Stop being a digital audio dummy! ■ Cook up your own B-3 Samples

Electronic Musician

April 1997

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Choose the right creative partner and live happily ever after!

Sweeten acoustic guitar tracks

Child's Play! Write songs with kids

A Cardi

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REALITY FOR $1500* A PAIR. INTRODUCING

If you've been trusting the quality of your creative product to passive monitors costing $400-$600 a pair, there's an astonishing revelation waiting for you at your Mackie dealer. In our opinion, the active, biamplified HR824 is the most accurate near-field monitor available. So accurate that it essentially has no "sound" of its own. Rather, the Mackie Designs High Resolution HR824 is the first small monitor with power response so flat that it can serve as a completely neutral conductor for whatever signal you send it.

HR HIGH RESOLUTION SERIES™

You'll hear the precise attack, texture and quality of individual bass notes exactly as they're being recorded. On instrumental and vocal tracks, you'll discern details of pitch, timbre and harmonics that passive monitors simply don't resolve.

Mackie acoustic engineer David Bie uses scanning laser vibrometry to map HR824 tweeter dome vibrations. Film at 11.

SCIENCE, NOT SNAKE OIL.

Internally-biamplified, servo-controlled speakers aren't a new concept. But to keep the cost of such monitors reasonable, it's taken advances in measurement instrumentation, transducers, and electronics technology. In developing the High Resolution Monitor Series, Mackie Designs sought out the most talented acoustic engineers (being able to live in perpetual drizzle was a plus) and then made an enormous commitment to exotic technology such as scanning laser Doppler vibrometry, analyzers, time delay spectrometers and machines that go "*ping*." The High Resolution Series HR824 is the result of painstaking research and money-is-no-object components. Not to mention thousands of hours of listening tests and *tens* of thousands of dollars in tooling.

HR824 Active Monitors accept balanced or unbalanced ¼" and XLR inputs. Jacks & removeable IEC power cord face downward so that the speaker can be placed close to rear wall surfaces.

FLAT RESPONSE...ON OR OFF-AXIS.

One of the first things you notice about the HR824 is the gigantic "sweet spot." The detailed sound field stays with you as you move back and forth across the console — and extends far enough behind you that musicians, producers and your mom can hear the same accurate playback.

The reason is our proprietary exponential high frequency wave guide. Without it, a monitor speaker tends to project critical high frequencies in a narrow beam (Fig. A) — while creating undesirable edge diffraction as sound waves interact with the edges of the speaker. Imaging and definition are compromised. The "sweet spot" gets very small.

Like biamped speakers, wave guides aren't a new concept. But it takes optimized, internal electronics and a systems approach to make them work in near-field applications.

The HR824's wave guide (Fig. B) maximizes dispersion, time aligns the acoustic center of the HF transducer to the LF transducer's center, and avoids enclosure diffraction (notice that the face of the speaker is perfectly smooth.) The exponential guide also increases low treble sensitivity, enabling the HF transducer to handle more power and produce flat response at high SPLs.

CLEAN, ARTICULATED BASS.

When seasoned recording engineers heard the HR824 at a recent tradeshow, they couldn't believe the controlled low bass extension — several snooped around for a hidden subwoofer. They heard low frequency

The Mackie HR824 Active Monitor. ±1.5dB from 42 to 20kHz.

accuracy that simply can't be achieved with passive speakers using external amplifiers. There are many reasons.

First, the HR824's FR Series 150-watt bass amplifier is directly coupled in a servo loop to the 8.75-inch mineral-filled polypropylene low frequency transducer.

It constantly monitors the LF unit's motional parameters and applies appropriate control and damping. An oversized magnet structure and extra-long voice coil lets the woofer achieve over 16 millimeters of cone excursion. Bass notes start and stop instantly, without overhang, distortion or "tubbiness."

Second, instead of relying on ports or slots, the HR824's low frequency driver is coupled to a pair of aluminum mass-loaded, acoustic-insulated 6.5-inch passive drivers. While typical, undersized ports cause vent noise, power compression and low frequency distortion, our ultra-rigid drivers eliminate these problems and couple much more

THE HR824 ACTIVE MONITOR.

effectively with the control room's air mass. They achieve the equivalent radiating area of a 12-inch woofer cone, allowing the HR824 to deliver FLAT response to 42Hz with a 38Hz, 3dB-down point.

Third, the woofer enclosure is air-displaced with high-density adiabatic foam. It damps internal midrange reflections so they can't bleed back through the LF transducer cone and reach your ears. The typical problem of small-monitor midrange "boxiness" is eliminated.

The High Resolution transitional wave guide. Film at 11 unavailable.

A TRUE PISTONIC HIGH-FREQUENCY RADIATOR.

We scoured the earth for the finest high frequency transducers and then subjected the likely candidates to rigorous evaluation. One test, *scanning laser vibrometry*, gives a true picture of surface vibration patterns. Two test results are shown in the upper right hand corner of this ad. Figure C is a conventional fabric dome tweeter in motion. You needn't be an acoustic engineer to see that the dome is NOT behaving as a true piston.

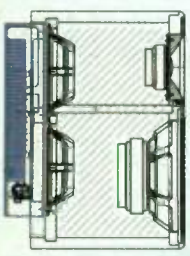


Figure D shows our High Resolution metal alloy dome at the same frequency. It acts as a rigid piston up to 22kHz, delivering pristine, uncolored treble output that reproduces *exactly* what you're recording.

INDIVIDUALLY OPTIMIZED.

You won't hear it from other manufacturers, but individual low and high frequency drivers can vary more than 10% in sensitivity due to production variations. Because our monitor is active, we can precisely match each transducer's actual output via electronic adjustments. During final assembly, each HR824 is carefully *hand-trimmed* to ±1.5dB, 42Hz-20kHz. As proof, each monitor comes certified with its own serialized, guaranteed frequency response printout.

The HR824's front board is 1-inch thick with "radiused" edges to further eliminate diffraction. An "H" brace bisects the enclosure for extra rigidity.

Mackie is one of the few active monitor manufacturers that also has experience building stand-alone professional power amps. Our HR824 employs two smaller versions of our FR Series M•1200 power amplifier — 100 watts (with 150W bursts) for high frequencies, and 150 watts (200W peak output) for low frequencies. Both amps make use of high-speed, latch-proof Fast Recovery design using extremely low negative feedback.

HR HIGH RESOLUTION SERIES™

FR FAST RECOVERY SERIES™

TAILOR THEM TO YOUR SPACE.

Because control rooms come in all shapes, sizes and cubic volumes, each HR824 has a three-position Low Frequency Acoustic Space control. It maintains flat bass response whether you place your monitors away from walls (*whole space*), against the wall (*half space*) or in corners (*quarter space*). A low frequency Roll-Off switch at 80Hz lets you emulate small home stereo speakers or popular small studio monitors.

Fig. C: Uneven fabric dome tweeter motion distorts high frequencies.

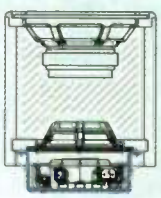
Fig. D: HR824 alloy dome's uniform, accurate pistonic motion.

Below: The HR824 Development Team. L to R, clockwise: Terry Wetherbee, Cal Perkins, Greg Mackie, David Bie, Paul Brengle, Jeff Hammerstrom, Dan Bonilla and Mats Jarlstrom holding P.D., our Over-20kHz Specialist.

CONFRONT REALITY AT YOUR MACKIE DESIGNS DEALER.

We've made some pretty audacious claims in this ad. But hearing is believing. So bring your favorite demo material and put our High Resolution Series monitors through their paces.

If you've never experienced an active monitor before, you're going to love the unflinching accuracy of Mackie Designs' HR824s.



If you've priced other 2-way active monitors, you're going to love the HR824's $1498/pair price* AND its accuracy.

*$1498 suggested U.S. retail price per pair.

MACKIE.™

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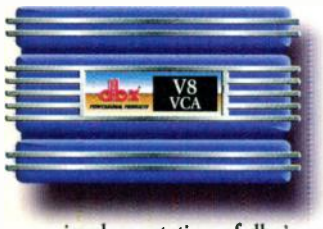
Check out the processing racks in any large studio, broadcast facility, or concert rig and chances are you'll find one or more dbx 160's (amongst a bevy of other great signal processors). Names like Abbey Road, A&M Studios, Westlake Audio, and Skywalker Sound still count on their 160's to deliver silky smooth vocals, tight bass and crisp, punchy drums . . . all dbx hallmarks.

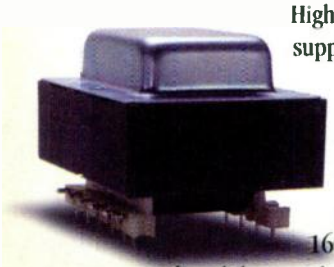
While designing the successor to our early classics, we talked to countless musicians, engineers, and producers about the way they like to work and what's important to them in a

V8™ VCA

The heart of any dynamics processor is its VCA. The dbx 160S features dual proprietary V8™ VCA modules. This state-of-the-art implementation of dbx's original Blackmer decilinear VCA boasts an unheard-of 127dB dynamic range and ultra-low distortion. Encased in a specially designed aluminum-zinc housing for shielding and thermal characteristics, the V8™ maintains its superior performance in harsh environments.



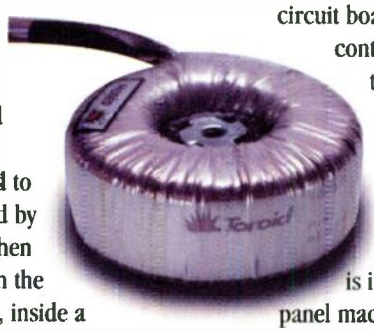
Premium Signal Path



High-voltage 24V supply rails and wide dynamic range active components in the signal path allow the 160S to cleanly process audio while providing a huge 26dB of headroom. Patented high current transformer isolated outputs feature >100dB common-mode rejection and distortion so low it's immeasurable. Designed for extreme conditions these outputs will drive 1000 feet of Belden™ 8541 cable at +30dBm.

Over-designed Power Supply

The 160S power supply features a massive toroidal transformer chosen for its low stray flux characteristics and mounted in a mu-metal can designed to attenuate stray field by 30dB. The can is then isolated, along with the AC power circuitry, inside a shielded power supply cover providing even more noise attenuation. Only clean DC power exits the isolated supply.



Discriminating Component Selection

The new 160S takes full advantage of the most technologically superior components available today. Premium active electronics, precision 0.1% and 1% metal film resistors, great sounding temperature stable polypropylene capacitors, high-reliability board-to-board connectors with gold-palladium-nickel contacts, Jensen® transformers, gold plated Neutrik® XLRs, rare earth magnet relays with gold contacts in a hermetically sealed nitrogen environment, military grade glass epoxy circuit boards, to mention a few, contribute to the most technologically advanced compressor in the world.

Distinctive Craftsmanship

The craftsmanship of the 160S is as stunning as the engineering is innovative. A striking blue front panel machined from 1/4" aircraft aluminum, hand-crafted solid aluminum knobs, LEDs mounted individually in machined stainless steel housings, custom VU meters with peak indicators, and heavy gauge chassis solidify the 160S as the benchmark compressor for decades to come.

What Makes the 160S
xt Industry Standard?

dynamics processor. Over and over again you told us what you wanted, classic dbx sound in a great package, with all the right controls. The result is the new 160S Stereo Compressor. Twenty-five years of experience, visionary technology, and impeccable craftsmanship combine to produce this masterpiece, a device destined to take its place in pro rigs around the world for years to come.

Ultimate Flexibility

The 160S combines the best features of all the great dbx compressors, past and present. In addition to having the auto attack and release as well as the hard knee threshold characteristics of the classic dbx 160, the 160S is also switchable to OverEasy® mode, made standard by the classic dbx 165A. And speaking of the 165A, all of its features, including variable attack and release controls, as well as dbx's latest limiting algorithm PeakStopPlus™, are included in the 160S. Not to mention new features such as hardwire relay bypass and external sidechain input, switchable from the front panel.

Designed and built in the USA

All dbx products including the 160S are proudly engineered and manufactured in our US factory. Every dbx product is performance tested and specification verified using Audio Precision® System One. The 160S is a most worthy successor in a long line of world class dbx compressors.

See, feel, and hear one for yourself.

dbx Blue Series -- Twenty-five Years of Experience, Visionary Technology, Impeccable Craftsmanship

dbx Blue Series MIC PRE

In today's recording environment the need for a high quality, great sounding microphone preamp is growing rapidly. Designed to unparalleled standards, the dbx Blue Series Mic Pre makes a great companion to the 160S Stereo Compressor. The dbx Blue Series Mic Pre is designed to provide the audio professional with two channels of deadly-accurate mic pre-amplification, revealing the true character of any microphone. A world class pre-amp for world class recordings.

