed. Any reader calling, faxing, or writing me can receive a free demo cassette. *(See ad p. 130—ed.)*

Timothy Kelly, President
MidiVox Marketing Cc.
Houston, TX

ONCE AGAIN, THE AKAI DR4D

Thank you for your review of the Akai Digital DR4d (February 1994). There are a few points in the review I would like to clarify. One of the main design goals for the DR4d was to produce a professional-quality recorder, with sound quality equal to that of our high-end products, such as the DD1000i. To achieve this, the DR4 uses an 18-bit, 64-times oversampling A/D converter. This is not the same as the converter used in the Alesis ADAT as stated in the review; in fact, it is quite superior in its performance.

The review mentions that time values, such as punch-in/out points, are entered directly by using the time display. Time values can also be captured on the fly while in either Play or Record modes and stored as either location points or in/out points.

In the discussion of the MIDI implementation, the review states that tempo changes can only occur at the beginning of a measure. In fact, tempo changes can occur at any clock pulse. These are accessed by using the jog wheel. MIDI Machine Control is available in version 3.0, as well as MTC output. When used with a sequencer that supports this, no tempo map will be required. Akai is not developing standalone MIDI software for MIDI Machine Control. We are simply implementing it according to the MMC specification to work with other software.

The final statement of the review ("You don't expect to need more than four tracks") doesn't make sense. The DR4d is expandable to sixteen tracks. When multiple machines are synchronized together, the operation and lockup between them is instantaneous, just as it is with one machine. This is not true of VCR-based recording systems. A comparison to other systems is always good, but it should be an apples-to-apples comparison. A better comparison would be to the Session 8 XL, because it is the system intended for professional applications. This system retails in the $5,600 range, plus computer and hard disk. The ADAT has no editing capabilities unless you have two ADATs and a BRC (a $10,000 retail price). The DR4d is not intended as a Pro Tools-type product and, as such, doesn't cost as much. It is intended to give high-end sound quality, editing capability, and easy operation at a modest price.

Mike McRoberts
Akai Product Manager
Fort Worth, TX

Mike—Thanks for correcting us about the A/D converter. It's unfortunate the mistake was overlooked when we submitted the article to you for fact-checking. In regard to Geary Yelton's final statement, his point was that the ADAT offers significant advantages in media cost, but doesn't have the DR4d's cut/copy/paste features. If you don't need these editing features and want more than four tracks, he feels digital multitrack tape is more cost-effective. The brief mention of Pro Tools merely pointed out that if you want the more extensive visual editing offered by computer-based hard-disk recorders, you have to step up to a more powerful system, albeit at a higher price. The new editing software Akai previewed at NAMM should change this equation in the DR4d's favor, but we didn't know about it when we edited the review.—Steve O.

WINDOW PAINS

Warren Sirota's February 1994 article "Computer Musician: Using Windows MIDI Software" was interesting and useful for those just entering the world of *Windows* MIDI. However, Mr. Sirota's information regarding the performance penalties associated with serial- and parallel-port MIDI interfaces is incorrect and potentially misleading.

The computer's serial-port hardware (the UART chip) appears to the CPU as a parallel device. Data is written to the UART and read one byte at a time, similar to a parallel-port device. The actual serialization occurs within the UART, completely transparent to the CPU, hence it requires no additional processing on the part of the CPU. Because data must pass serially between a serial MIDI device and a computer, a slight delay is introduced by serial MIDI devices. This delay is typically less than 320 microseconds and sometimes as low as 90. Perhaps this is what Mr. Sirota meant to address.

A common scapegoat for poor serial and parallel MIDI-device performance is *Windows* '386 Enhanced Mode. Realistically, poor performance is usually the result of poor MIDI-hardware/software design. A MIDI device originally designed for use under DOS does not necessarily work well with *Windows* due to the extra processing requirements of the *Windows* environment. On the other hand, if a MIDI product is designed with *Windows* in mind, it will work well in '386 Enhanced Mode, as well as DOS.

Bret Costin
Palm Harbor, FL

Author Warren Sirota responds: *Bret Costin's point that both serial and parallel*

BRIAN RASZKA

interfaces each take one interrupt to transfer each byte is accurate under normal conditions; however, there is a performance difference during the overload conditions, which can occur if a slow CPU falls behind the pace when processing interrupts (cf. Lucy and Ethel at the chocolate factory). Interfaces accumulate incoming bytes in their own memory buffers until the CPU asks for them. When that occurs, a parallel interface can transfer the entire contents of its buffer with a single interrupt; whereas, a serial interface will still require an interrupt for each byte transmitted. I claimed that the interrupt-processing overhead of a parallel-port interface could be as little as 12% of that of a serial interrupt, without pointing out that the figure is an estimate that might apply on a relatively slow system, such as a 16 MHz '386SX running Windows *in Enhanced Mode. In such a case, each parallel-port interrupt might end transferring 8-10 bytes to the CPU.*

Mr. Costin is also correct in pointing out that interfaces and drivers can be designed to accomodate the various performance characteristics of Windows, *although the details of such designs are esoteric and often proprietary.*

The column had one important omission: I would like to thank Charles Phelan of Key Electronics for his help and patience in explaining many of the misinterpretations I may have introduced.

I have a '386, 16 MHz laptop, with an MXQ M16s "fitted" inside. I won't go into how that was done, but it works great. However, I wanted to thank you for helping me out. I was having a problem with the computer bogging down under what I considered a moderate datastream. In Warren Sirota's article in the February issue on MIDI software, he discussed using *Windows* in the "WIN/S" mode to gain communications speed, and everything works great now. Thanks a lot.

David Lee Armstrong
Waukegan, IL

AN ACCORDION ACCORD

I'm responding to the article by Scott Wilkinson in the December 1993 issue, "From The Top: Multitimbral MIDI." As an accordion player who has owned a MIDI accordion for the past six years, when I saw the picture heading the article, I thought, "all right, finally something about the MIDI accordion." Although there was no mention of an accordion, the contents of the column did relate to uses of sound modules for the MIDI accordion.

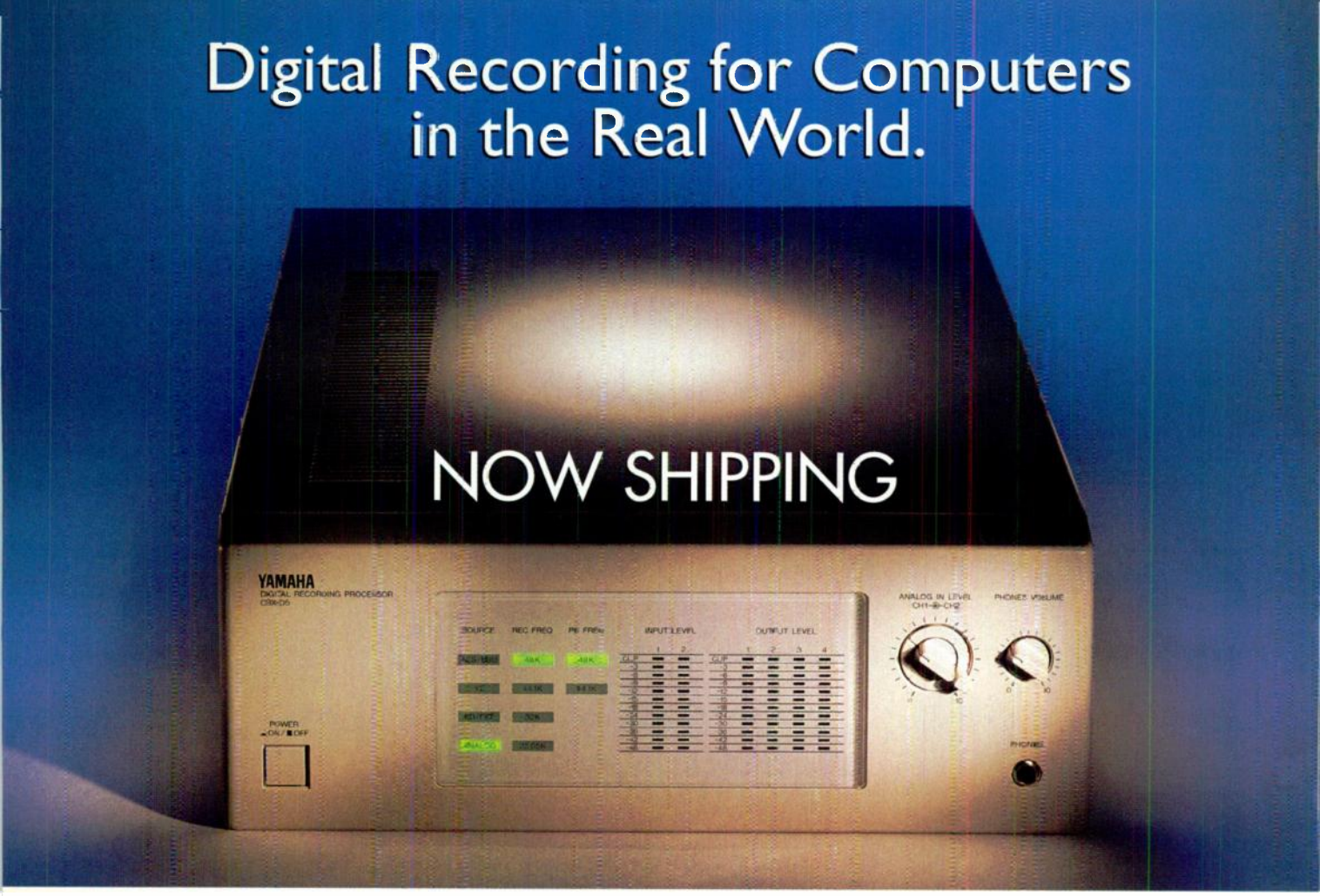
Many of us MIDI accordion players have been using sound modules in the way described in the article for several years. There are usually at least four channels of MIDI transmitted from the accordion: one for bass, one for chords, and two for the treble side. These latter two are separated: One channel is polyphonic, and the other channel is monophonic and plays the solo sounds. This is then sent to a sound module or modules, and they are programmed for whatever sounds the accordionist wants.

Richie Yurkovich
Willard, WI

We welcome your feedback.

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

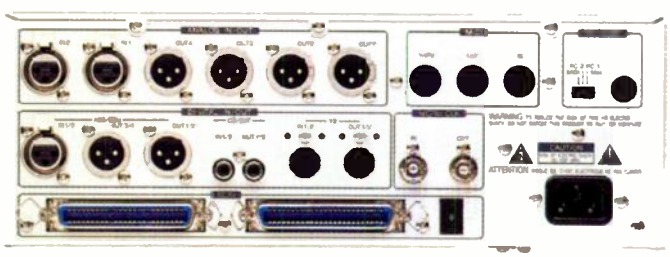
Digital Recording for Computers in the Real World.



If you're thinking about hard disk recording, you've probably heard that you'll need to buy a bigger, faster computer, with more slots and accelerators, that will end up costing you a whole bunch of money.

Until today!

The new Yamaha CBX-D5 Digital Recording Processor, developed in cooperation with premier hardware and software designers throughout the world, can be immediately interfaced with the most popular and affordable computers being used today. This impressive list includes Atari (ST, TT, and the new Falcon), Apple Macintosh (SE30, all II models, Quadras, and PowerBooks), IBM PS2, and even clones running Microsoft Windows 3.1.



detail of back panel

The CBX-D5 system was designed to let your computer compute and your storage devices store while the CBX-D5 handles the processor-intensive work. The CBX-D5 controls digital multi-track recording, analog-to-digital and digital-to-analog conversions, digital audio routing, digital signal processing and digital ecualization, digital inputs and outputs in all standard formats, word clock synchronization, MIDI, and much more.

YAMAHA CBX SERIES

DYNATEK STRUCTURED FOR STORAGE

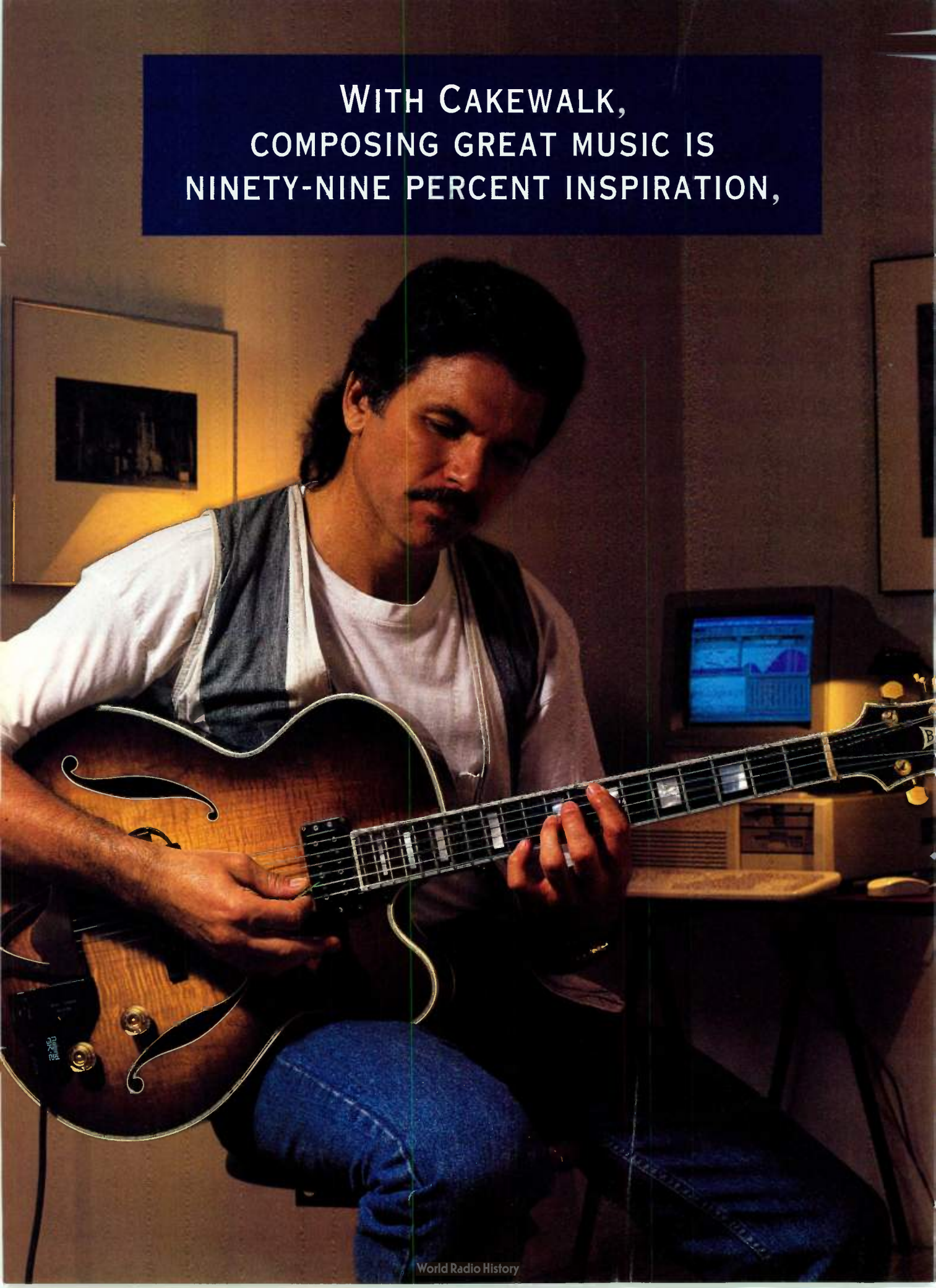
Steinberg JONES

Cooperative design input from companies such as Mark of the Unicorn, DynaTek, and Steinberg made this all possible. The CBX-D5's modular format also provides a logical upgrade path with the ability to add more tracks, more storage, and more computing power without disrupting, scrapping, or obsoleting the rest of the system.

See the Yamaha CBX-D5 Digital Recording Processor in action at your local Yamaha Dealer or call 1-800-932-0001, extension 500 for more information.

Yamaha Corporation of America P.O. Box 6600 Buena Park, CA 90620 714-522-9011

YAMAHA



ONE PERCENT PERSPIRATION.

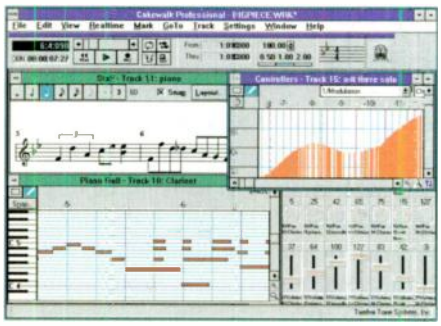
Cakewalk Professional for Windows™ 2.0 is the MIDI sequencer that's powerful enough to transform your inspirations into compositions. Yet it's no sweat to use.

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.

YOU'LL LOVE THE VIEWS.

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.

Cakewalk
PROFESSIONAL
for Windows

Other extraordinary Cakewalk Professional features include a Controllers view, a variable timebase of up to 480 pulses per quarter note, a Markers view for creating text "hit points," an Event Filter and on-line help screens.

NEW WAYS TO COMPOSE YOURSELF.

Cakewalk Professional 2.0 offers other new features like:

- Play List view for live performance
- 48 assignable faders (16 sliders, 32 knobs)
- Real-time editing
- Remote control from MIDI keyboard
- "Hot Key" macros
- Loop record
- Punch record on the fly
- Big Time display

INSPIRED YET?

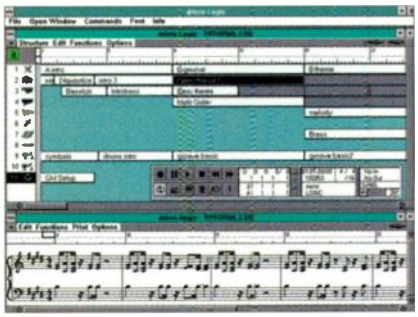
If you feel inspired to find out more about Cakewalk Professional for Windows 2.0, or to learn the name of the dealer nearest you, give us a call at **800-234-1171** or **617-926-2480.** Cakewalk Professional lists for just $349. If you'd like, we'll send you a demo disk for just $5 so you can see and hear Cakewalk Professional for yourself.

Twelve Tone
SYSTEMS
P.O. Box 760, Watertown, MA 02272

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.

WHAT'S NEW

By Steve Oppenheimer



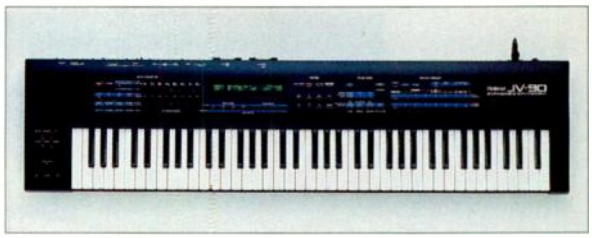
▲ EMAGIC MICRO LOGIC

Emagic is offering *Micro LOGIC* ($199), an entry-level sequencer and notation software for *Windows*. The program offers unlimited tracks and sequences; 960 ppqn record resolution; tempos from 0.05 to 9,999 bpm; and several Loop Record modes. Real-time, nondestructive editing features include quantization, looping, transposition, and cut/copy/paste. Event-list editing and graphic piano-roll editing are provided.

The Score Editor is fully integrated with the other editors, and scores can be edited in real time. Note entry is in real time or via click-and-drag. Notation features include unlimited staves, automatic rest and overlap correction, automatic triplet recognition, and full-page WYSIWYG editing. Concert and transposed scores are supported and can be printed out. Text can be entered anywhere in the score. Emagic; tel. (916) 477-1051; fax (916) 477-1052.

Circle #401 on Reader Service Card

▶ ROLAND JV-90



Roland is shipping three new JV-series, expandable keyboard synthesizers. The JV-90 Expandable Synthesizer ($1,895) has a 76-key, unweighted, Velocity- and Channel Pressure-sensitive keyboard that can transmit on up to eight independent zones. The eight front-panel sliders can send any MIDI Control Change message for each zone.

The synth is 28-voice polyphonic and 8-part multitimbral (seven instrument parts and one Rhythm part). It offers 256 preset Patches and 64 user Patches, plus four factory Rhythm Sets and one user Rhythm Set. A data-card slot provides for an additional 64 Patches and a Rhythm Set. A built-in effects processor provides reverb/delay and chorus, with individual send levels for each Tone.

The JV-90's 4 MB of internal waveform memory (152 waveforms) can be expanded using any of the 8 MB SR-JV80 plug-in wave expansion boards and a 2 MB SO-PCM1-series waveform card. (There are currently four SR-JV80 boards: Pop, Orchestra, Piano, and Vintage Synth.)

You can also add the VE-JV1 4 MB voice expansion board, which includes all the JV-1000/80 preset sounds and sounds from the PN-JV90-04 Rich Sound Collection 2 data card, for a total of 512 sounds. It also doubles the JV-90's polyphony to 56 voices and its multitimbral capability to sixteen parts. Alternatively, you can add a VE-GS1 board, which adds 226 General MIDI Level 1/Roland GS sounds, eight drum sets, and one Sound FX set. It also doubles the JV-90's polyphony and triples the multitimbral capability. Thus, a fully expanded JV-90 (with SR-JV80 board, VE-series board, and SO-PCM1 card) can have up to 18 MB of wave memory.

Roland also offers the JV-50 ($1,595) and JV-35 ($1,295) expandable synths. The two synths have 61-note Velocity-sensitive keyboards and come with 226 GS sounds. They are 28-note polyphonic and 16-part multitimbral. Nine factory drum kits and nine user kits are provided, and each drum sound's pitch, level, pan, and reverb depth can be edited. The units also have onboard reverb and chorus. Like the JV-90, the JV-50 and JV-35 can be expanded to 56 notes of polyphony with VE-series boards.

The only difference between the JV-50 and JV-35 is that the former has a 3.5-inch, double-density, floppy-disk drive that can record and play back Standard MIDI Files. This lets you combine SMF playback with real-time performance. Roland Corporation US; tel. (213) 685-5141; fax (213) 722-0911.

Circle #402 on Reader Service Card

▲ MOTU MIDI EXPRESS PC NOTEBOOK

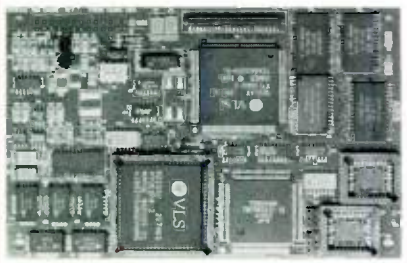
Mark of the Unicorn is shipping the MIDI Express PC Notebook ($349), which connects to the parallel port of laptop and microchannel-compatible computers. The 4-In, 6-Out MIDI interface/patch bay/processor provides extensive MIDI merging and filtering capabilities, and its SMPTE reader/generator has adjustable freewheeling. A *Windows* control console accesses all the unit's parameters, and a Multimedia Extension driver assures compatibility with most *Windows*-based MIDI software. The 1U rack-mount device offers a click-to-MIDI converter, footswitch input, and front-panel Panic button. Programs in its 16-Scene memory can be recalled from the front panel or via MIDI Program Change. Mark of the Unicorn; tel. (617) 576-2760; fax (617) 576-3609.

Circle #403 on Reader Service Card

SOUND CARDS ▲ ▲ ▲ ▲ ▲

▼ KURZWEIL MASS SYNTH CHIPS

Kurzweil announced its MASS (Multimedia Audio Sample-playback System) synthesis chip set, which will be included in at least four new cards and add-on daughterboards offered by third parties. The MASS



synth has 18-bit DACs and is 32-voice polyphonic and 16-part multitimbral.

The synth offers 6 MB of waveforms in ROM, which comprises 357 sounds and fifteen drum kits. It can operate in three modes. In the default GM mode, it offers 128 GM Level 2 sounds. It can also run in MT32/LAPC mode for game compatibility. Finally, it can run in Kurzweil SuperOrchestral mode, providing an acoustic and classical instrument set based on the Kurzweil Mark 10 Series. The MASS synth includes an onboard effects processor that produces 48 reverb, chorus, and delay algorithms.

Wearnes Technology (tel. [408] 456-8838; fax [408] 456-8846) will include the Kurzweil MASS chip set in its Beethoven MIDI EFX 2000 daughterboard ($349) for *Windows*-based PCs, which fits their Beethoven Pro 16 stereo, 16-bit sound card; the Creative Labs Sound Blaster 16-series cards; and the Aztech NX Pro sound card. The Beethoven Pro 16 board is bundled with *Midisoft Recording Studio* software.

AVM Technology (tel. [801] 571-0967; fax [801] 571-3634) is offering the Summit daughterbox ($389), a small "black box" that houses the MASS synth. It attaches to and is powered from any MIDI/joystick jack and connects to the audio input of a PC sound card or directly to a sound system.

Virtual Media (tel. [408] 980-9009; fax [408] 737-9890) is using the MASS synth in its Virtual Media Synthesizer Module ($349), which can attach directly to their Hypersound-16 stereo, 16-bit sound card or Creative Labs Sound Blaster 16 card.

Finally, Morning Star Solutions (tel. [508] 692-0373; fax [508] 692-6535) is incorporating the MASS chips into the MacWave Maker 7-inch NuBus card for the Macintosh ($695), which includes general-purpose MIDI In and Out ports. The MASS synth is addressed through *OMS*.

Circle #404 on Reader Service Card

ALPHA SYSTEMS LABS CYBER AUDIO PRO

SRS Labs, manufacturer of SRS surround-sound technology, has teamed with Alpha Systems Labs to introduce the Cyber Audio Pro sound card for PCs ($349). The card provides 16-bit, stereo audio recording and playback (at up to 44.1 kHz) with integrated voice-recognition. SRS processing lets you locate sounds beyond the normal stereo soundfield, for a "wrap-around" effect. The system does not depend on the listener being seated in a sweet spot.

The card uses the ARIA sound chip, which provides 32-voice polyphonic, 16-part multitimbral, GM-compatible wavetable synthesis. The chip also includes DSP architecture to handle the voice-recognition and sound features, relieving the computer's CPU of this burden. In addition, because it is DSP-based, the system's sound options can upgraded with software. Alpha Systems Labs; tel. (714) 252-0117; fax (714) 252-0887.

Circle #405 on Reader Service Card

BEST DATA PRODUCTS SONIQ SOUND

Best Data Products' Soniq Sound PC audio card ($259) uses Ensoniq's Soundscape 32-voice polyphonic, 16-part multitimbral wavetable synth to provide 128 GM instrument sounds and 61 percussion samples. The synth offers FM emulation, rather than an FM chip, to ensure compatibility with older games.

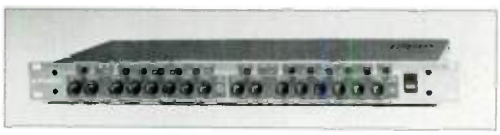
The Soniq Sound card can record and play 16-bit, 44.1 kHz audio and has dynamic filtering for clean sound. Its mixer allows simultaneous recording from multiple sources. A MIDI interface and joystick port are included. Best Data Products; tel. (818) 773-9600; fax (818) 773-9619.

Circle #406 on Reader Service Card

▶ APHEX 622

Aphex offers the 1U rack-mount, dual-channel 622 Expander/Gate ($795), which succeeds the model 612. The company's Logic Assisted Gate circuitry combines sophisticated level-detection with digitally generated voltage control for increased accuracy, regardless of attack time.

You can set trigger threshold, attack time, hold time, release time, and attenuation range. There's a switchable ducker and a downward expander with high-resolution ratios between 1.2:1 and 10:1. The 622 has 24 dB/octave, parametric Key Input filters, with a defeat switch.



The channel inputs and outputs use electronically servo-balanced, transformerless circuitry with XLR connectors. The sidechain has unbalanced, ¼-inch I/O, and you can listen to the Key Input signal with the Key Monitor headphone jack. Dynamic range is rated at 120 dB, THD is 0.003% (+4 dBm), and noise is -92 dB (unity gain). Aphex Systems; tel. (818) 767-2929; fax (818) 767-2641.

Circle #407 on Reader Service Card

▶ VESTAX HDR-6

Vestax has introduced the HDR-6 ($2,300) and HDR-4 ($1,880) 2U rackmount, multitrack hard-disk recorders. The 6-track HDR-6 comes with a 340 MB internal hard drive, offering up to 10.5 minutes of recording time per track, and the 4-track HDR-4 has a 270 MB drive, providing 12.5 minutes per track. The HDR case includes space for a second, user-installed, IDE hard drive, and Vestax will offer an optional SCSI interface.

The machine's MIDI-controllable digital mixer includes pan, gain, and 3-band EQ on each channel with sweepable midrange. The HDR-6 has four switchable pre/postfader aux sends and four stereo aux returns, while the HDR-4 has two aux sends and two stereo returns.

The HDR machines offer two ¼-inch, balanced TRS, analog mic/line inputs on the front panel and two analog line inputs in the rear. They also have two ¼-inch, balanced TRS, analog master outs, as well as optical and coaxial (S/PDIF) digital I/O. An optional AES/EBU interface is planned. The direct, post-EQ, individual track signals can be routed to the master outs and aux sends for external mixdown.

Channel and master levels can be monitored with six 10-segment LED ladders. (The HDR-4 includes four input meters and two master meters; the HDR-6 includes six input meters that can be switched to display master and aux send levels in the mixer section.) The time counter shows minutes, seconds, and frames, and the manufacturer claims editing, locating, and punching can be accomplished with subframe accuracy.

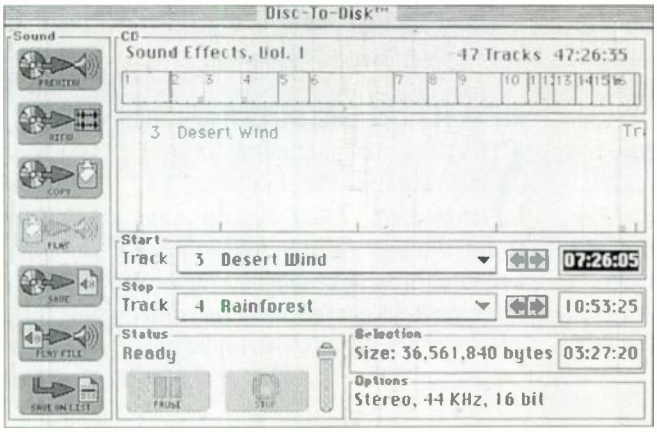
Internal track-merging is supported, as are "undo-able" Delete, Move, Copy, and Paste. Editing regions are selected by setting A and B in/out points. The 99-point autolocator offers zero return, selection single play, and selection repeat play (loop). Punch in/out can be accomplished automatically or with a footswitch. All data, including the mixer settings, can be backed up to DAT, and an optional interface for VCR backup will be offered.

According to the manufacturer, an unlimited number of HDR-series recorders can be synched together via the digital I/O and MIDI ports, without requiring a sync track. The HDR also sends MIDI Clock with Song Position Pointer and responds to MIDI Machine Control. An optional SMPTE sync interface will be offered.

The units include 18-bit A/D and 20-bit D/A converters and record at 44.1 or 48 kHz. Internal processing is 24-bit. The manufacturer claims a 20 Hz to 22 kHz frequency response, 92 dB S/N ratio, and 0.009% (10 dB @1 kHz) THD. Vestax Musical Electronics; tel. (707) 427-1920; fax (707) 427-2023.

Circle #408 on Reader Service Card

▶ OMI DISC-TO-DISK



Optical Media International is shipping *Disc-to-Disk* ($199), a sound-capture utility for the Macintosh that transfers digital audio directly from CD-ROM to hard disk via SCSI. No sound card is required. You can record the left or right channel only, both channels in stereo, or both channels summed to mono.

Sampling rates include 11, 22, or 44.1 kHz, with 8- or 16-bit resolution. Digital silence can be trimmed on capture, and you can display the acquired waveform onscreen. The captured audio can be saved in AIFF, SND, *QuickTime*, *Sound Designer II*, and *Windows* WAV file formats.

The source tracks can be selected by double-clicking in a graphical overview of the disc's contents, or selecting track numbers in a pop-up menu. Alternatively, you can use track names input from a CD database program such as *CD Remote* or a sound-editing program such as *AudioShop*.

The selections can be previewed, with level control, through the CD-ROM drive's audio outputs or the Mac speaker (via the clipboard). In addition, you can create a playlist of multiple selections for automated capture. The program displays absolute or relative time and shows selection sizes in both time and bytes. If you want to conserve disk space, you can apply audio compression at 3:1 or 6:1.

Disc-to-Disk will run on a Mac Plus or better with 5 MB of RAM and System 6.0.5 or later. However, a 68020 or better processor is required for some features. The program supports *QuickTime* 1.5 or later and *Sound Manager* 3.0. CD-ROM support is limited to newer drives, including the Toshiba 3401 and 4101, Procomm MAC-CD-MX, PLI 3401, Apple CD300 family, and Sony CDU-561 CD-ROM Reader. Optical Media International; tel. (800) 347-2664 or (408) 376-3511; fax (408) 376-3519.

Circle #409 on Reader Service Card

KORG G4

Korg USA has unveiled the G4 Rotary Speaker Simulator ($450), which emulates the famous Leslie rotating-speaker sound. The G4 offers separate controls for the lower rotor's acceleration time and the horn's rotation speed. It also emulates the effect of miking a rotating-speaker system in stereo, with control over the miking distance and stereo spread. An overdrive parameter emulates the Leslie's characteristic amp and speaker distortion, and a balance control mixes the horn and rotor signals.

Footswitches start and stop the rotation and toggle bypass, fast/slow rotation speed, and drive. An optional external continuous pedal speeds up and slows down the rotary effect. The G4 offers true stereo in and out, a headphone output, and input and output level pots. Korg USA; tel. (516) 333-9100; fax (516) 333-9108.

Circle #410 on Reader Service Card

POWER AMPLIFIERS

CARVER GA-250

Carver's 2U rack-mount GA-250 Guitar Power Amplifier ($675) offers control of several important circuit parameters that determine the amp's characteristic sound. A rotary knob controls the output damping factor: Heavy damping produces a tight, precise, solid-state sound; with less damping, the speaker is allowed to interact with the amp's output stage, emulating a tube amp. The Tube Clipping switch inserts a circuit that emulates the soft clipping of a tube-amp power stage with an output transformer. A Presence switch boosts the frequency band around 2 kHz.

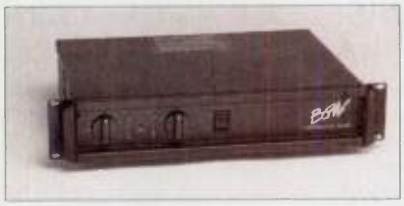
The GA-250 is rated at 75W RMS/channel into 8Ω, 125W/channel into 4Ω, and 250W bridged mono into 8Ω. Inputs are on balanced, ¼-inch TRS jacks, and outputs are unbalanced ¼-inch. A rear-panel switch determines stereo, dual mono, or bridged mono mode. Front-panel LEDs indicate ready, signal present, and hard clipping. The electronics are protected from DC offset, thermal overload, short circuits, and hard-clipping; a front-panel circuit breaker is also included. Carver Corporation; tel. (206) 775-1202; fax (206) 778-9453.