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I N S I

FEATURES

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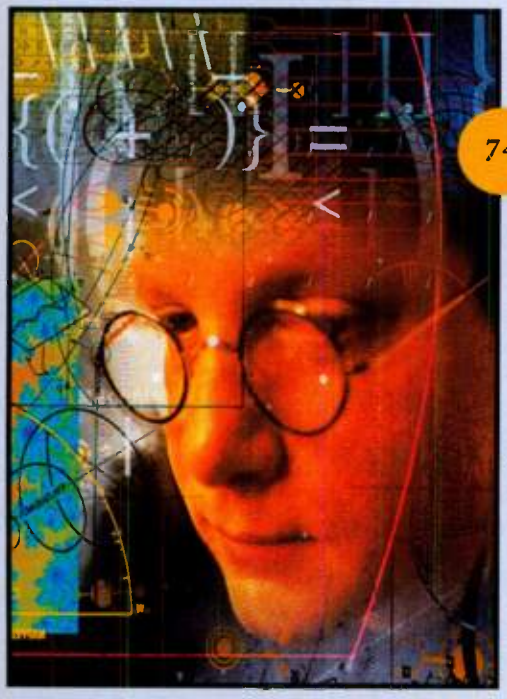
COLUMNS

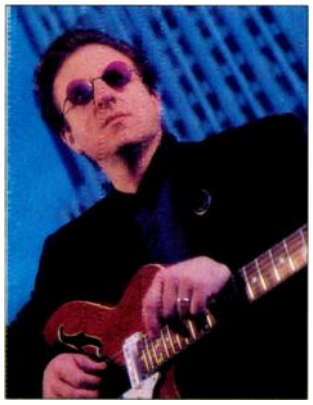


REVIEWS

Cover: Illustration by Larry Goode.

Soul Music?

Technology may be corrupting our values.



ROBERT PERRY

Let me tell you a chilling little story about how records are often made in the digital world. First, a band with a unique sound, a few good songs, or perhaps simply a "smashing" look is signed by a major label. Once the ink is dry on the recording contract, a producer is hired to ensure that the act delivers a commercially viable and artistically dazzling product. Then, things get weird.

In the studio, the band runs through its repertoire, the performances are recorded, and as quickly as possible, the act is banished from the premises. They will not participate in overdubs, experiment with musical arrangements, or explore sweetening options. They will be gone doggies until it's time to market the finished album. Does this tale seem familiar?

Sadly, this is not a historical account of tyrannical producers in the 1950s and early '60's, who routinely replaced a band's players with session musicians and exercised complete control over every note on an artist's record. This story is as current as China's impending takeover of Hong Kong. You see, today's digital audio workstations bestow upon producers the power to totally *reengineer* an act's musical DNA. The talent can be used solely for musical *data*, which is then fed into a DAW and manipulated into a "work" by the producer. In fact, some producers oversee an entire staff of young DAW editors who cut and paste song arrangements, comp vocals, correct faulty pitches, and perform other audio-beautification chores. At the end of the day, it doesn't matter whether the band couldn't play its way out of a sandwich bag or has the chops to become a supergroup—the final product will be all gussied up and radio ready. Guaranteed. All hail the miracle of the DAW!

But what are we doing here? Are we using this marvelous and powerful technology simply to make silk purses out of sows' ears? Should a producer be *proud* that he or she can shatter the personality of an artist and digitally remold the shards into a personal statement of aural and musical supremacy?

The moral questions here are as huge as your conscience allows them to be, but at the very least, invasive DAW productions blur the definition of the artist. After all, a producer who manipulates musical data culled from a performer is clearly as much the artist as the face (or faces) gracing a CD cover. Trust me, you listen to records all the time where a front person is, to some extent, window dressing for a producer's sonic creations. The pervasiveness of these audio productions makes it somewhat unfair to slam artists such as Milli Vanilli (who had to return their Best New Artist Grammy) for being much less than the sum total of their hits.

I'm not slamming DAWs, here, I'm questioning our creative choices as the benefactors of cutting-edge music technologies. If recorded music is becoming too predictable, too banal, too "same old, same old," and too outright boring, then we must look at our methods and our motivations. As music makers, we can make the decision to use the gifts of advanced technology to energize creative possibilities and electrify listeners. But if we really want to use our tools to become talent polishers and puppet masters, then we should probably be good sports and give Milli Vanilli their Grammy back. After all, they kept *their* part of the bargain.

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FREE SAMPLES!

Thank you for the wonderful idea of sampling an Appalachian dulcimer ("Sampling the World," February 1997). We happened to be refurbishing such an instrument, and we took your article to heart.

Not everyone has access to one of these silver-toned beauties, so we've decided to make our samples available to readers of your magazine for free. They can visit our Web site at www.ghgcorp.com/hidart and download our recorded-note samples.

Thank you once again for an amazing magazine that challenges us and gives us inspiration to try new things month after month. And the product reviews are great, too!

David W. Peterson Harvey
The Hidden Art
hidart@ghg.net

DULCIMER TIPS

As a long time **EM** reader and a fretted-dulcimer player, I was surprised and delighted to see a photo of one of these lovely instruments in the February issue ("Sampling the World"). However, please allow me to clear up a couple of misconceptions that may affect one's ability to accurately sample the dulcimer and use the samples effectively.

Although turkey quills were the traditional plectrum, a quill pick does not define the sound of the dulcimer. What is unique is the use of a *noter*—a wooden bar used to fret the melody strings while the remaining strings drone. This creates a cacophony of high-frequency slides and whistles that makes the dulcimer instantly recognizable and helps it stand out in a mix of fiddles, banjos, and guitars—or in my case, keyboards, wind controllers, and drums.

In addition, savvy musicians may notice another defining characteristic of the Appalachian dulcimer: its diatonic fretboard. Consequently, the instrument is traditionally used for modal music. A dulcimer sample, for example, wouldn't sound authentic if it were used to perform a chromatic gliss. Yes, you can get around this limitation with creative playing techniques, but I don't think that such "tricks" are what you're looking for when you sample one of these instruments.

Thanks to you and to author Jim Miller for an enjoyable article in an enjoyable issue.

Mark Nelson
Acme Arts
mnelson@cdsnet.net

SILENCE IS GOLDEN

I was impressed with Paul D. Lehrman's article on keeping your computer quiet ("Desktop Musician: Getting Away from It All," February 1997). Paul has obviously thought a great deal about getting rid of the annoying CPU noises that plague many of us daily.

I have also been trying to find a cost-effective way of keeping several machines quiet in my studio (especially when I'm recording vocals). Most of the solutions I've seen have been in the form of isolation boxes that people stuff their systems into and hope they won't overheat. But there *is* another way.

I work at Microsoft, so I get the chance to see new technology all the time. One day, a friend brought me into a small room that was empty except for a desk and a PC. Although this is not an unusual sight at Microsoft, it was an unusually quiet room. In fact, the PC was running defragmenting software, and the only thing I could hear was the monitor hum! No fan. No hard drive. No noise!

What was different about this PC was that it was using a new technology from Silent Systems called the Hush Kit. The system is basically a new power supply (Silent Power), a heat sink for the CPU (Silent Cooler), and a drive sleeve (Silent Drive). My friend recommended that I call Silent Systems for a beta kit, and I installed the system with ease. For the past two months now, my PC has been quiet—and I mean *dead* quiet. I'll never consider stuffing my gear into a box again!

If you're interested, Silent Systems can be reached at 168R Middlesex Turnpike, Burlington, MA 01803; tel. (617) 273-3200; fax (617) 273-0500; Web www.silentsystems.com.

Steve Ouimette
Diamond Multimedia
steveo@diamondmm.com

WHO'S THAT TECH?

In your article "Keys: How to Hear Yourself on Stage" (*JAM*, February 1997), author Lisa Kluber credits Bob Bralove as being the keyboard tech for Stevie Wonder. This is not true. The three keyboard techs for Stevie Wonder are Derrick Perkins, Mike Rodriguez, and Kevin McCourt. These guys work their tails off and have assembled a pretty impressive road rig for Steve. Bob may have worked for Steve at one time but not for the last four years.

The Drum Tech
tourteck@aol.com

Drum Tech—Our apologies to the current Wonder crew! Bralove's credit should have read "former tech for." Thanks for pointing the spotlight at the right people.—Michael M.

SPEAKER UP

I really enjoyed Brian Knave's article "Production Values: The Little Demo That Could" (January 1997) about John Leventhal and Rosanne Cash. I would like to commend you for the detail that went into this and other studio application articles. These are

VALERIE SPAIN

CONFUSED YET?

It's not surprising. These days it takes a full time professional to keep track of all the digital recording options available to the modern musician. Are you looking for a tape-based or hard disk-based system? Modular, stand alone or one that will work with your Mac or PC? How will you know if the recorder you buy will interface with all your existing equipment? Is it expandable, upgradable, or will it be out-of-date in less than a year? Tough questions . . .

Fortunately, help is only a phone call away because you have friends in the business — people whose sole purpose in life is making sure that the digital recording system you buy today is exactly the right one for your specific needs. In fact, Sweetwater Sound sales engineers are the HOME AND PROJECT STUDIO SPECIALISTS. Not surprising, since Sweetwater is the FASTEST GROWING PRO AUDIO RETAILER IN THE NATION. Everyone here has real world, hands-on experience with all the latest equipment including mics, mixers, monitors and MIDI keyboards. Don't make a mistake that could cost you hundreds or even thousands of dollars. Make the right call — call Sweetwater!

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invaluable teaching tools for those of us who are learning the art and craft of project- and home-studio recording. I had just one question about the Radio Shack monitors that Leventhal uses. In the RS catalog, four different Optimus speakers are designated by the number 7. Would it be possible to get the exact model name of the speaker?

Doug Emrich
Grey Katz Music
Oklahoma City, OK

Doug—A number of readers asked the same question, so I called both John Leventhal and Radio Shack to get the scoop. Evidently, when Leventhal bought his pair several years ago, only one model of the Optimus 7 was available: the Pro 7. In recent years, however, the Pro 7 has been replaced by the Pro X7, so that's the one to buy. Also note that there are two versions of the Pro X7: one with a gray cabinet and cloth grille and another with a white cabinet and metal grille. For studio use, I'd go with the cloth grille. (Retail price is $79.99 each.)

Leventhal asked me to stress, however, that the Pro X7s should not be thought of as replacements for your primary studio monitors. Rather, they make an excellent pair of secondary monitors. (I recently saw a pair sitting on top of some Meyer Sound HD-1s at a mastering studio in San Francisco!) Clearly, with 4-inch woofers and a frequency range rated at 100 Hz to 20 kHz, these are not *the most accurate monitors on the market. Nonetheless, Leventhal finds that when he gets a mix sounding good on his Pro 7s, it translates well to practically any other system.—Brian K.*

INSPIRATIONAL READING

I've been an avid reader of *Electronic Musician* for many years now. Although I've found very little material to be sexist or otherwise offensive, I always felt I was reading a magazine for men—just as I feel at most times like I'm working in a men's profession. It was great to read your recent article "Working Musician: Resources for Women in Music" (January 1997). I am a member of the International Alliance for Women in Music and, thanks to your article, am now becoming involved in AES Women in Audio.

Thank you for paying special attention to your female readers. I know this won't be the last time I find important resources in such a super magazine.

Leslie McHenry
Sound Designer
Ann Arbor, MI
lesliem@mediastation.com

Leslie—In an admittedly male-dominated music industry, I'm very proud that EM*'s editorial pages typically include female musicians. However, the more comprehensive coverage of women's issues and resources in recent years—and the increasing number of woman subscribers—is a tribute to the efforts of Managing Editor Mary Cosola and Assistant Editor Diane Lowery. They have helped us ensure balanced reporting by seeking out interesting feature stories involving women in the music industry.—Michael M.*

XT CONFUSION

I love your magazine, and I'm not ashamed to say I'm quite the gearhead. I can't wait for the next issue so I can see the equipment reviews. But I noticed a little oversight that's making

my MDM format decision more difficult! In the April 1996 Alesis ADAT XT review, it is plainly stated that the ADAT XT is capable of "digital assembly-editing." However, in the November 1996 review of the TASCAM DA-38, the "Feuding Features" chart (p. 142) shows the DA-38 is capable of "composite track building" and that the ADAT XT is not. Okay guys, which is it? Is this an error on the reviewers' part, or am I not understanding the definitions correctly?

Joe Rodriguez
antarian@magicnet.net

Joe—Well, we're dealing with the semantics of different manufacturers here, so the definitions may be a tad confusing. The DA-38 lets you build "composite" tracks internally within a single machine. In other words, you can select the coolest bits from three guitar solo takes on three separate tracks (say, tracks 1, 2, and 3) and—using the machine's digital track copy and punch-in/punch-out functions—assemble these bits into a single, killer solo "performance" on an available track.

The ADAT XT cannot perform this type of composite editing on a single machine, although you can copy tracks internally. To do a guitar solo comp on the S-VHS MDM format (Alesis XT, Fostex CX-8, or Panasonic MDA-1), you need at least two machines. Terminology aside, both the DA-38 and the XT can perform digital assembly edits (or "comps"). The only difference is that the DA-38 can comp tracks "in house" with one machine, whereas comping tracks on the XT requires a multimachine system. My production studio employs a 32-track MDM system, so both methodologies work for me.—Michael M.

I'M FIXING A HOLE

I am in the process of setting up a basement studio (aren't we all?), and currently, I am running mic cables out the door, down the hall, and into the control room. I know I have to cut a hole in the wall, but that's about as far as my expertise goes. Are mic panels available in standard configurations? Are the input/output sides two separate units, and if not, how are they connected to each other through the wall? Can I run a headphone feed through the same panel? At any rate, if you could shed any light on this subject in the form of easy, step-by-step instructions that a blindfolded chimpanzee could follow, I would gladly respond by forwarding any other obscure, inane, and off-topic questions that crop up in the future.

commonjohn@aol.com

Common—Several companies offer stock and custom wall-mounted jackpanel plates for creating your own studio tie lines. Two examples are Conquest Sound (tel. 800/323-7671 or 312/534-0390; fax 312/534-0398) and Middle Atlantic Audio Products (tel. 201/839-1011; fax 201/839-1976). You can also buy wall-mounted jackpanel plates from your local pro audio supplier or from mail-order suppliers such as Markertek Video Supply (tel. 800/522-2025 or 914/246-3036; fax 914/246-1757).—Steve O.

WE WELCOME YOUR FEEDBACK.
Address correspondence and e-mail to "Letters," Electronic Musician, 6400 Hollis St., Suite 12, Emeryville, CA 94608 or emeditorial@pan.com. Published letters may be edited for space and clarity.

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circle #577 on reader service card

WHAT'S NEW

By the EM staff

▲ PRESONUS BLUE MAX

Are you tired of having to think about compressor settings? Perhaps the PreSonus Blue Max ($249.95) compressor/ limiter is what you have been waiting for. This "smart" stereo dynamics processor offers fifteen preset compressor and limiter settings: three each for vocals, keyboards, and fretted instruments and two each for percussion, effects, and stereo programs. The ½-rackspace unit also provides a manual setting and rotary controls for ratio (1:1 to 20:1), attack (0.01 to 100 ms), and release (10 to 500 ms).

Other features include high-gain input- and output-level controls, LED metering for gain reduction and input/output levels (switchable), a bypass switch, and a sidechain circuit for de-essing, ducking, and so on. The Blue Max can be operated in mono or stereo (permanent stereo link) modes and is switchable between +4 dBu and -10 dBV operating levels. Inputs and outputs are unbalanced ¼-inch, and the power supply is internal. PreSonus Audio Electronics; tel. (504) 344-7887; fax (504) 344-8881; e-mail presonus@presonus.com; Web www.presonus.com.

Circle #401 on Reader Service Card

▶ A.R.T. PRO VLA

It's no secret that vintage tube compressors are well loved for their smoothness and warmth. Attempting to recreate that classic sound, A.R.T. has released a line of three new tube-based "leveling amplifiers": the Pro VLA ($599), Dual Levelar ($329), and Levelar ($159). The units use a transformerless design that responds to signal levels via optical electronics rather than VCAs. This design, coupled with a single 12AX7A tube per channel, results in soft-knee compression that A.R.T. describes as transparent, smooth, punchy, and fat.

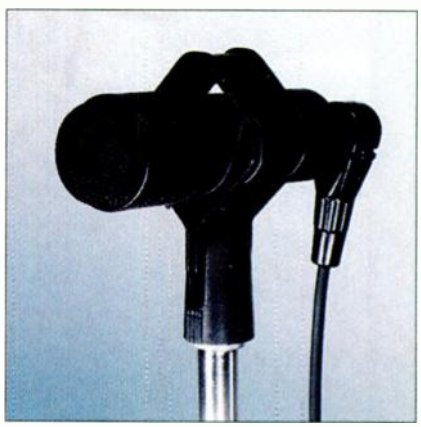
The 2-rackspace Pro VLA (Vactrol-based Leveling Amplifier) offers two independent channels of compression and limiting. Each channel features balanced XLR and balanced TRS ¼-inch inputs and outputs; rotary controls for threshold, ratio, and output; and fast/slow switches for attack and release. Ten-segment LED ladders monitor gain reduction, and VU meters can be switched to monitor input or output. Each channel also provides a bypass switch. The two channels can be linked or used independently. The unit uses an internal power supply. Frequency response is rated at 10 Hz to 20 kHz (± 0.5 dB), dynamic range at >100 dB (20 Hz to 20 kHz), and THD at <0.1% (typical).

The Dual Levelar is a scaled-down version of the Pro VLA. Each channel offers rotary controls for threshold and output, 4-segment LED gain-reduction monitoring, and a bypass switch. The linkable channels can function independently either in compressor or limiter modes and can be switched between fast and automatic response times. Balanced XLR and balanced ¼-inch inputs and outputs are provided for each channel. The unit is internally powered. Frequency response is rated at 10 Hz to 20 kHz (± 0.5 dB), dynamic range at >105 dB (20 Hz to 20 kHz), and THD at <0.1%.

Small enough to fit in a cigar box, the Levelar is a single-channel version of the Dual Levelar and is the latest in A.R.T.'s Personal Processor Series. It features balanced ¼-inch and XLR inputs and outputs and is powered by a 9 VAC external supply. Frequency response and THD are the same as for the other two units. Applied Research and Technology, Inc.; tel. (716) 436-2720; fax (716) 436-3942; e-mail artroch@aol.com; Web www.artroch.com.

Circle #402 on Reader Service Card

▶ K & K DYNA B 07



In the studio or on stage, when drums are part of the equation, a dedicated bass-drum mic can make the difference between a passable sound and one that slams. K & K's Dyna B 07 ($269) is a unidirectional, dynamic, bass-drum mic with a coaxial-dome diaphragm and a neodymium cartridge for extra-low frequency response.

According to K & K's bandwidth graph, the Dyna B 07's relatively flat response rises smoothly between 40 and 150 Hz (peaking by 4 dB at 50 Hz) and again between 3 and 12 kHz (peaking by 5 dB just below 5 kHz)—figures that would suggest both sufficient thud and click. The mic is small (4.5 × 1.5 inches) and features a heavy aluminum body; a reinforced, double-mesh windscreen; and an internal, gel-bed suspension bracket. It comes with an angled XLR-connector cable (for added security) and a shock-mount holder.

Maximum SPL for the Dyna B 07 is 158 dB. Frequency range is rated from 20 Hz to 18.5 kHz. K & K Sound Systems; tel. (800) 867-6863 or (541) 888-3517; fax (541) 888-4846; e-mail karla@kksound.com; Web www.kksound.com.

Circle #403 on Reader Service Card

Were You Waiting For The Ultimate Grand Piano Sound In A Digital Keyboard?

"The PRO2 Digital Piano by Generalmusic has, by far, the most realistic grand piano sound and feel I've ever experienced in any digital keyboard - and I've tried them all! From now on, this is an essential part of my kit and I will use it in all performances."

Keith Emerson (Emerson, Lake and Palmer)

Critics and world class musicians agree; with groundbreaking 128 note polyphony, Physical Modeling technology, great piano action keyboard and all at a price that seems difficult to believe, the new Generalmusic PRO2 is the absolute pinnacle of achievement in digital piano technology. In fact, Generalmusic is the first ever company to marry complex sample analysis with physical modeling to accurately reproduce the unique experience of playing a fine concert grand. We started by painstakingly creating a composite sample which represents "the ultimate grand piano". This composite is based on careful analysis of Steinway, Bosendorfer, Yamaha and Fazioli concert grands with the most outstanding characteristics from each being implemented in the final sample. Of course we didn't just stop there - a great sample does not make a great piano sound!

To replicate the complex acoustic environment of a piano soundboard we use no fewer than three (3) patented physical modeling technologies. The first calculates the harmonic contribution of any other undamped strings to the final sound of the notes being played. The second model analyzes the exact position of the continuous damper pedal and calculates the correct static and harmonic results from the notes played. Finally, whenever a key is released, instead of using an envelope to simply fade out the sample over time, an accurate model of the damper returning to the string is generated and authentic harmonic trails are heard unique to each and every note.

In plain English, the result is sheer perfection. The PRO2 is the only digital piano on the market which sounds its best with the reverb turned off allowing the natural ambiance of the soundboard to provide a characteristic warmth never before heard on a digital instrument. With up to 47 additional sounds of outstanding quality and with a price starting at below $2000 (PRO1), it's no wonder these instruments are sending shock waves throughout the music industry. Check one out at a dealer near you today and find out what all the fuss is about. **If you've been waiting for the ultimate grand piano sound in a digital keyboard....the wait is finally over.**

Generalmusic Corporation
1164 Tower Lane, Bensenville, IL 60106

1-800-323-0280
www.generalmusic.com

GENERALMUSIC

circle #538 on reader service card

▶ TECHNOSAURUS SELECTOR

The day of the analog synth is far from over, as new systems such as the Technosaurus Selector prove. The Selector is available as a hard-wired unit ($2,790), as separate modules, or as a modular system in wooden cases that contain 19-inch or 38-inch racks.

The VCO ($290) has individual outputs and level controls for sawtooth, triangle, sine, and square waveforms with frequencies ranging from 1 Hz to 20 kHz (±1 dB). There are one control voltage, two pulse-width modulation, and three frequency modulation inputs, along with sync in/out for hard-synching multiple VCOs.

The 2-pole VCF2 ($290) has four modes: 12 dB/octave lowpass and highpass and 6 dB/octave bandpass and notch. Resonance and cutoff frequency are voltage controllable. At high resonance values, the filter can be overdriven into oscillation. The module has four inputs and two outputs that carry identical signals. The filter's frequency range extends six octaves below the audio range so it can be used on LFO or other subaudio signals.

The VCA ($220) can produce several stages of distortion as a function of the input-gain setting. It has four audio inputs, one balanced/unbalanced out, and linear and exponential modulation inputs. One AM input can be inverted for

stereo effects with another VCA. The manufacturer rates dynamic range at >100 dB and noise level at -90 dB.

Modulation sources include the LFO/Noise module and the envelope generator module ($220 each). The LFO/Noise module has six outputs for white and pink noise and four waveforms with frequencies ranging from 0.015 Hz to 2 kHz. It also features pulse-width modulation and FM inputs. The EG module features a 70 ms attack time and can be switched between delay-attack-decay-sustain-release and attack-decay mode. Each phase is controlled from the front panel. Gate input and normal and inverted outputs are supplied. The dual version ($290) includes a second envelope with identical controls.

The Control MIDI module ($500) is built into the power module and features one MIDI In, a channel-select button, and eight control voltage outputs: CV, Gate, Dynamic, Aftertouch, Pitch Bend, Mod Wheel, Controller 16, and Controller 17.

Other available modules include a Triple Resonator 3-band bandpass filter ($390), Sample & Hold/Random ($220), and Dual Ring Modulator ($220). The Octal Subharmonic oscillator ($390) gives you amplitude control of the fundamental frequency and eight subharmonics, and you can modulate the odd and even subharmonics. Analog Modular Systems, Inc.; tel. (213) 850-5216; fax (213) 850-1059; e-mail polyfusion@aol.com; Web www.analogsynths.com.

Circle #404 on Reader Service Card

▼ ENSONIQ DP/PRO

Ensoniq's DP/Pro ($1,395) dual-channel digital effects processor features 24-bit processing and 20-bit A/D and D/A converters. The versatile 1U rackmount unit represents a new design rather than an upgrade of the company's popular DP/4 and DP/2 processors. Internal routing allows serial, parallel, stereo, or mono connection of the two processors.