Circle #411 on Reader Service Card

JBL SR6670A

JBL has added the SR6670A ($1,495) to its SR series of power amps. Designed for touring, the 2U rack-mount amp uses a proprietary, switching power supply and new cooling techniques. It supplies 600W RMS/channel into 4Ω. The inputs use balanced XLR and ¼-inch connectors, while the outputs use Neutrik Speakon connectors. The SR6670A weighs under 35 pounds. JBL Professional; tel. (818) 893-8411; fax (818) 893-0358.

Circle #412 on Reader Service Card



BGW PERFORMANCE SERIES 1

BGW's Performance Series 1 ($799) is a 26-pound, 2U rack-mount power amp that delivers 150W/channel (into 8Ω) in dual-channel mode and 300W in bridged mono. The amp uses low-noise fan cooling, with a custom heat sink, and offers LEDs for power, signal present, and clipping. The active, balanced inputs use XLR and ¼-inch jacks. Speakers connect to 5-way binding posts. Frequency response is rated at 8 Hz to 175 kHz (+0/-3 dB). BGW Systems; tel. (800) 468-2677 or (310) 973-8090; fax (310) 676-6713.

Circle #413 on Reader Service Card

YORKVILLE AUDIOPRO 3400

Yorkville is offering the Audiopro 3400 power amp ($1,679), which delivers 1,200W/channel (continuous) into 4Ω, which is tops in the Audiopro series. The design is essentially the same as Yorkville's Audiopro 3000, which is optimized for 2Ω loads. The new 2U rack-mount amp offers an Energy Management System that monitors and regulates the AC current to maintain performance from 120V, 12A circuits. A toroidal power supply is provided to minimize hum and weight, and there is a switchable bass boost. Yorkville Sound; tel. (716) 297-2920; fax (716) 297-3689.

Circle #414 on Reader Service Card

PG Music announces... PowerTracks Pro™ ...at the incredible price of $29

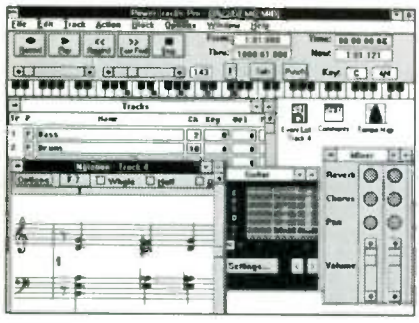
SEQUENCER/NOTATION/PRINTING FOR WINDOWS (IBM)

"Solid sequencing at an unbelievable price" *Electronic Musician - Sept.93*

NEW! Music Printout

PowerTracks is a professional, fully featured MIDI sequencing/notation/printing program, and is so easy to use! And we include versions for Windows 3.1 AND DOS so you'll be able to use PowerTracks on all of your machines!

PowerTracks Pro 2.1 for Windows



POWERTRACKS FOR DOS VERSION INCLUDED FREE

Yes! We include the DOS version for free in the same package. NOTE: The DOS version doesn't support music notation, or other graphical features.

EXISTING POWERTRACKS USERS CAN UPGRADE TO POWERTRACKS PRO 2.1 FOR ONLY $10

FOR STARTERS... *PowerTracks has all the Pro features found in sequencers costing hundreds of $$ more.*

PRO RECORDING, PLAYBACK, SYNCH, EDIT & SYS-EX OPTIONS: *48 tracks, real/step/punch record, sound-on-sound, MIDI File support, sync (SMPTE, Midi Time Code, MIDI) edit (quantize/ cut/ copy/ paste/undo/ data filters/transpose), multi-port support. 480 ppq timebase, sys-ex-editor-librarian, patch names, banks & much more.*

MUSIC NOTATION: *Enter/edit/display music in standard music notation. Intelligent/automatic features such as: correct beaming/tying of notes/minimize rests option/ "Jazz eighth notes" option (this automatically allows jazz swing eighth notes & triplets to be notated properly!!). Reads in any MIDI file & displays it as notation!!*

MUSIC PRINTOUT (ON ANY PRINTER!!): *Print any track in standard music notation. Selectable staves per page and bars per line. Selectable margins and paper size. Portrait or landscape (sideways) printing. Titles, composer, style, copyright information. Make your own lead sheets! You can also print the piano roll window for even more detailed analysis of a track!*

DELUXE WINDOWS INTERFACE: *Multiple Windows – Staff Roll, Event List, Tracks, Bars, Meter, Tempo, Piano keyboard, Guitar fretboard.*

BUT POWERTRACKS GOES MUCH FURTHER... WITH EXCITING NEW FEATURES NOT FOUND IN OTHER SEQUENCERS!

THE FASTEST WAY TO ENTER NOTES ONTO A MUSIC STAFF! *Using our intelligent AutoDuration™ feature, you can enter music onto a music staff using one mouse click per note - including the duration!!*

COMPREHENSIVE SUPPORT FOR GUITAR (STEP/REALTIME RECORD, PLAYBACK & DISPLAY OF GUITAR MUSIC): *PowerTracks has an on-screen Guitar fretboard. This allows you to quickly input/display Guitar music by simply clicking on the fretboard in step time. Or record the Guitar music in real time from a MIDI keyboard, or Guitar controller. Either way PowerTracks can display the track for you exactly as it should be played on guitar!! Comes with pro guitar files ready to play. Learn to play guitar by watching the guitar on-screen!*

BUILT-IN EDITOR /MIXER FOR ROLAND SOUND CANVAS/SCC1 & OTHER GENERAL MIDI PRODUCTS: *This allows you to control the features on your Roland card-(pan, reverb, chorus, etc.) even edit the sounds. All while the music is playing!! Uses on-screen knobs & sliders Save synth setups to disk.*

ON SCREEN PIANO, GUITAR & MUSIC STAFF SHOWS THE NOTES IN COLOR AS THEY ARE BEING PLAYED: *You see the notes drawn on the piano keyboard, the guitar fretboard & highlighted in red on the music staff as the song is playing.*

...AND POWERTRACKS COMES WITH PRO QUALITY MIDI FILES READY TO PLAY: *We include MIDI files of pro musicians playing piano, guitar & combo tracks.*

REQUIREMENTS: ***PowerTracks for Windows*** *- Windows 3.1, IBM Compatible AT, 386 or higher, 2mb RAM, Supports any device compatible with Windows 3.1 including Roland MPU401, Music Quest MQX interfaces, Key Electronics MIDIATOR, SoundBlaster, AdLib, TurtleBeach, etc.*
PowerTracks for DOS *- DOS 3.3 or higher, 640K, XT/286/386 or better. MIDI interface (Roland MPU401, Music Quest MQX series, SoundBlaster MIDI and FM sounds, Midiator, Roland SC7, Yamaha TG100) or Adlib/SoundBlaster compatible sound card.*

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PLUS... Music Trivia Game,"Guess the Song", Program Notes, Biographies, Music Dictionary (all on disk).... and much more.

the JAZZ PIANIST
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PRO FILE

Technological Zen

Patrick Moraz creates a shimmering digital Dance.

By Ric E. Braden

John Cage, twentieth-century composer and electronic-music prophet, was known for his Zen-inspired chance compositions and inventive use of available technology. Cage used record turntables to loop and reverse sound before tape recorders existed, and common phonograph cartridges to amplify the bizarre. In the 1940s, Cage's sonic experiments led him to develop the prepared piano. By inserting screws, coins, rubber wedges, bamboo, and other materials into the strings, he produced new timbres from a keyboard instrument long before there were Moogs or Arps.

When Patrick Moraz, former keyboard player for Yes and the Moody Blues, decided to record the first of Cage's "Three Dances for Two Prepared Pianos" as his contribution to *A Chance Operation: The John Cage Tribute*, he wanted to use sampling and MIDI sequencing technology to exercise unprecedented control over the material. The score requires two pianos, each prepared according to Cage's table of preparations.

Rather than search out the requisite two pianos, Moraz, had his own 9-foot Young Chang grand prepared twice. He enlisted sound designer Reek Havoc to sample each preparation with an Emulator III. "Reek's samples were so bright and clear," enthuses Moraz, "the only additional effect I used on the piece was a little reverb from a Dynacord DRP-20."

When they were satisfied that the samples captured the nuances of the original acoustic sounds, Moraz and second pianist Charles Turner used a Fatar 2001 and a Yamaha KX-88 to record MIDI sequences to *Vision* running on a Macintosh.

"We didn't quantize anything," points out Moraz. "What counted here was the contemporaneousness of the notes and the clusters being hit together to give the extra shine that we don't find in an analog version."

The result? Moraz's rendition doesn't just shine, it shimmers. Did all this control compromise Cage's composition? Not according to Moraz. "All along the line, I've stamped the project with John Cage's philosophies," he says.

Elements of the preparation that weren't dictated by acoustic needs were decided by chance operations. Even the final dynamics were given a Cagean signature. "Writing directly on *Vision* with the velocity pen, I not only freehanded the skyline of New York [an ongoing inspiration to Cage], but I also wrote his name within the skyline."

A Chance Operation features eighteen other contributors, from the avant-pop (Laurie Anderson, Yoko Ono, and the late Frank Zappa) to the avant-classical (Kronos Quartet, Robert Ashley, and longtime Cage associate David Tudor). Producer Gary Davis added his own touch by subdividing each piece with multiple track numbers.

Davis encourages listeners to play both discs simultaneously in random mode, which results in a chance-based cutup and rearrangement of the material. Because the possible number of combinations exceeds a googol (one followed by a hundred zeroes), this chance operation is a truly fitting tribute to the master of Zen composition.

Ric E. Braden, *graphic artist*

Patrick Moraz

Illustration by Dave Ember

By Michael Brown

Big Game Hunting

Your heart pounds as you run down the hall of the maze-like crypt. Light from flickering torches dances on the brick walls. Suddenly, the hair rises on the back of your neck. Someone or something is gaining on you. The tension builds, and then your computer produces a frightening..."beep." The illusion of the chase is shattered.

In the thrill-a-second fantasy world of video games, beep and bloop sound effects just aren't good enough any more. Computer and video gamers are demanding *real* music and sound from their high-tech toys. These heightened expectations, combined with consumers' voracious appetites for sophisticated electronic games, represent tremendous new opportunities for computer-savvy composers.

But scoring for video games is no picnic. It's fraught with as many pitfalls and dangers as the games themselves. Time-honored methods of scoring

and composition don't always work; audio quality is determined by playback systems, not state-of-the-art studio gear; and the demands of interactive media often transform composers into heavily scripted "sound schedulers." In short, if you want to play the game, you have to take some lumps.

LOOP THE LOOP

Composing music for video games is like film scoring. Film music is written to foreshadow events, underscore action, and stir viewer emotions. Film, however, is a linear medium. By the time the film is released to the composer, the sequence of events is usually fixed. The car is going to drive off the cliff, the stalker is going to attack his victim, and the bomb is going to explode. The composer knows these things are going to happen and scores accordingly.

Video games are different. By nature, games are nonlinear. The car might go off the cliff, but the driver might also avoid the crash. The stalker might attack his victim, but the victim might escape, or even turn the tables. The bomb might explode, or the hero might defuse it in the nick of time. You get the idea. Synchronized musical cues are seldom appropriate for video-game scores. Game play is often too fast and too random to successfully incorporate musical transitions for every action. Think of how jarring a soundtrack would be if it changed to "victory" music every time you thrashed an alien and "uh-oh" music each time the alien knocked you down.

To maintain a consistent underscore for the game action, many scores utilize 1- or 2-minute themes that are looped over and over. Even though loops solve the problem of concentration-breaking musical transitions, the repetition becomes boring fast. The key is to make the looped music interesting enough that it stays fresh.

"When most people think of video-game music, they think of these terrible merry-go-round ditties," says Tommy Tallarico, director of music & F/X at Virgin Interactive Entertainment. "In the old days, games had a 45-second theme that repeated. You'd play the game for twenty minutes and hear the same song four million times. But that's because most of the people who wrote music for those games were programmers, and there's a huge difference between programming music and writing music. A blues riff comes from the heart, not from the head.

"Today, the typical video-game score is two minutes long, and it's composed of many different elements," continues Tallarico. "For example, I don't structure my scores like pop songs with a verse/chorus, verse/chorus, solo, bridge, verse/chorus. I write an intro, verse one, chorus, then bridge, then back to a second variation or verse two or something. It never really goes back and repeats a part, because when it loops the person is going to hear it again anyway. My goal is to make the music so cool that the kids listen to it even after they've turned the game off."

Composer Laura Barratt stresses that game music must be structured to withstand sudden transitions.

DANGER ZONES

Creating an interesting loop is tough enough, but most video-game composers must deliver exciting scores without using the full power of their MIDI studios. In the electronic-game industry, FM synthesis is king. Unless you're scoring a CD-ROM game (more on this later), you can probably forget your samplers and PCM-based sound modules. The 6-voice, 4-operator FM synthesis chip is the driving force of video-game audio. Unsophisticated but cheap, Creative Labs' Sound Blaster 16 (see review in the November 1993 **EM**) is the *de facto* standard add-on sound card for the millions IBM PC-compatible computers now in use.

TINAH UTSMAN

Scott Scheinbaum enjoys the flexibility of producing music for CD-ROM-based games.

Although the Macintosh is used by countless musicians, its native audio-production capabilities (with the exception of the A/V Macs) remain primitive. The audio capabilities of PowerPC systems are promising, but the installed base of these machines is still too small to support the computer-game industry.

The same situation holds true for wavetable cards, such as Roland's RAP-10 and Turtle Beach's MultiSound series. These products sound wonderful, but there are not enough of them in computers to attract much attention from game developers.

Independent composer Donald S. Griffin, who has written award-winning soundtracks for *Aladdin* and *Cool Spot* (Sega Genesis), recommends that game composers only use sounds that they know will sound good on an FM chip. "You've got just six voices, compared to the timbral spectrum of an orchestra," he explains. "So you have to be certain that the patch sounds like the instrument you're trying to copy."

Another important consideration is the speaker system through which video-game music is typically reproduced. Most video games are played through a single 3-inch, low-fidelity speaker, whether inside a computer or a television. Even the stereo speakers

Big Game Hunting

offered in multimedia upgrade kits for computers are of the $19.95, plastic-box variety. Punchy horn stabs, ultra-fat bass, and monster guitar patches may sound great in the studio, but they're liable to turn into audio mud when piped from an FM chip into a set of cheap speakers.

"I EQ everything so it will come out just as well on a Mac speaker and a pair of multimedia speakers," says Scott Scheinbaum, music and sound director at Cyberflix, a company that produces Mac-based CD-ROM games. "It's like composing for TV. You've got this lame speaker with limited frequency range. You can't create a great masterpiece with all these layers. It might sound great through [studio] monitors, but try to shoehorn it into those little speakers and you're going to get a rude awakening."

Like most veteran game composers, Sega of America Senior Music Producer Spencer Nilsen stresses that strong composition technique goes a long way toward compensating for the limitations of FM playback hardware. "We really try to stress content," says Nilsen, "to create themes for characters and to underscore action."

CREATIVE OPTIONS

Thankfully, FM synthesis isn't the only audio technology used in game systems. Nintendo of America, for example, uses sample technology in its Super Nintendo Entertainment System. But the problem—at least the way it is implemented on the SNES—is limited memory. Good samples require lots of memory, and the SNES dedicates just 64 KB to audio. Samples, therefore, have to be short and seamlessly looped to be effective. The brevity of the sample makes it difficult to reproduce the attacks and decays that make a sample sound like a genuine instrument.

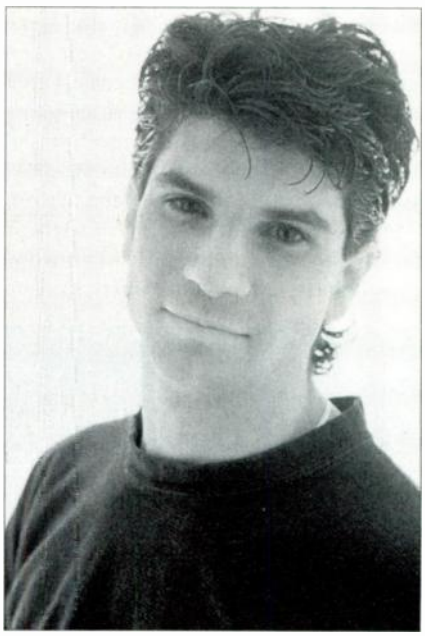
"If you're doing a Nintendo-type game," explains Tallarico, "you wouldn't want to have a big Oberheim-type patch, a big synth swell. Even good guitar riffs are hard to do. There's too much resonance and fullness in a guitar to be captured in a short sample. You can't do anything complicated or layered."

CD-ROM games, however, open a whole new world to the composer. Rather than rely solely on a sound card or a chip for sound reproduction, the music can stream directly off the compact disc, either as 16-bit Red Book audio or 8-bit Yellow Book audio interleaved with video data.

"When *Terminator* was developed for the Sega CD," says Tallarico, "we were able to have Red Book audio stream directly off the CD. Obviously, that's the best quality you can get."

Even with compact-disc drives, game machines are still limited by the amount of data that can be read from the disc during game play. "CD is great for accessing video in real time," says Tallarico. "If you're doing full-motion video during gameplay, the CD is going to be accessed constantly. Unfortunately, you can't do that and have Red Book audio play, too."

At Cyberflix, Scheinbaum digitized the soundtracks for the games *Lunicus* and *Jump Raven* onto the Mac and used Macromedia's *SoundEdit Pro* to edit and loop the tracks. Proprietary software enabled the game producers to interleave Scheinbaum's 8-bit, monophonic soundtrack (including music, dialog, and sound effects) with real-time animation streaming off the CD and into the Macintosh.



Tommy Tallarico says he grew up on video games. Now he produces soundtracks for them at Virgin Interactive Entertainment.

OPPORTUNITY KNOCKING

"We're getting so much [video-game] work that we have to farm a lot of it out," says Tommy Tallarico, director of music & F/X at Virgin Interactive Entertainment. This is music to the ears of independent composers.

"I'll take a demo tape from anyone," continues Tallarico. "The industry is growing so much that composers don't even need to know the ins and outs of a Sega or Nintendo system. On CD-ROM projects, for example, all you have to do is make good music. I also hire outside people to write 6- and 8-voice MIDI files for cartridge games."

Some of the other game developers interviewed for this article expressed interest in receiving demo tapes from **EM** readers. Here's where you can get in touch with them.

Murray Allen
Director of Audio
Electronic Arts
1450 Fashion Island Blvd.
San Mateo, CA 94404

Spencer Nilsen
Senior Music Producer
Sega Studios
Sega of America
130 Shoreline Dr.
Redwood City, CA 94065

Tommy Tallarico
Director Of Music & F/X
Virgin Interactive Entertainment
18061 Fitch Ave.
Irvine, CA 92714

"Stereo takes up such a large amount of space," says Scheinbaum. "There was no compelling reason to make the sound stereo. Leaving it mono made the game much faster."

INTERACTIVE SCORES

Interactivity is the Holy Grail of the entertainment industry. This is particularly true among the electronic-game companies, who seek to blur the line between fantasy and reality. Toward that end, many third-party software developers have developed techniques to

allow the soundtrack to follow the game action.

The game designers at Origin (publishers of large-scale simulation games) go through a great deal of advance planning with the composers to ensure that there is an appropriate musical theme for each stage of a game.

"The game designer creates an elaborate flow chart," says Origin in-house composer Laura Barratt, "that shows each of the possible branches the player can take in the game. From a scene in a dungeon, for example, the player may open a door into another room, encounter a monster, or climb the stairs to another level. Whichever action the player decides to take, the music must smoothly transition from one feel to another."

The software used to accomplish these transitions essentially creates an "if-then" matrix in the game's logic: *If* the player opens the door, *then* the music starts playing at bar nineteen. (For an in-depth look at another company's approach to rendering music interactive, see "Multimedia Musician: LucasArts Games" in the January 1994 **EM.**) The challenge for the composer, according to Barratt, is to structure the composition so it can move from one feel to another almost randomly.

"Everybody does it differently," says Barratt, "but for a war game, I'll write one huge combat piece and chop it into pieces. That way, I know it plays together as one whole piece. I may have three different sequences: Going into combat, getting into intense combat, and then the critical stage, but each of those pieces can go back to the other very smoothly."

Another Origin composer, Paul Baker, stresses that the composer needs to keep the game's action flow in mind.

"If you're writing music for a combat scene," he says, "you might need as many as ten or twelve different pieces of music. You have to keep thinking about keys, related keys, and tempos, because you have to move seamlessly from one segment of the piece to another as the game action

Pop star Thomas Dolby produced the soundtrack for the Sega CD game *Double Switch*.

1,2,3, WHAT ARE WE WRITING FOR?

Composers usually don't need to worry about writing music for a specific platform because the developer handles the necessary file conversions. However, a little knowledge of the capabilities and limitations of current game systems is always valuable.

CD-ROM drives are becoming *de rigueur* among computer users in both the Macintosh and IBM PC-compatible camps. CDs are popular with game developers because of the amount of data they can store and the fact that they can't be duplicated easily, which renders them immune to software piracy.

CD-i (Compact Disc Interactive), a stand-alone CD-ROM delivery platform codeveloped by Philips and Sony, has survived much longer than anyone predicted. Philips and Magnavox (a Philips subsidiary) are currently the only companies shipping CD-i players. These units are powered by a 16-bit, 15 MHz Motorola 68070 CPU (Central Processing Unit). According to Philips, this chip is equivalent to an 8 MHz 68000.

Each of the newest game systems to enter the market—Panasonic's 3DO (see this month's "Multimedia Musician" on p. 94), Commodore's CD32, and Atari's Jaguar—takes a unique approach to sound and music production. 3DO and CD32 are both CD-ROM systems with 32-bit brains. CD32 ($399) is Commodore's latest garb for its Amiga technology. CD32 is built around a Motorola 68020 CPU and a double-speed CD-ROM drive. CD32 can stream 16-bit stereo sound off its CD, but its native sound is a mundane 8-bit stereo.

Several companies, including AT&T and Sanyo, have licenses to manufacture 3DO players, but Panasonic was the only company marketing a 3DO machine ($499) at press time. The 3DO machine is designed around a 32-bit RISC (Reduced Instruction Set Computer) CPU, a digital signal processor, and a double-speed CD-ROM drive. 3DO can stream 16-bit stereo off the CD, plus it can generate 16-bit audio on its own.

Atari, a company many had written off as dead, surprised the industry when it announced that IBM would manufacture its new 64-bit game machine. Known as Jaguar, the cartridge-based machine sells for just $249. Jaguar features a 64-bit RISC-based graphics engine, a 32-bit digital signal processor, and three other processors that are dedicated to graphics and system management.

Nintendo, which saw its preeminence in the game industry diminish as Sega's influence grew, has partnered with Silicon Graphics to develop a new 64-bit game system. The game console, code-named Project Reality, will feature a 64-bit RISC processor designed by MIPS, a subsidiary of SGI. The home version of this system is scheduled to ship in the U.S. in 1995.

Sega is also working on a new game machine, code-named Saturn. Little is known about Saturn, other than that it is scheduled to ship in Japan at the end of 1994. Sega of America typically ships new Sega products six months to a year after they have debuted in Japan.

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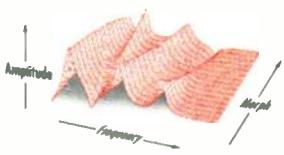

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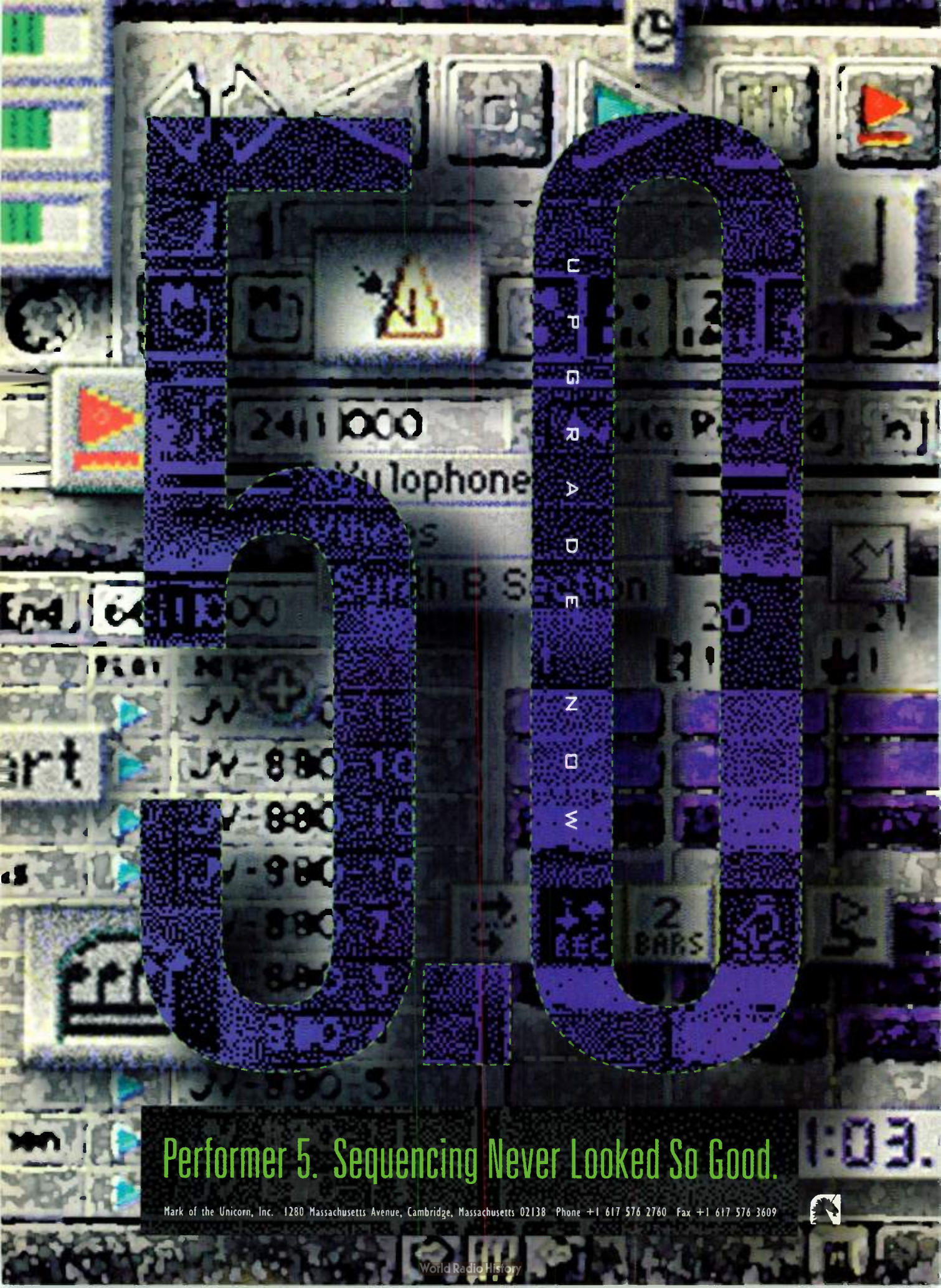

changes. Your music can't suddenly transition from 180 beats per minute to 140 beats per minute."

GOING TO MARKET

Composers have two primary methods for delivering their work to software developers: modem or mail. Using a modem to send a Standard MIDI File (SMF) is fast and easy, but many developers also appreciate a conventional audio recording of the score. Because a developer may not have the same sound card or sound modules as the composer, an audio version allows the developer to confirm what the composer wants the score to sound like.

Any sequencer can read any sequence saved in SMF format, so it really doesn't matter which platform or program you use to create your score. If you don't send your file over a modem, however, the medium you choose to store the sequence can be an issue. Most developers have settled on the Macintosh platform for music programming, but that preference doesn't shut out composers who use other platforms. IBM PC-formatted 3.5-inch diskettes have become a universal storage medium in the computer world, because Mac, Atari, and Amiga systems can read and write to them.

PAY SCALES

Composers typically receive $350 to $600 for the video-game rights to a simple, 6-voice theme song for a cartridge-based game. For longer compositions, such as those used for CD-ROM games, composers can negotiate higher fees. According to Tallarico, a composer without an established reputation can expect approximately $1,500 for a CD-game theme song.

"But for somebody like Jan Hammer, that's a completely different situation," says Tallarico. "With a celebrity composer, we can use his or her name to market the game, so the deal is often sweeter for them. In most cases, we'll pay the artist for the exclusive rights to use the score in any video-game format. Basically, we own the video-game rights."

Considering the number of titles sold each year, it should come as no surprise that some developers are considering releasing CD soundtracks of their video games. Sega and Electronic Arts have already pressed soundtrack CDs that they distribute at industry trade shows. But if video-game soundtracks are released through commercial distribution channels, even unknown composers would be entitled to royalty participation and larger advance payments.

"The whole complexion of the business is changing," states Nilsen. "I was talking to Ralph Simon, the vice president of Capitol Records the other day,

Spencer Nilsen, senior music producer at Sega Studios, welcomes demo tapes from new composers.

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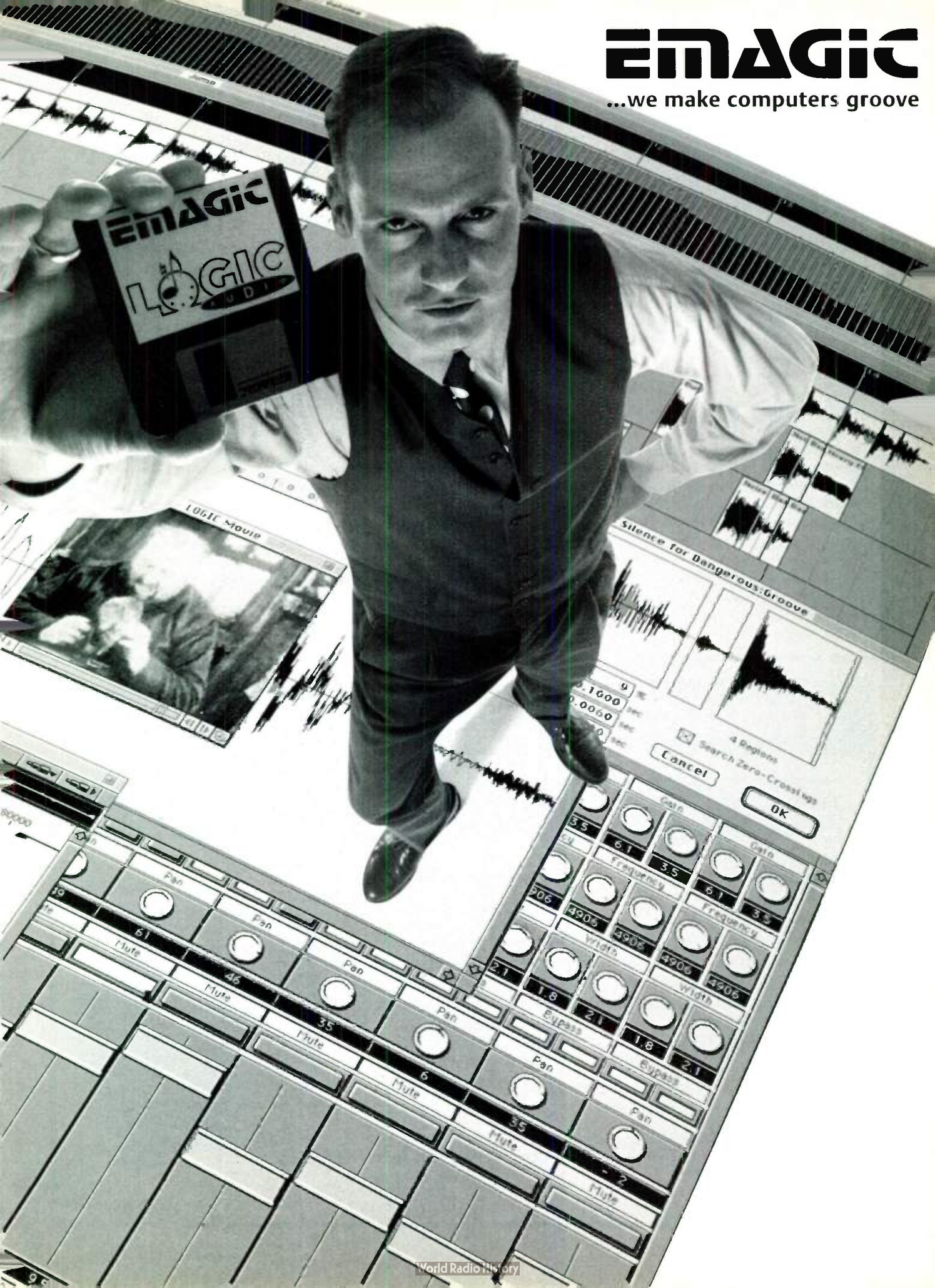
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and he said 'Did you ever stop to think that you're probably the most listened-to artist by young people in America right now?' That just shows how many alternatives there are to the tried-and-true ways of getting music out there. Someday video-game soundtracks may appear on the pop charts!"

LEGAL ISSUES

If developers *do* release commercial CDs of their game soundtracks—which seems like smart business, as most national record store chains already rent (or sell) videos, laser discs, and video games—composers should take special care when signing contracts for video-game scores. In short, make sure you know what rights you may be giving up. Marc Greenberg, an attorney with the San Francisco law firm of Nelson and Greenberg, which specializes in copyright and entertainment law, offers composers a few pieces of advice.

Don't work without a contract. Always secure a written agreement that spells out exactly what you are doing and what you are getting paid for it. Make sure the contract spells out your profit participation in secondary markets such as soundtrack albums and television broadcasts (when interactive cable networks become a reality).

Negotiate payment in stages. Insist on obtaining a portion of your fee up front; another payment—often called a "progress payment"—when the music is in rough form; and the balance upon delivery of the completed work.

Know what you're selling. Clarify whether the game developer *owns* your work (in which case, you are doing a "work for hire" and the company owns the copyright), or just has the right to use your work in the video game.

Get help. If you want to play it real safe, consult a lawyer. Attorney referral services, such as California Lawyers for the Arts ([415] 227-0300), can refer you to an attorney who specializes in music and copyright law.

GAME OVER

With five game machines and two major personal-computer platforms on the market, software development for video games is one of the biggest growth industries of the 1990s. Of course, the game industry was also big business in the late 1970s, only to collapse under the weight of tons of mediocre software. This time, developers have learned their lesson: Gamers will support only those companies that produce quality product.

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EM *associate editor* **Michael Brown** *had too much fun researching this article.*

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Photo by Adrian Ordeñana

Six studio condenser mics stand up for vocal excellence.

Most vocalists are wackos, and small wonder. They are constantly shut into small, padded vocal booths and expected to deliver impassioned performances

In Your Face

for a hypercritical audience consisting of an engineer, a producer, and assorted band members. The last thing they need is an unsympathetic microphone. This is one reason expensive, large-diaphragm condenser mics are critical tools in pro studios. These mics can reproduce every subtle nuance of a singer's performance.

Today, the need for such exquisite sound quality is not limited to the pro studio. A home recordist with a digital tape recorder or hard-disk recorder has an engine capable of producing killer masters. But what about your vocal mic? The dynamic mic that served you so well in your cassette mini-studio days, and did double-duty on stage, won't cut it in the digital domain. If you record vocals and are committed to producing professional master tapes, you need a large-diaphragm condenser.

THE CONTENDERS

Fortunately, the revolution that brought affordable digital recording to the masses continues to spread. Prices for professional quality, large-diaphragm condenser microphones have fallen below the "impossible dream" level, to the point where several models currently retail for less than $1,500. Admittedly, that's still not pocket change, but two years ago it was unthinkable that you could buy a spanking-new, large-diaphragm Neumann without breaking the bank at Monte Carlo.

By Michael Molenda

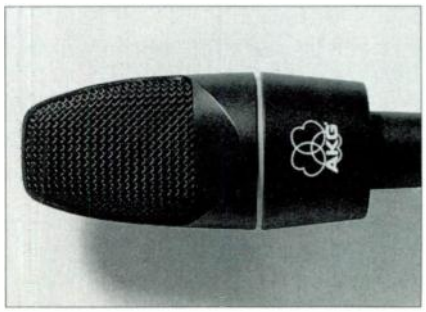
In Your Face

We'll compare features and sound quality for six models from this new generation of studio vocal mics: AKG's C3000 and C414B/TL II ("Vintage TL"), Audio-Technica's AT4050/CM5, beyerdynamic's MC 834, Langevin's CR-3A, and Neumann's TLM 193. All have slipped beneath the magic $1,500 bracket, although some mics have slipped further than others. For a quick look at specs and features, see the chart on p. 42.

The comparison tests were performed during actual studio sessions, with artists who were in the process of recording albums and demos. I put up the mics and made sound-quality decisions just as I would in any professional situation. To facilitate comparisons and cross-referencing, each test rates the mics by the level of their performance (which model finished first, second, third, and so on). Ties were common.

ERGONOMICS

Despite all the mental energy they generate, creative surges are extremely frail. Something as seemingly innocuous as a ringing telephone can decimate concentration. When I'm auditioning mic positions and working hard for an inspired mix of source sound and room acoustics, a squeaky mic stand or faulty XLR cable can trigger a regression to childhood tantrums. A well-designed microphone avoids such creative impediments by being easy to use and a joy to handle. Setup and positioning should be almost effortless, so the recordist can concentrate on



AKG C3000

getting sounds. I've rated the mics for function and ease of use.

❶ TLM 193. Although it's a win by default, Neumann's mic is the easiest to set up. The TLM 193 is like an automatic camera: You just point and shoot. There are no attenuation or roll-off switches to worry about, and you get one polar pattern: cardioid. The stand adapter looks like a contraption out of the movie *Brazil,* but it's very sturdy and screws into position without a wrestling match. My only complaint is that an upside-down position is nearly impossible, which effectively scotches my favorite way to record group background vocals from above the singers' heads. The optional, elastic-web shockmount ($169) is an added expense, but I recommend it if you want versatility. If recording lead vocals is your primary mic application, save the money and use the stand adapter.

❷ Vintage TL. Of the mics with variable functions, the Vintage TL is the quick-change artist. Its polar pattern, attenuation, and roll-off switches protrude far enough from the body to allow easy and precise selections. (However, the switch tips are sharp and sting a bit if you manipulate them with the fleshy part of a finger.) The stand adapter snaps onto the bottom of the mic and is secured by a large knob. Multiple mic positions are a breeze. The optional shockmount ($149) was not reviewed. However, the shockmount on my old C414 has survived eight years of torture tests and is still "ticking."

❸ AT4050/CM5. The CM5 has a comfortable, easy-to-grab switch on the front for changing polar patterns, but the rear switches for attenuation and roll-off are recessed and nearly impossible to move with your thumb. I needed assistance from a pencil tip. The mic comes with the same shockmount used for the AT4033, and it's far from a cheap "value-added" model. Thick rubber straps hold the mic firmly in place, allowing worry-free positioning.

❹ C3000. The C3000 makes no pretense at being a quick draw. All switches are deeply recessed into the rear plate and require a pencil tip to change functions. (Although, in a pinch, I found I could use the nail on my little finger.) The stand adapter is a conventional plastic design, but worked fine for all applications. The optional shockmount is the same model used for the Vintage TL.

AKG C414B/TL II "Vintage TL"

❺ MC 834. Gear-like rotary switches embedded into the front of the MC 834 are used to change attenuation and bass roll-off. Most of the time, I could snap my thumb across the switches—much like flicking on an old cigarette lighter—and get the functions to change. However, surefire switching required a pencil tip. The optional shockmount ($199) uses thin, rubber band-like straps that didn't secure the mic in place. Although the mic never slipped completely out of the straps, it constantly settled down into the mount. I had to repeatedly coax the mic back into position.

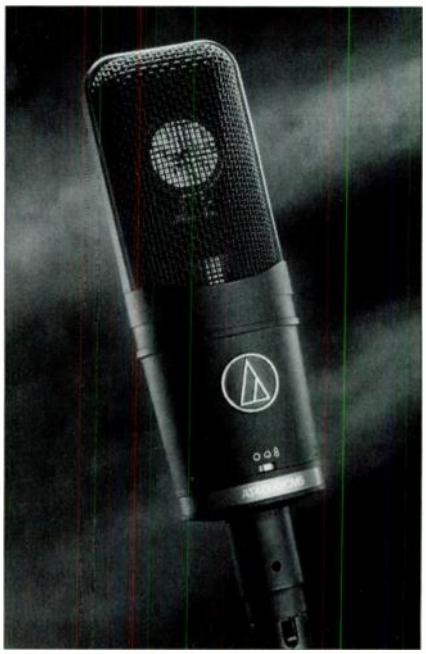
❻ CR-3A. Erratic tooling kept the CR-3A from being as ergonomic as it was obviously designed to be. The mic's horizontal sliding switches promise swift, one-touch operation. Although the attenuation switch was a dream, the roll-off switch on the review model was obstructed by an overhanging rim; I had to fumble around to grasp it. Langevin's seemingly hand-made shockmount has a medieval locking device that I could never close. For "straight on" miking applications, it didn't matter; the mic sat snugly within a single circular strap. But I didn't dare mount the mic upside-down, or at a steep angle.

THE COWABUNGA TEST

When a singer is sweating passion and delivering an amazing performance, it never hurts to cross your fingers and hope your levels hold. Invitations to tragedy are abundant: The vocalist can accidentally lean into the mic, unleash an unexpected and sustained loud note, or torpedo the diaphragm with a nasty plosive. In these instances, consider yourself lucky if the signal distorts, and you only have to face the performer's wrath. ("Uh, sorry, I didn't get the bit at the end of the chorus.") If fate is laughing at you, the miscue will vaporize the mic, and the session is history. To paraphrase MTV's cartoon rocket scientists, Beavis and Butthead, a fragile mic sucks.

To test how these mics stand up to rough treatment, I recorded a trio of extremely dynamic vocalists who can really put a mic through its paces. Each of these singers is capable of whippet-quick shifts in volume, pitch, and power. Roots rocker Dave Crimmen was recording his second CD, *Just Call It Rock 'n' Roll,* dance-music artist Winthrop was finishing a 12-inch club version of Aretha Franklin's "Rock Steady," and singer/songwriter Eva Jay Fortune was tracking a new demo.

Each singer was enclosed in a small, padded vocal booth at Sound & Vision studios. The microphones were set up facing a carpeted wall, six feet away from the viewing window, to minimize reflections. For this test, the singer's mouth was positioned twelve inches from the microphones. No windscreens



Audio-Technica AT4050/CM5

or pop filters were used, and the console EQ was flat. The signals were routed directly to a Tascam DA-30 DAT machine, recording at 44.1 kHz. Input levels were calibrated by running a 1 kHz tone at 0 VU, and signal peaks were set to average +3 dB. No compression or outside processing was inserted into the signal chain.

To ensure relative consistency after changing mics, both the position of the mic stand and the singer were marked with masking tape. Because some of the mics offer only a cardioid pattern, every mic was set to cardioid for the test. Ratings were based on overall sound quality.

❶ TLM 193. While working with the TLM 193, I often fantasized that the multitrack's Record button was actually the Energize control on the Starship *Enterprise*'s main transporter. The extremely transparent reproduction of the TLM 193 made it seem as if I was transporting sound waves directly to tape—coloration from the microphone was that minute. Even with the coloration imposed by mic preamps, mic cables, monitor speakers, and the tape itself, the recorded voices sounded amazingly close to what I heard acoustically in the vocal booth.

Vocal crescendos were handled without introducing shrillness or audible distortion. Dave's tendency to explode midverse into yelps and hollers didn't seem to trouble the TLM 193, although sibilance was slightly accentuated at high energy levels. If you want a faithful sonic document of a vocal performance, this is the mic for you.

❶ Vintage TL. The Vintage TL has a strong personality, so it isn't as sonically unobtrusive as the Neumann. But that's not a bad thing. I've always loved the subtle high-midrange articulation of C414s, and the Vintage TL adds a beautiful shimmer to vocals. Like the Neumann, it wasn't bothered by dynamic leaps or rapid timbral shifts (chest voice to falsetto). The intimate, wispy quality of Eva's voice was especially enhanced by the TL's slight presence boost. This is a great mic for clarifying a singer's vocal nuances (including dramatic breaths, whispers, moans, etc.) and recording timbres that can cut through a thick instrumental track. Some degree of sibilance was evident at all times, but it never bothered me. (I *like* a touch of sibilance on vocals.)

❶ AT4050/CM5. On the other end of the spectrum, the CM5 is a very warm mic. Midrange frequencies seem discretely attenuated to produce a smooth, even timbre. The sound triggered images of Sinatra, at the height of his vocal powers, crooning a delicate ballad. Sibilance was moderately discernible during high-energy performances, but the sound was never harsh or brassy. *A cappella* vocal performances sounded incredibly fat and sensuous.

❷ MC 834. The MC 834 is an articulate mic, with an aggressive midrange response. I liked the "in your face" quality, especially during the tougher passages of Winthrop's performance, but

Neumann TLM 193

THE CONTENDERS

Microphone	Polar Patterns	Frequency Response	Signal-to-Noise Ratio (A-weighted)	Maximum SPL	Pre-attenuation	Bass Roll-off	Standard Equipment	Price
AKG C3000	cardioid, hypercardioid	20 Hz-20 kHz	76 dB	140 dB	-10 dB	100 Hz	mic case, stand adapter	$695
AKG C414B/TL II "Vintage TL"	bidirectional, cardioid, hypercardioid, omnidirectional,	20 Hz-20 kHz	80 dB	166 dB	-10 dB, -20 dB	75 Hz, 150 Hz	foam windscreen, mic case, stand adapter	$1,499
Audio-Technica AT4050/CM5	bidirectional, cardioid, omnidirectional	20 Hz-20 kHz	77 dB	159 dB	-10 dB	80 Hz	shockmount	$995
beyerdynamic MC 834	cardioid	40 Hz-20 kHz	69 dB	150 dB	-10 dB, -20 dB	80 Hz, 160 Hz	mic case	$1,419
Langevin CR-3A	cardioid	40 Hz-16 kHz	67 dB	132 dB	-10 dB	100 Hz	foam windscreen, mic case, shockmount	$800
Neumann TLM 193	cardioid	20 Hz-20 kHz	84 dB	140 dB	none	none	stand adapter, wood case	$1,295

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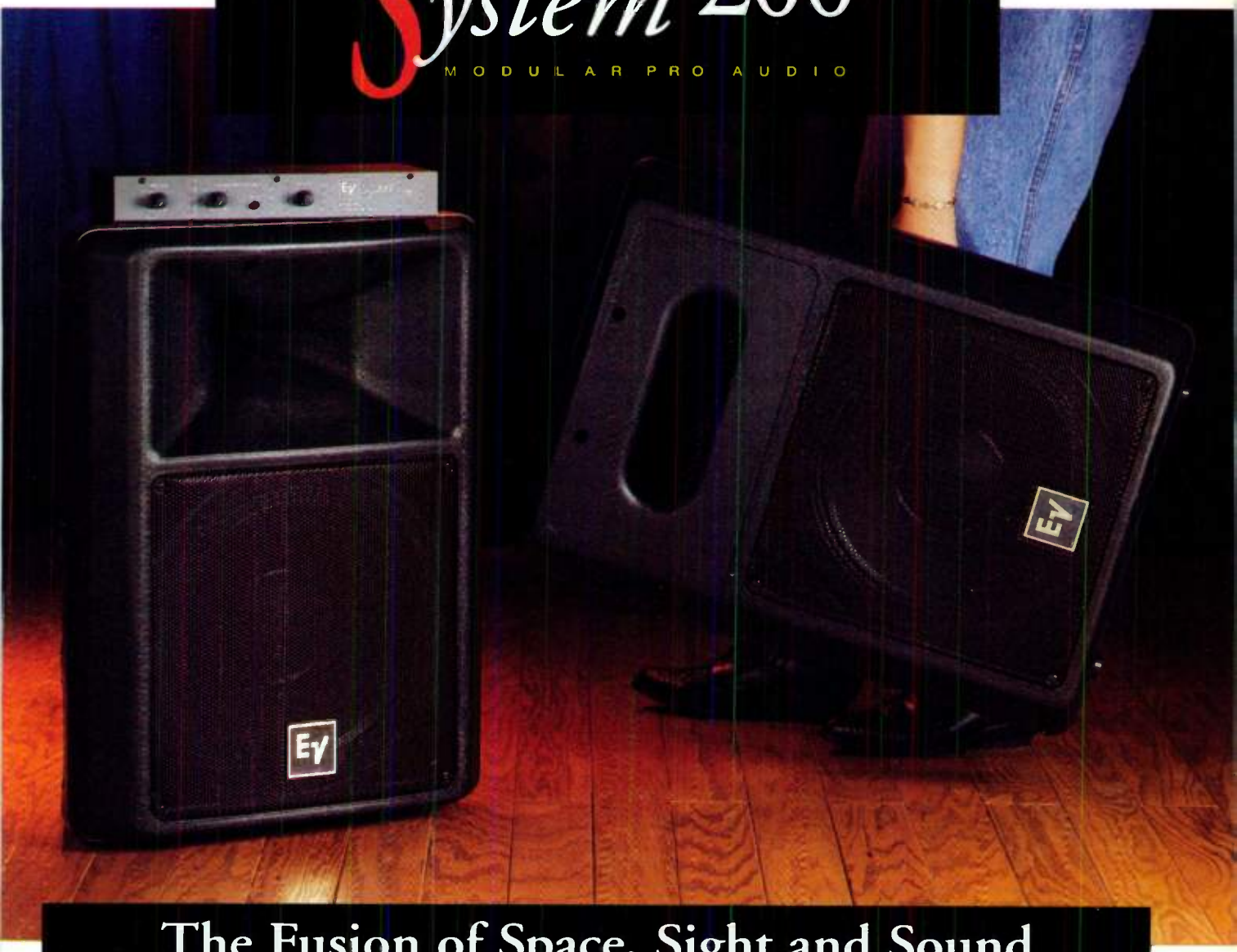

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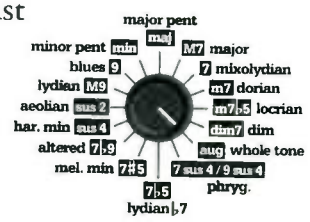

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In Your Face

the brighter timbre yielded more sibilance than the TLM 193, Vintage TL, and CM5. The effect wasn't overbearing, but the S's were hot enough that I used a de-esser during mixdown. The output of the mic was the hottest of the six.

❺ C3000. Even more aggressive than the MC 834 is AKG's C3000. Sound quality is very clear and present, but the sibilance can be painful during high-energy performances. Although I tracked without processing for the sake of this test, under normal circumstances I would have used a de-esser during recording.

❻ CR-3A. A tendency toward thin, "AM radio" midrange frequencies KO'd Langevin's mic. The sound was not bad, but compared to the other mics, the CR-3A just didn't measure up. Minimal warmth and low end was evident, and sibilance was apparent whether the singers shouted or crooned.

INTIMATE PERSPECTIVES

Of course, power isn't everything. Some amazing vocal performances have been delivered at near-whispers. To capture a feeling of intimacy on tape, engineers often compress the vocal to tame dynamics and make the voice sound more "up front." To test vocal versatility, I decided to see how each mic handled dynamics processing and close miking positions.

The singers were once again shut into the vocal booth, with the same mic position and polar pattern used for the cowabunga test. This time, however, a windscreen was employed, and the vocalists' mouths were within two inches of the mic. A dbx 166 compressor was inserted into the signal path and set to a ratio of 2:1, with a threshold of -10 dB. (The unit's attack and release times are preset.) Signals were routed directly to DAT. Although the ratings for this test were based on the overall sound quality of the processed signal, it seemed appropriate to stress "vibe" over accuracy.

❶ Vintage TL. The shimmer that made the TL so appealing during the cowabunga test was still present under

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moderate compression. Eva's whispers and delicate legato passages were beautifully reproduced, while Winthrop's crooning sounded smooth and clear. Even though compression and close miking positions accentuate low end, the mic never sounded boomy. There was no temptation to cut 100 Hz to attack a muddy signal, which was good, because fair testing prohibited the use of EQ. Sibilance was present, but not obtrusive, and the noise factor was nil.

❶ **AT4050/CM5.** I expected the warmth of the CM5 to be a slight disadvantage under moderate compression, because enhanced low-frequency response risks turning squashed signals into mud. The CM5 was warmer than the Vintage TL, as expected, but it also proved to be surprisingly clear and articulate. I liked the mic best on Dave's voice, because it highlighted his Johnny Cash-like lows. Eva's more ethereal voice also sounded great, although I missed the extra sheen provided by the Vintage TL. During recording, sibilance was minimal and noise virtually nonexistent.

❶ **TLM 193.** Even with its signal squashed down, the TLM 193 is a model of transparency. In addition, the mic is extremely quiet, which allows soft vocal nuances to be reproduced with sterling accuracy. These two traits alone should be enough for even the most critical recordist. However, the evocation of "intimacy" requires extremely subjective judgment. For this application, I found that the TLM 193's flat tonal quality lacked personality. Given a choice, I would opt for the Vintage TL's sparkle or the CM5's warmth over the Neumann's precise resolution.

❷ **MC 834.** Personality is not a problem for the MC 834: It produces a very present sound with sharp, articulate mids. Unfortunately, a touch of audible hiss and increased sibilance drops the mic from the top positions.

❸ **CR-3A.** Noise is also a problem for the Langevin mic, as is its propensity toward gritty midrange timbres. We're talking about minute shadings of sound quality here, but they're enough to keep the CR-3A from knocking off the Vintage TL, CM5, and TLM 193.

❹ **C3000.** At moderate compression settings, the C3000 produced biting sibilance that had me running for the de-esser. I was happier with the sound *sans* compression, but drop-kicking the processor compromised fair comparison.

IN MY ROOM

I'm forever in awe of classic recordings that were tracked with one or two mics. And today, a burgeoning movement toward acoustic music and "authentic milieu" recordings almost makes it essential that a mic deliver full-spectrum, monophonic sound. So I was curious how well the mics would perform if I simply plopped each one in front of a solo acoustic performance.

For this test, Dave sang and accompanied himself with his beautiful Gibson J200 acoustic guitar. The mic stand was placed ten feet away from the playing position, with the mic hoisted approximately six feet in the air and pointed directly at Dave. To ensure fair results, each mic was set to a cardioid pattern. No EQ or outside processing was employed. Input peaks were averaged at +3 VU to maintain consistent volume levels. I also moved Dave into our reasonably spacious control room to approximate the sonic environment of the average home studio. Outside of the sound-proofed vocal booth, occasional street noises wafted into the mix (just as they will in a home or apartment studio), and I took note of which mics seemed bothered by the ruckus. Ratings were based on overall sonic quality.

❶ **AT4050/CM5.** I could have made a monophonic "unplugged" record with the CM5! The balance between voice and guitar was excellent, with neither element intruding on the other's sonic turf. It almost sounded like a tiny recording engineer was inside the capsule, mixing the guitar and voice separately. Room acoustics were subtly integrated into the overall sound, while environmental noises were far enough in the background to be virtually insignificant.

❷ **TLM 193.** Although the TLM 193 proved to be extremely transparent in most recording applications, it brought the guitar to the forefront during the room test. For the most part, the mix of guitar, voice, and room acoustics was excellent. The TLM 193's sound was warm and clean, but it just didn't have the "premixed" quality of the CM5. Environmental sounds were

beyerdynamic MC 834

Langevin CR-3A

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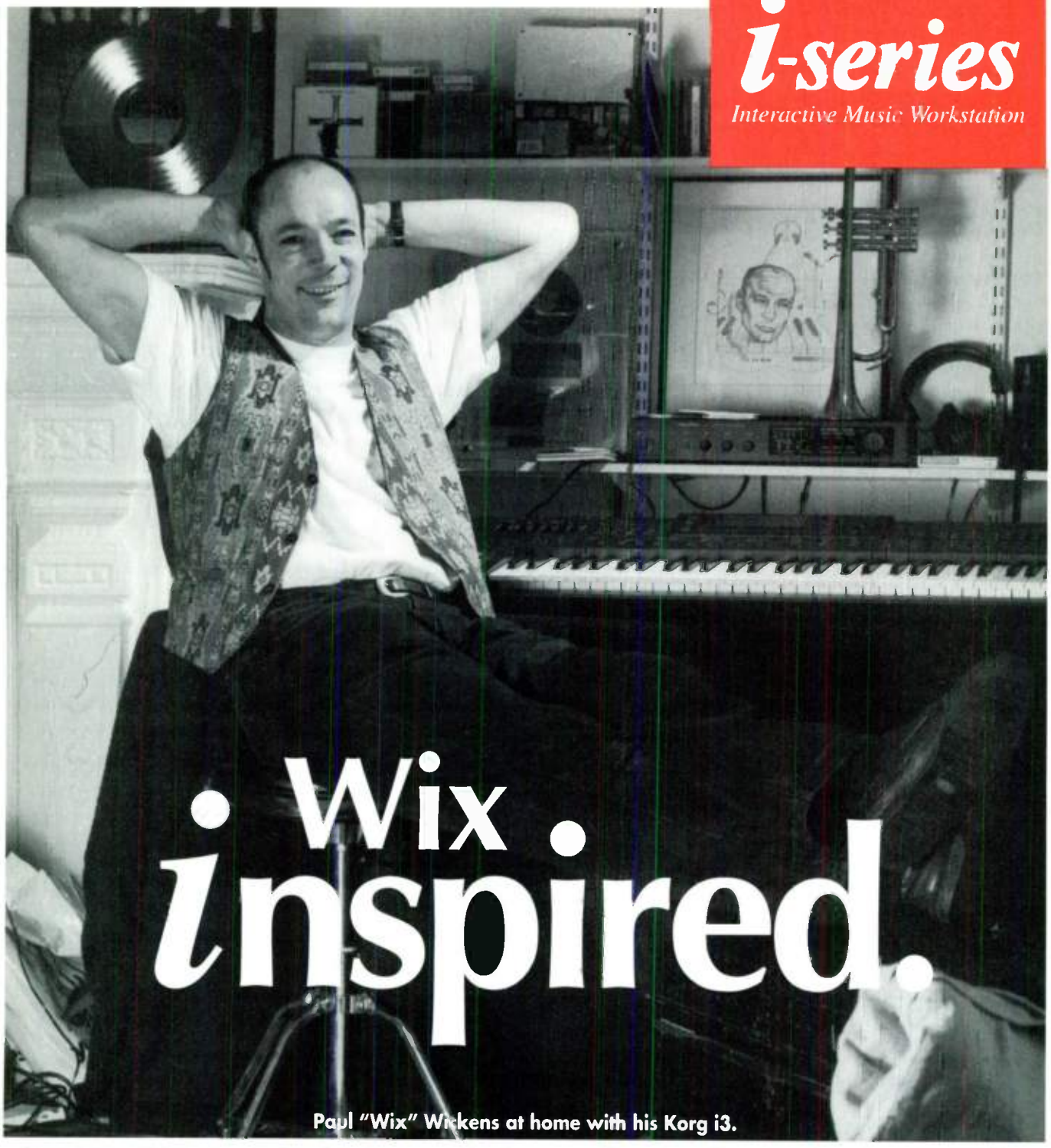

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masked by Dave's performance.

❸ **Vintage TL.** The brighter tonal orientation of the TL made for a lively performance document. Dave's voice soared over crystalline guitar timbres, and room acoustics added subtle body to the mix. Between the Vintage TL, the CM5, and the TLM 193, it would a tough choice deciding what to use for, say, a live folk recording. However, the relative accuracy of the Neumann and Audio-Technica mics make them slightly preferable to the sharper quality of the Vintage TL.

❹ **CR-3A.** The big surprise in this test was how well the CR-3A stood up to the more expensive mics. Dave's voice had a clear, pleasing tone, and the jewel-like guitar timbres settled nicely into the sonic spectrum. Room acoustics were also well-integrated into the mix, and although the mic picked up some environmental rumbles, they were not audible during the performance.

❺ **C3000.** Both the C3000 and the MC 834 are clean and clear enough to be great ancillary room mics. However, I wouldn't choose either as the primary mic for documenting an organic "singer and instrument" performance. In this test, the C3000 favored the guitar in the overall mix. It also accentuated the high mids of Dave's vocal and the guitar, causing his voice to sound somewhat thin. Room acoustics were on the obtrusive side, with a sharp slapback evident in the overall mix.

❻ **MC 834.** The MC 834 reproduced Dave's voice with a bright, present quality. Unfortunately, the guitar sounded just as bright, making the overall mix a wash of midrange frequencies. The mic also picked up slight environmental rumbles, but they were only audible during soft dynamic passages.

S. HOTCHKISS

Dance-club artist Winthrop unleashes his pipes on Audio-Technica's AT4050/CM5 during one of the "cow-abunga" vocal tests.

MULTITASKING

Because these mics are still relatively expensive, it's hardly cost-effective to limit their application to vocals. I miked kick drums and acoustic guitars with each mic and used them as room mics while tracking drums.

Every model did an excellent job, and the sonic personality of each mic was evident throughout the tests. In the over-$1,000 price range, the Vintage TL was sharp and articulate, the TLM 193 transparent, and the MC 834 bright and sassy, with a nice, solid bass response. In the under-$1,000 category, the C3000 produced jewel-like mids, and the CM5 was smooth as silk. The CR-3A was sharp and punchy, but showed a tendency toward muddy bass.

THE MEDAL RUN

Sometimes it's a real drag getting so picky for these product comparisons. But then again, it probably kills Olympic athletes that a few hundredths of a second are often the difference between a gold medal and a lonely ride home. My criticisms of these mics often worked in equally minute ranges of sound quality. Any of these six microphones would render excellent service in personal and professional studios.

But as you shop for the perfect microphone, keep in mind that all voices are not created equal. Given the time, professional engineers often audition several mics before finding an empathetic match for a particular singer. Try to purchase your mic on a 30-day return guarantee, or rent it for a session or two, to ensure that you end up with the best mic for your voice. You may find that an inexpensive model makes your voice sound heavenly, while a budget-buster just doesn't have the same magic. My obnoxious nasal twang actually sounds better on a $150 Shure SM57 dynamic mic than it does on a $2,500 Neumann U87.

The final ratings were based on overall sonic quality and value (price versus sound quality). Keep in mind that these are subjective judgments. Pros have their favorite mics, and seldom is there rhyme or reason why one model is chosen over another. A mic that sounds great to one engineer may sound mediocre to another. That said, consider these ratings as mere starting points for your own research.

Gold Medal. The Audio-Technica AT4050/CM5 is a monster. It's less than $1,000 (including shockmount!), offers multiple polar patterns, and sounds incredibly sexy on just about everything. The warm timbre also works well with digital recording mediums, where too much bite can end up sounding like stir-fry.

Silver Medal (tie). Awarding second place to AKG's Vintage TL was a tough call, because the classic AKG C414 (on which the mic's design is based) is my favorite vocal mic. The Vintage TL has personality and sonic quality to burn, but the $1,499 price tag and optional shockmount edged it out of first. This is one of those hair-raising contests where less than 1/100th of a second separated the gold and silver.

Dave Crimmen strumming for the beyerdynamic MC 834 during the acoustic guitar test. The mics were positioned at the twelfth fret, approximately five inches from the neck, and pointed off-axis toward the sound hole.

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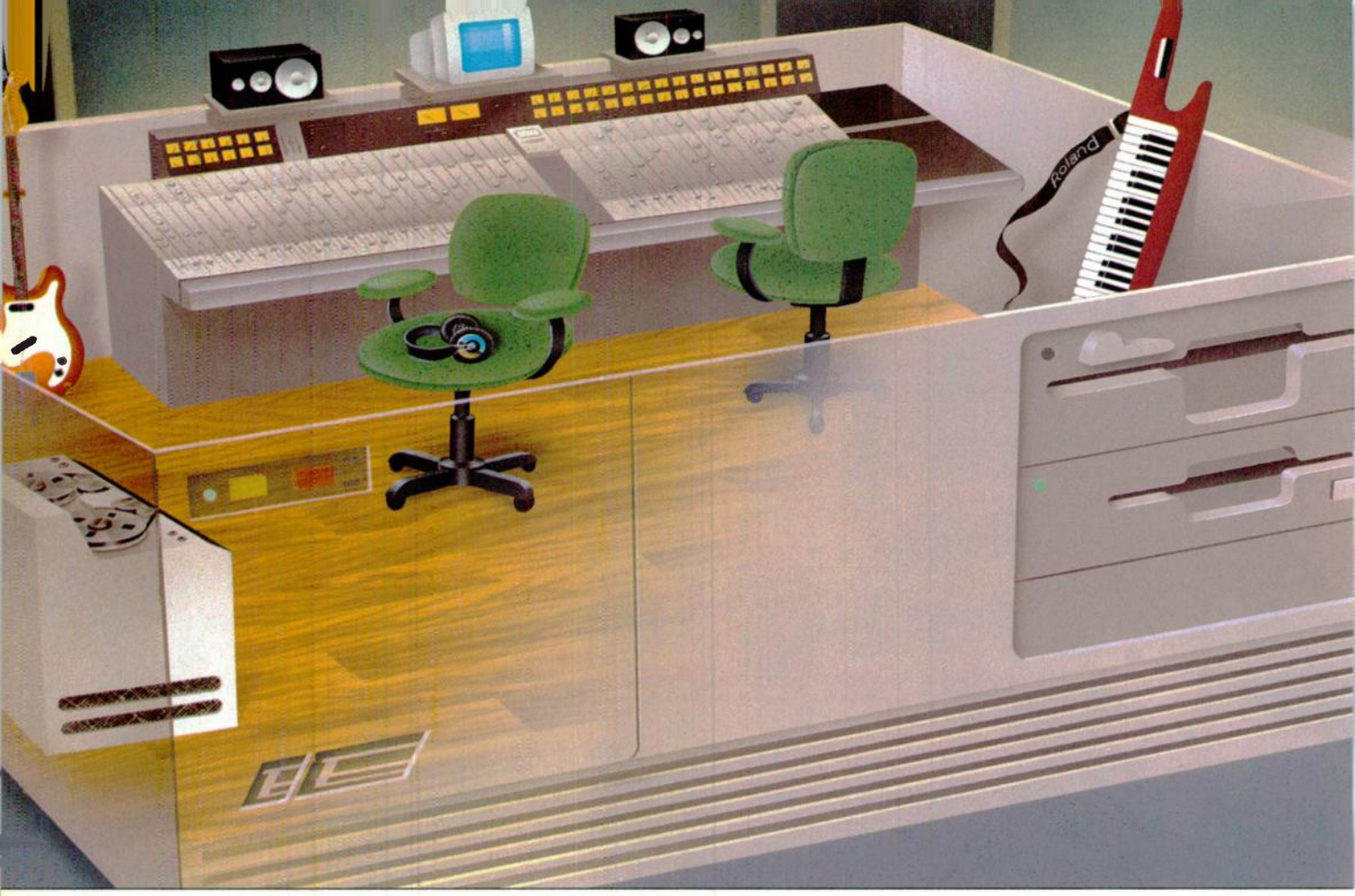

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And don't think you have to be a recording engineer to use it! Combining MIDI and wave files is a breeze with the included Roland Audio Toolworks™ software. And of course, Audio Toolworks is fully compatible with all of your Windows wave and MIDI files, and applications.

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- Reverb and chorus processing
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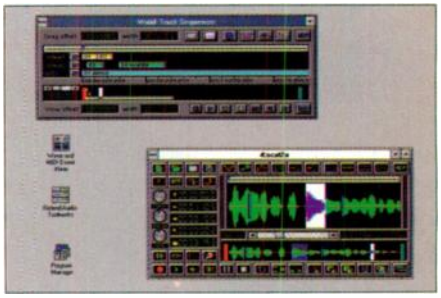
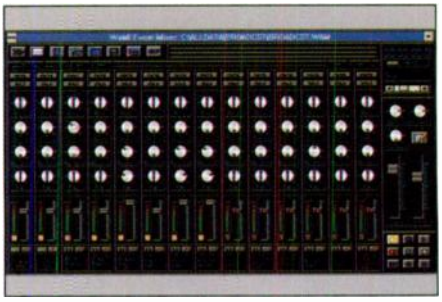
- Compatibility with most sequencer software

Just bring in any standard MIDI file, add vocals or acoustic instrument parts, and then you control the mix. You can even re-orchestrate the music to fit your own personal style. And spot production for broadcast is fast and easy using the RAP-10's digital track merging and visual waveform editing.



Audio Toolworks provides an easy, visual way to remove sections of audio and cut out pops or clicks. Plus, it allows synchronized playback of your MIDI files and digitized recordings.



With this 18-channel audio mixing console, you simultaneously control up to 16 channels of MIDI with two tracks of digitized audio. What's more, all on-screen controls are fully recordable.

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Silver Medal (tie). Neumann's TLM 193 was also edged out by milliseconds, due to its $1,295 price and optional shockmount. There's no doubt that the TLM 193 is an amazing mic. Its precise resolution and ability to handle high sound-pressure levels makes it a wonderful all-purpose microphone. For a full review, see the March 1994 **EM**.

Bronze Medal. Here's one of those surprise finishes: I picked the AKG C3000 for the bronze. I know, I know! You're probably saying, "What's going on here, the C3000 didn't finish very high in any of the preliminary runs." But listen, it's hard to beat a pro-quality, multipattern, large-diaphragm condenser mic that costs only $695. If your mic-acquisition budget is tight, I'd recommend the C3000 in a flash. Although it can be argued that the MC 834 and CR-3A offer similar (or better) sound quality, they can't touch the C3000's value. For the paranoid, keep in mind that most of my concerns about the mic's bright resolution can be addressed with careful mic placement, subtle EQ tweaks, and a de-esser.

Runner-ups. What a race! Both the beyerdynamic MC 834 and Langevin's CR-3A are good mics. Value knocked the MC 834 from the top spots; at $1,419 it's the second most expensive mic and offers but one polar pattern. (A single polar pattern is no sin, but in a tight race, it helped some of the other mics squeeze by.) Value wasn't a problem for the CR-3A. The mic costs just $800, including shockmount, foam windscreen, and case. However, the sonic quality was consistently a bit lower than the other models.

MIKED OUT

Before I sat down to write this feature, I let some other local engineers use the microphones so I could see if my perceptions stood up under professional scrutiny. To my surprise, most of the engineers started playing with the console EQ after just a few minutes of auditioning each mic. They considered the inherent sound of the microphones as a mere foundation for their tonal explorations.

Normally, I don't cringe when people do wacky stuff during recording sessions, because it usually ends up sounding good (or at least *interesting*). But this was a tough one.