The DP/Pro provides 39 algorithms, including reverbs, delays, chorus, flanger, phaser, panner, rotary speaker, tremolo, vibrato, pitch shifter, de-esser, parametric EQ, signal generator, loop recorder, and six multi-effect algorithms. The algorithms also encompass dynamics processing and include a mastering limiter for processing final mixes. The unit offers 128 ROM presets and 256 user RAM locations. A Find feature allows you to search for effects by category (reverb, chorus, delay, etc.) or application (e.g., guitar, bass, and vocal).

The front panel features two display windows, sample-rate indicator lights (48, 44.1, and 32 kHz), a Value knob, and twenty dedicated buttons including Tap Tempo, individual channel-bypass buttons, and a Tweak button that provides instant access to the most important parameters of each algorithm. Input levels are controlled for both channels by a single input-level knob, and dual 6-segment LEDs can be switched to monitor analog input or digital output levels.

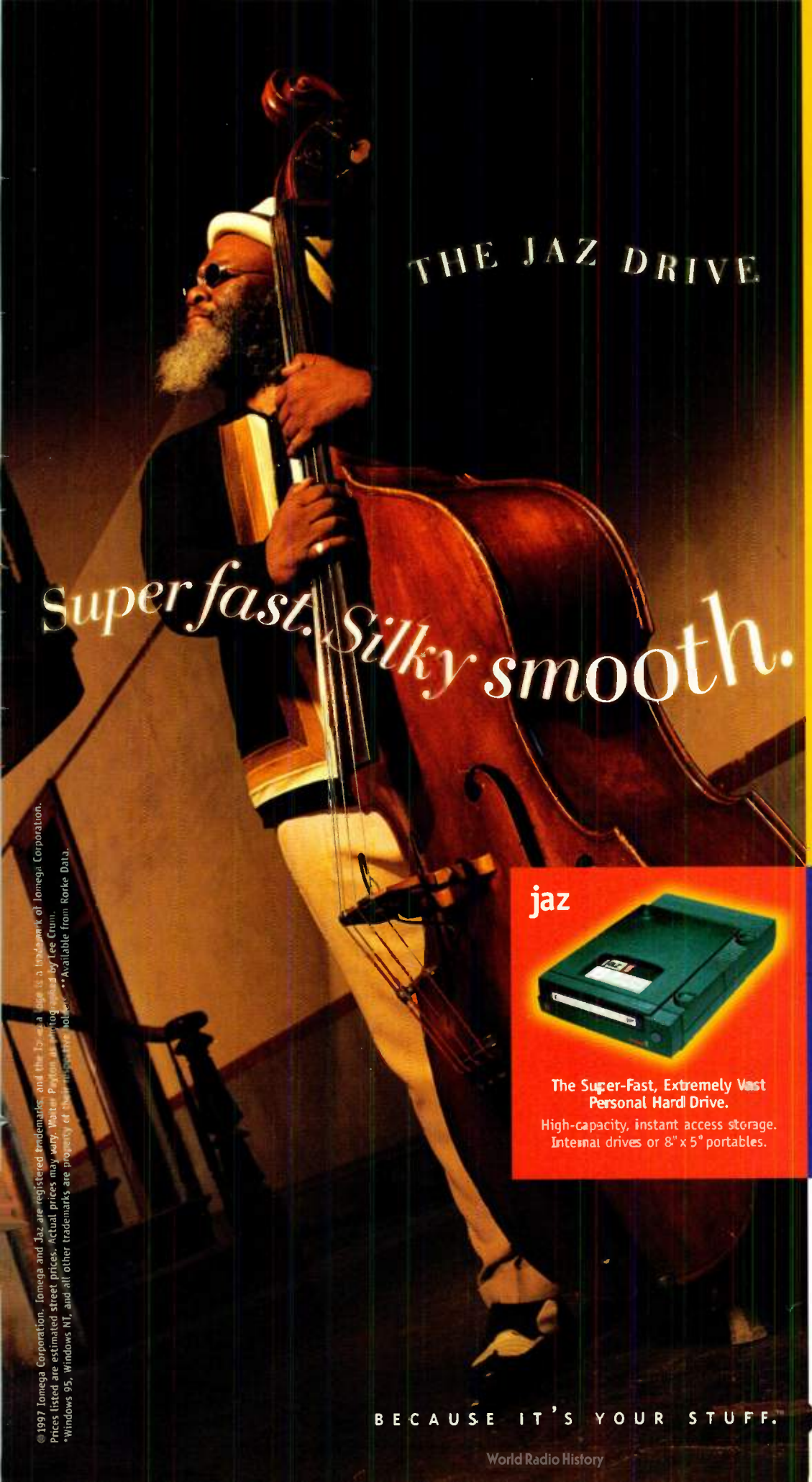
The DP/Pro's modulation system includes two global LFOs and sixteen programmable modulators assignable to footswitches, Tweak knobs, system LFOs, MIDI-note number, Velocity, Aftertouch, Pitch Bend, and all MIDI controllers.

The unit's rear panel provides combination XLR balanced and ¼-inch TRS balanced/unbalanced input and output jacks; MIDI In, Out, and Thru ports; a footswitch jack; and a switch that toggles between +4 dBu balanced or -10 dBV unbalanced operating levels.

The optional, user-installable DI-Pro ($269) adds S/PDIF (up to 20-bit) and AES/EBU (up to 24-bit) digital I/O and allows you to mix the analog and digital inputs. Eventually, Ensoniq also plans to offer the ADC-24, which will provide a 24-bit analog I/O path.

Frequency response is rated at 10 Hz to 20 kHz, dynamic range at >100 dBA, and THD at <0.003%. Ensoniq Corporation; tel. (610) 647-3930; fax (610) 647-8908; e-mail music-support@ensoniq.com; Web www.ensoniq.com.

Circle #405 on Reader Service Card



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▶ ROLAND JP-8000

The JP-8000 ($2,295) keyboard synth introduces Roland's new Analog Modeling synthesis, which combines the conveniences of digital technology with the real-time control features of analog synths. The JP-8000 uses two DSP oscillators: one with pulse, sawtooth, and triangle waveforms and one with these waveforms plus four new special waveforms. Thirty-eight front-panel knobs and sliders provide real-time control over the sound with many features you'd expect to find on an analog synth, such as ADSR envelope generators; 12 or 24 dB/octave, resonant filters; and a ring modulator.

The JP-8000 is 8-voice polyphonic and 2-part multitimbral. It has a 49-key, Velocity-sensitive keyboard; a ribbon controller; pitch bend/mod lever; and expression and hold pedals. The memory holds 128 preset and 128 user patches, along with 64 preset and 64 user Performances. A 2-band tone control, twelve types of chorusing, and five types of delay make up the effects section. A Realtime Phrase Sequencer has memory for 48 4-measure loops that can be triggered from the keyboard, and an arpeggiator with 48 beat patterns is included.

Roland's Motion Control sequencer can record and play back slider and knob movements in 8-measure loops. The unit includes MIDI In and Out jacks, and all slider, knob, and ribbon control movements are sent to the Out. There are also ¼-inch left, right, and headphone outs; a backlit, 16-character by 2-line LCD; and an internal power supply.

Also new from Roland is the JV-2080 ($2,095), a 2U rack-mount synth module featuring 64-voice polyphony and 16-part multitimbral operation. The unit has 16 MB of wavetable data, which is organized into five banks of 128 preset patches, one bank of 128 user patches, ten preset and two user drum kits, and 64 preset and 32 user Performances. Eight internal slots accept SR-JV80 expansion boards. There's also a front-panel slot for data cards that hold 128 patches, two drum kits, and 32 performances.

The JV-2080 has three simultaneously available effects blocks, each containing 40 algorithms, as well as global chorus and reverb/delay. A large, backlit LCD gives you access to the Patch Finder function that groups patches into 38 categories and to the Phrase Preview that lets you audition patches.

The back panel includes MIDI In, Out, and Thru jacks and three sets of ¼-inch L/R outputs. Roland Corporation U.S.; tel. (213) 685-5141; fax (213) 722-0911; Web www.rolandus.com.

Circle #406 on Reader Service Card

▶ OPCODE STUDIO 64X

Opcode's Studio 64X ($319.95) is a 1U rack-mount Mac/PC MIDI interface and patch bay with 64 discrete MIDI channels on four MIDI Ins and six MIDI Outs. The unit automatically determines whether it is connected to a Mac (via standard serial connector) or PC (via DB9 serial port), or it can function as a stand-alone MIDI patch bay. A Thru switch lets your computer address a modem or other peripheral when the Studio 64X is not in use.

Patch-bay configurations are programmed using the included software for Mac and Windows. Four preset and four user programs are stored in battery-backed RAM and can be accessed from the front panel. The unit reads and writes all formats of SMPTE via ¼-inch jacks, with adjustable freewheeling and regeneration. A front-panel panic button sends All Notes Off and individual Note Off messages on all channels.

The Studio 64X is OMS-compatible. Included *Studio Patches* software (Mac only) offers full MIDI mapping and processing as well as creation of Virtual Instruments and Virtual Controllers for use in Opcode's sequencers. Opcode Systems; tel. (415) 856-3333; fax (415) 856-0777; e-mail info@opcode.com; Web www.opcode.com.

Circle #407 on Reader Service Card

▼ MIDIMAN DIGIPATCH 12X6

Midiman's single-rackspace DigiPatch 12x6 ($699.95) is one of the first digital audio patch bays available at a price the average personal-studio owner can afford. The unit features twelve independent inputs—six RCA and six optical (Toslink)—any one of which can be patched to multiple outputs. The connectors accept S/PDIF or ADAT Lightpipe signals. Each of the six output pairs comprise one RCA and one optical connection that carry identical signals. The DigiPatch automatically converts between optical and electrical formats, but it does not convert between ADAT and S/PDIF formats.

You can program DigiPatch from the front panel or via MIDI SysEx with the included Mac and Windows software. Patch configurations can be stored in 50 nonvolatile memory locations and recalled from the panel or via MIDI Program Change. The unit has MIDI In and Out jacks and an external wall-wart power supply. Midiman; tel. (818) 445-2842; fax (818) 445-7564; e-mail info@midiman.net; Web www.midiman.net.

Circle #408 on Reader Service Card

"These puppies keep on barking"

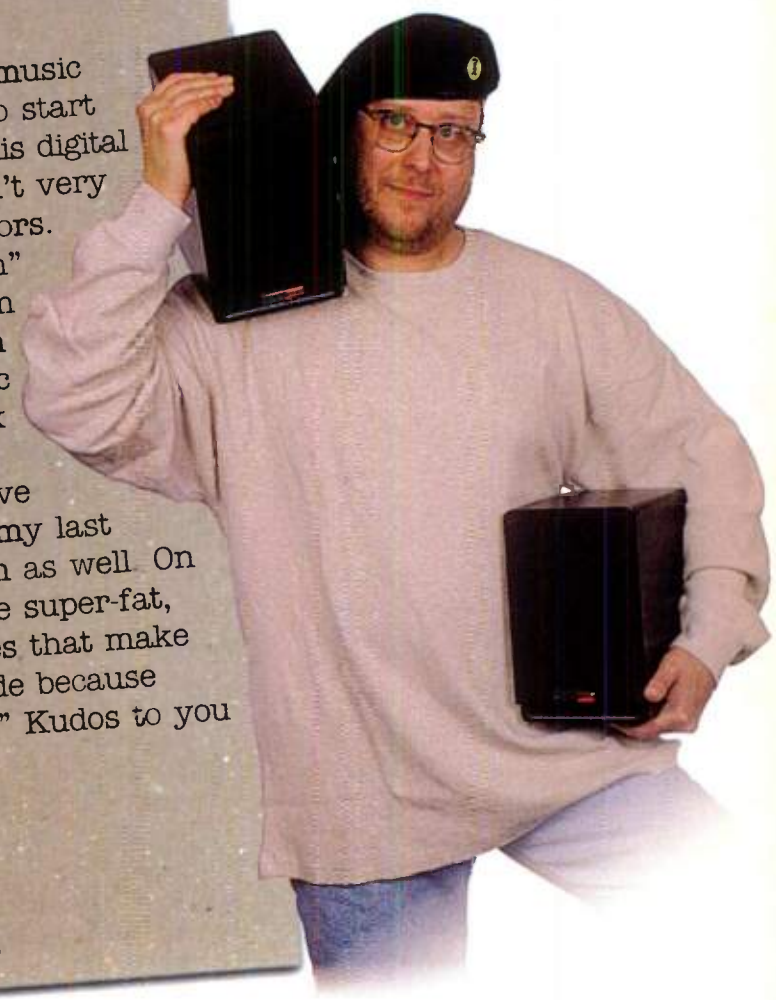
Dear Audix,

"After years as a session bassist and music teacher, I finally decided it was time to start making my own albums at home. In this digital age, choosing recording equipment isn't very difficult until it comes to studio monitors. A friend loaned me some "well known" speakers but they really lacked bottom end and lower-mids. (A major problem if you're a bass player!) A local music store recommended I try some Audix PowerHouse speakers and I got the self-powered PH15-vs. Man, I just love the little brutes!! I not only tracked my last two CDs on them.... I mixed on them as well. On my new record I came up with some super-fat, clean, low end kick and bass grooves that make me crazy! I see no reason to upgrade because these puppies just keep on barking." Kudos to you and your design team!