Remember, even if you equalize while recording, you'll probably add EQ again during the mixdown. That's two trips through filter electronics, and each pass can add noise and other sonic gremlins.

My big tip for this issue is: Select the right mic, put it in the best position, and keep your hands off the EQ until mixdown. Your vocal tracks will be much cleaner, and you won't kick yourself for spending hundreds of dollars on a "sonic foundation" when you thought you bought a great mic.

EM *editor* **Michael Molenda** *wishes he could have dragged his own band into the studio when all these marvelous mics were available.*

ILLUSTRATION: RANDY SOUTH

Power Macintosh offers lightning speed and a host of questions.

POWER FOR THE REST OF US

In 1984, the Macintosh 128K burst onto the computing scene. Well, okay, it crept onto the scene. The "computer for the rest of us" was a risky venture that could easily have fizzled. The world was ready for the Mac's graphical user interface; Apple just needed to explain that fact to the planet's unsuspecting inhabitants in an evangelical PR campaign. In the decade that followed, all Macs that ever lived were built around a single family of microprocessors, the Motorola 68000 and its descendants.

But no more; the PowerPC chip has been born, and the 680X0 clan appears headed for the spare-parts bin. The product of a once-unthinkable alliance between Motorola, Apple, and IBM, the PowerPC family of high-speed microprocessor chips will be the brain of most Apple and IBM personal computers in the future.

Apple, for one, is putting all its high-tech eggs in the PowerPC basket. In the midst of another evangelical PR campaign, the company is moving quickly to phase out most of its high- and mid-level 680X0-based Macs and almost certainly will phase out the rest of them in the next year or two. The Quadra AVs, 610, 650, and 800, will almost certainly be history in the near future.

Of particular interest to musicians, the blazing speed of the PowerPC makes the new computers capable of recording and playing 16-bit, digital audio without using a DSP coprocessor. As we'll see later, however, there appear to be several "ifs" and "buts" to this capability. ►

By Steve Oppenheimer

TAKING RISCS

The PowerPC chip is not simply a faster conventional microprocessor; it has a completely different architecture than the chips used in previous desktop computers. The Intel 80x86 and Motorola 680x0 chips that provide the brain power for Ataris, Amigas, PC-compatibles, and pre-PowerPC Macintoshes are Complex Instruction Set Computing (CISC) chips. These chips contain a wide variety of instructions that enable the computer to carry out its functions. The much-ballyhooed Intel Pentium is a very fast, highly integrated CISC chip. In that sense, it is a further development of current desktop computing technology.

Motorola, Apple, and IBM believe that CISC technology has almost reached its performance peak. (Motorola is working on a 68060, however, and DayStar Digital will offer current Mac users a series of accelerators based on it.) Apple sources state that further integration of CISC chips will increase the size and heat output of the chip but provide only a minimal gain in speed. Instead of continuing down the CISC path, the partners decided to tap the power of an alternative chip architecture, Reduced Instruction Set Computing (RISC).

The main difference between CISC and RISC is that instead of the wide variety of instructions contained in a CISC chip, a RISC chip only contains the instructions used most often. However, it can execute these basic instructions extremely quickly. When complex instructions are required, the RISC chip builds them by combining sets of basic instructions. This means that most operations are handled far more rapidly by RISC than by CISC. (The hardware details of PowerPC RISC chips were discussed in the March 1994 "Tech Page.")

RISC chips of various types have been around a long time, powering various, primarily UNIX-based, systems such as engineering workstations, high-end graphics machines, and large, commercial database servers. However, this constitutes a relatively small volume of expensive chips. Until the development of PowerPC, nobody marketed an affordable RISC chip that could run familiar operating systems such as Microsoft DOS and *Windows* and Apple System 7. In contrast, Motorola, Apple, and IBM are developing a full line of PowerPC chips and products for desktop computing, network servers, portables, workstations, and even consumer electronics.

WELCOME TO POWER MAC

Apple's line of PowerPC machines are the first to reach the market. Dubbed *Power Macintosh*, Apple's new machines began shipping in quantity on March 14 of this year. These computers are still Macintoshes: They run System 7 (v.7.1.2), work with Mac peripherals, and are expected to run the overwhelming majority of 68040-compatible and System 7-compatible applications. (For details on the first three Power Macintosh models, see sidebar "Power Macs That Be.")

In addition, UNIX fans should be able to run Power Open, a replacement for A/UX, sometime later this year. A Power Mac version of the Taligent operating system is also in the works. To top it off, Insignia Solutions is offering *Soft Windows*, which lets you run DOS and *Windows* applications on a Power Mac (see sidebar "Power Windows"). (IBM's as-yet-unreleased PowerPC computers also are expected to run several operating systems, with the primary focus on *Windows NT* and *OS/2*.)

The first three Power Macintoshes off the line use the first-generation, 32-bit PowerPC 601 chip and replace the mid- to high-end Quadras. Early next year, the 601 chip will be joined by the low-power, low-heat PowerPC 603. The 32-bit 603, which is already in production, is a tad slower than the 601, so it probably won't obsolete the current crop of 601-based machines. Unlike the older chip, however, the 603 offers four software-controllable, power-saving modes, including a dynamic mode that automatically puts inactive areas of the microprocessor in a low-power state. This makes it Apple's choice for portables, as

THE POWER MACS THAT BE

Apple will start out with three mid- to upper-market Power Macintoshes. The Power Macintosh 6100/60 (CPU only, $1,819) is the entry-level computer, offering a pizza-box design with one 7-inch NuBus slot. The Power Macintosh 7100/66 (CPU only, $2,899) runs about 25% faster than the 6100/60 and could prove extremely popular among electronic musicians on a moderate budget. The first-generation top-of-the-line is the Power Macintosh 8100/80 (CPU only, $4,249). This tower of power is nearly twice as fast as the 6100/60.

All models are available as complete systems (see "The First Power Macs" on p. 58), with color monitor; extended keyboard; 1.44 MB floppy drive; internal hard drive; SCSI; Ethernet; two LocalTalk and GeoPort-compatible serial ports; Apple Desktop Bus input; ⅛-inch, stereo, line-level audio input; ⅛-inch, stereo, line-level, audio output; and 8 MB of RAM soldered to the motherboard. Additional RAM slots accept 70 ns, 72-pin SIMMs, added in pairs. A CD-ROM drive is also available.

Although the 256 KB Level 2 cache is optional ($299) on the 6100/60 and 7100/66, it is highly recommended, as it considerably speeds up many operations by providing the PowerPC 601 chip with immediate access to fast memory for storing most-used commands. The 8100/80's standard 256 KB cache can be expanded to 512 KB.

In addition, all three models are available in AV versions. However, unlike the Centris/Quadra 660AV and 840AV, the AV Power Macs do not include a DSP chip; the designation refers to video I/O. The AV Power Macs offer NTSC and PAL video I/O and SECAM video in. An S-video I/O interface is provided, with composite (RCA) adapters. Video-in capabilities include a resizable window and frame and video capture. If you buy a non-AV Power Mac and later want to add video I/O, an AV NuBus card is available for $200 to $300.

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By late 1995 or early 1996, Apple expects to ship Power Macs that use the PowerPC 604 chip. This supposedly will be the leader of the 32-bit pack, but not much else has been revealed. The final PowerPC chip announced for Apple computers (so far) is the 620, a completely 64-bit design due sometime in 1996. All we have been told is that the 620 will offer super-fast multiprocessing for big-time workstations and supercomputers. By the way, Motorola also is developing market-specific PowerPC chips for consumer electronics, computer peripherals, and assorted control

The First Power Macs

	6100/60	7100/66	8100/80
CPU Speed	60 MHz	66 MHz	80 MHz
Stock DRAM	8 MB	8 MB	8 MB
SIMM slots (Max DRAM)	2 (72 MB)	4 (136 MB)	8 (264 MB)
Standard Cache (max)	0 (256 KB)	0 (256 KB)	256 KB (512 KB)
NuBus slots (size)	1 (7")	3 (full-size)	3 (full-size)
Hard drive	160*-250 MB	250*-500 MB	250 MB*-1 GB
Keyboard	extended	extended	extended
Stock Monitor	Apple 14" Color Plus Display	Apple 14" Color Plus Display	Macintosh 14" Color Display (Sony Trinitron)
Standard VRAM (Max VRAM)	0 (0)	1 MB (2 MB)	2 MB (4 MB)
Max Monitor @ Resolution w/Stock VRAM	14" @ 16-bit or 16" @ 8-bit	16" @ 16-bit or 21" @ 8-bit	16" @ 24-bit or 21" @ 16-bit
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Independent Monitor Outs	1	1	2
System Price	$2,209	$3,379	$4,869

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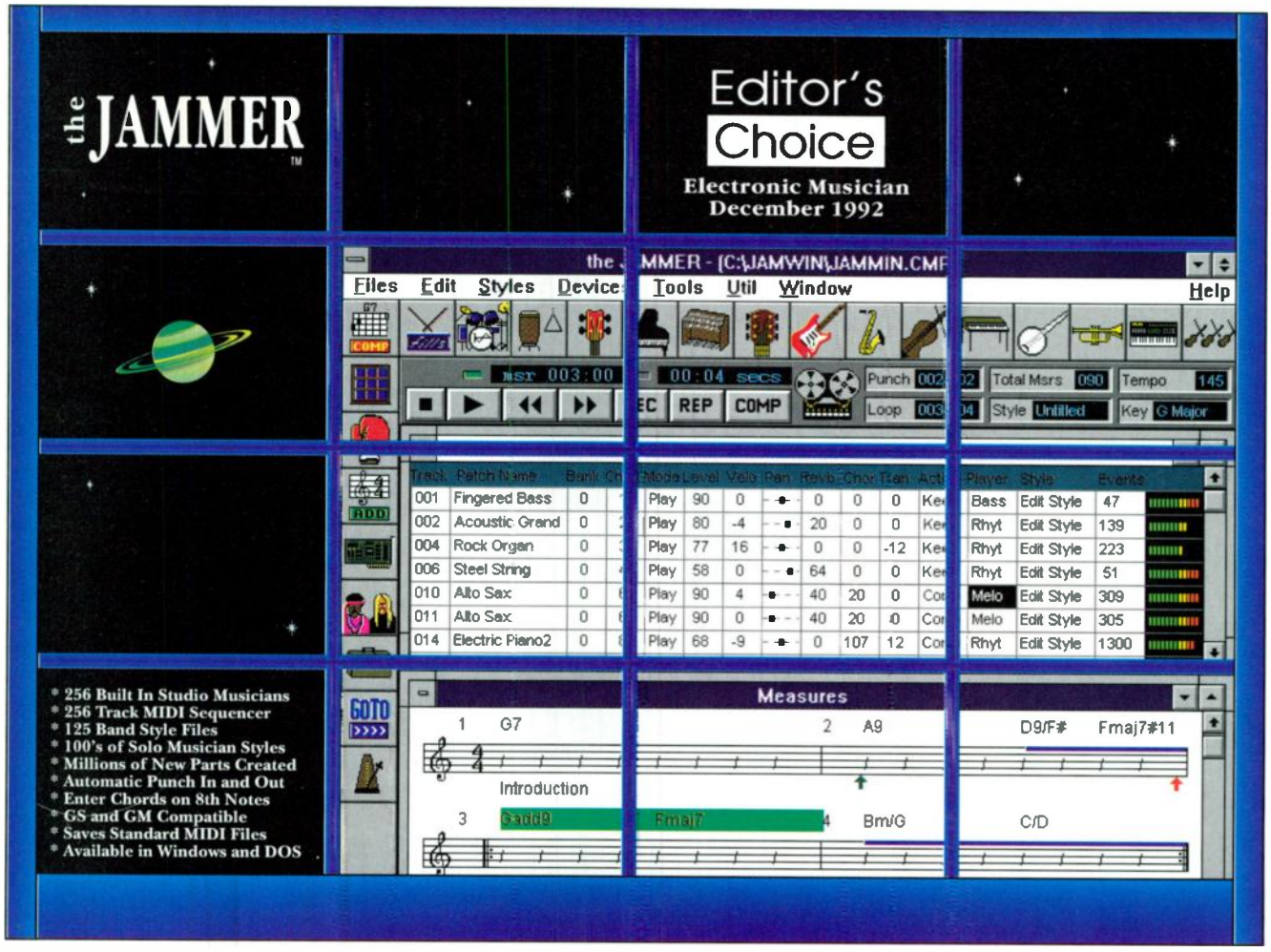

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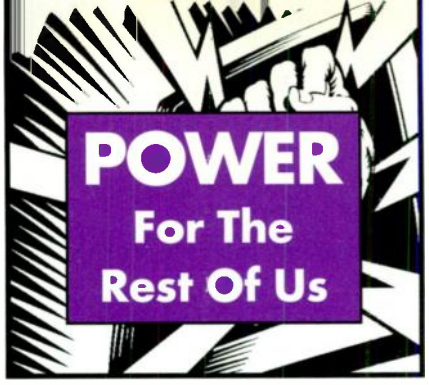


and communications applications.

One minor drag is that System 7 still uses cooperative multitasking instead of the preemptive multitasking offered in the Commodore Amiga. This means that although applications can run in the background, there will still be times when one operation takes over your Mac, and you have to wait to switch programs. Apple apparently is considering changing to preemptive multitasking someday—it's an operating system issue, not a hardware limitation—but it is a low priority at the moment. Besides, it could open a can of worms for developers.

DANCING MADLY BACKWARD

Fast hardware notwithstanding, many potential Power Mac customers will remain on the fence until two issues are resolved. First, Apple's claims of excellent backward compatibility (i.e., emulation of the 680×0 instruction set) must be confirmed in real-world use. Next, programs must be written specifically for the Power Mac to achieve the smoking-fast performance Apple promises.

Apple's Power Macintosh 8100/80 is by far the fastest Mac yet. It comes with all the trimmings, including two independent monitor outputs, a 14-inch Macintosh Color Display, three full-size NuBus slots, 8 MB of RAM, and eight additional SIMM slots.

A certain amount of compatibility problems are inevitable when a major hardware or operating system changes: Many Macintosh users had problems switching to System 7, the 68040 CPUs, and the PowerBooks. PC folks had to go through hard times with *Windows*, despite Intel's and Microsoft's attention to compatibility issues. And don't even ask an Atari ST user about the problems encountered when upgrading to the Mega. Apple warns us to expect problems with as much as ten percent of existing programs, which is pretty good.

Apple's confidence in the Power Mac's backward compatibility is rooted in the fact that the new computers have the 68LC040 instruction set stored in ROM. To a pre-Power Mac program, a Power Mac looks like a 68040. A Mix Mode Manager lets 680×0 code and PowerPC code run at the same time.

Also, the Power Macs operate under System 7.1.2, which is call-for-call compatible with System 7.1. In theory, anything that is 68040-compatible and System 7.1-compatible should run fine.

Putting theory aside, I asked former **EM** editor Bob O'Donnell to share the results of his hands-on Power Mac testing. In his current position as *Macweek* magazine's executive editor for reviews, O'Donnell tested several music applications on a prerelease Power Macintosh and reported no problems with Digidesign's Audiomedia II hard-disk recording hardware and *Sound Designer II*. Opcode's *Studio Vision* 1.44 contentedly handled digital audio and MIDI together, though with multiple windows open and an extreme zoom setting, it started to slow down. This would also be the case on a Quadra, though, so it can't really be considered a problem.

Passport's *Alchemy* sample-editor required more memory than expected, but then ran well. However, *Macweek*'s Power Mac spontaneously rebooted whenever O'Donnell tried to launch Opcode's *Galaxy* 1.22. He attributes this to a conflict between the Power Mac's new floppy-disk handler and version 1.2.2's older copy-protection scheme. *Galaxy* 1.2.5 and *Vision* 2.0 have a new copy-protection method and ran with no problem. Eight-channel MIDI files played back correctly through both serial ports.

So far, then, Apple's confidence in Power Mac's 68040 emulation seems well placed with regard to some popular, bellwether music programs. How fast programs will run under emulation is open to debate. Apple says that depending on how the application is written, you can expect anything from fast 68030 speed (i.e., a IIci) to fast 68040 speed. Every other company I contacted said to expect emulation to run between IIci and Quadra 700 speed.

GOING NATIVE

You would think that in order to take

POWER UPGRADES

Apple wasted no time announcing upgrade paths from its 68040 machines to PowerPC (see table below). All are available immediately.

Logic-board upgrades include System 7.1.2, 8 MB of DRAM, and the same interfaces, audio, and video support as the Power Mac model. DRAM from the upgraded system must be 72-pin, 80 ns or faster, installed in pairs. List prices: $999 for an upgrade to the 6100/60, $1,499 to the 7100/66, and $1,899 to the 8100/80. The AV logic-board upgrades cost an additional $100 to $400, depending on the model, and include the video I/O ports.

Apple's user-installable, PDS-slot upgrade cards range in speed from 50 MHz to 66 MHz, essentially twice the clock speed of the motherboard (e.g., 66 MHz with a Quadra 650). They include 1 MB of SRAM (cache) and use the host computer's DRAM. They also use the host's ports, so the Power Mac AV video technologies are not supported. A Control Panel lets you boot from the host 68040 or the PowerPC 601. The PDS upgrades are a bargain, listing at $700.

In addition, Daystar Digital, a long-time leading accelerator manufacturer, is initially offering two Power Mac PDS accelerators. These PowerPro 601 accelerators are available in 66 MHz (est. $1,500) and 80 MHz (est. $2,000) versions. They can go in any Mac with an in-line PDS and NuBus slot, including the Centris 650 and Quadra 650, 700, 800, 900, and 950. Support for the IIci and other Mac platforms are expected by midyear. Daystar will also offer upgrades from its Turbo 040/040i accelerators.

The PowerPro 601 uses Apple ROMs and PowerPC 601 chips but offers higher performance than Apple's PDS card. Unlike Apple, Daystar uses an asynchronous design, so its card runs at full speed in any compatible machine, rather than running at twice the host processor's speed. It has four 72-pin SIMM sockets, providing 128 MB of memory that works in addition to the host machine's memory. The PowerPro's data path is 64 bits, whereas the Apple card is 32 bits. Applications take advantage of this by loading into the accelerator's memory until it is filled, then using the host machine's RAM. A 1 MB static RAM cache, with the same specifications as Apple's, also is available (est. $500). A Control Panel lets you boot from the PowerPro 601 or the host CPU.

Sometime in the second quarter of 1994, Daystar also will offer the nPOWER, a PowerPC 601 coprocessor card for multiprocessing applications. However, it is too soon to ascertain whether a PowerPC 601 coprocessor would offer significant advantages over a DSP coprocessor for running music software. Right now, the Motorola and AT&T DSP solutions still look good.

Apple Power Mac Upgrades

	Logic Board 6100/60 or 6100/60AV	Logic Board 7100/66 or 7100/66AV	Logic Board 8100/80 or 8100/80 AV	Upgrade Card (Speed depends on host.)
Quadra 900, 950				✘
Quadra 840AV			✘	
Quadra 800			✘	✘
Quadra 700				✘
Centris/Quadra 660AV	✘			
Centris/Quadra 650		✘		✘
Centris/Quadra 610	✘			✘
IIvx, IIvi, Performa 600		✘		

full advantage of the PowerPC's capabilities, software must be written specifically to run on the Power Mac, i.e., written in *native code*. Not all programs will achieve the same degree of acceleration when ported to native code, though.

The vast majority of common applications use *integer* math, which is the type of calculation carried out by the computer's CPU. Word-processors, telecommunications programs, spreadsheets, and system operations such as screen redraws rely on integer math. Digital-audio programs, such as those from Digidesign, depend on DSP cards to process audio. They mostly use the main CPU for the user interface and system calls, which require integer math.

The Power Macintosh 6100/60 gets you into the latest technology for just $2,000, including monitor, keyboard, and 8 MB of RAM. The 6100/60's most noticeable limitation is its one 7-inch NuBus slot.

Accelerating integer calculations can speed up applications significantly. Apple says that ten percent of main processor routines—especially applications that heavily use the Macintosh operating system and Toolbox—account for 90% of the processor time. By accelerating these system routines, most OS-dependent applications should get a significant speed boost.

▼

How fast programs will run under emulation is open to debate.

To this end, System 7.1.2 includes native versions of *PC Exchange* 1.0.4, *AppleScript* 1.1, and (attention, multimedia authors!) *QuickTime* 1.6.2. The new *QuickTime* should be much smoother, with better resolution and larger windows. In System 7.5, now in beta and due this summer, *PowerTalk* and, more important, *QuickDraw GX* will be native code. *QuickDraw* is responsible for drawing the screen; any Mac user will immediately appreciate the relief of much faster redraws.

However, most software that requires large amounts of high-speed calculations generally relies on *floating-point* math. High on this list are graphics programs, especially for CAD and graphic design. The floating-point unit is a separate math coprocessor chip in early 680x0-based machines, but in the 68040 machine, it is an integral part of the main CPU. (A less-expensive version of the 68040 without the integrated floating-point unit—the 68LC040—also is available.) In contrast, the floating-point unit not only is an integral part of the PowerPC chip, it is an essential source of its long-term performance potential.

Apple says that for native applications, Power Mac integer operations should be two to four times faster than a Quadra 950 and floating-point operations as much as ten times faster. Therefore, while most programs for Power Mac will initially be simple ports, second-generation software will probably make use of floating-point math for as many jobs as possible to gain maximum use of the PowerPC chip.

Presumably, at this point we'll start seeing products with features simply not possible with the 68040 Macs. Right now, the music software vendors, at least, probably haven't had time to consider the possibilities beyond porting their existing products. Besides, as we'll see, fancy digital-audio tricks might be

done better with third-party DSP cards than on the PowerPC CPU. But it seems likely that faster multimedia applications means smoother, more responsive interactivity.

Unsurprisingly, you will need more memory for native-code software. Apple recommends you add at least 4 MB to your current RAM to account for larger applications. Power Macs ship with 8 MB soldered on the motherboard, though, so you have a head start.

NOT SO FAST, BUSTER!

Some kinds of programs, including MIDI applications, have real-time operations that won't necessarily benefit from being written in native PowerPC code. This is true because at this juncture, System 7.1.2 itself is not entirely native. (Presumably, this was done to ensure backward compatibility with existing software.) In particular, the interrupt handler—the code that tells the processor when to stop what it's doing and deal with a higher-priority task—uses the 68LC040 emulator. Whenever there's an interrupt, the PowerPC switches to emulation mode, which takes time; when the priority job is done, the CPU goes back to native mode. This is a system operation, so it occurs regardless of whether the application itself is native.

Operations that can be done in the background without interrupting the processor—such as screen redraws or printing—don't force the processor into emulation mode and can be accelerated dramatically in native code. However, real-time operations, such as reading and writing MIDI bytes, have to be handled immediately, requiring the processor to interrupt its other work. The time required to switch to and from emulation mode to handle the interrupts could mean you won't see a lot of real-time performance improvement from native MIDI programs.

If the MIDI application uses emulation mode all the time, however, there is no switching. Therefore it *might* be better for real-time music applications to be written in mixed code, with 680x0 code for time-sensitive operations and native code for printing, redraws, and user-interface operations. The music-software companies will have to experiment with several approaches before deciding which solution works best.

THE FIRST NATIVES

Developers of business, graphics, and other general-interest programs are moving rapidly toward native-code versions. Apple recommends developers use a *fat binary* solution that provides both 680x0 and PowerPC code. A "smart" installer checks with the Mac CPU and installs native code for a Power Mac and 680x0 code for earlier Macs.

Software powerhouses such as Microsoft, Symantec, Claris, Adobe, Aldus, and Quark hope to offer native versions of some top programs either on, or within ninety days of, Apple's March 14 Power Macintosh ship date. However, many popular software applications won't go native until later this year.

Many of the larger music and multimedia software vendors hope to go native sometime this fall. Macromedia and Passport will port their multimedia authoring software later this year. Emagic has announced they will port *Logic Audio* this fall, while Opcode and Mark of the Unicorn are testing the waters. However, many digital-audio sequencers rely on *Digidesign Audio Engine* (*DAE*) software to address Digidesign's audio DSP hardware. Digidesign is porting *DAE* to PowerPC before porting its other programs, while dependent software developers adjust their schedules.

Because PowerPC was derived from IBM's Performance Optimized with Enhanced RISC (POWER) architecture, used in the IBM RS/6000 workstations, software-development tools such as debuggers and compilers were supposed to already exist, though they needed to be optimized for the new chip. Theoretically, software developers should have a much easier time porting existing programs and writing new ones for the RISC machines thanks to these tools.

In fact, according to Passport Designs' Denis Labrecque, a lack of finished development tools is one of the main things slowing Passport's efforts to port its *Producer Professional* multimedia production software to native PowerPC code. Labrecque expressed sympathy for tool developers, noting that writing a development language is tough, and debugging a compiler can be torture. He sees this as a short-term problem. Once the development tools are available, Labrecque expects things to move along quickly.

The Power Macintosh 7100/66 resembles the Quadra 650 and should appeal to musicians for many of the same reasons: three NuBus slots, scorching speed, a desktop-size case, and a modest list price.

POWER AUDIO

As mentioned earlier, the Power Mac is capable of recording and playing 16-bit, digital audio without using a DSP coprocessor. How will porting digital-audio applications to native code affect existing Mac digital-audio hardware solutions?

Today, Digidesign's Motorola DSP56000-based NuBus cards (especially Audiomedia II, Sound Tools II, and Pro Tools) are unquestionably the top-of-the-line audio cards for the Mac. Their sound quality is superior to that of the AV Macs and will almost certainly exceed that of Power Macs. The Digidesign card is dedicated to processing digital audio; the PowerPC does that, plus many other functions.

In addition, Digidesign is developing

Hard Disk Recording Doesn't Have To Be Hard On Your Wallet.

"...in a price/performance comparison, the DR4d would be hard to beat. Thumbs up on this one."
George Petersen, MIX Magazine

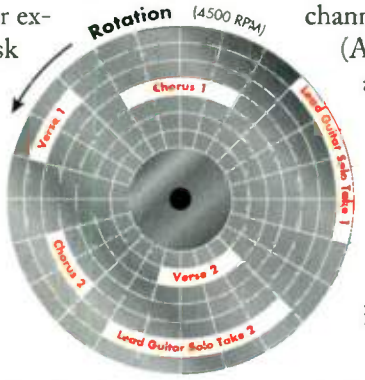
"...great sound, useful features, and friendly operation... technology that is sure to set a new standard in affordable recording"
David Frangioni, EQ Magazine

Ah, decisions, decisions. You want to buy a new multitrack recorder, and you want to go digital so that you'll get the best possible sound quality. And you'd like to buy a hard disk recorder, rather than tape, so you can get random access editing power. And finally, it's got to be something you can really afford. But there's a problem.... don't all hard disk systems require expensive add-in hardware and software, to already expensive computers? Not anymore!

The DR4d is the solution for those looking for an alternative to expensive, complex computer-based systems, or the limitations and mechanical uncertainty of tape recorders. It offers a perfect combination of hard disk recording benefits with an easy-to-use interface.

The DR4d can record up to four tracks simultaneously to standard SCSI hard disks, either internal or external drives. An optional 213MB internal disk offers 40 track minutes of recording (44.1kHz) right out of the box. To expand your recording time, simply connect external drives to the DR4d's supplied SCSI port.

With standard tape machine-style controls the DR4d is by far the easiest hard disk recorder to operate, which means that you can get to work immediately creating music rather than setting up and operating a computer system. Punch ins/outs can be performed manually or automatically from the front panel, or by footswitch, naturally.



On a spinning hard disk, the sections of music can be accessed almost instantaneously by the moving heads of the drive mechanism. This allows you to seamlessly output parts regardless of their location on the disk. Also, music can be easily rearranged in ways not possible with tape.

Now you can start to take advantage of random access editing. You can cut, copy, and paste sections of audio with ease. Our Jog/Shuttle wheel lets you scrub through the audio at various speeds, forwards or backwards. Try out different arrangements. Create perfect tracks by combining the best sections from multiple takes. And you can edit with confidence, because if you change your mind you can instantly Undo your last edit - even after the power is turned off and on again! Imagine it. Do it. It's that simple.

You can instantly move to 108 memorized locations at the touch of a button, and these locate points may be entered manually or on-the-fly. It's also simple to set up **seamlessly looping** repeat sections, so it's easy to jam over tracks. No more wasting time on rewinding tape!

Of course, how the DR4d sounds is as important as how it works. Advanced 18-bit oversampling A/D and D/A converters insure crystal clear sound, and with a full 96dB dynamic range, the DR4d offers no-compromise specs. The four balanced 1/4" input and output jacks are switchable between -10 and +4 operation, and 2-channel digital I/O is included standard (AES-EBU and SPDIF) with two additional digital ports optional.

Need more than four tracks? Four DR4d's can be linked to create a 16-track system. And for synchronization to other gear, just add the optional MIDI or SMPTE interfaces.

And best of all, the DR4d is an **affordable** reality: suggested list is only $2495.00 (or $1995.00 w/o hard disk)! Multitrack disk recording *is* within your reach, so see your Akai dealer today for a complete demo!

Now Available - Version 3.0 Release: Track Merging, Midi Machine Control, and Midi Time Code support!!

On tape, the sections of music are physically located far from each other, separated by many feet of the tape itself. Since you have to move all that tape past the heads to get where you want to go, it's impossible to jump instantly from one section to another. It wastes time, and limits creativity!

DR4d

AKAI DIGITAL

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a powerful audio-processing card, called a *DSP Farm*, that contains multiple DSP chips. The DSP Farms and compatible audio-processing cards communicate by way of Digidesign's special, high-speed Time Domain Multiplexing (TDM) bus. (For more on TDM, see "Virtual Effects" in the March 1994 **EM**.) Some of this is relatively new technology, but clearly Digidesign audio cards will remain a standard among professionals.

Digidesign hardware is not the only digital-audio solution, of course. Media Vision offers an inexpensive card, the Pro Audio Spectrum 16 (reviewed in the April 1994 **EM**). But it lacks pro-quality software support, and its audio quality is not acceptable for serious recordists. It's okay for adding budget 16-bit sound to existing Macs, but unless Media Vision makes some major upgrades, the PAS 16 card will not tempt Power Mac users.

Several digital-audio programs support Apple Real-Time Architecture (ARTA) compatible DSP systems, such as the AT&T DSP3210 chip used in the Quadra AVs and in Spectral Innovations' NuMedia NuBus DSP card. Assuming comparable sound quality, if Power Macs are fast enough to perform audio DSP functions while maintaining the system and other applications, will the DSP3210-based cards die in their infancy?

It's a fair question. Apparently, one problem with using the AT&T coprocessor is that the chip shares the main bus with the CPU, causing bottlenecks when the two vie for bus access. With the PowerPC chip handling both tasks, this isn't a problem. On the other side, the limits of the PowerPC CPU's ability to simultaneously handle audio, other applications, and system software are untested. Apple representatives emphasize that the 601 is not intended to meet the heavy audio-processing needs of a serious studio. True, the AT&T DSP chip also is asked to carry out assorted coprocessing tasks, so it's not always completely available for audio. But overloading it shouldn't crash the system.

The Power Mac is new, and it will take time to properly test its digital-audio capabilities. If it really can handle everything asked of it, including audio, without slowing down or crashing, the AT&T solution probably is history. But that's a big "if." It seems more likely that a Power Mac with an ARTA-based card or Digidesign Audiomedia II card will prove a better solution for the serious hobbyist and semi-pro, while the higher-end Digidesign cards will serve the pros.

POWER MAC AND ARTA

At press time, newcomer Alaska Software was just beginning to ship its initial version of *DigiTrax*, a hard-disk recording program for the AV Macs and Macs with ARTA/AT&T cards. Alaska also is planning a native-code version of *DigiTrax*, which the company (perhaps optimistically) hopes to release in early fall. Alaska's projected approach to using ARTA cards on the PowerPC seems logical and probably

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BETA Bio

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"... So quiet I had to doublecheck to make sure it was on." M.C., Los Angeles, CA

"One of the mixer's most impressive features is the **channel EQ section**. The amount of tonal control is **awesome**." *Electronic Musician 2/94*

"Killer, sweet-sounding, **mega-versatile** EQ!!!" R.T., Los Angeles, CA

"Flip... allows you to choose the signal that's fed to the channel strip and conversely selects the signal that is sent to Mix B, the **powerfully featured monitor section**. Yes you can still access all the gear you plumbed in without having to repatch a thing. This... effectively doubles your inputs. It's ideal for mixing situations when you have stuff playing live from a sequencer coming in on Mix B." *H&SR (UK edition 9/94*

"The **mic input circuitry** is the remarkable **low noise** design that first brought Mackie into the spotlight." *H&SR (UK) 2/94*

"I'm happy to report that the desk maintains Mackie's reputation for **clean, quiet circuit design**. Some of my tests, involving CDs, showed up the noise on the original recording quite clearly. Even without the EQ switched in, the desk displayed a very open, transparent quality." *Sound on Sound (UK/Europe) 12/93*

32•8 shown (instead of 24•8) because we had a cooler picture of it.

1994 Music & Sound Award

Most Innovative Product of the Year
MACKIE DESIGNS 8-BUS MIXER
January 22, 1994

Winner of Music and Sound Retailer Magazine's awards for **"Most Innovative New Product"** & **"Best New Console/Mixer"** of 1994.

NEW! 24•E 24-ch. expander

NEW! 11-rack space "Sidecar"

"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." *Electronic Musician 2/94*

"**Amaz-ing. Beautiful. Sexy.** I've been waiting for six years for someone to come out with a mixer like this." J.C., Charlotte, NC

"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." *MIX magazine 2/94*

"When I read about your 'quiet' fan in your power supply manual, I almost fell over. When I didn't hear it, I fell to my knees. **When I brought up fader after fader and still heard nothing, I almost blacked out!** Who in the world EVER realizes that audio gear must be **quiet**? I love you people." D.S., Palmdale, CA

"Used a competitor's console while waiting for your 8•Bus and will never use the other board again. **Yours is quieter, has better mic pre's, better EQ, more logically laid out, much cleaner sound and better quality construction.**" P.P., Salt Lake City, UT

"Replaced a $20,000 console with the 24•8. **Your console kicks butt over my old one.** I love the EQ, the headroom and even the pans." D.C., Burbank, CA

"The back of the board has 24 submaster/tape outputs incorporating a **triple bus system** normalling your submaster to tape ins on the multitrack. When you send a signal to submaster 1 output, for example, it appears at submaster outputs 1, 9 and 17, which **simplifies operations** with 8-, 16- or 24-track recorders." *MIX magazine 2/94*

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will be taken by other companies (including OSC when *Deck II* is ported to PowerPC later this year). Let's take a quick look at this plan.

Alaska will use a fat binary installer. When the installed application boots, it will look for an ARTA-compatible DSP chip. If the software finds the ARTA DSP chip, it will run the audio on it, using native Power Mac code for the rest of the application (mainly the user interface). If no ARTA chip is present, the application uses the PowerPC chip to do everything, including audio.

What about running audio on both ARTA and PowerPC for multiple tracks? Synchronization is the big problem here. To understand why, let's take a brief look at how the AT&T DSP chip and PowerPC chip get their audio timing. The DSP chip processes audio in *frames* of 240 samples each. As the audio streams in, the DSP's Direct Memory Access (DMA) section writes the 240-sample frame into a buffer, where the signal is preprocessed and held until the DSP is ready to process it. While the DSP is processing one frame, the DMA is working on the next frame. When the DMA is finished, it sends an interrupt message to the DSP saying that the half it is working on is ready to go. The DSP takes over the prepared frame, while the DMA works on the next 240 samples.

One problem with ARTA's time-slicing approach is that if you try to overdub on existing audio, monitoring the old and new tracks together, the DSP has to line up the two separate datastreams. Inevitably, there's at least a 5 to 10 ms processing delay, so overdubs aren't quite in real time. But that's just for starters.

ARTA includes built-in sync between DSPs, but at an unacceptable price for audio applications. To sync two DSPs, the slave DSP has to ignore its own DMA interrupts and strictly follow the master DSP chip's timing. But because the slave is ignoring its DMA, it doesn't know when the next frame is ready for processing and therefore cannot run smoothly in time with its own incoming audio datastream. Thus, the slave could look for incoming audio at the wrong time, stumble, and miss a frame. A 240-sample frame takes about 5 ms to sample, so if the timing of the interaction between DMA and DSP drifts by one frame, it's unacceptably noticeable.

Apparently, PowerPC chips sync in roughly the same way and pose similar sync problems. Until a way can be found to have a common clock for both

POWER WINDOWS

One of the long-standing (and overblown) arguments in the computer world pits Mac users against *Windows* aficionados. We're not quite to the point where everyone can quit fighting, but we're getting closer.

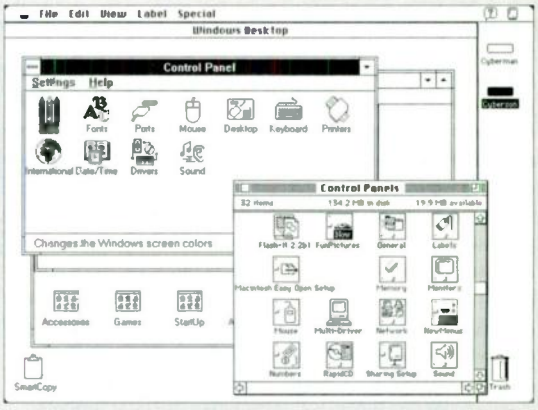
Insignia Solutions has a line of programs that let you run DOS (*Soft PC Professional*) or *Windows* (*Soft PC with Windows*) on a Mac. Unfortunately, even if you have a fast 68030- or 68040-based Mac, it can't exceed 25 MHz 80386SX performance when running applications in Insignia's environment. PC MIDI applications have never been tested.

With Power Macintosh, some of this, at least, is changing. Insignia Solutions licensed the *Windows* source code from Microsoft and also struck a deal with Apple. The result is that under Insignia's *Soft Windows*, *Windows* 3.1 applications run on a Power Mac 7100/66 as fast as on a 25 MHz 80486SX. When *Windows* 4.0 comes out, Insignia will have the source code to emulate that, too. You can even run System 7 and *Soft Windows* simultaneously, in separate windows, and transfer data between them via the clipboard. Estimated list price for the program is $499, and at least 16 MB of RAM are required. The company expects to ship when Apple ships the first Power Mac. In fact, Apple will optionally bundle preinstalled *Soft Windows* with Power Macs that have 16 MB of RAM or more.

The first version of *Soft Windows* for Power Mac emulates the 80286, albeit at 80486 speed. Later this year, an 80386/486 emulator is planned that will permit running *Windows* software in Enhanced mode. PC veterans might notice that hard-drive access is a tad slower, because the Macintosh does more data-integrity checks than a PC when accessing a drive.

Unfortunately, the initial offering won't support digital-audio recording (e.g., Sound Blaster 16 emulation), though it permits PC system beeps. Digital-audio support is also on the 1994 agenda. Insignia still has not tested their environment with MIDI software, but we're pressing them, and they have promised full MIDI tests in the near future. By the way, if MIDI works under *Soft Windows*, it should work under Insignia's *Soft PC* programs, too. Stay tuned.

Overall, I got the impression that Insignia is not hip to the relatively small music-software market. But even without MIDI and audio support, *Soft Windows* lets the Power Mac user run specialized non-music programs from the PC world.



Insignia Solutions' *Soft Windows* for the Power Macintosh lets you run DOS and *Windows* software simultaneously with Mac software, in a separate window. You can transfer data between programs via the Mac clipboard.

processors, it probably won't be practical to use the two chips simultaneously for multitrack audio.

These issues might not be resolved soon and may prove moot. Apple's decision not to include a DSP chip on the Power Macs may foreshadow ARTA's early demise. So far, Apple has not indicated whether it will revive ARTA, replace it with something new, or put the whole issue on the back burner indefinitely.

THE POWER TO SUCCEED

Assuming you have decided you need some sort of upgrade, the biggest questions pit cost and compatibility against investment in a coming technology. Skepticism is usually justified regarding claims of compatibility with upgraded hardware and operating systems. But because of Power Mac's hardware-level 68LC040 instruction set, there's good reason to believe you'll have few compatibility problems with software that runs cleanly on a Quadra. (That's *not* a promise.)

Power Mac will provide an immediate speed boost for some users, and there will be much better performance when native-code programs arrive. Eventually, we'll see real-time capabilities not possible on a 68040. In addition, if you want to experiment with hard-disk recording but don't need (or can't afford) the quality of a Digidesign card, Power Mac gives you an as-yet-undetermined degree of 16-bit audio recording.

Still, I don't think all Macintosh users should go to Power Mac immediately. (You will eventually.) Most Quadra owners won't see much improvement with their present software, and the 840AV might even run some programs faster than the Power Mac. If you have a 68040-based machine, or can make do for awhile with your IIci, wait to move to a PowerPC until your critical programs go native (which might take as long as a year in some cases). When the time comes, you can decide whether to buy an accelerator (see sidebar "Power Up-

grades"), a logic-board upgrade, or a new computer.

In addition, the prices on 68040 machines are dropping and will undoubtedly drop some more. If you have anything slower than a IIci, especially a compact Mac (Classic, SE/30, etc.), and are looking for a short-term, low-cost solution, a Quadra or 68040-based LC or Performa should satisfy you for the next year or two, and perhaps longer. (A fast 680×0 accelerator card might even do the trick.) You can always add a PowerPC accelerator later. However, keep in mind that accelerators don't speed up I/O operations, including accessing SCSI and NuBus, which digital-audio programs use a lot. Thus, for digital-audio applications, you're better off with a new computer built around a faster CPU.

Given that, if your machine is slower than a IIci and you can budget $2,000 to $3,000, consider going straight to Power Mac. You won't get as much speed in the short run as you would with, say, a Quadra 650. But next year, when most major applications are native, you'll get a big boost for the price of a few software upgrades. If you have a PC-compatible and are considering switching to Mac, you absolutely should go Power Mac, as you can still run DOS and *Windows* business programs at acceptable speed under *Soft Windows*.

Maybe I'm past the point of being old and jaded and have reached the senile innocence of second childhood, but I am extremely optimistic and enthusiastic about Power Macintosh. Sure, native applications will take awhile, and 680×0 emulation isn't as fast as I'd like. And as always, something better will come along later, such as the PowerPC 604 chip. But the 601 offers enough power that the "rest of us" working stiffs on a budget can confidently upgrade to the new generation of desktop computing.

(Special thanks to Evan Brooks of Digidesign, Jeff Boone of Alaska Software, Denis Labrecque of Passport Designs, and Bob O'Donnell of *Macweek* magazine.)

Despite his title, Senior Editor **Steve O** *is not an Ancient, nor does he only edit articles written by septuagenarians. He has, however, worked in* **EM***'s editorial department longer than any of these young whippersnappers.*

SERVICE CLINIC

Q & A's Greatest Hits

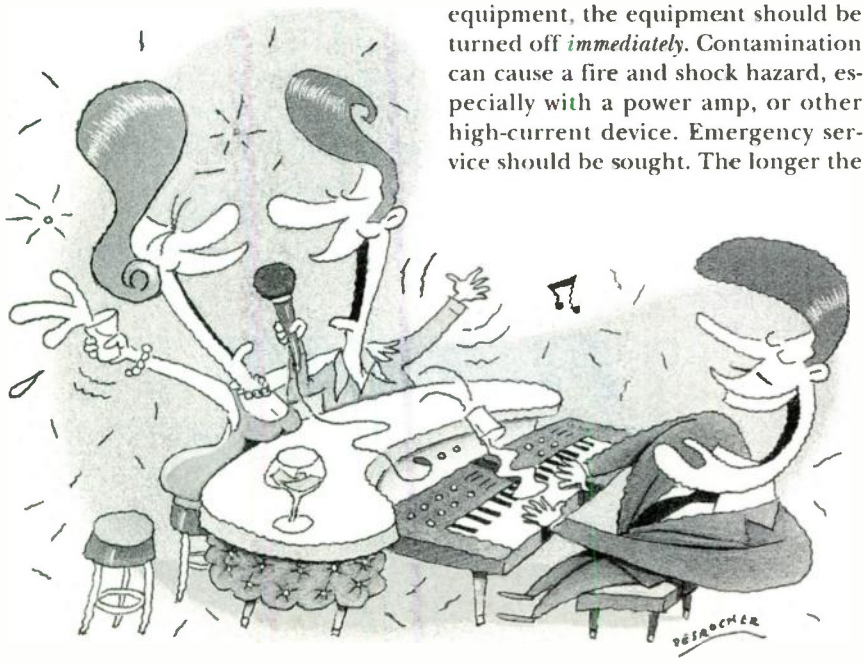
Our very own techno star reprises his most-requested tunes.

By Alan Gary Campbell

Q An enthusiastic audience member spilled a drink into my keyboard. I turned off the unit, disassembled it, and cleaned out all the liquid I could. After it dried, I turned it back on, and it worked okay for a few days. Now the operation is erratic. What should I do?

A. Contamination by spilled liquids is one the two most common causes of equipment malfunction. It can result in cumulative, irreparable damage if not rectified quickly.

When liquid is spilled onto or into equipment, the equipment should be turned off *immediately*. Contamination can cause a fire and shock hazard, especially with a power amp, or other high-current device. Emergency service should be sought. The longer the contaminants remain in contact with the circuit boards and electromechanical components, the greater the potential damage.



JACK DEBROCHER

Although the effects of an initial contamination are serious enough, they are usually reversible, or at least repairable. It is when the user, assuming that the unit has "dried out," turns it back on to assess the damage that the real problems begin. Seldom is the unit completely dry. Even if it is, contaminants that were in solution are now deposited on the circuit boards and can conduct electricity, forming gremlin-like short circuits. Moreover, when such contaminants conduct, they form new compounds that are even more invasive and can be permanently "etched" into the circuit boards. These secondary problems cause irreparable damage.

In the absence of available emergency service, it is understandable that the technically inclined player or equipment manager may attempt do-it-yourself cleaning, but this should be approached with caution. Make certain that the AC line cord and all cables (including footswitch cables) are unplugged before you even think about opening the case. Use a clean toothbrush and tap or distilled water (never mineral water) and clean only the area directly affected. Concentrate on the circuit-board spaces and mechanical

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AC line-voltage regulaters, such as this Furman AR-117, smooth out voltage spikes and drops, delivering a steady 117 VAC.

components. Avoid contact with electronic components as much as possible. Consider this "first aid" only, and do *not* turn on the unit afterward, but take it to a service center ASAP.

Prevention: Put singers' beverages in sealed squeeze bottles, absolutely forbid outside liquids or foods anywhere near equipment, and post a constipated Klingon security officer with a phaser set to kill.

Q. How can I keep AC line surges from damaging my gear?

A. AC line surges are the second most common source of equipment damage. Surges come from electrical storms, accidents that damage power lines, brownouts and other utility company "events," and many other sources.

No device can stop a nearby lightning strike. However, AC power processors, such as ferroresonant transformer-based, line-voltage regulators can gobble up hefty surges and compensate for brownouts and other fluctuations. At the budget end of the spectrum, a simple, cube-tap style, varsitor-based surge suppressor works well on smaller surges.

Buy and use the best surge suppression you can afford. At the least, install a cube-tap style suppressor (RCA SK 403, or similar) with each main instrument and subsystem. These inexpensive (about $10) gizmos are cheap insurance.

Q. I like my older XYZ synth/sampler, but it's noisy. Can I replace some of the ICs and other parts to make it better?

A. Older synths and samplers use lower-resolution, non-oversampled, digital-conversion circuits that can produce audible aliasing, distortion, and noise. In only a few cases are upgrades available that will improve these units, because the problems do not derive from inferior components, but simply from older, less-sophisticated designs. Replacing op amps and resistors with low-noise versions, which might improve the signal-to-noise ratio and distortion in an analog mixer, will have little effect in a digital synth.

A gentle, high-frequency EQ cut and slight tweaking of the patch or sample parameters to reduce harmonic content provides all the improvement that is attainable. Occasionally, using an aural exciter or other signal-enhancement device helps mask unwanted artifacts. A noise gate can be used if quiescent noise is troublesome.

Prevention: Select patches or samples that reflect the strengths of the instrument. For example, on an original-type Yamaha DX7 (or TX7 or TX816), decay-envelope patches with moderate harmonic content can be effective.

Q. How can I modify my multitimbral XYZ synth/sampler to have separate outputs for the internal voices?

A. In many older multitimbral instruments, the voices are virtual, i.e., they exist solely as algorithms in a computer. The only analog outputs are the final, stereo outputs. Trying to separate the individual channels is analogous to trying to separate the strings, woodwinds, brass, and percussion from a stereo orchestral recording.

▼

Equipment should never become so hot that it will burn the skin.

The main disadvantage is the absence of individual outputs for separate processing. The least expensive alternative is to rent or purchase additional, perhaps older and less expensive, modules to augment current capabilities. When possible, routing accompaniment timbres to one side of the stereo mix and solo timbres to the other for separate

processing is a compromise that can help to avoid the undesirable, "all processed the same" effect.

Q. Some of my equipment gets quite warm when running. Is this normal?

A. It is normal for some equipment, especially power amps, older synths, and some computers, to get quite warm when running. But equipment should never become so hot that it will burn the skin. Equipment that runs hot should be referred for service.

Keep equipment out of direct sunlight and away from heating/air conditioning ducts, portable heaters, lights, and other heat sources. Keep heat sinks clean and dust-free. Do not allow heat sinks to be placed in close proximity to clothes, furniture, or anything except air. Install extra fans in densely populated racks. Use floor fans to cool equipment used outdoors in hot weather.

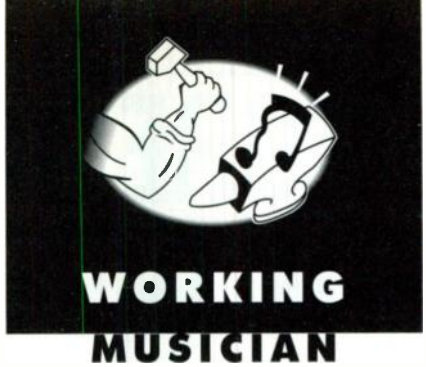
Q. How can I find out which "Service Clinics" contain information pertaining to my gear?

A. Reasonably detailed, topical indexes (now updated biannually) appeared in the January 1989, 1991, and 1993 issues of **EM**. Many libraries carry **EM**, and the single-page indexes can be readily photocopied for future reference. Back issues and photo-reproduced copies are available from Mix Bookshelf; tel. (800) 233-9604 or (510) 653-3307; fax (510) 653-5142.

MORE ON ABSOLUTE PHASE

For those whose interest was piqued by the discussion of signal phase integrity in the May 1993 "Service Clinic," I recommend the excellent article "A Quest for Absolute Polarity," in the December 1993 issue of *Audio*. Authored by researchers R. A. Greiner and Douglas E. Melton, it reports on a series of intelligently conceived and well-executed studies, and summarizes the findings to date. The issue also carries an enlightening article on the environmental stability of audio cassettes. For *Audio* back-issue information, write PO Box 7085, Brick, NJ 08723.

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



The Fine Art of Self-Promotion

Pound the pavement, hit the phones, get the word out!

By Teri Danz

Have you ever been shocked to see a local band on the cover of a major music magazine? Have you ever been surprised when an unknown artist creates an event and gets great press? Do you ever wonder how that happens and, more importantly, if you can do it?

Well, the good news is that anyone can generate publicity. You don't have to hire a publicist or spend a lot of money. The bad news is that publicity is not magic, and it doesn't just happen. Getting press takes time, energy, creativity, and an understanding of what "newsworthy" really means. Once you know how the media works, there are tried and true ways to get attention. People do it every day, from garage bands to Janet Jackson. You can too.

San Francisco industrial act Headlock promote their urban wasteland image with a boxed press kit, hand-constructed from common cardboard. The kit includes a video, cassette, photocopied publicity shots, and various ideological manifestos.

FEEDING THE MEDIA

"A publicist's job is often getting information and spoon-feeding it to the public," says Christopher Veech of Levine/Schneider Public Relations in Los Angeles, a firm that handles Janet Jackson and Stone Temple Pilots, among others.

The primary spoon that feeds the media is a press kit. In simple terms, a press kit is a promotional tool that tells the media what you want them to say about you. Believe it or not, the information that ends up in magazines and newspapers is often lifted verbatim from press kits.

The key elements of a good press kit are: a cover letter; an 8 × 10 glossy, black and white photo; a biography; a logo; a cassette, complete with J-card (the printed label insert); and, if available, a collection of press clippings. Each item in the press kit should accurately represent your style and image. Do not misrepresent yourself, because it will come back to haunt you. Many bands attempted to strike gold in the recent deal-making frenzy for grunge acts by aligning themselves with the genre. Of course, the bands that

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act and developing chops, but they're not exactly hot news.)

DO THE RIGHT THING

"A common mistake people make when seeking publicity is not understanding the workings of the press," states Kimpel. "You've got to do some homework."

Doing homework means researching which magazines and trade papers might be interested in what you're doing. It's important to find out who to call. A typical magazine or newspaper has many different editors with different functions. For example, a calender editor is only interested in who, what, when, and where. However, a feature editor seeks longer, general interest stories and usually requires a press kit and a news "hook" to determine if your band is worthy of coverage. Also, be sure to find out publication deadlines, and work within them. Don't forget that media professionals are extremely busy, so be respectful of their time. Good publicists limit follow-up calls to concise discussions that take less than one minute from "Hello" to hang-up.

SUCCESS STORIES

Many artists believe that generating publicity is an expensive proposition. This is not always true. But to make "budget" promotion work, you'll need time, energy, and a lot of ingenuity.

Kathy Peck, founder of Project HEAR (Hearing Education and Awareness for Rockers), masterminded a celebrity Bowl-A-Thon fundraiser that became a huge media event. She got a story printed in a small Haight Street newspaper, using contacts developed as a member of the Contractions, a San Francisco new wave act. The *San Francisco Chronicle* picked up on it, which led to an article in the *New York Times*. Peck's organization was featured on local TV and radio stations and even earned a spot on the MacNeil/ Lehrer Newshour. She also received the support of rock legend Peter Townshend, who suffers from catastrophic hearing loss.

"I discovered it's not enough to have a good cause," she says. "The media is more interested if your cause is tied to an event."

Kathy Peck created a media event—a celebrity Bowl-A-Thon—to raise funds for her Project HEAR (Hearing Awareness and Education for Rockers).

• WORKING MUSICIAN

Ingenuity is also the hallmark of New York dance-music artist Anthony Sicuso. Having independently produced and financed the release of his first record, *Use Your Imagination*, Sicuso established a local telephone line ([212] 581-IMAGINE) to promote the record.

▼

Keep superlatives out of your press releases and bios.

Callers can hear a sample of a song, get information about upcoming shows, and sign onto a mailing list. Sicuso's promotional smarts and perseverence have scored reviews in *Billboard*, *Street Sound*, *DJ Times*, and *Black Radio Exclusive*, as well as dance-market airplay and prestigious club gigs.

"My formula for success is: Release your own record, keep the costs low, send out press releases, hound the media, play live, and sell your record at shows," says Sicuso. "Most of all, be patient. It takes a lot of time and energy to get a record going and keep your name in the press."

NEW FRONTIERS

Trends move fast in the entertainment biz, and electronic press kits are the wave of the future. Hollywood Records is already releasing video kits that include concert clips, conceptual performances, and artist interviews. I'm certain that CD-ROM versions are just minutes away. But whatever medium you use, the goal remains the same: Get the word out! Make the media work for you. All it takes is energy, tenacity, and a little help from your friends. And don't get discouraged if one avenue proves a dead end. There are many ways to get attention, and different things work for different people. "The key," reveals Peck, "is to always have confidence in your vision."

Soon to be a 10-year overnight success, **Teri Danz** *is a San Francisco-based singer/songwriter whose artistic star is just beginning to get publicized.*

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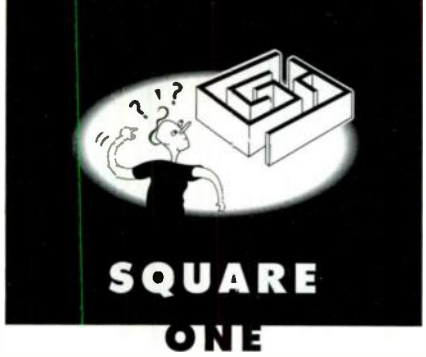


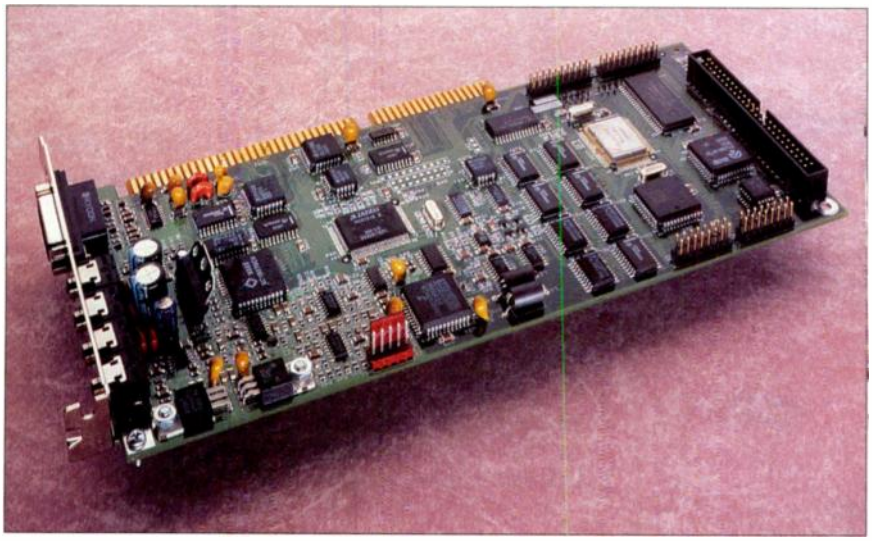
Installing PC Sound Cards

Your ears will thank you for upgrading your computer's sound.

By Bob Lindstrom

There are some things you just can't take seriously. Among them are campaign promises, anticipated tax refunds, and the sound of an IBM PC-compatible's internal speaker. After a few exposures to the PC's flatulent warblings, most computer owners race for the screwdriver and wire cutters.

On the other hand, the cool-headed start shopping for a PC-compatible sound card. These internal add-on cards let you surpass the limitations of the PC speaker by placing a synthesizer and digital sampler into your PC. If you're like many computer musicians, however, you already have one or more external synthesizers attached to your PC through a MIDI interface (see "From The Top: MIDI Basics, Parts 1 and 2" in the August and September 1993 **EM**). Why bother with an internal sound card?



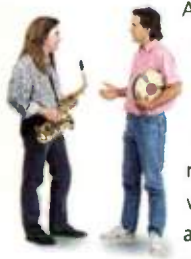
Sound cards can turn your computer's bleeps and bloops into symphonies. Logitech's SoundMan Wave, for example, provides 24-voice wavetable and 20-voice FM synthesis. The card also offers stereo, 16-bit digital-audio recording.

CARD GAMES

Most of today's internal sound cards include analog-to-digital (A/D) and digital-to-analog (D/A) converters, which let you record digital samples and save them on your hard disk (see "From The Top: Hard-Disk Recording" in the December 1991 **EM**). Although it's not a replacement for a full-blown, direct-to-disk recording system, handy digital sampling and MIDI playback capability within the computer is convenient for adding voice-overs, simple sound effects, and musical scores to a multimedia presentation. If you're working in multimedia, you'll want one of the sound cards that is compatible with the Multimedia Personal Computer (MPC) standard, which is becoming common in business and home computer systems.

If you haven't installed a MIDI interface in your PC, get an MPC-compatible sound card with a Roland MPU-401-compatible MIDI interface option (which now includes most of the cards). Along with the ability to connect

The Most Widely Used Studio Headphones.



As a recording professional, you need to listen to the music—not the headphones. You want the audience to feel the emotion and excitement that you feel. That's why so many musicians and recording engineers rely on the K240M.

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external MIDI devices, you get an internal synthesizer and digital-audio record/playback capabilities. Some cards also include an internal SCSI (Small Computer Systems Interface) port for connecting an *internal* CD-ROM drive. We emphasize internal because the SCSI port is on the card, not on the mounting bracket where it would be accessible for connecting an external CD-ROM drive. If there is no room inside your computer's case for an internal CD-ROM drive, don't spend the extra money for a sound card with a SCSI port.

GETTING CARDED

Sound-card development has proceeded at a feverish pace during the last year. Take a look at the "What's New" section of the April and May 1994 issues of **EM** for recent announcements.

For less than $200, you can choose from a variety of cards with 4-operator FM synthesis and 16-bit sampling. Cards in this category include the Creative Labs Sound Blaster 16 Basic ($199.95) and the Media Vision Pro Audio Spectrum 16 ($159).

For just a few more bucks, however, you can choose from several cards that offer wavetable synthesis. Best Data Products' Soniq Sound PC ($259) and Kalix's SoundTrax ($289) both feature Ensoniq's Soundscape 32-voice wavetable synthesizer. These cards offer 128 General MIDI instruments and 61 (64 on the SoundTrax) percussion samples. Both boards also feature onboard DSP, a $50 option on Creative Labs' cheaper cards. Monterey ($299), the latest in Turtle Beach Systems' MultiSound series of cards, features a custom 32-voice wavetable synthesizer. The card's SampleStore feature lets you use any WAV file as a MIDI instrument.

Not to be outdone, Creative Labs recently announced the 32-voice polyphonic Sound Blaster AWE32 ($399.95), which features the E-mu EMU8000 DSP. The AWE32 plays sounds from the E-mu Systems SoundFont library of samples and is compatible with General MIDI. The card's onboard sample RAM can be upgraded to a whopping 28 megabytes.

Meanwhile, Kurzweil is staking out territory at the high end of the spectrum with its MASS (Multimedia Audio Sample-playback System) synthesis chip set. The 32-voice, 16-part multitimbral MASS synthesizer features 6 MB of

waveforms in ROM (357 sounds and fifteen drum kits). It's currently featured on Wearnes Technology's Beethoven MIDI EFX 2000 daughterboard ($349), AVM Technology's Summit daughterbox ($389), and other add-on products for the Sound Blaster 16-series and compatible cards.

Whatever card you choose, it should be compatible with the Sound Blaster, the *de facto* industry standard in sound cards. This is particularly important if you're planning to use the card to play computer games. Establishing Sound Blaster compatibility, however, is becoming problematic, because Creative Labs has filed false advertising lawsuits against four companies (Cardinal Technologies, Computer Peripherals, Orchid Technology, and Prometheus Products) whose sound cards are supposed to be Sound Blaster-compatible. As of this writing, Media Vision was the only company that had licensed the Creative Labs' technology.

For multimedia applications, the sound card you choose should be compatible with MPC Level One or Two, so it will work effectively with the majority of *Windows*-based multimedia products. If you intend to go further with multimedia, you'll also want the card to include the aforementioned SCSI port for the later addition of an internal CD-ROM drive.

ACE IN THE HOLE

Once you've purchased a sound card, it's time to put it inside your PC. Installing a sound card isn't brain surgery, but if you feel the least bit uncomfortable about opening your PC, have the store install it for you. On the other hand, if you are courageous with a screwdriver and have the fortitude to stare down techno-frustration with a steely gaze, get ready to party down with your PC's innards. Be advised, though, that opening the case on your computer may void your warranty.

The easiest part of the process is the physical installation of the card itself. The manual should provide step-by-step instructions for the installation of your card. The following example gives you an idea of what to expect from the installation process.

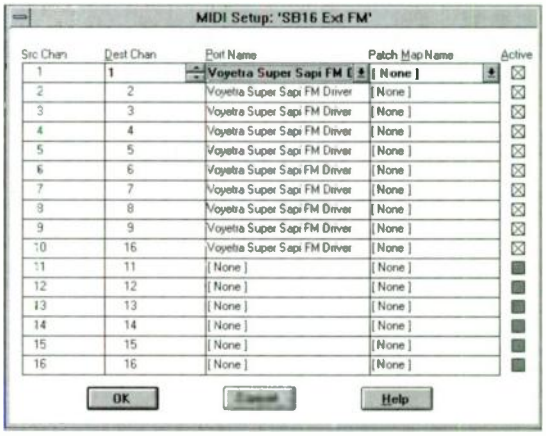

FIG. 2: The Setup window of *MIDI Mapper* lets you assign MIDI channels and Patch Maps for your sound card and other MIDI devices.

First, make sure you're not a throbbing pyre of static electricity, the mortal enemy of everything electronic. Check that the power switch is turned off and the power cable is unplugged, then remove the case cover of your PC. Rid yourself of static electricity by touching the large metal box around the power supply. Better yet, wear a grounding strap on your wrist. You can pick one up at most electronics hobby shops.

Look for one of the empty expansion slots near the back of the computer. You'll see slots of two different lengths. Compare the lengths of the slots in the computer to the length of the copper-colored "teeth" on the edge connector along one side of your sound card. Ideally, you should put short (8-bit) cards in short slots and long (16-bit) cards in long slots. Eight-bit cards will function properly in 16-bit slots, but long cards must go in long slots.

Remove the screw holding the metal cover plate for the selected slot from the rear of the computer. Carefully line up the metal teeth on the card with the slot, then firmly press the card directly into the slot using moderate pressure until it is "seated" securely. Don't force, jam, or hammer the card into submission. If it won't go in with moderate force, you probably don't have the teeth and slot aligned properly. If you still have trouble inserting the card, make sure the metal plate on the end of the sound card (the one with the external input/output connectors) is properly aligned with the mounting slot in the computer case.

Replace the screw that holds the card's metal plate against the back of the computer case. But don't replace the computer cover just yet. Plug in the power cord and boot up the computer.

If all goes well, you should now be able to install the software that came with the card and everything will spring into flawless operation. Unfortunately, chances are good that this will not be the case. Don't be discouraged.

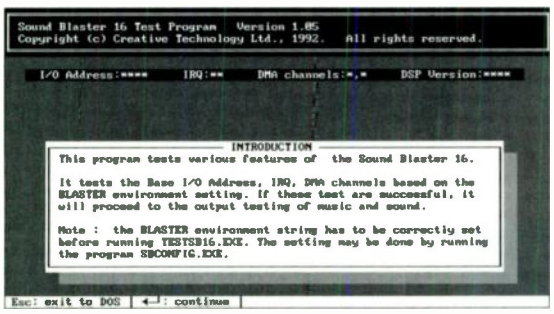

FIG. 1: Test programs such as *TESTSB* are supplied with most sound-card installation software. After the hardware and software have been installed, the test program verifies the card's configuration and operation.

WE INTERRUPT THIS MESSAGE

During the installation of the software, you may be asked to establish the *interrupt request line* (IRQ), *input/output address* (one for sound, one for MIDI), and *direct memory access* (DMA) *channel* of the sound card. The manual and/or software will probably recommend factory-set default values. These values tell the computer where to find the card and how to communicate with it.

Unfortunately, every other device in your computer, from the printer to the mouse, has similar parameters. If two devices try to use the same value, chances are that both will operate incorrectly, intermittently, or not at all.

Often, finding values that do not conflict with other devices is a trial-and-error process. Start by trying the following values: IRQ 5, Synth Address 220, MIDI Address 330, and DMA Channel 1. Run the test program that comes with most cards (see **Fig. 1**). If the card doesn't test out properly and you already have another MIDI card or a network card in your system, try

substituting IRQ 2, 7, or 9 and MIDI Address 300. If digital samples do not play, try using DMA Channel 0, 5, or 6.

Chances are good that one combination of these values will get your system up and running correctly. Once you've determined values that work, write them down for later reference.

If you have an older piece of software that fails to operate properly with your sound card, don't panic. Some older software expects all sound cards to use IRQ 5. If you aren't using IRQ 5 and you have an older piece of software that refuses to play digital samples correctly, contact the publisher for an updated version.

Some people might wonder if you can install more than one sound card in a single computer. Theoretically, the answer is yes. However, multiple sound cards create the potential for additional interrupt and address conflicts and greatly increase the difficulty of configuring a fault-free system. I don't recommend it.

LOOK OUT! A JUMPER!

The method of changing the address, IRQ, and DMA values varies from card to card. In some cards, such as Creative Labs' Sound Blaster 16 ASP and Media Vision's Pro Audio Spectrum, the installation software automatically scans for conflicts, then modifies the settings until it finds a combination that works.

On other cards, such as Sound Blaster 16, you have to physically change tiny jumper connectors on the card itself. (This is why you should test the system before you replace the case cover.) Jumpers are small plastic blocks that connect two metal pins out of several that stick up from a small region of the card. Choosing and moving these tiny gizmos requires the mind of a rocket scientist and the hands of a child. But don't panic; you can do it. Remember to turn off the computer and either discharge any static electricity, or wear a grounding strap before changing jumpers.

In addition, changing these values in the software for cards such as the Sound Blaster 16 doesn't necessarily change the values in the hardware. When I installed a Sound Blaster 16 for the first time, I had the software correctly configured but not the hardware. When I ran *Windows*, I got error messages that did not identify the

incompatibility between the software and hardware setups. I had to physically change the onboard jumpers before the card was fully configured.

You're done when you can boot up the computer (including *Windows*) without error messages and play music and sound effects with the card's software. At that point, turn off the computer, replace the cover permanently, and get ready to boogie.

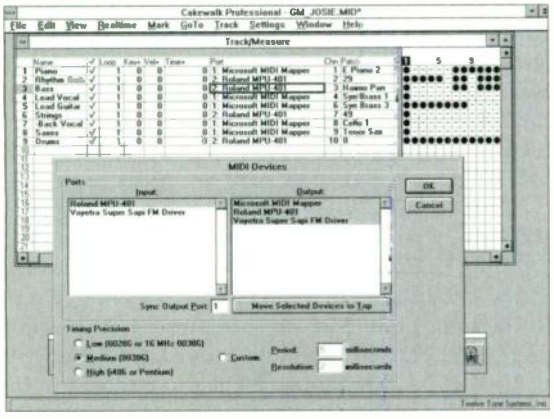

FIG. 3: In the Track screen of *Cakewalk Professional*, a MIDI sequencer from Twelve Tone Systems, each musical track is mapped to a MIDI port, channel, and synth patch.

Before we move on to software configuration under DOS and *Windows*, you might encounter one more jumper. Most cards have onboard low-power amplifiers that will drive small, efficient, desktop, stereo speaker systems. If you're connecting your sound card to an external amplifier or self-powered speakers, these small amps can overload your sound system or add unnecessary noise. On some cards, an onboard jumper can be changed to route the audio signal around the onboard amplifier and send a line-level signal to the audio output.