Keep up the great work,

Dann Glenn

Bassist—Recording Artist, Nightvision Records



PH15-vs

SPECIFICATIONS

frequency range	*50Hz-20kHz*
power capacity	*45 watts RMS per ch.*
nominal impedance	*4 ohms*
sensitivity	*88 (1w@1m)*
crossover frequency	*2.6kHz*

Thanks for the letter Dann!

Audix offers a full range of powered monitors to suit any studio's needs. The ultra linear frequency response and greater dynamic range of the PH15-vs make it the perfect choice for mixing in the studio.

PH15-vs are constructed with a 5 1/4" polypropylene long throw woofer and a 3/4" ferrofluid tweeter. Every woofer and tweeter are matched with a custom crossover and front ported cabinet for the most balanced sound possible.

Like Dann, you'll be amazed at the definition and punch these compact speakers deliver. Best of all, suggested retail for the PH15-vs is only $479 per pair.

Audix PowerHouse Speakers—a musician's best friend

AUDIX

For more information call. 1 800 966 8261
or 714 588 8072 fax: 714 588 8172
...or visit our website at AUDIXUSA.COM

circle #508 on reader service card

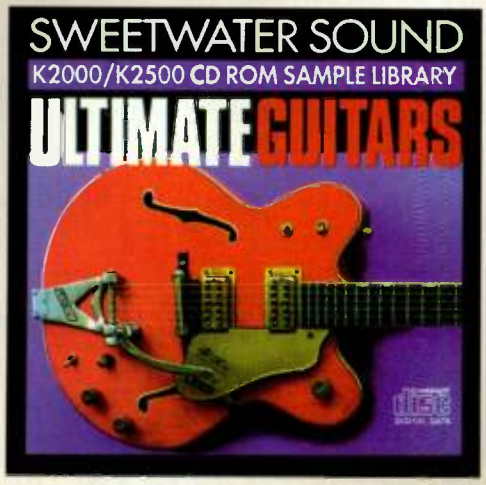
SOUND ADVICE ▲ ▲ ▲ ▲

▼ SWEETWATER SOUND

Over $60,000 worth of vintage and modern guitars were used in the making of Sweetwater Sound's *Ultimate Guitars* ($329) CD-ROM sample library for Kurzweil K2000/K2500. Sampled by frequent EM contributor Jim Miller, the guitars include Fender, Gibson, Gretsch, Martin, Paul Reed Smith, Yamaha, Taylor, Takamine, Ovation, Rickenbacker, Godin, and Hernandez models. Acoustic and electro-acoustic, plus clean and distorted electric guitars, are represented, as well as some fretted and fretless basses.

Over 400 MB of samples are arranged by instrument. The included *Musician's Guide* has a description of each file, historical notes on some of the guitars used, and performance tips. The samples were programmed by V.A.S.T. wizard Daniel Fisher to let you simulate performance techniques such as slides that mimic the sound of sliding across frets, whammy-bar tricks, wah-wah, and individual note bends. (Notes held on the keyboard bend whereas notes held with the sustain pedal do not.) Sweetwater Sound; tel. (219) 432-8176; fax (219) 432-1758; e-mail sales@sweetwater.com; Web www.sweetwater.com.

Circle #409 on Reader Service Card



▲ DISCOVERY FIRM

Six audio CDs make up the Discovery Firm's Sound Effects CD Series ($39.95 ea.; all six for $199.95). Most sounds are live recordings made for this library; others are synthesized sounds that were originally made for television, radio, or video games. The sounds are license free. Most tracks are longer than 30 seconds.

Life features 90 tracks (38 minutes) of "human" noises (including several punches, footsteps, laughter, screams, and cheers) along with kitchen, household, sports, and festival sounds.

Industry (52 tracks, 41 minutes) has factory machinery and construction and excavation equipment as well as science-fiction sounds such as rockets, robots, and lasers.

Airplanes and helicopters, trains, cars, trucks, and ships are included on *Traffic* (65 tracks, 47 minutes).

War provides 37 tracks (20 minutes) of guns, cannons, missiles, mortars, and katanas; explosions; jet and propeller fighter planes; and land and air battles.

The *Animal* disc features 55 tracks (57 minutes) of insects, domestic and wild mammals, birds, dinosaurs, and frogs.

Nature (30 tracks, 48 minutes) has water sounds from rain, waves, rivers, and so on; mountain forest, landslide, and rumbling sounds; thunder; winds; and storms. Discovery Firm; tel. (888) 544-3476 or (310) 781-1333; fax (310) 781-1330; e-mail dis@discoveryfirm.com; Web www.discoveryfirm.com.

Circle #410 on Reader Service Card

▼ PROPELLER ISLAND

Giant Gongs and FX Gongs ($99) from Propeller Island is an audio-CD collection of 201 gong samples totaling over 55 minutes. The collection includes gongs recorded at Propeller Island studio, gongs recorded at Salvatore Church in Berlin, filtered and EQ'd gongs, and gongs that have been heavily computer processed to create unusual textures such as "Interstellar Deep Space Travel Selection."

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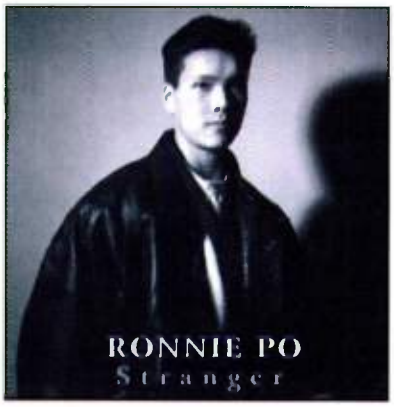


PRO FILE

Summertime Blues

Ronnie Po studies the pros to beat the DIY heat.

By Diane Lowery

What's the definition of a self-starter? It's someone with an idea who takes the initiative and gets things done. For example, on his debut CD, *Stranger,* Ronnie Po wrote the songs, played the instruments, recorded and mixed the tracks, and designed the graphics—all in his bedroom. It was the first time he had tackled such an all-encompassing project, but Po ensured success by doing his homework.

For instance, when it came time to select a mic for his one-room studio, Po studied reviews from back issues of gear magazines. "My ears aren't trained to hear subtle differences between mics," says Po, "nor am I in a position to afford an extensive mic collection. So I compared reviews and decided on a mic I couldn't go wrong with: the Audio-Technica AT4033. It was versatile, highly rated, and relatively inexpensive. I also picked up a Shure SM57, a $90 mic the Rolling Stones still use for tracking electric guitars."

Po's songs have an early rock 'n' roll feel, from the Buddy Holly–esque "Looking for a Stranger" to the "Lady Madonna"–like rhythm of "About You." To capture a suitably retro sound, Po pulled out some favorite oldies and steeped himself in their vintage tones. But he also referenced his work to more contemporary mixes from albums by Chris Isaak, Jude Cole, and Crowded House.

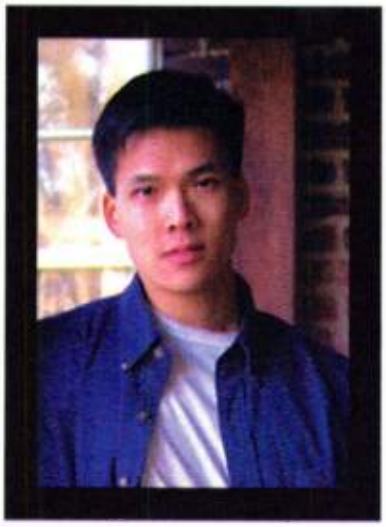
"Not having mixed a project before," Po explains, "I wanted to hear what successful artists have done so that I didn't do something obviously wrong, such as mixing a vocal or a guitar too hot. Of course, there aren't any rules about how loud or soft an instrument should be, but I did want to make sure I was in the 'pro mix' ballpark."

Po recorded his CD using an Alesis ADAT synched to Opcode's *Vision* 1.4. Although he is mainly an acoustic guitarist, Po chose to sequence the drums first—often a verse at a time. "I'm not a drummer, but I know how drums are supposed to sound. To produce something a drummer would actually play, I 'air-drummed' the parts on an imaginary kit before I sequenced the beats on my Alesis HR16."

Another trick Po employed to evoke a full band "feel" was to use a ritard at the end of some songs. Of course, because the drums were the first instrument he tracked, Po had to sequence the drum ritards while "singing" the song in his head. "Rather than go to the trouble of using *Vision* to dial in the ritards," he explains, "I simply ignored the clicks at the end of the song."

Although Po assumed the stressful task of doing everything himself, he maintained his cool each step of the way—that is, until the Houston heat prevailed. "Unfortunately, I recorded much of the CD in the middle of summer," he says. "So I would have to turn the air conditioner off to keep things quiet, tune my guitar really fast, and try to do a take or two before the rising temperature knocked the guitar out of tune. It was a pain because I was constantly racing the clock. But in the end, it probably helped me stay more focused and get the tracks done. There simply wasn't any time for dallying around."

For more information contact Mobius Records, PO Box 541481, Houston, TX 77254-1481; tel. (713) 662-2252; e-mail ronniepo@aol.com.



Ronnie Po

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Randy Siegmeister,
Production Manager - Touring and Special Events for Maryland Sound

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Illustration by Michael Sloan

A Piece of Cake

By Dennis Miller

Cakewalk Pro Audio is one of the best-selling professional sequencers in the Windows market. Long popular among PC users, *Cakewalk* has evolved into a highly reliable and intuitive program.

Underneath *Cakewalk's* lean main screen lie many features that reveal the software's true power. The program now boasts one of the best feature sets around, with even more new audio functions on the way (see the sidebar "What's New in *Cakewalk Pro Audio* 6.0"). In addition, the Cakewalk Application Language (CAL) lets you enhance the operation of many features and even add your own.

Whip up sweet sequences with EM's Cakewalk tutorial.

When you consider its extensive MIDI and audio-editing tools, quick and easy navigation, and powerful customization options, you begin to see why this program has maintained its popularity over the years. We'll take a look at these and some other features of *Cakewalk* 5.0 and help you uncover this software's hidden treasures. (Many of the techniques covered here also apply to earlier versions of the program.) Users at all levels should find some helpful tips and tricks here, so let's get started.

FROM THE TOP

Users of *Cakewalk* 4.0 and later know about Clips, which are segments of audio or MIDI data that are displayed on the main Track view as small rectangular bars. Clips free you from measure boundaries when working with your music (see Fig. 1). There are many ways to use Clips, and you'll probably find that editing becomes much more musical and intuitive once you get comfortable with them.

When you first record a MIDI or audio passage into *Cakewalk*, it automatically creates one large Clip for the whole segment of music. You can use a number of methods to split this Clip into smaller sections. One of the most useful methods is to have *Cakewalk* search for silences within the Clip and split it at each silence. (This and other Clip options are found in the right mouse-button Inspector menu, which is accessible from the main Track view.)

The program will split a long Clip every time it finds a silence of at least the length you specify, but it only recognizes silences that last for a full measure or longer. You can get around this 1-measure limitation if you use another split operation: insert markers where you want the Clip to be split, and then choose the Split Repeatedly at Each Marker command from the right mouse-button menu.

To set the markers during playback, you must have the Marker view open. Move this window to the bottom of your screen, or resize it so you can see the main Track view. Then start playback and click the Add button in the Marker view each time the music reaches a point where you want to split the Clip. You'll hear little hiccups in the playback while you're setting the markers, but the marker times will be perfectly accurate, and you can name them later if you wish. When all the markers are set, highlight the Clip and choose Split Repeatedly at Each Marker. A new set of Clips appears on the screen that you can now edit as you wish. In addition to splitting Clips into smaller segments, you can also combine Clips into larger units. This lets you move, copy, or otherwise edit large amounts of data at once.

Another of my favorite tricks is to create a Clip from just a few notes, which is useful when I want to loop or repeat those notes. Go to the Piano Roll view, find a small phrase such as a bass riff or drum groove, and highlight it. Then pull down the Edit menu and select Create Clip. Now that the phrase has been turned into a Clip, you can copy and paste it or use it repeatedly throughout your sequence. This is especially handy because *Cakewalk* lost the ability to loop individual tracks with version 4.0. (Clip looping will be available in the next release.) Don't forget that you can name Clips and toggle their display on and off, as well.