After installing the sound card, you may find that you've lost access to a sizable amount of RAM (random-access memory) that was previously available. Type "MEM" at the DOS prompt and read the "Largest executable program size." If the amount is less than 600 KB and you're using DOS 6.0 or later, try running *MEMMAKER* (which is included with DOS 6.0 or later) to recover most, if not all, of the missing RAM. Follow the instructions and prompts provided by the *MEMMAKER* program. If you need more explanation than this, you may want to have your retailer install the card, or you will continue through life using much less RAM than your system can provide.

DRIVING WITH WINDOWS

If you purchased a Sound Blaster-compatible card, it should work with most DOS software. In some cases, the card comes with DOS sequencing software (see "From The Top: Sequencers Made Easy, Parts 1 and 2" in the March and April 1992 **EM**). By and large, DOS compatibility requires little or no additional effort once your installation software has configured the system.

This is not true with *Windows*, because Microsoft designed it to be "easier to use than DOS." As a result, sound-card users encounter a new realm of confusion and complexity when they migrate to this graphic user interface. Sigh.

To effectively configure a sound card for *Windows*, you must become familiar with two programs in the *Windows* Control Panel: *Drivers* and *MIDI Mapper*. Your installation software has probably configured the *Drivers* program correctly. If you get a MIDI-related error when loading *Windows* or sound does not play, check the settings in *Driver*.

Load the *Drivers* program by double-clicking on its icon, which is found inside the Control Panel folder. Then look in the File dialog box for driver files used by your sound card. (They'll probably have some variant of the name of the card in their title.) Click once on the driver name to highlight it, then click once on the Setup button. Verify that the Interrupt, Address, and Channel values displayed are identical to the values you wrote down after you installed the card. (Don't say I didn't warn you to do that.) This should solve the problem. If it doesn't, make sure the hardware jumpers on the card are consistent with the expected values.

LOST WITH A MAP

The other *Windows* Control Panel program you need to know is *MIDI Mapper*. Confusing as it is, *MIDI Mapper* is actually an ingenious program. It creates compatibility between a wide range of *Windows* programs.

The three sections of *MIDI Mapper*

are quite useful. First, the Setup window lets you assign separate devices to each of the sixteen MIDI channels and select a Patch Map for each device (see **Fig. 2**). This lets you route each MIDI channel to individual devices, one device per channel, and ensures that each channel will play the proper patches.

In addition, the Patch Maps let you remap the patches of your synth or sound card to be consistent with other synths, typically using General MIDI as the patch-map standard (see "MIDI For The Masses" in the August 1991 **EM**). Using a Patch Map, you can be assured that a MIDI sequence calling for a General MIDI string patch will give you a string patch on a Pro Audio Spectrum, Sound Blaster 16, MultiSound, or any other card when played through the *MIDI Mapper*.

Finally, the Key Maps let you remap each key on the musical keyboard to any pitch. This lets you establish a consistent layout among various drum setups that feature a variety of percussion samples assigned to different pitches.

Usually, the installation software automatically creates Setups, Patch Maps, and Key Maps to work with your card. Unfortunately, this tends to wipe out any custom *MIDI Mapper* configuration you have already created. Once again, be warned.

If your sound card does not play or plays strangely under *Windows*, check the various *MIDI Mapper* sections to ensure that the system is finding the Device and Patch Maps in the *MIDI Mapper* Setup screen. Also, make sure that the selected Patch and Key Maps are customized for your sound card. For more information, you should consult the user manual for the sound card and/or *Windows*.

Most *Windows*-based sequencers also have the ability to route MIDI channels directly to individual devices, including sound cards, MIDI interfaces, or *MIDI Mapper*. These settings generally appear as Port settings in the MIDI Setup menu and the Track screen of the sequencer (see **Fig. 3**). Be sure these settings are consistent with your setup.

A little experimentation will help you grasp the powerful, if befuddling, functions of *MIDI Mapper*. In time, you'll see that *MIDI Mapper* and the ability to easily route MIDI channels to separate devices are among the reasons that *Windows*-based MIDI sequencers are becoming so popular and widespread.

MORE TO COME

Given the complexity of interaction between MIDI, computers, and sound cards, a single article can only leapfrog between the most common problems. Accomplished electronic musicians will undoubtedly find many problems not mentioned here.

Just remember this: Frustrating though they may be, most computer and MIDI problems can be resolved without harming software or hardware. With trial and error, a little careful thought, a call or two to technical support, and consideration of the issues raised here, only your frazzled nerves will be impaired at the end of the installation process. After they recover, you can start enjoying the music for which you bought these toys.

Bob Lindstrom *is a freelance writer, composer, and conductor who owns nearly every major type of computer available.*

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3DO Interactive Multiplayer

Why musicians should care about this latest techno toy.

By Michael Brown

And CD players were plentiful and multiplied and came to be the dominant means of reproducing audio programming throughout the land. Their power grew. In time, they were no longer satisfied with simply playing back music. They wanted to play back video, too. Shortly after attaining that ability, they evolved as far as any machine has evolved: They became interactive.

Being interactive doesn't necessarily render a machine sentient. On this planet, at least, it seems only humans have been blessed (burdened?) with that perk. CD-ROMs, however, feature the ability to permanently store massive amounts of data. And storage has been one of the biggest obstacles that has stymied the design of a cheap, powerful, interactive computer that the masses could reasonably afford.

3DO could be that machine. But why should musicians care about 3DO? It has no MIDI interface and no keyboard; it's a home entertainment system. The answer lies both in how music is created and how listeners experience it.

Like music videos, interactive CDs engage both the eyes and ears of your audience. Because they allow the listener to control and change the music as it is played back, interactive CD transforms the musical encounter from a passive experience to a dynamic, collaborative one. This technology, developed by the 3DO Company in San Mateo, California, is at once a new means of delivering an artistic product and a new means of artistic expression.

***CPU Bach*, from MicroProse, relies on 3DO's RISC CPU and DSP chip to algorithmically compose and perform Baroque-style music.**

NOT THE FIRST

3DO is not the first interactive CD product, and it most likely won't be the last. Philips' CD-i has been on the market for some time, and there are several relatively new interactive CD game platforms, including Sega CD and Commodore's CD32. These systems, however, are based on CPUs and operating systems that were developed

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.

No-compromise sound
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.

So take a second look to find the best value in effects processors — the ENSONIQ DP/4. For an even closer look, see your local Authorized ENSONIQ Dealer. Call 1-800-553-5151 for the one nearest you.

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

in the mid-1980s. (If you consider the CPU to be a computer's brain, you can consider its operating system to be its intellect.) Those systems have gone through evolutionary changes over time, but the fact remains that their underlying technology is almost ten years old. In the computer industry, ten years is an incredibly long time.

3DO offers some intriguing possibilities for interactive music, most of which had yet to be realized at the time of this writing. The problem with covering new technology early in its life cycle is getting around the paranoia (which is often justified) of those who jump on a new computer's third-party, product-development bandwagon. Everyone wants you to know how wonderful their new product is going to be, but no one is willing to provide enough details for you to fully understand what it's all about.

MORE THAN IMPROVED

Unlike the other interactive CD platforms now available, 3DO is based on a brand new 32-bit RISC (Reduced Instruction Set Computer) microprocessor. And 3DO's multitasking operating system was developed from the ground up, not inherited from another platform. (See "Tech Page: PowerPC" in the March 1994 **EM** and "Power for the Rest of Us" on p. 54 of this issue for discussions of RISC technology.)

3DO's brain, an Advanced RISC Machines ARM60 microprocessor running at 12 MHz, is a capable CPU in its own right, but it is tightly coupled with several other coprocessor chips that are dedicated to processing the audio and video elements of multimedia almost completely independent from the CPU.

DSP ONBOARD

One of 3DO's coprocessors is a digital signal processor (DSP), which you won't find on any other CD-ROM-based system. For musicians, the DSP is one of the most important elements of the 3DO design. Unfortunately, 3DO refuses to publish the complete specifications for this chip. "It's much like the powerful DSPs that are out now," says 3DO Software Licensing Manager John Edelson, "but I don't think we want the specifications out there."

Edelson did say that 3DO's DSP can mix eight individual audio tracks, with those eight tracks grouped into four independent stereo tracks that are finally mixed down into a single stereo track for output. Those tracks can come from either the CD or from the DSP chip itself. This is more than enough for the typical 3DO software title, which uses two tracks (left and right) for music, two for sound effects, and two for voice-overs. That leaves two other tracks open for internal sound synthesis.

NATIVE SYNTH CAPACITY

"We have several levels of functionality built into the DSP" says 3DO Co-Designer and Vice President RJ Mical. "There's system code that lives on top of the hardware that can algorithmically generate synthesized sounds, then there are a set of basic building blocks for generating sounds based on wave tables. This enables developers to define their own instruments. At the highest level is a set of predefined instruments the programmer can call on."

The DSP has its own mini-operating system, according to Mical, that the developer can use to address 3DO's sound-generation capabilities without

having to program the DSP directly. The number of voices that the DSP can generate is dynamic, Mical said, with 16-voice polyphony a comfortable limit. "It's not General MIDI," says Mical, "but it's pretty flexible."

Processing each of the audio tracks separately enables the end user to mute each of them independently, plus it simplifies the developer's task of producing titles with voice-overs in different languages.

Panasonic is the only company currently manufacturing a 3DO machine.

MIDI is fully supported in software, according to Mical, but a MIDI interface that will allow you to access and control 3DO's sound-generation capabilities from a MIDI device or computer, or allow 3DO to access or control a MIDI keyboard or other external sound module, is still only being talked about. The system also lacks a conventional typewriter keyboard. A game paddle is the only mechanism currently available for interfacing with the unit. Although several companies have announced plans to develop alternative input devices, including keyboards, mice, and trackballs (up to eight such devices can be daisy-chained together), no one has announced a MIDI interface yet.

ANIMATION

Without any additional programming at all, 3DO is capable of producing real-time graphics based on the audio output from a standard audio CD. "We have a lot of idle computer time when we play a CD," says Edelson. "So we throw some animated graphics up on the screen based on a real-time analysis of the audio stream coming in."

3DO features a palette of 16.7 million colors and two custom animation engines that are capable of moving as many as 64 million pixels per second. (Compare that to Commodore's CD32, which can move only 7 million pixels per second.) 3DO's engines organize graphic elements into "animation cels," hundreds of which can be independently moved, scaled, rotated, and distorted. The engines can move these cels around the screen as entities independent from the background image, much as a traditional animator would use individual pieces of art to create the illusion of motion on film.

VIDEO CAPABILITIES

3DO's CPU is theoretically capable of decompressing Cinepak video (the same video-compression algorithm used in Apple's *QuickTime* 1.5) on the fly to produce full-screen (640 × 480), full-motion (30 frames per second) video. In reality, there is too much aliasing (visual distortion) in Cinepak video for it to be displayed full-screen.

"Cinepak is good enough," explains Edelson, "if you're shooting special video to fit in the middle of an interactive experience. It's not good enough if your goal is to take any piece of video or film and play it back on a 3DO. To do that, you need hardware decompression, and that's what MPEG is about."

Adding an MPEG video cartridge to a 3DO machine tacks on another $249 to the cost of the system, but it enables

3DO supports Cinepak video-decompression software. This shot is from Software Toolworks' *20th Century Video Almanac*.

3DO to play back 74 minutes of MPEG-1 video (VHS quality) along with 74 minutes of CD-quality audio.

Although they offer more promise than reality, 3DO's animation engines should be able to lay their own graphics over the decompressed MPEG video as it streams into the 3DO system, lending yet another degree of interactivity to the system. This would make it possible, for example, for 3DO to generate interactive graphics in real time and lay them over MPEG music videos.

FORGING PARTNERSHIPS

3DO represents a new way of doing business. The 3DO Company is responsible for the design of the 3DO system, but it doesn't manufacture or sell the machine. Instead, it licenses other companies to manufacture and sell 3DO systems. The stated intent is to establish 3DO as a standard platform in the consumer-electronics industry much like VHS. The company's management reasons that if there is a single video-game platform for which to develop, software developers can focus on developing new and better titles, instead of diluting their resources trying to maintain compatibility with numerous, disparate systems.

Currently, Panasonic is the only company manufacturing a 3DO system (the $499 FZ-1 REAL 3DO Interactive Multiplayer), but AT&T and Sanyo have also announced plans to manufacture 3DO systems. The AT&T unit will incorporate technology that will enable 3DO users to play and talk with each other over existing telephone lines.

The 3DO Company derives its income from companies that sign on as software licensees, just like other video-game developers. Unlike the other game platform developers, 3DO offers each of its licensees the exact same royalty structure: The software developer pays 3DO $3 for each disc pressed.

"The royalty structure makes becoming a licensee approachable," says Keith Wood, a partner at Cognisense, Inc., in Dallas, Texas. "but it also makes it easy to access information. When you sign up as a licensee, it's easy to get information. It's not like Nintendo or Sega where you have to prove that you've got the financial wherewithal to pull it together in a short time frame. I talked to Sega and Nintendo before I decided to go with

Interactive CD-ROM Platforms

CATEGORY	3DO	CD32	Sega CD	Philips CD-i	Personal Computer
PRICE	$499	$399	$348	$499	$1,299 and up
CPU	32-bit ARM60	32-bit 68020	2 16-bit 68000s	16-bit 68070 (68000 equivalent)	32-bit 80486 (PC) or 68040 (Mac)
MEMORY	2 MB	2 MB	128 KB	1 MB	4 MB
MASS STORAGE	none	none	none	none	hard disk; floppy disk
CD-ROM	double-speed	double-speed	double-speed	double-speed	double-speed
VIDEO	NTSC S-video	NTSC S-video	NTSC Comp.	NTSC Comp.	RGB
COLOR PALETTE (total number that can be displayed)	16 million	256,000	64	128	256 or more
I/O PORTS	controller; expansion; MPEG cartridge; composite video out; S-video out; stereo audio out; RF out	controller; expansion; MPEG cartridge; composite video out; S-video out; stereo audio out; RF out	controller; composite video out; stereo audio out; RF out	IR controller; controller; composite video out; stereo audio out; MPEG cartridge; RF out	joystick; keyboard; mouse; printer; modem; RGB video out; stereo audio out

3DO; the access to information at those places did not exist."

ON THE FAST TRACK

With its powerful hardware, well-designed multitasking operating system, liberal licensing program, and powerful business partners, the 3DO player looks to be on the fast track to success. If the 3DO Company succeeds in establishing a standard for interactive CD systems, it will drive down the cost of interactive CDs and make that technology much more accessible. And if that happens, interactive music-video CDs could supplant audio-only CDs just as quickly as CDs succeeded LPs.

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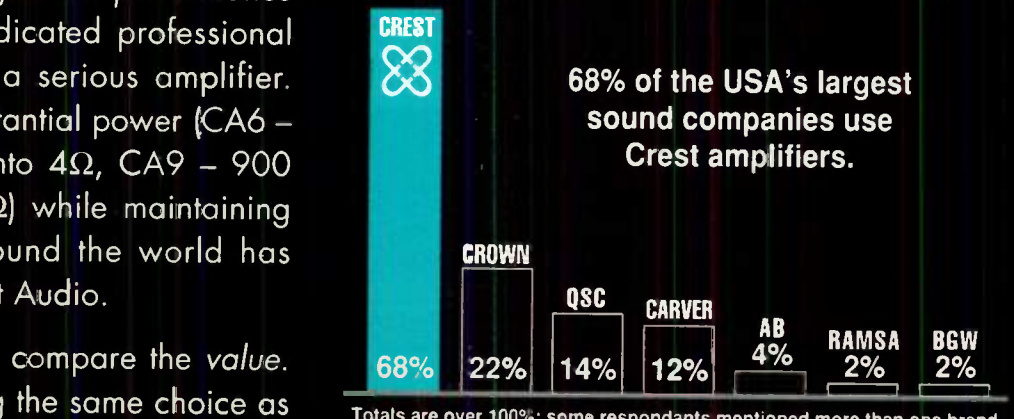

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Reviews

E-mu Morpheus Z-Plane Synthesizer

By Larry the O

At last, something truly new under the sun.

In recent years, we have become accustomed to rapid and spectacular advances in technology, bringing previously unattainable tools to the masses. Nevertheless, it is rare to find something truly new under the sun. When something new does come along, it takes a little getting used to. E-mu's Morpheus *is* something new.

On the face of it, the Morpheus is just another 1U rack-mount, multitimbral synthesizer module. A quick glance reveals a 2-line LCD, memory-card slot, volume control, data knob—all standard stuff. The voice architecture and user interface closely resemble the Proteus family, and it even has three stereo pairs of outputs (Main, Sub 1, and Sub 2), 32-voice polyphony, and 16-part multitimbral capability. New to the Morpheus are two onboard effects processors. However, a peek under the hood reveals that the Morpheus is not merely a nicer yacht, but a hotel hovercraft.

The Morpheus Z-Plane Synthesizer features the ability to "morph" between up to eight different complex, multiband filters.

MORPHING AROUND

The Morpheus sends ROM-based, sampled waveforms through a series of complex, resonant filters that consist of seven bands, typically configured as a 6-band, fully parametric EQ and a dynamic lowpass filter. Each set of multiband filter parameters is called a *Frame*. The Frames are preprogrammed to emulate the natural characteristics (formants) of specific acoustic instruments, the human voice, or completely new sounds. (The user cannot access the individual EQ settings.) For example, you could apply the resonant characteristics of vibes or piano to an acoustic guitar sample.

But the heart of the Morpheus is its ability to interpolate (perform smooth transitions) between Frames. This process, which is dramatically different from mere crossfading or cross-switching, is called *morphing*. You've undoubtedly seen video morphing in movies such as *Terminator 2* or music videos such as Michael Jackson's *Black or White*.

In the Morpheus, audio morphing lets you smoothly interpolate between two, four, or eight independent Frames. You can morph between two Frames, using a modulator (discussed shortly), then morph between those two Frames and another pair of Frames with a different modulator, and finally, morph between those four Frames and another set of four Frames with a third modulator. The result is a smooth, dynamic change between formants applied to the same waveform. You don't have to start at one Frame and simply morph to the other; you also can choose a Morph Offset that lets you begin the morph at any point between Frames.

A preset group of two, four, or eight Frames, along with all the morphing settings, is called a *Filter Type*. You can't program your own combination of Frames into a custom Filter Type; you choose one of 197 preset Filter Types and apply it to any waveform in the Morpheus.

To visualize what's going on, consider a 2-Frame Filter Type (see **Fig. 1**). Each Frame can be represented by a frequency-response graph, in which fre-

quency is charted on the horizontal (X) axis and amplitude is charted on the vertical (Y) axis. Imagine these graphs in 3-D space, one in front of the other. As you move the mod wheel or other continuous controller, a third frequency-response graph appears between the other two, moving forward or backward according to the position of the controller. The specific curve depicted in this third graph changes as it moves forward or backward, moving smoothly between the settings in the two original graphs. The "movement" of this third graph occurs along the front-back (Z) axis, hence the term "Z-Plane Synthesizer."

For example, the Filter Types labeled MovingPick1 and 2 can be used to simulate the change in sound when a guitar is picked in different places on the string. Bendup/Swap "features several series of tuned resonant peaks and notches which can seem to bend up or down in pitch depending on the settings," according to the manual.

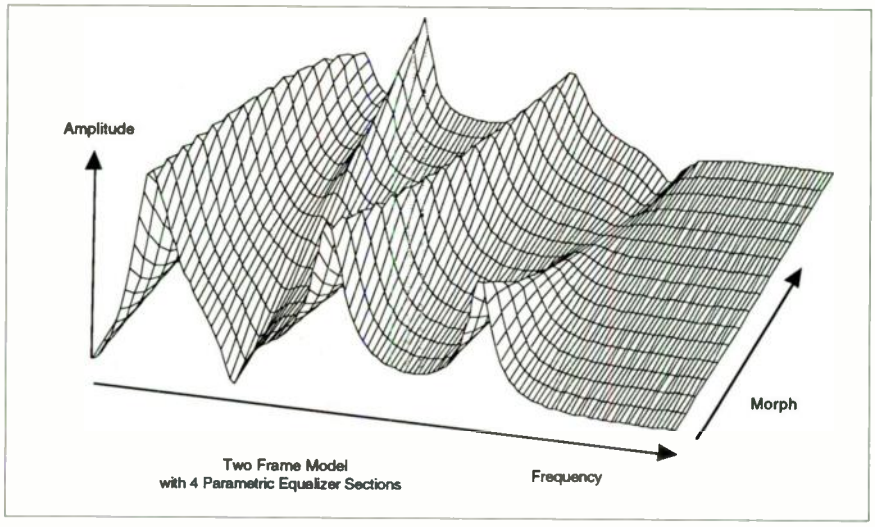

FIG. 1: The front and back of the diagram represent two filter Frames, each with three peaks and one notch. As you morph between them, the actual frequency response of the filter interpolates smoothly, moving forward and backward along the Z axis.

METAMORPHOSIS

You can control the morphing between Frames in a Filter Type with a wide variety of modulators. Automatic, programmable modulators include envelope generators (EGs) and 8-segment function generators (FGs). The function generators can act like fancy envelope generators, with a separate shape for each segment, or they can act like LFOs, with a wide variety of waveforms. There are several ways to introduce controlled amounts of randomness into these modulation sources, which is a common trait of acoustic sounds.

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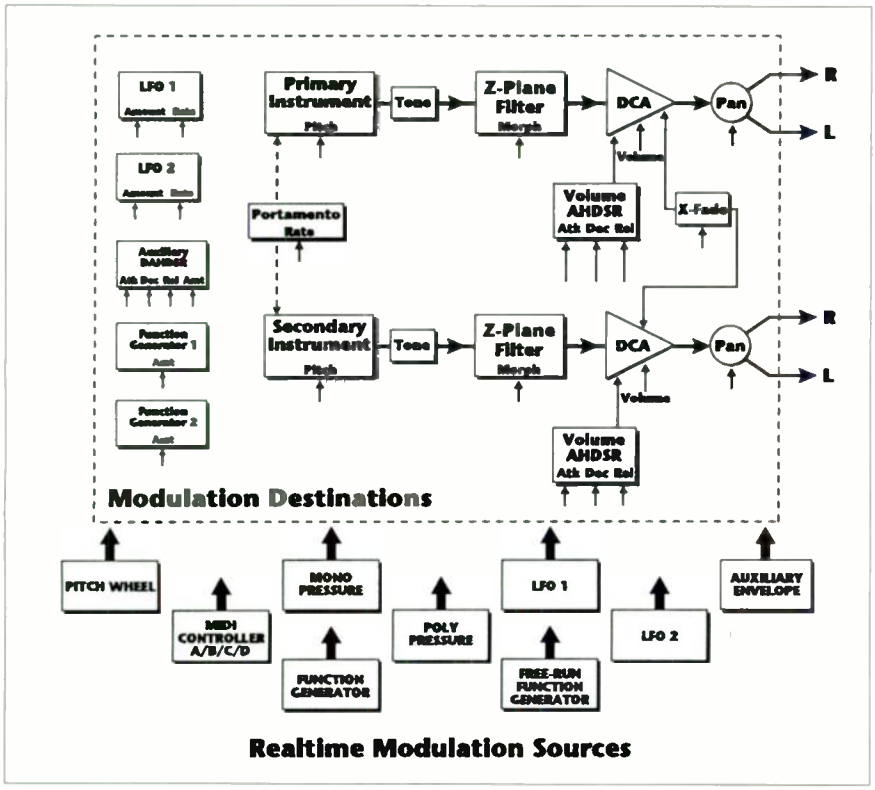

FIG. 2: The architecture of the Morpheus includes two identical signal paths. The Realtime modulation sources are joined by the Note-On modulation sources, which are not shown here.

The modulators are organized into two groups: *Realtime* and *Note-On*. Realtime modulators include all MIDI Control Change messages, while Note-On modulators include note number, Velocity, etc. Note-On modulators can also include an instantaneous reading of a Control Change value (e.g., the position of a control slider) at the moment a note is played. For example, this lets you simulate the effect of playing a drum at different points on the drum head by moving the slider to another position, without affecting the current sound as it decays.

Another common application of Note-On modulators is to morph between two Frames according to note number, which changes the filter characteristics as you play different pitches. The connection between timbre and pitch is another hallmark of acoustic instruments.

Morphing in each Filter Type can be controlled with no more than one Realtime modulator. For example, if you are using a 4-Frame Filter Type, you can morph between two of the Frames with a Realtime modulator, such as Modulation messages, while morphing between the other two Frames with a Note-On modulator. In an 8-Frame Filter Type, you can morph between two Frames with a Realtime modulator, while morphing between the Frames in the other two pairs with Note-On modulators.

SYNTH ARCHITECTURE

Of course, you must have sound sources in order to use this wonderful filter scheme, and the Morpheus is no slouch here. The unit comes with 8 MB of 16-bit samples (called Instruments) in ROM, expandable to 16 MB. You can even move the Start, Begin Loop, and End points around among the contiguous samples in ROM for rudimentary wave sequencing.

A Morpheus Preset consists of two identical signal paths (see **Fig. 2**), each starting with an Instrument that is passed through a simple, lowpass filter. This filter is a remnant of the Proteus sound engine, on which E-mu's Morpheus is based. Each signal then proceeds through its selected morphing filter, a digitally controlled amplifier (DCA) with its own EG, a panner, and an effects processor before reaching the outputs.

In addition, there are two LFOs (with five waveforms), two function generators, and an assignable EG for each Preset. You can also crossfade between the two Instruments in the Preset. Add this crossfading between sources to the elaborate crossfading of filters, and you get one more dimension of sonic evolution.

The Morpheus Presets sound interesting, but you can take them still further by combining up to sixteen Presets into a HyperPreset. Each Preset in a HyperPreset can be assigned its own key range, Velocity range, volume, and pan position. You assign a Preset or HyperPreset to each MIDI channel in a MIDI Map, which also includes settings for the two effects processors. There are 128 ROM Presets and 128 user-programmable RAM Presets, as well as 128 HyperPresets and sixteen MIDI Maps in RAM. An optional memory card can hold an additional 128 Presets, 128 HyperPresets, and sixteen MIDI Maps.

The effects processors are not identical. The A processor can perform about a dozen different reverbs in addition to flanging, phasing, chorusing, delay, and a couple of weird reverb-ish effects called "Rain" and "Shimmer." The B processor can perform distortion, flanging, phasing, chorus, delay, and ring modulation. I would put the Morpheus' workaday reverb on par with the Alesis Quadraverb. For live performance, it will do fine; for a featured part in the studio, you'll probably want to reach for something a little finer. The other effects all sound excellent and have some interesting algorithms.

THE SHAPE OF HISTORY

As I explored the Morpheus and tried to grasp its operation, I felt a familiar chord being struck. The large Moog modular beasts on which I learned electronic music had the flexibility to hook just about anything to anything and had the fattest sound this side of a championship Sumo wrestling match. After the Minimoog appeared, some aspects of synthesizers—especially modulation capabilities—began to shrink for the sake of expediency and cost-effectiveness. When the Oberheim Xpander came out, it seemed to buck this trend with a fat analog sound, extensive modulation, and the addition of a more powerful MIDI implementation than anything else at the time.

I see the Morpheus as the next link in this chain. The freedom to build a new sound by trying various ideas and rolling with the result is half of the

unit's strength. I am particularly impressed with the flexibility of the function generators. There are no less than 63 shapes for FG segments. In addition, a separate conditional test (Is the note still sounding? Is it higher than note number x?) can be applied to each segment, the outcome of which can cause the segment to be skipped or jumped to.

The FG segment shapes go far beyond variations on linear and exponential curves. For example, there are 27 shapes that fall into the category of Chaos or Random. The Chaos shapes are essentially linear, but their precise values can vary randomly within a specified range (although this range is not user-programmable). Chaos 03 is not too far from linear, while Chaos 99 is all over the place.

The Chaos and Random shapes are excellent for introducing random variations into a sound, and the large number of shapes provides a lot of choice in the quantity and quality of randomization. The LFO Variation parameters introduce controlled amounts of randomness to periodic events such as vibrato.

The other half of the Morpheus' strength is its sound, which evokes the image of an old Oberheim or Roland analog synth crossed with a PPG Wave and fed a diet of steroids and psychedelics (at least, that's what it sounds like to *me*). The Morpheus' real beauty emerges with the use of controllers such as note number, Modulation, etc. When they are well programmed and well performed, controllers put a lot of expressiveness literally in the user's hands, which is where it belongs.

PROGRAMMING

The challenge of the Morpheus arises from the same source as its strength: the breadth of possibilities it offers. The learning curve is quantitative, not qualitative. It's not that difficult to understand the features, but familiarizing yourself with 197 different Filter Types and finding the most effective combination of morphing and crossfading are daunting tasks. Unquestionably, programmers will love this machine.

E-mu has provided some excellent tools to facilitate programming. For example, extensive copy and paste capabilities let you copy crucial portions of a Preset (such as settings for the LFOs, modulators, or filters), complete Presets, and HyperPresets. The manual is well written, skillfully intermixing reference and tutorial information more effectively than I've seen before. However, the sheer quantity of information is so overwhelming that it is somewhat abbreviated just to keep the manual down to a not-so-svelte 250 pages. It will be a great boon when editing software and books on Morpheus programming are published.

For those who aren't into programming, there are a lot of interesting Presets, but even they require a fair amount of fooling around if you want to get a grip on using the controllers. It takes some time working with the unit to catch on to its ways, develop sounds, and become comfortable with modulation patching. I would be surprised if a fairly brisk trade in Morpheus Presets and HyperPresets on memory cards or floppy disks didn't pop up quickly.

THE AGE OF MORPHEUS

I see the Morpheus as the dawning of a new age in synthesis that might finally provide sounds with the depth and quality to fulfill the promise synthesizers have held out since the mid-1960s. The Morpheus sounds excellent and is extraordinarily powerful. Even at $1,495, I think it's a great deal.

A magazine review cannot hope to do justice to a device of this complexity. I strongly recommend that you get a good demo (which requires finding someone who really understands the thing) before making a purchase decision.

The only tradeoff Morpheus presents is the old "power vs. ease of use" syndrome.

Product Summary

PRODUCT:
Morpheus Z-Plane Synthesizer
PRICE:
$1,495
MANUFACTURER:
E-mu Systems
1600 Green Hills Rd.
Scotts Valley, CA 95066
tel. (408) 438-1921
fax (408) 438-8612

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

• MORPHEUS

Don't get me wrong, it's not hard to *use* Morpheus, but it is complicated to program. However, there is no question that it is worth the effort. Even if you can't buy one right now, make a point of checking it out; you'll be delighted and amazed.

(Special thanks to Clark Salisbury.)

Larry the O *performs with 11:11 and Ascot Jacket (along with* **EM** *editor Michael Molenda) and edits sound at Wave Group Sound for ABC's "Bump in the Night."*

Circle #437 on Reader Service Card.

Opcode Vision 2.0 (Mac)

By Dan Phillips

Who says ease of use must be traded for professional features?

Over four years ago, Opcode's *Vision* made a big splash as the first Macintosh sequencer to offer both graphic, piano-roll editing and an event list. The other major programs offered only one or the other. In the intervening years, the competition has followed Opcode's lead, and multiple editing views are now the norm. In fact, all the major programs have advanced to the point that a cynical observer might think *Vision* 2.0, with its new Track Overview and Notation views, is merely playing catch-up. Features aren't everything, though, and in the end it's ease of use that makes *Vision* 2.0 a success.

BIGGER, BETTER, COOLER, FASTER

The first thing that experienced Visionaries will notice when booting version 2.0 is that the interface has been revamped in a 3-D style reminiscent of the NeXT computer, with extensive use of grayscale and color. The jumble of typefaces that characterized the original *Vision* has also, thankfully, been streamlined. It's a tad less distinctive, but much easier to read. Many dialog boxes still use the older style and fonts,

but I'm told that the rest of the program will be revamped as time permits.

Vision 2.0 also adds a fantastic Track Overview window, notation editing and printing, groove quantize, MIDI Machine Control, a redesigned user interface, and a new timing structure that Opcode says improves both MIDI and user-interface performance. Because **EM** last reviewed *Vision* in its initial release (see the August 1989 **EM**), I'll give the entire program a once-over.

SEQUENCES AND SUBSEQUENCES

Vision's basic organizing structure is the Sequence. Each Sequence contains a virtually unlimited number of Tracks, and each Track holds MIDI data for one or more MIDI channels. Previously, *Vision* allowed a maximum of 26 Sequences to be open at a time (one for each letter of the alphabet); *Vision* 2.0 allows for an unlimited number of Sequences in a file. Multiple Sequences can be played simultaneously, with independent meters and tempos, if desired, which could be really handy for overlapping film/video cues, as well as for avant-garde compositional experiments.

Sequences can also be placed within a Track; doing this creates what *Vision* calls a Subsequence. Once placed in a track, Subsequences can be copied and moved just like other MIDI events. Edits to one copy of a Subsequence are applied to all other copies; discrete, independent copies can be made by "cloning." This all makes glorious sense in combination with the new Track Overview.

THE BIG PICTURE

The Track Overview (see **Fig. 1**) is a major highlight of *Vision* 2.0. It gives a thumbnail graphic overview of as many tracks as you can fit onscreen and lets you perform any of *Vision*'s edit operations—cutting and pasting, quantizing, and so on—on a macro scale. Other Macintosh sequencers offer similar views, falling roughly into two camps: Some offer a Block view, in which each measure (or other section of time) is represented by a block on the screen, which can then be selected for editing, dragged to move or copy, and so on. Others are based around groups of patterns and allow you to view and manipulate a glob of MIDI data as a logical entity, such as "verse 1 drums" or

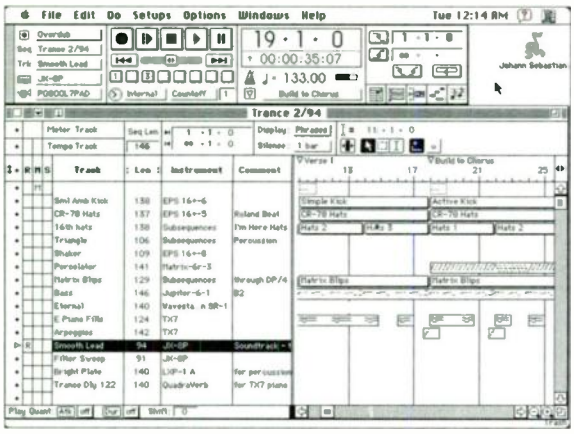

FIG. 1: One of *Vision* 2.0's major highlights is the Track Overview screen. Subsequences (Simple Kick, CR-78 Hats, etc.) are shown on the right. The window is in Phrases mode, so non-Subsequence events are shown as mini piano rolls.

"bridge sax." Opcode's *Vision* 2.0 does—drum roll, please—both, and a little more on the side.

Vision's Track Overview has three basic modes—Blocks, Phrases, and Tracks—which are toggled between from a menu at the top of the window. Blocks mode divides the music into evenly spaced sections from as small as an eighth note to as large as sixteen bars. Sections containing events appear as shaded boxes, and those without events are clear. Phrases mode creates groups of notes based on the gaps between events, so that a pause of, say, a quarter note will separate one phrase from the next. (The size of the gap is user-selectable, of course.) Tracks mode simply shows the entire track as a single block, so that it can be selected with a single mouse-click. You can shift between modes easily and instantly.