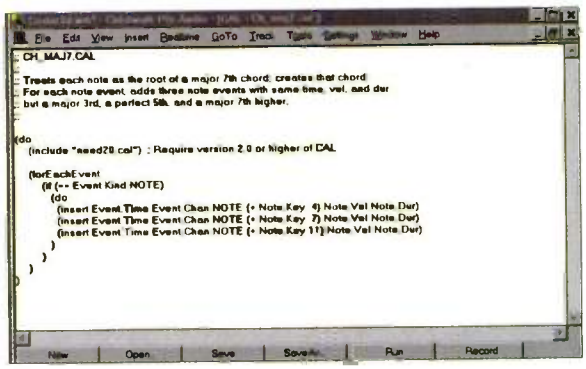


FIG. 2: CAL programs allow you to extend the features of the program. This routine builds a major seventh chord above every note in a selected range.

If you prefer the older *Cakewalk* interface in which a measure-by-measure view was displayed, pull down the View menu and highlight Options, which opens a submenu. Select Display Vertical Rules from this submenu, and then use the Split by Measure option to get the look and feel of earlier *Cakewalk* versions.

CAL

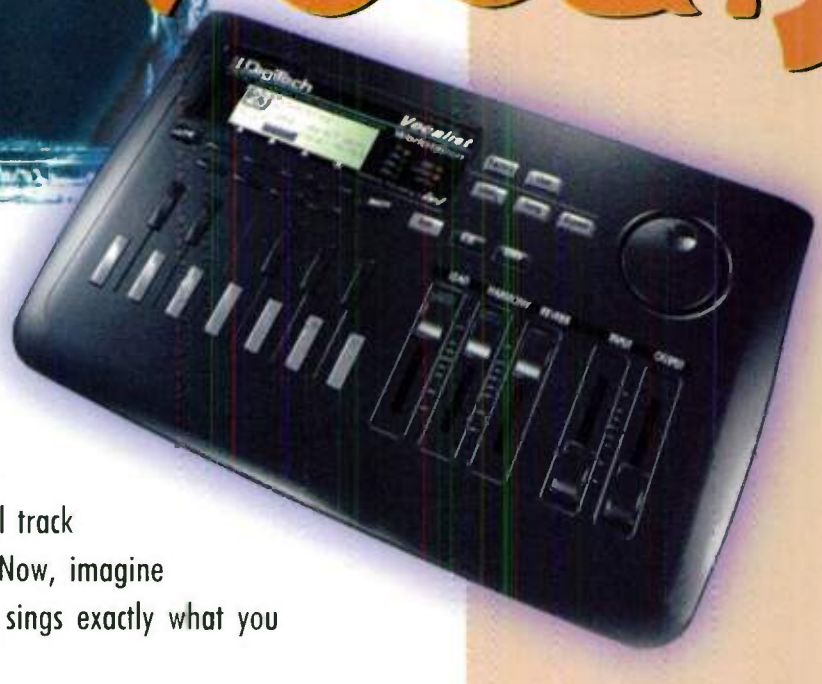
The Cakewalk Application Language (CAL) is one of the most versatile features you'll find in any sequencer. CAL lets you create your own functions. Want to split different MIDI pitches to separate tracks? It's easy with CAL. How about a function that builds a major chord above every note within a specified range? CAL can do that, too. *Cakewalk* ships with numerous CAL functions, which are displayed when you select Run CAL in the Edit menu. These examples are excellent starting points for your own experiments.

Let's start by taking a look at an existing CAL function, and then we'll make some changes to see how it works. Pull down the View menu, choose CAL, and open a file called "ch_maj7.cal." (Under Windows 95, CAL file names can be longer than eight characters and include spaces.) This file builds a major seventh chord above every note in a selected region (see **Fig. 2**). The keys to this function are the numbers in the lines that begin "insert Event.Time." The numbers 4, 7, and 11 indicate the pitches that will be added by specifying the number of half steps above the root note.

FIG. 1: *Cakewalk* uses Clips to represent MIDI and audio data in the main Track view.

Create killer vocals

Jon Anderson/YES ©Roxi Cook



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To test this out, enter a few notes in a new track. For example, enter a series of quarter notes starting with C5; just go up the scale a few steps, including the notes C5, D5, E5, and F5. Now highlight these notes, move back to the CAL view, and choose Run CAL. You can also run a CAL program from the Edit menu if you don't have a CAL view open. When you return to the Piano Roll, you'll find major seventh chords above every note in the track.

Select Undo CAL in the Edit menu, and return to the CAL view. Change the 4 in the file to a 3 and the 11 to a 10. When you run this version, you'll find a series of minor seventh chords in the Piano Roll view. Experiment with other intervals; when you're done, select Undo CAL in the Edit menu again.

CAL routines can be interactive; you can tell a routine to prompt you to enter values before the operation occurs. Applied to the previous example, this lets you choose the intervals you want on the fly. A CAL file for this purpose (called em_class.cal) is available on the company's Web site (www.cakewalk.com/downloads/index.html), along with many other CAL routines.

MACROS

CAL can also be used to create macros that perform common tasks. For instance, I often like to set the first sixteen tracks of a sequence to MIDI channels 1 through 16. Of course, you could create a template file for this purpose, but you might not decide that you want this configuration until you're well into a work session. CAL comes in very handy in this case.

To create a CAL macro you can use any time you need it, start with a new sequence using the Normal template. Place the cursor on the Channel parameter of Track 1 in the main Track

CUOMO'S "CAKEWALK" TV

I use *Cakewalk Pro Audio* for sequencing when I write the music for the NBC television series *Homicide: Life on the Street*. Because my schedule is fairly demanding, I've tried to figure out as many ways as possible to streamline my work process. For example, I've created a template that I open each time I begin a cue for the show. I use a basic foundation of particular synth and sampler sounds, which I then augment depending on the specific needs of each cue. Each of my synthesizers and samplers is assigned to its own MIDI port, and all of my "foundation" sounds are assigned to their own MIDI channels, with their names entered in the Instrument column of the Track view. As soon as I open the template, I'm ready to go.

I also make judicious use of key bindings and CAL. The trick here is to identify the operations you do over and over and use key bindings or CAL to automate them. For example, after an editing session, I often have many windows open, and I want to close them all instantly to reduce visual clutter. So I assigned Control-W to close all open windows. I have also assigned key bindings for Quantize, Slide, Length, and opening the Time Format window, because these are functions that I do dozens of times whenever I work on a cue.

Some of these functions already have a shortcut in *Cakewalk;* for example, Alt-W-A also closes all open windows, but I find it much faster to use shorter key combinations for my shortcuts. I've also used CAL to write a couple of very simple programs that I assigned to key bindings. For example, I can turn the metronome on or off for recording in a single stroke. I also assigned certain CAL programs to some of the function keys so I can randomize pitches or note values and copy or archive a track instantly.

Douglas J. Cuomo, composer for NBC's *Homicide*.

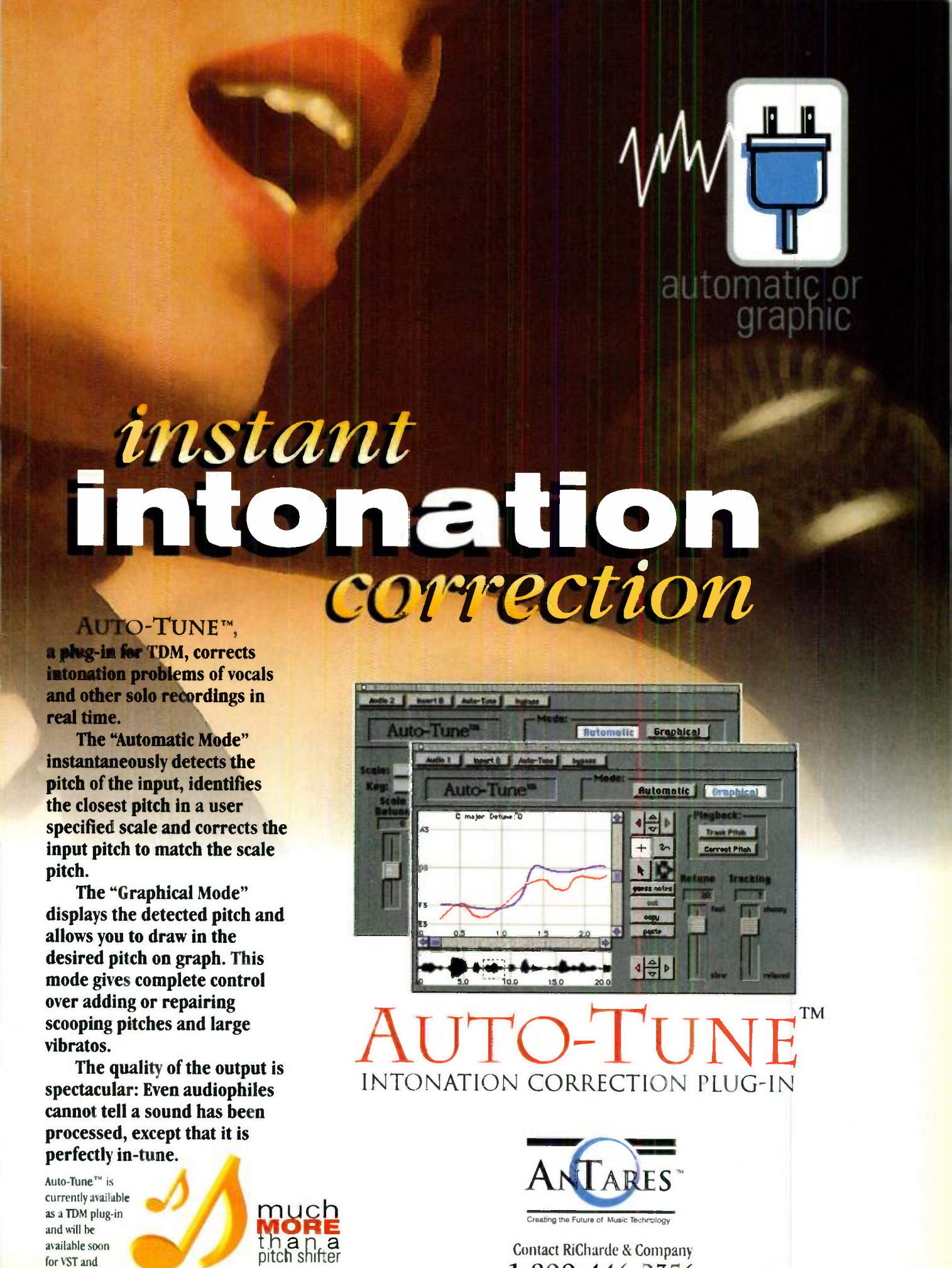
It's most efficient to assign functions that you typically use together to adjacent keys on your computer keyboard. In a fraction of a second, I can copy a track to work on and archive the original track as a backup. This is critical when my new idea reveals itself to be hopelessly unworkable and the original begins to sound more and more like inspired genius.

A final tip on key bindings: it's best to assign them only to the functions you use most frequently. If there are so many shortcut keys that you can't remember them, they aren't all that much of a shortcut.

I also use MIDI controllers to automate the mix for each cue within *Cakewalk Pro Audio*. The nature of the music I write for *Homicide* dictates that a lot of synthesizer sounds or percussion figures fade in and out of the music in a very exacting way. In the Controllers window, I draw my volume fades (Control Change 7) and panning moves (Control Change 10) very carefully, so I don't have to make these moves on the mixer in the final mixdown.

In short, determine what you do a lot, and then figure out how to let *Cakewalk* do it for you.

—Douglas J. Cuomo



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screen, and then select CAL in the View menu. Click on the Record button in the CAL window—the program will return to the Main view—and then double-click on the Channel field in Track 1. Highlight the Channel box in the Track Properties dialog that appears, set the Channel to 1, and click OK. Double-click on Track 2's Channel parameter and set it to 2 in the Properties box, click OK, and do the same for each of the next fourteen tracks. If you have a preferred panning arrangement (e.g., alternating hard left and right), you can set these in the Track Properties screen, as well.

When you're done, return to the CAL window by selecting it in the Windows menu, and click on Stop. Use the Save As function in the CAL screen to name the macro (I use "16chanl"), and you're all set. You can now run the macro any time you want.

Macros are very handy for automating repeating tasks, and you'll certainly want to try some of your own. Unfortunately, version 5.0 of *Cakewalk Pro Audio* doesn't allow you to automate audio functions with CAL, but we can hope that this feature will be available in a future release.

AUDIO OPTIMIZATION

Now that desktop musicians are using integrated MIDI and audio programs on a regular basis, getting the greatest number of audio tracks out of your personal computer has become a major issue. Here are a few suggestions that can help you improve audio performance using *Cakewalk Pro Audio*.

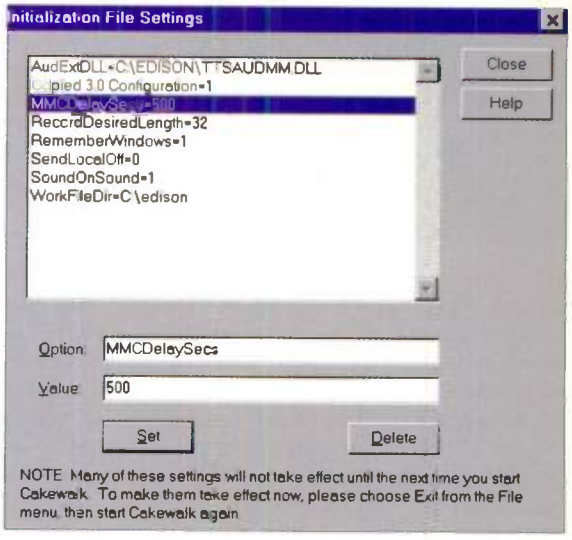


FIG. 4: The initialization file provides many options for customizing the operation of the program.

First, let's take a look at how *Cakewalk* handles audio files. Any time you record audio into *Cakewalk*, the program creates a file in the Wavedata directory and gives it a unique name. It then associates that file with a specific sequence. If you don't save the sequence that was open when the audio was recorded, the audio files are deleted. However, if you save the sequence and later delete it from Windows or DOS (rather than from within *Cakewalk*), the audio becomes "orphaned." To get rid of these files, you can normally use the Clean Audio Data command from the Edit/Utilities menu. Clean Audio Data deletes all files that do not have a sequence associated with them.

But there is one problem: Windows 95 sends "deleted" files to the Recycle Bin, where *Cakewalk* detects them and assumes that they are still viable files. As a result, the program won't delete the audio associated with these files. The same is true of some other applications; for example, *Norton Utilities* sends files to a Protect directory rather than removing them from your disk. You must clear out the Recycle Bin (in Windows 95), or disable *Norton*'s Protect feature to ensure that *Cakewalk* doesn't see the files.

When you import a preexisting audio file from disk, *Cakewalk* makes a copy and saves it in the Wavedata directory by default. You can disable this copy-on-import feature by opening the aud.ini file in the Cakewalk directory and changing the value of CopyOnInput from 1 to 0. (Be sure to use a text editor or save the file as ASCII text in your word processor!) Also keep in mind that if you change this setting, any edits you make to the imported file while you are working in *Cakewalk* will be permanent.

There are many ways to improve audio performance in *Cakewalk*. For example, quit any other programs that are running. Fax programs that run in the background or Windows 95 utilities such as the auto-run option for your CD-ROM can interfere with disk access. If you're having trouble, you might also try recording audio at a lower sampling rate. I find that working at 22 kHz with a resolution of sixteen bits is acceptable for many applications. Keep in mind that you can have only one sampling rate within an individual *Cakewalk* file.

If you're using several tracks of audio, decrease the Velocity of all tracks by the same ratio, especially if you are noticing pops and clicks during playback. (In *Cakewalk*, the amplitude of audio data is represented by Velocity to remain consistent with MIDI nomenclature.) Often, this problem is a

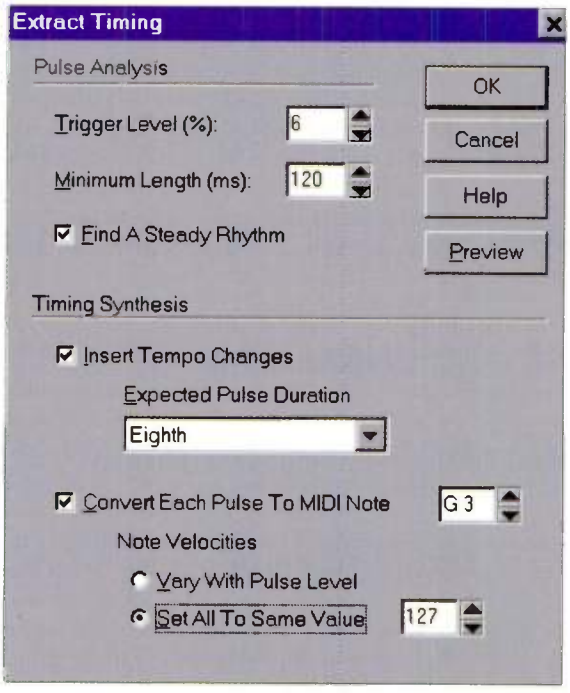
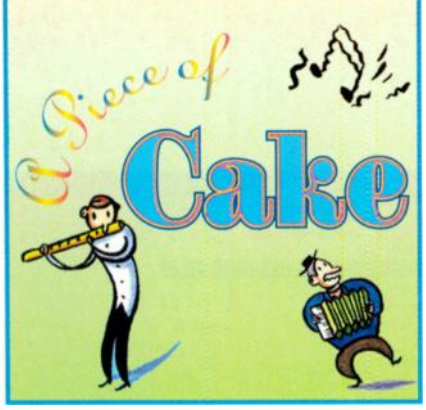


FIG. 3: The Extract Timing option can be used to synchronize MIDI with peak events in an audio file.



result of clipping. If you have an audio passage that repeats, record the smallest amount of audio possible and copy and paste it as many times as you need to. *Cakewalk* stores only the original Clip on your hard drive and points to it when playing the copies.

You can also disable Display Clip Contents to save a few CPU cycles when playing back. Right-click anywhere in the Track view and select View Options to disable this feature. In addition, turn off Draw Playing Audio. This option is off by default, but it doesn't hurt to check the setting in your wincake.ini file. To disable the setting, change the value of DrawPlayingAudio from 1 to 0. This should improve audio performance significantly.

EXTRACT TIMING

Cakewalk's Extract Timing feature is a handy way to align audio and MIDI data. This feature is available in the Audio menu, and it automatically locates amplitude peaks in an audio file and creates a track of user-specified MIDI notes that line up with those peaks. Extract Timing works especially well with music that has a steady pulse, and you can get good results if you understand the feature's various settings.

To experiment with this feature, open the Audio view with an audio Clip loaded, highlight the Clip, and click on it with the right mouse button. Select Extract Timing (see **Fig. 3**). The Extract Timing routine scans your audio and tries to find points where the audio matches the settings you specify.

For example, the Trigger Level Percent setting represents the change in amplitude that must occur between one sample and the next to register as a "hit." For example, if you set the Trigger at 10%, the program searches for points where the amplitude jumps at least 10% from one sample to the next. A setting of 100% would mean that the amplitude must double to be a hit. I find that a value of 6 or 7 usually works well with drum patterns, especially if they are recorded clean with no processing.

The next setting, Minimum Length, determines how soon the program will identify a hit after the last one. In other words, if you set this parameter to 20 ms and the program finds another hit 10 ms later, it will ignore the second hit. In most cases, I use a setting of around 120 ms, but trial and error is a good approach in this case.

Assuming your music has a steady beat, you can select Find a Steady Rhythm in the Extract Timing dialog box. If the pattern is not perfectly in tempo, try engaging Insert Tempo Changes, as well. In this case, you select a note number and duration to which the pulses are converted.

Using the Preview button, you can see which points the program has identified as meeting your conditions. When everything looks cool, click on OK, and *Cakewalk* creates a string of MIDI notes that match the pulses in your audio and writes them to the Clipboard. You can then paste them into a MIDI track or use them as a Groove Quantize map.

CUSTOMIZATION

There are many ways to customize the operation of *Cakewalk*, and it is well worth the effort to understand how these options work. For starters, let's look at some of the choices you can make directly within the program. Open the initialization file from the Settings menu (see **Fig. 4**). The only options installed by default are the name of your audio driver and perhaps a line indicating that the configuration of an earlier version of *Cakewalk* was copied to this file.

MANDEZ'S STUDIO MAGIC

When recording background harmony vocals, I always double each voice. That is, I record each voice of the harmony twice onto separate tracks to produce a thicker sound. Once I have all the harmonies recorded, I take one track of each harmony and pan them hard right by changing the Pan value to 127 in the Track view. Then I mute the other harmony tracks by double-clicking in the Status column for each track I want to mute.

Next, I select the panned tracks and open the Audio view. By selecting the tracks I want to edit before opening the Audio view, I am able to see all the waveforms and Velocity knobs [individual Velocity controls on the left side of each audio event]. Then I can work on establishing a proper blend between each voice by adjusting their Velocities. Once I get the proper blend, I return to the Track view, right-click on the edited tracks, and select Combine. All the right-panned harmony voices are merged onto one track. I then repeat the process for the remaining tracks, which are panned to the left, to create a stereo spread.

If I want to raise or lower the volume of one of the voices after I've merged them, I go into the Event view, find the voice, and change its Velocity. This is a very flexible option that lets me change my mind after I've done an edit. If I want an even fuller sound, I copy each harmony part by selecting Wavefile from the Insert menu, which inserts an identical copy of the voice in the track. By changing the time in the Meas:Beat:Tick column with the plus or minus key, I can create an electronic doubler effect.

—Magic Mandez

Magic Mandez, producer of the Whispers, the Rippingtons, and George Duke.

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circle #518 on reader service card

To add a new line to the initialization file, you normally type the name of a function in the Option field and the desired value in the Value field. Clicking on the Set button adds the appropriate line to the file. Keep in mind that any changes you make to this file won't take effect until you restart *Cakewalk*.

You can change the default directory that *Cakewalk* uses to store your files. Specify any path by typing "WorkFileDir" into the Options field and the desired path name into the Value field, which forces *Cakewalk*'s File Open function to start wherever you wish.

If you're an ADAT user and have trouble with *Cakewalk*'s MMC feature, you might slow down the speed of transmission between the PC and recorder. The default delay time is 200 ms, but you can increase this by adding an "MMCDelaySecs" option with a value of 500 to fix the problem.

I have a Kurzweil K2000, and I was surprised that it would not respond on channel 1 immediately after I started *Cakewalk*. Like many other sequencers, *Cakewalk* sends a Local Control Off message that interferes with the K2000's operation. The fix is simple: just add a line that reads "SendLocalOff" with a value of 0 to disable this feature.

If you're running *Cakewalk Pro Audio* on a machine that is RAM-challenged, you can reduce the number of undo steps that *Cakewalk* stores. Add the option "MaxUndoSteps" with a value of 64 to cut the number of steps in half. If you want, you can set the value even lower.

Guitar- and wind-controller users know that their instruments generate a flood of MIDI data. If you want to optimize *Cakewalk* for use with these devices, you can increase the maximum number of MIDI events it will record. In this case, however, you must edit the initialization file, which is called ttseq.ini, within a word processor. (The company feels that certain parameters should not be readily available to the casual user, which is why this procedure is different from the others described here.) By default, the setting is 16,000 MIDI events, but you can double this number by opening this text file in a word processor and adding the line "RecordDesiredLength=32" (making sure to type the characters exactly as shown).

Cakewalk Music Software has added a new 5.0 DLL update file to their Web site that lets you customize the way *Cakewalk* handles Standard MIDI Files. In particular, this offers better support for Yamaha XG files. You can find the file, which is called dllup50.exe, in the Download area.

Cakewalk's Key Bindings feature in the Settings menu provides many options to make the program work your way. Nearly every function can be assigned to a key on your computer keyboard or MIDI controller. I have created single-key settings for Start, Stop, Rewind, File/New, and even some CAL programs that I use often. I also set up some bindings for my keyboard controller; using the sustain pedal in conjunction with MIDI notes, I can trigger the functions I want from my keyboard.

For example, if you want *Cakewalk* to start playback when you step on the sustain pedal and play C8, open the

THE MULTIMEDIA ARTIST KNOWN AS PRINCE

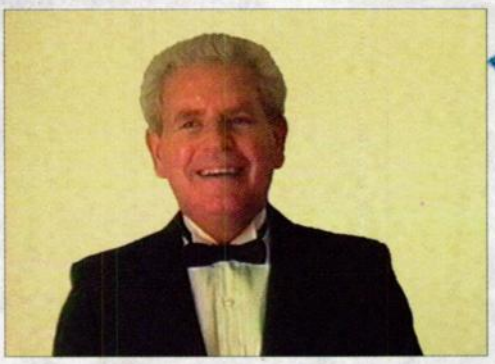
Usually, my ultimate goal is to deliver a MIDI file that will sound good on General MIDI, GS, or XG synthesizers, including FM sound cards. Aside from the output-level differences in these devices, the most troublesome thing is polyphony.