A separate menu selection, Detailed Track Overview, switches from the simple, shaded/clear approach to one that shows tiny, graphic, piano-roll representations of the notes (or other data) in the blocks. This is a nice touch that applies to all three modes.

Once you've chosen a display mode, you can select blocks by clicking on them individually, or by dragging around a group of them with the Marquee tool (the dotted, rectangular box at the top of the window). Discontiguous selection is also supported. Dragging moves blocks in time, or between tracks; option-dragging creates copies of the selected blocks.

As in all of *Vision*'s editing windows, a cursor quantization option is always available at the top of the window. This doesn't quantize MIDI data, but restricts the cursor's selection and movement of blocks to user-selectable time grids. (*Vision*'s resolution is 480 pulses per quarter note, which is a mite fine for moving entire measures around.) If you want to take a few bars of music and drag them two bars later, for instance, you don't need to make sure that your cursor is landing directly on the bar lines; just select cursor quantization of a whole note (for standard 4/4 time, at least), and as long as you're in the right bar, everything will work out right.

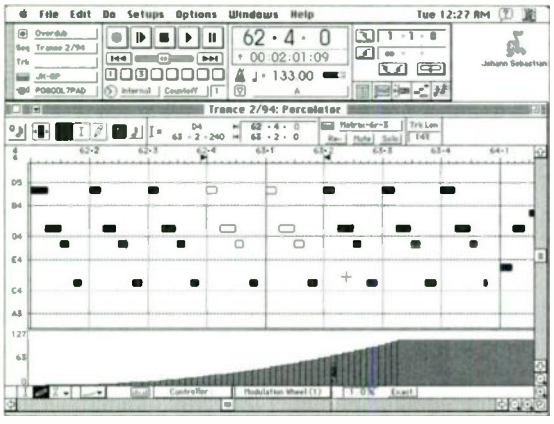

FIG. 2: *Vision*'s Graphic, or piano-roll, editing window. Selected notes are indicated by gray boxes. The Strip Chart in the lower half of the window shows a sweep of the modulation wheel. The icons at the bottom left are the Strip Chart editing tools.

Events retain their position relative to the beat regardless of the cursor quantization. For instance, if a phrase starts twenty clocks after the downbeat, and you move it with cursor quantization set to a whole note, after the move the phrase will still start twenty clocks into the bar.

The Track Overview has been added to the Sequence window, which has been renamed the "Tracks window." It allows you to view and edit each track's

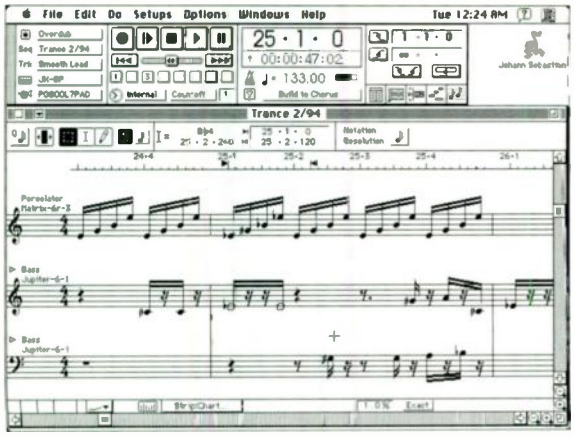

FIG. 3: The Notation Editing window allows you to view, edit, and print in standard notation. Here, the bass part is spread out over a grand staff. You can change the transposition of parts for easier viewing without affecting the actual MIDI data.

name, MIDI instrument assignment, comments, solo, mute, record status, and other track parameters. This information now appears in the left part of the window, with the Track Overview on the right. If you need a little more space for editing or want to view more of a track's comment line, the dividing line between the two may be dragged to show more of one side than the other. *Vision* 2.0 also adds the ability to change the order of the Tracks by simply dragging them to a new position in the list.

I wish that the Tracks and Track Overview portions of the window were more highly integrated. The manual refers to them as "two windows in one," which is how they behave sometimes: as if one doesn't always know what the other is doing. For instance, an entire track can be selected by clicking on a dot to the left of its name, allowing any edits to apply to the track as a whole. However, if part of the track was previously selected in the Track Overview, those blocks will deceptively remain highlighted.

In addition, the start and end points for an edit region can be set at the top of the window, or by dragging over the time ruler in the Track Overview, but these only apply to currently selected Tracks. If you set the points and then choose another Track, the points will not apply to the new Track.

SUBSEQUENCING

What really puts the Track Overview over the top is the ability to work graphically with Subsequences. Just drag a Marquee around several measures of one or more tracks, choose Make Subsequence from the Edit menu, and you're off and running. The new Subsequence appears in the Track as a shadowed box with an alphabetical label (A, A1, A2, and so on).

Subsequences can be copied to other places in the track by Option-dragging, or opened by double-clicking. Naturally, opening reveals another Track Overview window, with the Tracks already named as they were in the main Sequence. Subsequences don't have to start and end on measure boundaries, which is great if, like me, you tend to have notes anticipating the downbeat by a few clocks.

Subsequences make it possible to work with *Vision* in a number of ways. The simplest technique involves recording your data into individual Tracks and working with the music in a linear fashion, emulating a multitrack tape deck. You might also define a short section of one Track—say, the hi-hat part for the verse of a song—as a Subsequence, and then copy the Subsequence for all of the different verses. Not only does this make dealing with the section easier, because you only need to grab onto a single block, but any edits you make to one of the copies will be instantly reflected in all the others. Very handy.

You can also work by breaking up your piece into sections—for instance, Intro, Verse, Chorus, and Break—and making them into separate Subsequences that can be dragged and copied to build the song structure.

Finally, you can put together a set of entirely different pieces—cues in a film score, for instance—each with its own tempo, meter, and so on, and have them all play back one after another, or overlapping, or even simultaneously. Being able to use all of these techniques with a single sequencer is good; being able to do so in combination with each other and in the same window, with the same interface, is simply beautiful.

It would be nice, though, to have easy methods for merging Subsequences together or cutting them into pieces. Steinberg's *Cubase* and Emagic's *Logic* allow you to do this kind of thing in their Track Overview with Glue and Scissors tools. I also wish it were possible to name Subsequences directly from the Track Overview; currently, you have to enter the Track's Event List and name them there. There also seemed to be a few small bugs in my release version, one of which caused Subsequences to appear longer than they actually would play, but these didn't cause major problems.

GRAPHIC EDITING

The Graphic Editing window (see **Fig. 2**) shares a set of core features with all of *Vision*'s graphic editing windows (including Track Overview and Notation). This consistency really helps when learning your way around the program. Dragging the Marquee tool creates a rectangular selection box that can select events within a range of time and value (from E2 to C3 in the first half of bar 1, for instance). Command keys used along with the Marquee allow you to resize the current selection rectangle, or select discontiguous regions. The I-Beam tool, on the other hand, quickly selects all events within a time range, which is handy if you just need to snag all events from bars 6 through 10. To zoom in on a group of events, you just Option-drag a rectangle around them.

Vision divides the notes into three

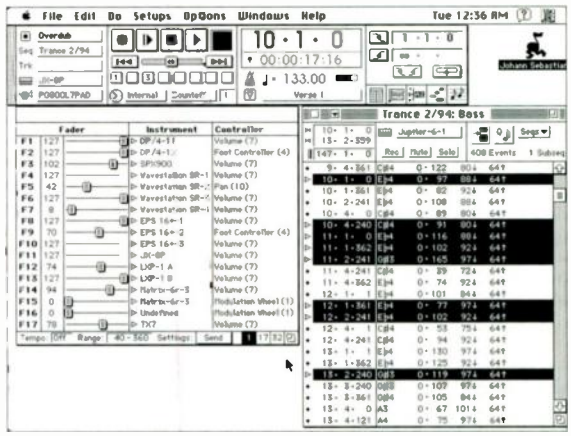

FIG. 4: *Vision* has 32 faders that can send any controller to any MIDI device, or control *Vision*'s tempo. Faders can also remap controller data in real time. The Event List allows numerical editing of MIDI data; notice the discontiguous selection.

areas, and which third you click in determines how mouse movements will modify the data. Clicking on the start of a note allows you to adjust its start time; clicking in the middle changes its pitch; and clicking on the end allows you to adjust its duration. This takes a little getting used to, but it's nice to be able to affect one part of the data easily without worrying about the rest. A numerical display of the selected note's Velocity, start time, and duration would really enhance this window; convenient editing of individual Velocities currently requires a trip to the Event List window. An Exact mode, toggled with an onscreen button, brings up a dialog box after every edit operation, allowing you to enter precise numerical values.

Cursor quantization is available in all the editing windows. I wish it maintained separate values for the Track Overview, where I tend to use coarse values in the area of a whole note, and the other event-level windows (Graphic, Notation, and Event List), where finer resolutions are often more appropriate.

NOTATION EDITING

In addition to the familiar Graphic and Event List editing windows, *Vision* 2.0 adds a Notation editing window (see **Fig. 3**), which allows you to view, edit, and print using standard music notation. *Vision* uses Adobe's Sonata font for display and printing, so output is clean and crisp, even on my little

Product Summary

PRODUCT:
Vision 2.0
PRICE:
$495
SYSTEM REQUIREMENTS:
Any Macintosh with 4 MB of RAM; System 7 or higher; hard disk; MIDI interface
MANUFACTURER:
Opcode Systems, Inc.
3950 Fabian Way, Suite 100
Palo Alto, CA 94303
tel. (415) 856-3333
fax (415) 856-3332

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

• VISION 2.0

StyleWriter (Apple's 360 dpi bubblejet printer). This part of the program isn't meant to replace a dedicated notation package; if you intend to produce polished scores, you'll need to get another tool. However, it's fine for printing out readable parts and allows some basic page-layout controls, including number of measures per line; spacing between staves and systems; title and author text, with a user-selectable font; page numbers; margin sizes; and so on.

I also like to use standard notation for some of my editing tasks and was happy to find that *Vision* performed well in that area. Unlike the other event-level editing windows, the Notation window allows multiple tracks to be viewed at once, which is convenient for cutting and pasting notes between tracks. As with the other editing windows, you can zoom in and out to view fine details or get a basic overview of the Tracks, and using *Adobe Type Manager* the display is reasonably smooth at all levels.

THE STRIP CHART

Even though it might sound like a step-by-step manual for exotic dancers, the Strip Chart (see **Fig. 4**) is actually a pull-down part of the Graphic and Notation windows that lets you graphically view and edit continuous controllers, note velocities, and tempo information. (Text-based events, such as Program Changes, also appear here.) One type of data can be selected at a time. You can scale regions of data by a percentage, add or delete amounts, apply maximum and minimum values, and so on. *Vision* allows you to adjust the density of controller information as a percentage of MIDI's total bandwidth, which is a good, user-friendly touch.

Certain scaling operations are available from *Vision*'s Do menu, but the Strip Chart is the only place that you can scale data from one value to another over a period of time. Examples of this are accelerandos, decelerandos, crescendos, and diminuendos. Different tools can be selected for linear changes or parabolic curves. You can also draw changes in Free (freehand) mode, or apply random changes to a region. I was able to crash the program pretty consistently by drawing dense, freehand tempo changes, but this is not a common application.

Because Exact mode is available here, bringing up dialog boxes for numerical

tweaks on the graphically entered changes, I don't quite understand why these options aren't also available from menus.

GROOVE THE GRID

Vision's quantization functions are as good as I've seen, providing all the requisite parameters for creating good-sounding, musical results. User-defined tuplets or arbitrary grids are available, along with standard eighths, sixteenths, etc., and duration quantization is separately adjustable.

A bevy of "S" parameters (Sensitivity, Strength, Shift, Swing, and Smear) help fine-tune the effects of quantization. Sensitivity sets how close to or far from the grid a note must be to be quantized. Strength allows you to drag notes a percentage of the distance to the grid, while preserving some amount of feel. Shift lets you build time offsets into the quantization for feel, or to compensate for slower attack times. Swing shifts every other grid line forward or backward to create shuffle or pushing feels. Smear adds small amounts of randomness to the quantization.

In addition to the normal, evenly spaced grids, *Vision* 2.0 adds a new Groove Quantize option. Like similar options made popular by *Cubase* and *Logic*, Groove Quantize works with a user-defined stream of rhythms, instead of an evenly spaced grid, allowing you to instantly apply different rhythmic feels to your tracks: shuffles, in-the-pocket, rushing, etc.

All "S" parameters are available when working with Grooves, except for Swing, which wouldn't really make sense. In addition to Note-On rhythms, a Groove can impart both Velocity and durations to a track (with user-adjustable amounts, of course). The addition of Velocity is very hip and makes a genuine difference with some of the preprogrammed Grooves. Duration doesn't apply to most percussion tracks, but could be used with comp parts to make "Da Da Da Da" into "Daaaah Da Daaaah Da."

Vision comes with a large set of Grooves, including many "human" feels from Groove pioneers DNA, and has templates for simulating the Linn 9000 and Akai MPC-60 drum machines. You can also add your own Grooves, of course, and best of all, the tools for editing Grooves are the same as those for editing normal MIDI data. (What a concept!) *Vision*'s Grooves, you see, are simply taken from tracks in a normal *Vision* file (named, appropriately, "Vision Grooves"). You can open and edit this file just as you would any other. Unfortunately, you can't directly take one track in a sequence and apply it as a Groove to another track; you'll have to copy it into the Grooves file first.

I AM NOT A NUMBER!

Vision tries, as much as possible, to shield its users from the numbers and codes that make up MIDI. To this end, almost all data can be viewed and edited graphically, and plain English names and labels are used wherever possible. For starters, *Vision* works in conjunction with Opcode's *Open Music System* (*OMS*), allowing you to call up the MIDI devices in your studio by name (such as Wavestation SR 1 or DP/4), instead of having to remember channel and cable numberings. On top of that, *Vision* has so many other options for assigning names to MIDI events that it has a Names window.

You can name each note on each MIDI device, which is great for keeping track of the sounds on a drum machine. Controllers are referred to by their normal MIDI names by default, such as Modulation Wheel instead of Controller 1, but you can also give controllers application-specific names, so you don't have to remember which controllers do what for a given synth program. (You could rename "Mod Wheel" as "Reverb Time," for example.)

If you use Opcode's *Galaxy* or *Galaxy Plus Editors* as a librarian (and you probably will, as *Galaxy* is included free with *Vision*), *Vision* can subscribe to your stored SysEx data and display programs by both name and number. Once you subscribe to a particular *Galaxy* file, if you change the data in the file (by copying new programs into a bank, for instance), *Vision* will update its program names accordingly.

Unfortunately, this scheme doesn't work well with synths that use the Bank Select controller to access more than 128 different programs. *Vision* will only show 128 names in a list, and selecting a program from the list will not automatically send the necessary Bank Select commands. Opcode is aware of this difficulty and will no doubt address it in the future.

WORDS CANNOT DESCRIBE

It's difficult to fully convey the capabilities of a program as complex as *Vision*, so I'll summarize some of the larger points that would otherwise go unmentioned. *Vision* 2.0 adds support for MIDI Machine Control for external control of late-model multitrack decks, including the Alesis ADAT. Highlights include a Remote Console window on the Macintosh screen, with autolocation and punch-in/out capabilities. Unfortunately, I wasn't able to test these functions.

The incredibly powerful Select By Rule command allows you to select data based on a wide range of criteria, including a number of logical options (for example, Is or Is-Not a particular value and Is or Is-Not between two values). Events can be selected based on whether they are between two other, arbitrarily defined, events (such as Sustain Pedal down and up), or by metric placement. Although it is reasonably simple to use on the surface, it is also incredibly deep and quite valuable to insatiable tweakers.

Generated sequences let you apply the pitch data of one track to the rhythm data of another for arpeggiator-like patterns or serial composition techniques. *Vision* also allows a significant amount of real-time interaction via MIDI and the Macintosh keyboard, including the use of MIDI events to trigger entire sequences, splitting incoming controller data to different "thru" instruments, and mapping of Pressure to Velocity for Linn 9000-style repeated note entry. Of course, adding Opcode's Studio 5 interface brings a whole new meaning to the term "real-time MIDI processing," but that's outside the scope of this review. (The Studio 5 was reviewed in the March 1992 issue of **EM**.)

Unfortunately, I don't have space to discuss the unglamorous, but extremely useful, Event List (see **Fig. 4**), which presents a text-based list of MIDI data, or the Markers pop-up menu in the Control Bar, which shows the current Marker position and allows easy relocation elsewhere in a sequence.

However, I must make room for a few miscellaneous comments on the down side. *Vision* supports multichannel recording, but all channels will be recorded into a single track. There are some decent work-arounds for this, but MIDI percussion work, in particular, would be simplified by supporting simultaneous recording into multiple tracks. *Vision*'s faders are serviceable, but seem a little underpowered in comparison to those of *Performer* and *Logic*, for example. The ability to send out SysEx messages would be particularly welcome here.

IT'S THE INTERFACE, STUPID

For the technology-minded, it's easy to get caught up in the game of Creeping Featuritis, in which "more features" equals "better." In reality, though, it doesn't matter how many features something has if they're too complex to understand, or too difficult or tedious to use. *Vision* manages to keep many of its functions on the surface, which really increases its usability. I'm even convinced that its unusual Numericals, initially a source of annoyance, are now helping me to work faster and easier. (Numericals allow you to edit most numerical values by dragging the mouse, similar to moving a fader, or increment and decrement by mouse-clicks on the top or bottom of the value.)

When I began working with *Vision* 2.0, I carried with me eight years of experience with another sequencer. Quite frankly, in the beginning, I found many aspects of *Vision* to be strange, not necessarily because they were fundamentally wrong, but just because they weren't what I was used to. Given that starting point, I'll have to admit that I (and more than a few of my musical friends) am startled at the outcome: I've decided to switch to *Vision*, at least for awhile.

Vision 2.0 offers a unique combination of power and ease of use. There's simplicity for the user who wants to get to work immediately, along with the depth a power user craves. Once Opcode straightens out the few anomalies mentioned earlier, this package will be hard to beat. Those of you looking for a professional sequencer, or even those who are already using another one, owe it to yourselves to give it a test run.

(Thanks to Patrick Feehan for his thought-inducing input.)

Dan Phillips *works for Korg Research and Development and spends entirely too much time with his sequencer.*

Circle #438 on Reader Service Card

Lexicon Vortex

By Larry the O

A unique effects processor with a bent for the bizarre.

Transformation is in the air, and morphing—smooth transformation between dissimilar states—is all the rage. Arnold Schwarzenegger's little tag-team Terminator buddy did it whenever somebody shot, burned, or conked him. You see morphing in fancy car ads, and you can hear it in the new E-mu Morpheus synthesizer (reviewed on p. 104).

Doing what they have done well for years, Lexicon has applied this concept to modulation and delay effects. The resulting combination of delay, modulation, and morphing makes the new device capable of wild swirling effects, hence it's name: Vortex.

In an interesting recognition of the market, the Lexicon Vortex Audio Morphing Processor is clearly an effects processor for performing musicians, as opposed to Lexicon's usual studio clientele. With its $479 list price and extremely simple design, the 1U rackmount Vortex is within easy reach of any musician in search of new and different sounds.

INTO THE VORTEX

The Vortex comes with 32 factory Presets in ROM that contain A and B versions of sixteen effects and associated parameter settings. Thirty-two user RAM locations, which Lexicon calls "Registers," are provided for storing your programs. (I'll use the term "program" to refer to the contents of either a Preset or a Register.)

Each of the Vortex's 32 different delay-based effects algorithms can be assigned to be part of the A/B effects pair. Morphing occurs between the A and B effects over a programmable period of time, or morph time can be controlled continuously from a footpedal. You can trigger morphing from a footswitch, or the front panel.

A particularly useful aspect of the Vortex is its powerful implementation of Tap Tempo, which lets you set the

overall length of the delays with two successive taps of a footpedal or front-panel button. You can set up the delays in musical relationships by tapping in the delay time so that at the chosen tempo, the full delay period represents a whole note, quarter note, etc. The delay time can then be subdivided according to a programmable value from 1 to 64. Subdividing a whole-note delay, for instance, provides half notes, quarter notes, and so on.

You can even tap in an interval that is much longer than the Vortex's maximum delay time, so you can synchronize echoes to musical phrases and single beats. If the delay value for a tempo/rhythm combination is greater than the maximum memory available, the Vortex automatically divides the large value in half until it fits, preserving the rhythmic feel.

Because you can set up two separate delays with independent delay times for each A and B effect, you can use the subdivisions to create polyrhythms, such as 3 against 2, which could open up unimaginable rhythmic possibilities when morphed. The Tap Tempo setting is global, but the subdivisions are programmable for each program.

An envelope follower gives dynamic control over one parameter per effect as a function of the input signal's amplitude, but the user cannot select the parameters under envelope control. A footpedal can be used to control one user-selectable parameter in real-time.

PERUSING THE PANELS

The front panel is simple: an input-level knob (with signal present and overload LEDs); Pedal/Tap button, which selects footpedal control of a parameter or allows Tap Tempo entry; a 16-position parameter-select knob; Store and Clear buttons; a 2-character display (with a few status LEDs); an A/B switch for selecting Preset or Register banks, or activating the rear-panel, channel-switching output relay; a parameter-value knob; the Register/Preset switch, with LED; and a 16-position Register/Preset select knob. That's it. I would prefer a power switch, but I suppose this was an area where Lexicon figured they could shave a few cents.

On the rear panel are the stereo, unbalanced, ¼-inch phone inputs and outputs; a power connector; two ¼-inch TRS footswitch jacks; a footpedal jack; and an A/B switching output. The

power connector accepts the nefarious 9 VAC "wall-wart" outboard transformer, which takes up at least two outlets in any strip.

The footswitch jacks are of the TRS type, because each jack is intended to service a dual footswitch. (One dual footswitch is supplied with the Vortex; the other is optional.) One jack is for a Bypass switch and a Register Step switch (for stepping through programs), while the other accepts switches to control the Tap Tempo and trig-

▼

Given the general nature of Vortex as a "weird" effects box, some of the artifacts produced by morphing are pretty cool.

ger A/B morphing.

The footpedal jack accepts a user-supplied, standard expression pedal (Lexicon supplied a Roland EV-5 for my evaluation), which can be assigned to control any one parameter, including morphing. If the footpedal is assigned A/B morphing, it can control the value of both sets of sixteen parameters at once, with independent scaling and polarity for each. If the pedal is assigned to one of the other parameters, the full range of the pedal is mapped to the full range of the parameter.

The last rear-panel jack is a switch output for connection to the channel-switching jack on 2-channel instrument amplifiers. This makes it easy to do things like switch amplifier and effects from a rhythm sound to a lead sound with a single footswitch.

This type of coordination is often achieved through MIDI, but most guitar amplifiers do not have MIDI, and neither does Vortex. Lexicon, in searching for ways to bring their high quality of effects processing to a lower

Lexicon's Vortex applies the transformational power of morphing to delay and modulation effects. The results are often unpredictable but can be mind-bendingly spectacular.

price point, has obviously concluded that one way to bring costs down is to eliminate MIDI. They believe that the musicians who are Vortex's primary market are not that immersed in MIDI, and they may be right.

Vortex's lack of MIDI does, however, reduce the number of neat tricks that can be done with it in a studio environment, especially a MIDI-oriented home or project studio. For instance, it would be nice to trigger morphs between effects from MIDI.

INPUT CONFIGURATIONS

Although it is a true stereo device, the Vortex can, of course, also be used with mono inputs or outputs. This brings up the curious way it treats its audio inputs. The 32 effects algorithms are divided into five input/output configurations: Stereo In/Stereo Out, Dual Stereo In/Stereo Out, Dual Mono In/Stereo Out, Dual Mono In/Dual Mono Out, and Mono In/Stereo Out. In case you're wondering how one can have Dual Stereo Inputs when there are only two input jacks, "Dual Stereo" means that each channel input is internally split and sent to the inputs of two parallel stereo effects.

Although this input/output configuration system is pretty straightforward, I found it a little tough to anticipate the ramifications of morphing from an effect with one configuration to an effect with a different one. If you are using a mono source, such as a guitar, you would expect this to be less of a problem, but most of my evaluation was done with a guitar running through a guitar preamp that had stereo outputs.

OPERATION

Operating the Lexicon Vortex couldn't be easier. To call up an effect, simply use the Register/Preset switch to choose user or factory programs, then turn the Register/Preset select knob to select the desired program. Legends on the select knob have the names of the factory presets, and the display shows the number of the selected program and whether the A or B effect is selected.

The Vortex uses the same sixteen parameters for all its effects, so editing requires nothing more than turning the parameter-select knob to the desired parameter and using the value knob to adjust it. No editing mode must be entered or exited. Among the parameters are wet/dry mix, output level, modulation and echo effects levels, delay time, morph A/B time, envelope, feedback, and resonance.

If an expression footpedal is plugged in, the function of the Pedal/Tap button depends on which parameter is currently selected. When Echo 1÷ or Echo 2÷ (the delay-time parameters) are selected, the Pedal/Tap button serves the same function as the Tap pedal: Press it twice to set the delay period. When any of the other fourteen parameters are selected, pressing the Pedal/Tap button illuminates the LED and assigns the footpedal to control the selected parameter. Want to change the assignment? Select another parameter and press the Pedal/Tap button.

The A/B footswitch and the front panel A/B button both trigger morphing between the A and B effects in the program. Any of the 32 effects can be assigned to A or B, so morphs can be set up that are subtle alterations or bizarre twists. The Morph Time parameter determines how quickly effect A is morphed from or to B. Assigning the footpedal to control the Morph parameter lets you manually control the morph, or simply find an interesting in-between setting and leave it there, something I found fun and useful.

When you finish editing, store your new program in one of the user Registers by pressing and holding the Store button, choosing the desired destination with the Preset/Register select knob and the A/B button, then letting go of the button, completing the Store. This is awkward and dangerous. I prefer two button-presses for destructive operations such as Store. It would be easy to tweak an effect between sets at a performance, then, trying to store under low-light, high-adrenaline conditions, accidentally let go of the Store button

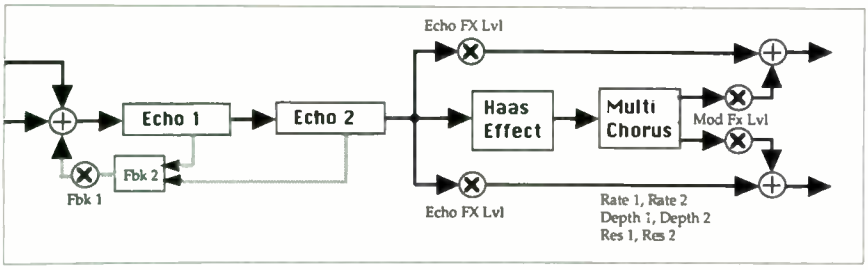


FIG. 1: In Preset 10B, "Choir," the envelope follower controls chorus depths. Note the combining of feedback from Echo 1 and Echo 2. The Haas Effect module, like several processing modules in the Vortex, is not described in the manual.

and store it in 5B, when I want it in 5A. Beware of this one.

FACTORY PRESETS

The Vortex's 32 factory Presets are created from 26 different algorithms. The algorithms are based around combining modulation effects (flanging, chorusing, detuning, autopanning, multivibrato, etc.) with two delay lines. It has a maximum time 0.9 seconds for stereo delay effects and 1.8 seconds for mono delays. Envelope control is factory-assigned for each algorithm and can control anything from echo feedback to resonator tuning or vibrato depth.

The algorithms are complex and inventive, often incorporating cross-feedback and sophisticated signal routings. For example, Preset 10B, "Choir" (see **Fig. 1**), combines the two inputs and passes them through the two delay lines, which are in series. Feedback taps from the delay lines are mixed before being fed back to the input. Then the echoed signal passes through a Haas Effect module, which is not described in the manual, but creates a stereo output that feeds a Multichorus. The outputs of the Multichorus are mixed with the unmodulated echo output (a mono signal fed to both channels) and routed to the audio outputs.

The unusual algorithms are a double-edged sword. On one hand, there is no question that Vortex is well-equipped to produce spectacular, out-of-the-ordinary effects that have a great deal of flexibility. On the other hand, the involved nature of some of the routing and the lack of description of the nonmainstream components make it difficult to predict what an effect will sound like. Likewise, morphing between dissimilar effects can have unpredictable results.

Don't get me wrong; this is not a complaint. I'm only saying that if you're looking for a straightforward, bread-and-butter effects device, look elsewhere. True, the Presets also include some classic effects, such as rotating speakers, stereo chorus with echoes, and stereo flanger with echoes. Unlike other effects boxes, the Vortex lets you control these with Tap Tempo, morphing, and the envelope follower. But most people will buy the Vortex to make new and wild sounds. If you enjoy finding your own way with an unusual instrument, Vortex is superb.

GOING FOR A SPIN

Because Vortex isn't just another "EQ-chorus-echo-reverb" box, it tends to find its personality in the hands of the user. The things I liked might not appeal to you. This is not to say that what I found won't apply to you, only that one needs to experience an unusual device firsthand.

I used Vortex mostly with guitar and some with synthesizers, but I also took it out on a couple of performances and let sound mixer Mike Haeffelin use it for P.A. effects. The device proved extraordinarily easy to use; Haeffelin got it working after spending just fifteen minutes with the manual. He especially liked the ease of editing and the Tap Tempo feature.

The features I found most useful were the Tap Tempo and footpedal control of morphing. For the latter, I generally either set it to one spot between two very different effects and left it there, or set the A and B effects to be variations on the same idea and used the pedal to crossfade between them for different parts of a song. I found little use for moving the footpedal between radically different effects.

Quick morphs between different effects sometimes produced artifacts, but they were generally of the warble/burble variety, not clicks or glitches. Given the general nature of Vortex as a "weird" effects box, I found most of these artifacts to be pretty cool, rather than objectionable.

Typically, I start using a signal processor with an effect in mind and then try to get it. With Vortex, I tended to pick an effect, play into it, listen, find a musical part that worked well, and tweak it until it was browned evenly on both sides, so to speak. I have always enjoyed this way of working, although production-oriented projects (albums, post-production for film and TV, etc.) usually have time demands that preclude heavy experimentation.

CONCLUSIONS

Vortex is an interesting addition to the signal-processing arsenal. Like the E-mu Morpheus, it uses new ideas that take some getting used to and is oriented more toward the unusual than day-to-day needs. The entire package is designed to be extremely fast and simple to use.

I would find a version of Vortex with MIDI better suited to my needs, but it probably would raise the price. In a few situations I also found myself wanting more delay time, but that's another price-inflater. After all is said, you get a unique effects box with Lexicon's usual sound quality for $479. That deal is good enough that a lot of musicians will go for it and live without a few desirable features.

If you are looking for something to spark inspiration and give you some different sounds, Vortex can do it more easily, and at a better price, than anything else on the market.

Circle #439 on Reader Service Card

Product Summary

PRODUCT:
Vortex Audio Morphing Processor
PRICE:
$479
MANUFACTURER:
Lexicon, Inc.
100 Beaver St.
Waltham, MA 02154
tel. (617) 736-0300
fax (617) 891-0340

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

dbx Project 1 Series

By Neal Brighton

Affordable sonic partners for your studio.

A surprising side effect of the digital-recording revolution is the resurgence of analog gear. Analog signal processors are getting cheaper, sounding better, and offering multiple functions. The Project 1 series from dbx is a welcome product of this trend.

The Project 1 line up includes four 1U rack-mount devices: The Model 266 stereo compressor/gate, the Model 274 quad expander/gate, the Model 296 spectral enhancer, and the recently released Model 242 parametric equalizer (which was not available in time for review). All of these units offer a lot of features without costing a lot of money. They also sound good enough to find work in pro studios and home studios alike.

SERIES CONSTRUCTION

Each unit in the Project 1 series is lightweight and well constructed. The PC board is solidly mounted inside a metal housing, so you should have no road worries with these units. The pots and switches aren't as robust as the rest of the unit, but they seem tough enough to last.

One small feature that I hope *doesn't* last is the external "wall wart" power supply. Although I realize external AC adapters help reduce costs, they're still a drag. If you decide to install two or three Project 1 units in your studio rack, make sure you have plenty of power strips. Three of these units will eat up a 6-plug power strip. (At press time, dbx released a rack-mount power supply/auto circuit-protect device that lists for $299 and can service up to six Project 1 units.)

COMPRESSOR/GATE

The ability to control dynamic range is critical to making good recordings. Vocalists with erratic breath control and drummers who aren't able to hit their snares consistently are just two

examples of why dynamics processing is important. The Project 1 Model 266 is a dual (stereo) compressor/noise gate that also offers downward expansion.

Hook up is easy. The 266's rear-panel, ¼-inch input jacks can be used as either tip/ring/sleeve balanced lines, or as tip/sleeve unbalanced lines. (The ¼-inch outputs are unbalanced.) A ¼-inch sidechain insert is ring/sleeve for the send and tip/sleeve for the return. These units can be plugged into just about any type of recording situation without much trouble or effort.

The controls are pretty standard. A threshold control goes from -40 dB all the way up to +20 dB. Compression ratios are adjustable from 1:1 up to infinity. You also have separate controls for attack and release times. In addition, a handy output gain delivers 20 dB of boost or cut. The gate/expander function has its own ratio and threshold controls. Finally, the simple push of a button turns the 266 into a stereo unit or two completely separate compressors.

The dbx Model 266 Compressor/Gate offers smooth compression, even at extreme settings. The gate/expander function also worked well.

I first used the 266 on some vocals, and it did an excellent job. The compression was quite smooth, and even heavy-handed settings failed to produce the boomy bottom end common with inexpensive units. The gate/expander function also worked well. It was easy to diminish headphone bleed and other unwanted sounds. When I used the 266 on guitar tracks, the unit remained smooth and efficient. Amp hiss was easily expanded out of the mix, and the compressor delivered some incredibly punchy guitar tones.

QUAD EXPANDER/GATE

Control of extraneous noise in an audio signal is always a high priority for a recording engineer. Unwanted sonic blemishes can take the form of amp hiss, lip smacks, ambient noise, headphone bleed, or just about anything else that compromises the desired source sound. The dbx Model 274 is a noise terminator.

More accurately, the 274 is a quad expander/gate. Its connections are pretty much the same as those for the 266: The ¼-inch input jacks can be run balanced or unbalanced, while the ¼-inch outputs are unbalanced only. However, on the 274 you only get one ¼-inch sidechain input per stereo pair of expander/gates. I don't consider the lack of one sidechain per expander/gate a problem, as few personal recordists need to have multiple sidechains.

Again, "easy to use" seems the credo of the Project 1 series. The 274 has controls for threshold, release time, expansion ratio, and hold time. With a little bashing about, even a novice could start working the 274 without the aid of a manual. I was especially surprised by the hold function, which controls how long the 274 continues to process the input signal. Units in this price range usually don't have such a "high end" feature.

The dbx Model 296 Spectral Enhancer uses dynamic EQ with an envelope follower to add high-end and low-end detail as a function of amplitude. Best of all, it has pre-EQ, single-ended noise reduction.

I hate noise, so I always go overboard with noise gates and expanders during mixdown. The 274 provided excellent support for my clean fetish. The hold function worked especially well on noisy reverb units. I was able to match the decay of the reverb perfectly, so that the reverb faded smoothly without an annoying tail of hiss.

The expander function is excellent for subtle noise control on background vocals and guitar solos. You can get all the impact of the source sound without the hums, buzzes, throat-clearing, and so on. At first, I was a bit dismayed that the expander ratio only went from 1:1 to 4:1, but the control proved sufficient for most applications.

Aside from mixing, the only time I consistently use a gate/expander is when tracking guitars or ancient synths. The 274 tackled ugly amp noises without flinching. I could dial out most of the hiss and hum at the head *and* get a smooth, natural release at the tail.

My only complaint is that I would have liked a variable attack time on the noise-gate function; the unit comes preset at less than 100 µs. Although the attack was smooth for the most part, some signals could have benefited from a shorter—or longer—attack time. In expansion mode, however, the attack time is variable, although it is program dependent, rather than user selectable.

SPECTRAL ENHANCER

The Model 296 spectral enhancer uses dynamic EQ to offer user-selectable high-frequency "detailing," static EQ for low-frequency detailing, and a pre-EQ, single-ended noise-reduction system to attack hiss. I try to engineer sounds so they *don't* need additional enhancement. But a spectral enhancer with noise reduction—now that's a thing of beauty!

Product Summary

PRODUCT:
Project 1 Dynamics Processors

PRICE:
266 Compressor/Gate $299
274 Quad Expander/Gate $449
296 Spectral Enhancer $349

MANUFACTURER:
dbx
1525 Alvarado St.
San Leandro, CA 94577
tel. (510) 351-3500
fax (510) 351-0500

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

The dbx Model 274 Quad Expander/Gate provides excellent single-ended noise reduction and even has a hold function, which is rare in this price.

Allow me to elaborate. It's common in the commercial studio business to have people bring in tapes that are, let's say, less than pristine. For example, I make performance tapes for dance companies that are often assembled from *cassette* masters. (Sometimes a cassette version of a musical piece is all the choreographer can find.) Obviously, the hiss on these masters is extremely high. But the 296 can save you the embarrassment of dirty audio masters.

Just like its compatriots in the Project 1 line, the 296 accepts ¼-inch balanced or unbalanced inputs, while the outputs are unbalanced. I should mention that all Project 1 processors have their I/O configured for use as line levelers and can be plugged into the audio chain at any point without risking signal-level anomalies.

The 296 operates much the same as dbx's 563X Silencer, but adds high- and low-frequency controls. You also get a gain knob that offers a maximum 14 dB of signal-level increase. The unit's dynamic-shelving feature provides up to 9.5 dB of hiss reduction.

I tried the 296 on some analog, ¼ inch master tapes I needed to transfer to DAT and was very happy with the results. The 296 cleaned up the audible tape hiss, making the masters sound as if they had been recorded to DAT in the first place. Also, the high-end control was helpful for improving overall sonic clarity.

When coengineer Buddy Saleman used the unit on an *a cappella* album, he reported that the low-frequency control was useful for adding low-end presence to vocals. In addition, the noise-reduction feature tamed some of the hiss from a noisy (but wonderful-sounding) tube compressor. Everyone who used the 296 remarked on its quick and easy ability to attack common noise problems and clarify source signals.

WRAP UP

The dbx Project 1 series is a well thought-out product line that should be a welcome addition to any personal or pro studio. Every unit is functional, sounds good, and is extremely light on the bank account. My "major" complaints—the external AC and the fixed attack on the 274—are mere quibbles compared to what these units offer.

I'm excited about the dbx Project 1 series, because the easy price/performance factor may inspire more personal recordists to invest in dynamics processors. A move like that may actually help improve the sonic quality of home demos, and a heightened awareness of pristine sound would certainly make my job as an engineer/producer much easier. Now if I can just get those dance companies to stop using cassettes!

Neal Brighton *is an independent producer/engineer and co-owner of Sound & Vision Studios in San Francisco.*

Circle #440 on Reader Service Card

TAP Nightingale 1.3 (Mac)

By Geary Yelton

A new high-end music-notation program joins the fray.

Almost as long as there's been a Macintosh, I've been waiting for a music-transcription/notation software package that performs flawlessly. I'm still waiting, but in the meantime, I've found a program that I like better than most.

Nightingale, from Temporal Acuity Products (TAP), has many positive attributes, including the ability to make detailed adjustments to almost any music symbol, a high degree of user customization, and most important, a logical and intuitive user interface. The level of complexity inherent in any high-end notation program makes this last point especially important.

Another feature that gives *Nightingale* an edge is speed; it's the fastest program of its type I've seen. Details that slow other programs down—part extraction, importing Standard MIDI Files, zooming in and out on the screen—are amazingly quick, at least on a fast computer.

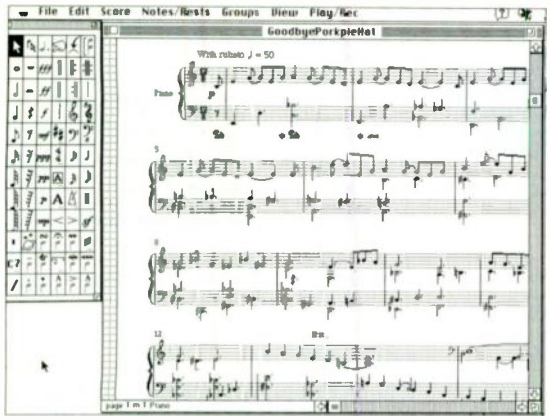
SETTING UP

When you run *Nightingale,* a dialog box lets you either open an existing file, or create a new one. A number of score templates are offered, including orchestra, big band, marching band, wind quintets, and various quartets. It's also simple to create your own templates.

When creating a new file, the program presents you with one system, which contains a grand staff. To its left is the Tool Palette (see **Fig. 1**), which contains notes, rests, dynamics, and virtually every musical symbol you need to set up and create a score. Sixty symbols appear, and if you click the Zoom box to expand the Tool Palette, 86 tools are revealed. The icons in this palette can be rearranged, and you can even shrink it to show only the tools you use most.

Tools are selected either by pointing and clicking, or by pressing a corresponding key on the Mac keyboard. For example, "q" selects the quarter note, and "t" selects the treble clef. You can change which keys select which tools, making it possible to set up keyboard equivalents to match any notation program to which you are accustomed. This is a good example of the way *Nightingale* lets you customize its user interface. Pressing the Enter key selects the Selection Arrow, the pointer tool used to select symbols and move the insertion point. Here's a nice touch: By jiggling the mouse, you can toggle between the Selection Arrow and the previously selected tool. This feature is called "MouseShaking."

The Master Page command on the Score menu lets you set up a few basics of your score layout. When in the Master Page, a new menu appears to the right of the others, allowing you to add and delete parts, group and ungroup them, determine the width of margins, assign instruments, and change the staff size. You can add any number of staves that will fit on the printed page. Changing staff size lets



Despite a few flaws, TAP's *Nightingale* music-transcription/notation package has much to recommend it, including speed, flexibility, ease of use, and a high degree of customization.

you specify the size of the Adobe Sonata font in eight steps, from 24 points (for big-note songbooks) to less than twelve points (for sharp-eyed symphony conductors), plus one user-definable size.

Each staff can be assigned an instrument name, which appears on the left margin unless you specify otherwise. When you double-click on a staff in the Master Page, an Instruments window appears (see **Fig. 2**). This reveals a scrolling list of instrument names, along with a display of the selected instrument's range and transposition. When selected, its corresponding General MIDI program number appears in the Patch field. In addition, staves are assigned MIDI channels in this window. When you close the Master Page and go back to the main screen, you're asked if you want to save changes to the Master Page.

If you need a time signature other than 4/4 (or whatever you've specified in Preferences), select the Time Signature tool or press "4." The numerator can go up to 99, with denominators from a whole note to a 64th note. Key signatures are specified in a similar manner. Time and key signatures can be inserted at any point, not just at the beginning of measures, and can be applied to a single staff or all staves.

Nightingale provides several views of your music. You can almost instantly zoom in and out; screen redraw time is astoundingly fast. View sizes range from 25% to 400%. However, the Enlarge command doesn't seem to use *Adobe Type Manager* to improve display; at maximum enlargement, symbols are extremely jagged. The program also provides a piano-roll view, which will be familiar to almost anyone who has used a sequencer.

MAKE A NOTE OF IT

Simple note-entry works a lot like it does in most music-notation programs. Simply select a note or rest symbol from the Tool Palette and click it into position on the staff. To enter a note with an accidental, hold the Shift key as you click the note into place; a small box to the right of the note lets you scroll from double-sharp to double-flat by dragging the mouse up and down. This Shift-click-drag motion quickly becomes second nature.

Ledger lines can be seen in advance of placing a note by clicking and dragging the note vertically into position. If a note is positioned above or below another note on a different staff, a dotted "sync line" appears momentarily to show where it falls in relation to other voices. Sync lines also appear when placing notes in a chord.

As an alternative to the Tool Palette, you can select the rhythmic value of any note you enter by holding the Command key and dragging the note sideways. This scrolls the entire range of rhythmic values, and it may be the quickest way of entering music directly into *Nightingale*, except for a slight bug. Let's say you've selected quarter notes on the Tool Palette. Now you Command-drag sideways, changing the cursor to an eighth note. You enter one. Even though the cursor remains an eighth note, the next note you enter will be a quarter note, or whatever value was selected on the Tool Palette. It's very disconcerting.

Note spacing is automatic, depending on rhythmic value. In addition to standard spacing, six alternate spacing tables can be selected in Preferences. There's also an elegant tool for adding extra space, if necessary. To check that the rhythmic values within a measure add up to exactly a measure, there's a handy Show Duration Problems command. When it's turned on, measures that don't add up are highlighted.

Dynamic markings, articulation, accents, and other symbols are also found in the Tool Palette, including triple piano through triple forte, crescendo and decrescendo, fermati, trills, clefs, slurs, endings, and chord symbols. Some symbols must be attached to notes, bar lines, or other symbols already in the score; an accent, for example, is entered by selecting a note and clicking it with the accent tool. That way, when a note is moved or a part is extracted, its modifier stays in place relative to the note.

MIDI NOTE-ENTRY

The alternate means of entering music is, of course, via MIDI. For MIDI recording and playback, *Nightingale* requires Apple's *MIDI Manager*, with all its usual problems and limitations. At least it's not required for non-MIDI use; if *MIDI Manager* isn't present, MIDI commands are simply disabled.

For recording, there are the usual two possibilities: step time and real time. You can record on any channel you want, but the program has no MIDI

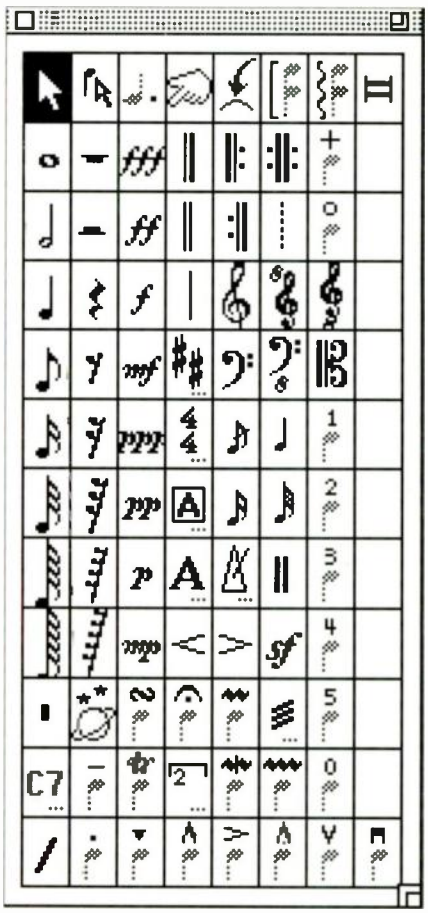


FIG. 1: With 86 items that can be rearranged to suit, *Nightingale*'s Tool Palette is as complete as one could wish. The icon resembling the planet Saturn adds—what else?—space.

patch-through capability for automatically changing channels when you record on different staves. You can overdub parts to more than one staff, but you can't hear previously recorded tracks play back while overdubbing. This unfortunate shortcoming limits the practicality of recording multiple parts with MIDI.

During step-time recording, rhythmic values are selected from the Tool Palette, or with keyboard equivalents. Pressing the Space bar increases durations, making it possible to enter dotted notes. When you select the Step Record Insert command, a box shows only the three most recent notes or chords as you play your MIDI instrument. When you finish, click anywhere, and every note is quickly transcribed. Unfortunately, barlines must then be entered manually, but that's easier than it sounds: You can tap them in with the Tab key during playback. Additional parts are recorded with the Step Record Merge command.

Record Insert is used to record MIDI in real time. It summons a dialog box that lets you indicate a split point and turn the metronome on and off. The metronome can be an internal click or any note on any channel you specify in Metronome Preferences. Unless you've inserted a tempo marking beforehand, the default tempo is 100 beats per minute. The metronome begins ticking when you press the Record button, and recording begins when you begin playing. When you're finished, you can click Done if you're satisfied, or Re-record if you're not.

At this point, only highlighted noteheads appear. To guess durations, immediately select Transcribe Recording from the Play/Rec menu and specify a quantization grid. Triplets can be recognized if quantization is no finer than sixteenth notes. If you deselect the noteheads and select them again before attempting to transcribe, you can't have any barlines or other non-notehead symbols in your selection. Even if you select notes discontiguously, you're not allowed to cross a barline.

Also, if there are notes or rests of any definite duration in the same measure, Transcribe Recording refuses to work (see **Fig. 3**). Even when I followed the rules, sometimes it refused to work. At these times, I was presented with a cryptic notice that read, "Program Error: DuplicateObject: objL=NLINK." Then I was informed that the operation failed and that I probably needed more memory. When this happened, increasing the amount of memory didn't make any difference.

Importing MIDI files is another way to get music into *Nightingale*. This works pretty well. All parts retain their track names and MIDI-channel assignments. All the notes are imported most of the time, but you should use the Fill Empty Measures command to enter whole-note rests in blank measures. Triplets can be transcribed, if requested, but if there are more complex tuplets, *Nightingale* can't notate the file. If you choose to notate triplets, you can't import anything smaller than a sixteenth note. Quantization is optional.

Selecting notes and other symbols uses intuitive, tried-and-true Macintosh selection techniques.

I had no problems exporting MIDI files and opening them in a sequencer. Almost everything but text, tempo changes, crescendos, and decrescendos is exported.

With a MIDI instrument connected, you can listen to music play back. On-screen pages turn as the music plays, unless you turn off page turning. When turning pages, however, there's an annoying delay in playback. Though the cursor highlights what's being played, there is no scrolling of measures on a page. If you want to see every note highlighted as it plays, you have to zoom out far enough to see an entire page. You can hear the whole file, just a selected part, or everything after the insertion point.

SELECTING AND EDITING

Selecting notes and other symbols uses the intuitive, tried-and-true Macintosh

selection techniques. Once selected, you can perform all the usual edit operations: delete, cut, copy, paste, etc. You can Merge Paste to combine copied music with existing music. You can also copy, paste, or clear whole systems and pages, or unlimited multiple systems and pages. By using the Double Selection command, any or all of an instrument's part can be selected and duplicated into the same measures on another staff.

The Dragging Tool is located on the Tool palette, next to the Selection Arrow. This useful tool is used to select and move symbols. It can be activated by clicking its icon, pressing the letter "d," or momentarily pressing the Option key. During editing, I found myself MouseShaking between the Selection Arrow and the Dragging Tool a lot. The Dragging Tool can drag notes vertically to new pitches or horizontally to create space for lyrics, change the position of note modifiers, and widen entire measures by moving barlines. As you're dragging notes to new pitches, you can hear them, if you enable "Feedback on note Insert and Drag" in MIDI Preferences.

Most editing operations can be accomplished by simply selecting something and choosing a command from the menu bar. For instance, to beam notes, you select a group and choose Beam Notes (Command-B) from the Groups menu. You can choose Beam by Beat if you want *Nightingale* to decide the best way to beam them. Beam angles can be edited by clicking on a beam, which reveals two dots for handles.

In addition to using the Dragging Tool, you can transpose notes, groups of notes, and whole parts with the Transpose Chromatic, Transpose Diatonic, and Transpose Key commands in the Notes/Rests menu.

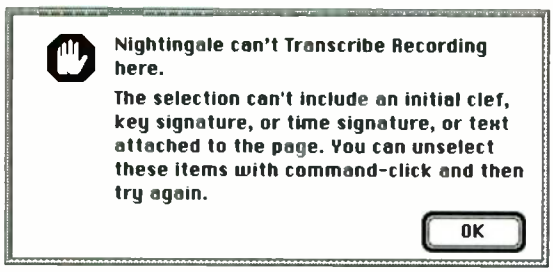


FIG. 3: All current notation programs have their share of bugs and limitations, and *Nightingale* is no exception. This unhappy sight can be avoided if you guess durations immediately after recording.

Ties and slurs couldn't be easier. If you click on a note with the Slur Tool, a tie or slur is drawn to the following note. To slur a group of notes, click on the first with the Slur Tool and drag to the last. To edit the appearance of a slur, click on it to select it. Handles appear for altering its curves, just like those in a vector graphics program such as *Freehand* or *Illustrator*.

To turn a group of notes into a triplet or other tuplet, select the notes and use the Create Tuplet command. You can even create tuplets within tuplets, called "nested tuplets."

Several editing operations are bundled under the QuickChange command in the Edit menu. This calls up a dialog box with pop-up menus to choose what to change and how to change it. QuickChange possibilities are extensive. For example, if you select a note, you can change its voice, staff, Velocity, size, stem length, or one of many aspects of its appearance. You can turn it into an "x" shape, a harmonic, a hollow or filled square or diamond, or a chord slash. You can make it invisible, or make only its head invisible. QuickChange gives you a lot of power to quickly alter the details of a music score.

WAXING LYRICAL

The Text Tool is used to insert text anywhere in the score. This could be a title, lyrics, copyright notice, chord symbols, performer's notes, music symbols not available from the Tool Palette, or whatever you want. If you have a lot of fonts installed, expect to wait an extraordinarily long time whenever you use the text tool, even with a fast computer. Eventually, a Style dialog box appears that lets you specify the font, size (in points or relative to the staff size, from tiny to jumbo), and whether it's plain, bold, italic, and so on. You can also choose from four user-definable, preset text styles as you might with a word processor.

Lyrics are handled a little differently. Start by choosing Flow In Text/Lyrics from the Score menu. This presents a dialog box in which you type the lyrics, separating syllables with hyphens as necessary. When you've finished, click on the note of the first word or syllable, then tab to subsequent notes to insert the remaining lyrics. You can't import text directly from a word processor, but you can copy it from another program and paste it into the Flow In Text/Lyrics dialog box.

Extra verses can be added by vertically dragging the first lyric of a new verse into position. If you need to change an entire verse's baseline, you can do that with QuickChange. Individual lyrics can be selected and moved with the Dragging Tool. Words or sym-

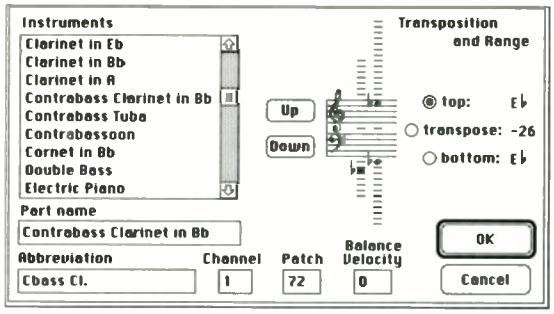


FIG. 2: The Instruments window reveals a scrolling list of instrument names, along with a display of the selected instrument's range and transposition. Staves can also be assigned various MIDI parameters from this window.

Product Summary

PRODUCT:
Nightingale 1.3
PRICE:
$495
$295 for academic/community organizations
SYSTEM REQUIREMENTS:
Mac Plus or better with 2.5 MB RAM; System 6.0.5 or later
MANUFACTURER:
Temporal Acuity Products
300 120th Ave. NE
Bldg. 1, Suite 200
Bellevue, WA 98005
tel. (800) 426-2673
or (206) 462-1007
fax (206) 462-1057

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

bols can be replaced by double-clicking them, waiting for the Style box, and then typing in something new. Because I use a lot of fonts, I found lyric entry and editing to be slower than any other music program I've used.

EXTRACTING PARTS

Extracting parts from *Nightingale* is faster and easier than in any other program I've seen. You can take an entire orchestral score and almost effortlessly create separate documents for every player in the orchestra. When you choose Extract Parts from the File menu, you are given the option of extracting all parts or only the part containing the insertion point. The program will save extracted parts immediately, if requested.

Any series of whole rests is converted into a multibar rest. For a symbol to be part of all extracted parts, it must be attached to a barline, initial clef, key signature, or time signature. If it's attached to a note or rest, it only appears in that part's extracted score. Once extracted, new documents have no connection to the original score, so editing operations have no effect on any but the extracted parts, just as it should be. Extracting parts always worked flawlessly for me.

UTILITIES

Nightingale comes with several useful utilities. *NightCustomizer* allows you to change the program's default settings and alter the user interface to your liking. It provides a list of "preference objects." When you select one, you see a list of editable items. If you select Instruments, for example, you get a list of instrument names. Pick one from the list, and you can modify its name, its default MIDI channel, its patch number, and so on.

Another utility lets you convert *Nightingale* files to *Illustrator* files, which allows a more flexible graphic editing. Expect to stare at the wristwatch for a long time while waiting for such conversions to work, however.

At the January 1994 NAMM convention, TAP was showing an optical character-recognition (OCR) utility called *NoteScan*. It converted scanned images of printed music into a file that could be opened with an unreleased version of *Nightingale*. Accuracy is still a bit shaky, but it's amazing that it works at all. Just imagine the future possibilities if they get the bugs worked out.

QUIBBLES AND CONCLUSIONS

Nightingale has its share of irritating bugs and flaws. While writing this review, I occasionally had to reboot the computer when the program crashed. Sometimes the program would "unexpectedly quit" with a bus (Type 1) error. When that happened, I tried to restart the program only to be presented with a dialog box that read, "*Nightingale* had trouble signing into *MIDI Manager*. Restarting the computer should help."

Other times, the computer just froze up. For example, whenever I split a grand staff and tried to delete the lower staff, the computer froze when I switched back from the Master Page. Fortunately, there are dependable ways to accomplish the same end. (Patient: "Doctor, it hurts when I do that." Doctor: "Don't do that.")

As far as I'm concerned, *Nightingale*'s most bothersome design flaw is that you can cut or copy a part on a single system, but nothing beyond one system. I found this limiting and unintuitive. Other flaws include the program's inability to record complex tuplets or recognize them in MIDI files. I also wish barlines could be entered automatically.

On the plus side, the program's accomplishments are quite respectable. In part because of its high degree of customization, it is generally easy to learn and use. A generous number of demonstration files are included, allowing plenty of instant gratification. These include not only *Nightingale* files, but several complete arrangements in Standard MIDI File form.

I like *Nightingale* as much as any high-end, music-transcription program I've seen. They're all far from perfect, of course. Despite its flaws, I plan to stick with the program in the hopes that its problems will be resolved in future versions. *Nightingale* does a lot, and when it works, it works quickly and easily. This year, anyway, that's all you can expect from such a program.

At this very moment, **Geary Yelton** *is living the blues with style and grace, watching the world from his office in the world's ninth tallest building.*

Circle #441 on Reader Service Card

(continued from p. 103)

channel and pan it center (mono). By adjusting the balances between the "stereo" signals from the bidirectional mic and the mono cardioid mic, you can control the stereo imaging of the recording. The band can sound washed in room ambience, relatively "dry," or anywhere in between. In addition, the cardioid (middle) mic ensures that a mono signal is available if needed.

If your mixer doesn't have a phase reversal switch, you can buy (or possibly rent) dedicated M/S decoder boxes. Audio Engineering Associates (AEA) of Pasadena, California, manufactures a complete line of M/S decoders. One-piece M/S microphones, such as Shure's VP88, also exist.

TAMING THE BAND

Unfortunately, all your planning and careful mic placement will be for naught if your source sound—the band—isn't happening. Because you're getting your sound from the house sound system and the room, you are at the mercy of the band and its soundperson. If the lead guitar is piercing, or the bass is too loud, you'll have to ask the musicians to adjust their instruments. People skills come in handy here, especially regarding volume control. Most musicians are pretty touchy about turning down. It's your job to convince them that you can make a better recording if the stage volumes are relatively equal.

If possible, set up your recording equipment before the soundcheck and record some test passes while the band runs through a few numbers. Then, have the band stop playing long

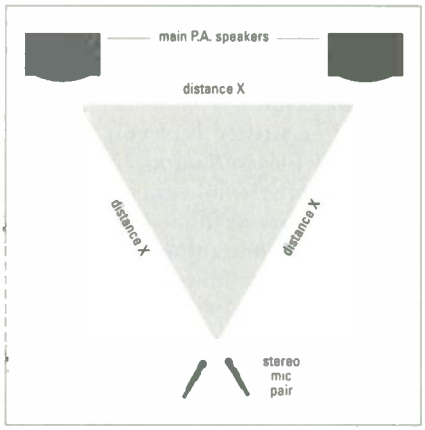


FIG. 1: An accurate documentation of a live performance can be captured by positioning the stereo mic pair at the tip of an equilateral triangle with the house speakers.

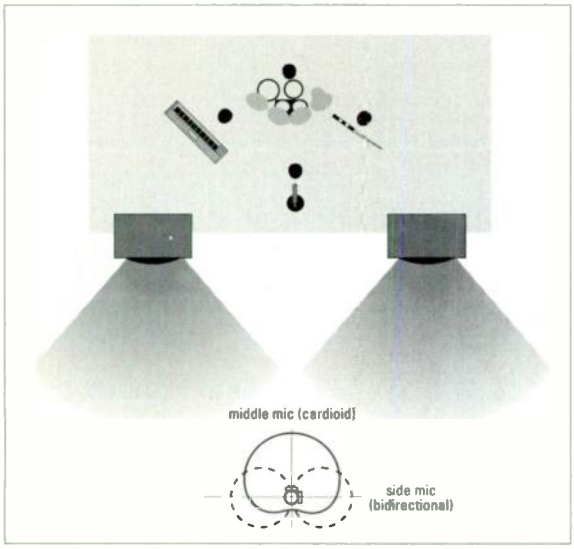


FIG. 2: The middle and side (M/S) mic technique allows recordists to control the stereo balance in post-production.

enough for you to check the instrumental balance and overall tonal spectrum of the tape. Any changes that you suggest for the live mix will be taken more seriously if you can prove your point by playing back the recording. It's also easier to work with the soundperson at this stage, rather than during the heat of performance.

Unfortunately, things will change at show time, so be prepared. The acoustics of an empty club during a soundcheck are very different from a room filled to the rafters with enthusiastic fans. And it's a certified miracle if the soundperson sets up the board *exactly* as it was during soundcheck. Because you're recording direct-to-DAT, you can't do much about changing room timbres or stage volume levels. It's a hope-for-the-best and ride-it-out scenario. But if the vocals (or any other instrument) are buried or sonically butchered, tell the soundperson immediately. Fortunately for your persuasive powers, any changes that are good for your recording are also good for the audience.

ENCORE

If you're recording for your own study, consider the DAT recording of the show to be the final master tape. If the gig was especially hot, you may want it duplicated for release. To make a duplication master, the DAT needs to be edited to another medium (DAT, cassette, reel-to-reel, etc.). This can be as easy as fading out song endings and closing up the gaps between songs. But you can also do some comparative listening to see how your tape stands up to commercial live recordings.

Reference your DAT master to CDs of live performances that you like, and determine whether high, middle, and low frequencies should be rolled off or boosted. If necessary, route the tape through your mixing console and use the EQ to spice things up. Don't go overboard; a boost or cut of 5 dB is usually all that's needed. That's the great thing about live-to-DAT recordings: If the performances are good, a couple of tweaks is all it takes to make a record.

Camran Afsari *is a San Francisco-based music journalist.*

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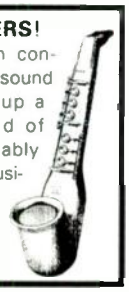

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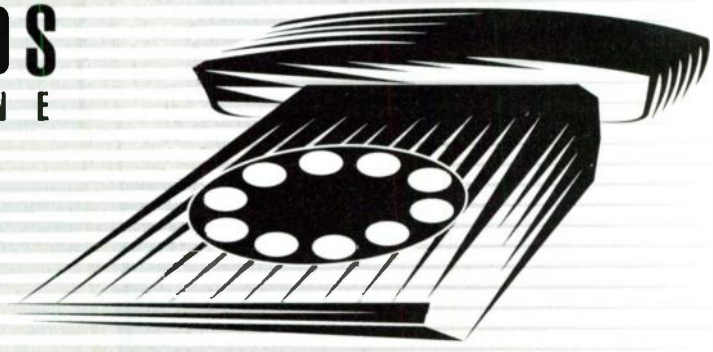

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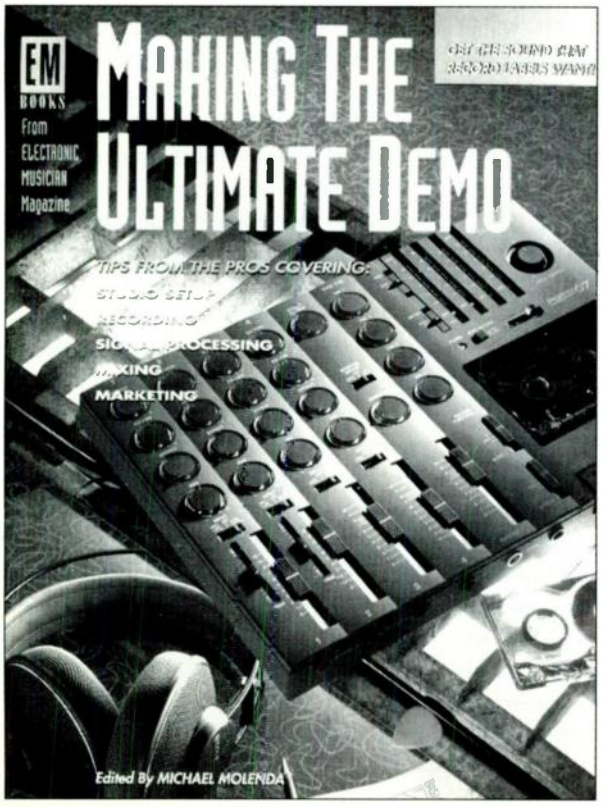

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MIDI On The Brain

Controlling MIDI instruments with your mind.

By Scott Wilkinson

Wouldn't it be great if you could compose music in your head and convert it directly to MIDI messages? Of course, science has a *long* way to go before it will be able to detect something as complex as musical phrases in the brain. However, certain electrical signals from the brain are readily accessible; *electroencephalographs* (EEGs) have been around for years to monitor the brain's electrical activity. Can these signals be converted into MIDI messages? What applications might be served by doing so?

At the January 1994 Winter NAMM show, WaveAccess (PO Box 4667, Berkeley, CA 94704; tel. [800] 697-8823 or [510] 526-5881) demonstrated one of the first commercial products to address these issues. The WaveRider ($1,500) includes a hardware interface box and *WaveWare* software for *Windows* computers. The system can actually detect and utilize four different types of electrical signals from the human body: brain waves, muscular activity, heartbeat, and electrical resistance of the skin, known as *galvanic skin response* (GSR).

To detect these signals, the user affixes a set of electrodes, embedded in an elastic strap, around the head (for brain waves), arm (for heartbeat and muscle activity), and/or finger (for GSR). The electrodes attach to small-gauge leads, which are connected to as many as five inputs on the interface box. The box amplifies and digitizes the incoming biosignals, using special low-noise electronics, and sends them to the computer through one of its serial ports.

The software can display the incoming signals in several ways (see **Fig. 1**). Brain, muscular, heartbeat, and GSR waveforms can be displayed in "strip charts" in real time. Brain waves can also be displayed in the frequency domain as the result of a continuous, real-time Fast Fourier Transform (FFT), which determines the spectral content of the EEG signal. This spectrum ranges from 0 to 40 Hz. In addition, a spectrogram displays the frequencies and amplitudes determined by the FFT over time. All these displays include a number of controls in pop-up dialog boxes.

The software converts the incoming biosignals into MIDI messages, which are sent to an internal sound card or external MIDI sound module via the PC's MIDI interface. The parameters for this conversion are specified in a separate dialog box. You can specify an independent set of parameters for each biosignal on different MIDI channels, which lets you create musical output that ranges from simple to complex. The settings and location of the displays on the screen can be stored in configuration files, and any session can be recorded and played back.

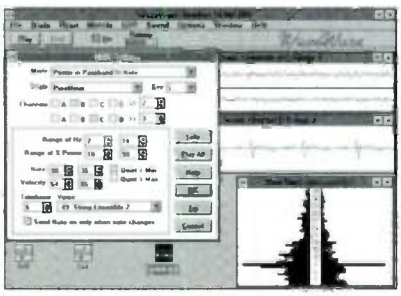

FIG. 1: In this screen shot, *WaveWare* displays brain waves (upper right), heartbeat (middle right), and an FFT of the brain-wave frequency spectrum (lower right). The overlapping MIDI Options dialog box (left) lets you specify how the program converts incoming biosignals into MIDI messages.

There are several modes that determine how the biosignals are converted. For example, one mode takes the average frequency from the brain-wave FFT and maps it to MIDI Note On, Velocity, or Control Change messages. Another mode maps the amplitude of the frequencies within a specified band to these MIDI messages. The amplitude envelope of muscular or heartbeat signals over time and the GSR value can be mapped in a similar way. To achieve a musical output, the notes conform to a user-specified musical scale and key.

The applications of systems such as WaveRider include biofeedback, stress reduction, consciousness research, and performance art, to name a few. You might set up a bioperformance in which your heart provides the basic beat, while flexing an arm muscle plays a set of notes under your immediate and direct control. Opening and closing your eyes emphasizes different brain-wave frequencies, as does meditation and intense thought. Although this system can't read your mind and play the music you think of, it can create a musical soundscape based on your psychophysiological processes, which offers some intriguing possibilities.

EM *technical editor* **Scott Wilkinson** *explores consciousness in a variety of ways.*

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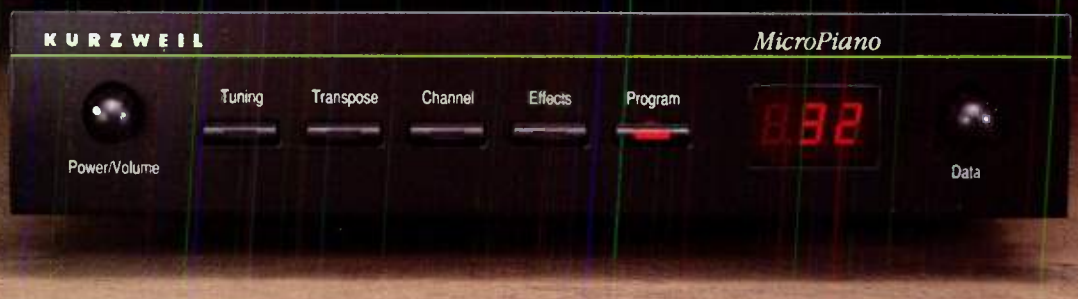

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