My best trick is reducing polyphony on the drum tracks. Most modern synthesizers play a complete drum sound even if the note is only one tick long. Extra ticks waste polyphony. To change the length of all drum notes to one tick, select all the drum tracks by left-clicking on each drum-track number. Next, press Control-F9 and Control-F10 to select all events in those tracks. Pull down the Edit menu, and select Interpolate, which opens two windows in succession. Click on the None button in the first window to deselect everything. Then, click on Note to select all notes and click on OK. The second Interpolate window looks just like the first one, and you only need to make two changes here: at the far upper right, change both the Min and Max Duration to 1. This sets the length of every note to one tick.

If polyphony is still a problem, select all your drum tracks and then right-click on one of the drum-track numbers and open the Event view. This lets you look at each individual event parameter. Look at the columns labeled Meas:Beat:Tick and Kind. Chances are you will find Note events that occur on the same Meas: Beat:Tick. Move the note events so that no two occur on the same tick. To do this, left-click on these events in the Meas:Beat:Tick column. Now, use the + key on the keypad to add one tick to the event time. Just make sure that no events overlap in time and that you keep the events centered around their original Meas:Beat:Tick.

Before you save this edited song, play it through and make sure that you didn't accidentally include a melodic instrument track in your editing.

–Bobby Prince



Bobby Prince, soundtrack producer for best-selling multimedia game titles, including *Doom*, *Duke Nukem*, and *Wolfenstein*.

Key Bindings window from the Settings menu, click on MIDI, scroll to C8 in the Bindings box, and find the option called Realtime Play in the Functions list. Click on Bind and then click on Controller and find the value 64-Pedal in the Controller list. Click Bind again, followed by OK. Now, whenever you press the sustain pedal and hit C8, the sequence will begin playback.

SPEED RACER

Cakewalk offers many shortcuts for speeding up your work. Most of these are well-documented, but a few aren't covered extensively in the manual. Here are some quick tips that can make your work go faster.

When scrolling in a numeric field (such as the track parameters), hold the left mouse button and drag the mouse to increment or decrement the numbers. To really speed up the process, hold down the right and left mouse buttons to scroll the values by tens. You can also use the bracket keys to increment values by tens.

In the Audio view, you normally use the Line tool for drawing fade-ins and fade-outs. However, if the Line tool is selected and you drag vertically along the left side of the screen, you can quickly change the volume for all audio Clips in an entire track.

Shortcut Keys

Tool	Shortcut Key
Select	S
Pencil	D
Erase	E
Scrub	B
Line (Audio view only)	L
Cut (Audio view only)	C

To quickly change a note number in the Event view, double-click on the desired note in the Values column and hit a key on your controller, and the value in that field will change to the incoming note number. Another shortcut is useful for entering numbers in a drop-down list within a dialog box (i.e., a field in which you would normally select from a list provided by *Cakewalk*).

This shortcut is best explained by example, so try the following procedure in the Patch field within the Track Properties view, or in the Controllers field within the Fader Properties view. Instead of typing the full number for the desired patch or controller or scrolling way down the list to get to a number like 93, just hit 9 repeatedly on your computer keyboard, and the numbers 90, 91, 92, etc. will appear in succession.

If you need to enter a time value (e.g., in the Time+ column in the main Track view), you can save a few steps using the following procedure: instead of typing the numbers of hours, minutes, and seconds separated by colons, such as 2:03:46, simply leave a space between the numbers, as in 2 3 46, and *Cakewalk* automatically adds the missing zeros and colons.

Speaking of time, *Cakewalk*'s Snap To feature is great for snapping events to a rhythmic location, but what if you want to snap a Clip to an actual SMPTE time? This option is not available from the main Track view, but you can snap an audio Clip to a SMPTE time by moving to the Audio view, opening Event Properties, and setting the Clip's start time in the Time field.

Here are two tips that can speed up the process of navigating through a sequence. Pressing F5 on the computer keyboard brings up the Go To window with the Now Time displayed, but if you hit F5 again, you see a list of all your markers. Double-click any marker, and the Go To time automatically

WHAT'S NEW IN CAKEWALK PRO AUDIO 6.0

Cakewalk Pro Audio 6.0, which should be available this spring, adds several new DSP functions to the program's audio-editing tools. These functions include pitch shifting, pitch-to-MIDI translation, and time expansion/compression. On the processing side, you'll find new reverb, chorus, and delay effects. All the new editing commands feature a preview mode and preset parameters that include common effects settings. Users can also create and save their own custom presets.

Equally important is support for Microsoft's ActiveMovie audio plug-ins. ActiveMovie represents the emerging standard for audio plug-ins on the Windows platform, and any ActiveMovie plug-in works with *Cakewalk* as an audio effects processor. In addition, *Cakewalk*'s new DSP effects are themselves ActiveMovie plug-ins, which can be used with other compatible programs.

Waves has already released a suite of ActiveMovie audio-processing tools, called the Native Power Pack, which includes the *L1-Ultramaximizer* dynamics processor. Plug-ins from Tracer Technologies, QSound Labs, and Arboretum Systems should also be available in 1997. In fact, Cakewalk Music Software will be distributing QSound's QTools/AX plug-ins worldwide.

Cakewalk's new StudioWare onscreen control panels let users create custom control interfaces for their favorite studio gear. Any device that can respond to MIDI and System Exclusive data, such as mixing consoles, hard-disk recorders, and effects processors, are supported. These StudioWare panels provide you with onscreen emulation of the hardware's front panel, which should greatly simplify your work flow.

In addition, these StudioWare panels can also execute complex operations that are not easily accessible from the device's physical surface. This allows users to automate their mix; save, recall, and change settings on the fly; and program fader and effects parameters. *Cakewalk Pro Audio* 6.0 will ship with several StudioWare panels for a variety of studio gear, including the Roland VS-880 and TASCAM DA-38. Additional StudioWare panels will be made available throughout the year.

Among the other expected features for *Cakewalk* are improved looping of MIDI and audio Clips, real-time display of notes while recording, the ability to view controller data within the Piano Roll window, and enhanced percussion notation. You'll also be able to save and recall screen layouts and record System Exclusive data in real time. All in all, this is quite a hefty upgrade.

updates to the selected marker's location. When listening to a sequence, hit the F9 key to set the From and Thru time to the current cursor location. When you then hit F7, *Cakewalk* immediately jumps to that spot.

PRINTING AND LYRICS TIPS

Cakewalk's notation capabilities aren't designed to match those of a dedicated notation program, but you should find them serviceable for everyday tasks. Here are a few tips that can make the scoring features a bit more useful.

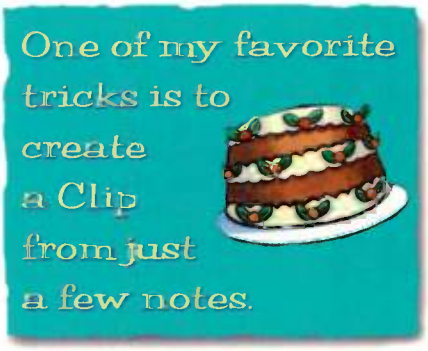
If you work with transposing instruments, you'll probably need a printout of each instrument's part at the transposed pitch. But how do you listen to the part in the sequence at concert pitch without transposing the track? Simple; just create the part at the transposed pitch and then use the Key+ parameter in the Track view to adjust the entire track up or down to concert pitch.

For example, if you have a B♭ trumpet part, enter the pitches transposed up a major second. When you want to hear the part, simply set the Key+ value to -2. In addition, *Cakewalk* automatically transposes the key signature in the Staff view for each track according to the track's Key+ value. When you're ready to print, the proper key signatures are printed for each track.

Speaking of transposition, when you drag a note up or down in the Staff view, the note normally snaps to a pitch in the current key signature. This is handy if you want to stay in the key, but to move a note chromatically, hold down the right mouse button along with the left button as you drag.

Even though *Cakewalk* displays your music as standard notation, it always uses the underlying MIDI data as a reference, which can cause a problem. For example, if a note holds over into the last measure of the sequence, the program might not print that measure; it simply doesn't know where the note ends! This is especially likely to happen if the note starts near the end of the penultimate measure. This problem can be avoided by inserting a bogus event after the note ends. For example, try adding a Pitch Bend event with a value of 0 after the last note in the Event List. *Cakewalk* will ignore the controller event and should print the entire measure.

I like to use the copyright symbol on all my scores, but *Cakewalk* doesn't offer that symbol in its menu. The solution? Click on the Pencil icon and then the Expression tool (the "f" icon) to create a text box on the screen. Hold down the Alt key and type the number 0169 using the numeric keyboard, which inserts the copyright symbol. There are dozens of "upper ASCII" characters that you can add to your score in this way. Check the manual of your word processor to find a list.



Finally, Cakewalk offers a variety of shortcut keys that select various tools in the Staff/Lyrics and Piano Roll views (see the table "Shortcut Keys"). Remember that you can also establish any key bindings you want to control nearly every feature of the program.

OVER AND OUT

We have just scratched the surface of *Cakewalk*, but I hope you have found some useful tips and tricks. In addition to browsing through the program's manual and online help, which are among the best available, be sure to keep an eye on *Cakewalk*'s Web site for new tutorials and other files. There's a lot of power in this program, and the more you explore, the more tools you will find.

Dennis Miller *is a composer living in the suburbs of Boston.* *Thanks to Chris Rice, Jim Komentani, Alan Myers, Ron Kuper, and Carl Jacobson at Cakewalk Music Software for their help in preparing this article.*

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By Larry the O

DREAM DATES

It's one of those nagging, impenetrable mysteries of life: how to find one's soul mate. There are simply no foolproof road maps for personal relationships—although I hear there are many books and videotapes available that will surely confuse the journey—so the mystery of human "chemistry" will likely remain a mystery for eons to come. Darn. ?? But believe it or not, musicians actually get a bit of a break on one aspect of forging relationships: it is no mystery how to develop a successful, thriving creative partnership between you and your gear. If you yearn to start an artistic bond with digital audio, for example, there is no reason to shrink away from your dream system. The attributes of each system are not hidden behind smoke and mirrors; they are easily identifiable and open to practical review. All you have to do is determine whether a specific system meets your creative needs and work ethic. ?? To ease you into the digital dating game, I'll help you identify the strengths and weaknesses of four current digital audio systems: MiniDisc ministudios (MD), Digital Audio Workstations (DAW), Modular Digital Multitrack tape systems (MDM), and Modular Hard-Disk Recorders (M-HDR). ?? Obviously, matching the system to the type of work you do is critical to ensuring a harmonious relationship. Music recording provides the greatest range of demands on a digital audio system, so I'll deal primarily with that area. However, I'll also be sure to discuss sound design and other audio-post issues. ?? Once we've scoped out these digital wonder machines together, it should be relatively easy for

Illustration by Larry Goode

you to select a mate. Don't get sidetracked by trying to determine which medium is the best overall—no system can be all things to all musicians—just focus on the features that are essential to your creative process. Trust me, if you can honestly (and completely) nail down the basic, day-to-day requirements, all your digital recording sessions will be Dream Dates!

PLAYING THE FIELD

Let's take a quick look at our Dream Dates before we start analyzing the kinds of creative relationships each system is best suited for.

DAW. Digital audio workstations combine a host computer with specialized hardware and software. Although they started as 2-channel systems, DAWs now let you add channels as you can afford them. These systems are fairly resource-hungry, however, and 32 MB of RAM is the minimum requirement for doing serious recording. (Hard-disk space gets used up at a rate of about 5 MB per track per minute.) Although the advent of multigigabyte drives and large, fast removables such as Jaz drives have greatly improved the affordability of DAWs, systems can still get rather pricey once you add up all the necessary parts and pieces.

Because DAWs are computer-based, they offer the greatest possibility for upgrades and expansion. For example, DAWs can cascade from one drive to the next, so unlike MD and MDM, they have no inherent limit on the amount of recording time—it depends only on how much disk space you have available. In addition, sound files can be edited and processed in any number of stand-alone software programs, and DAWs can be enhanced with various third-party add-ons.

DAW prices vary greatly, depending on how much you spend on options (such as a large monitor, CD-R recorders, additional RAM, and so forth). Assuming you already own a suitable host computer, you should budget a minimum of $1,500 for a 4-channel system and a decent-sized hard disk. (For a comprehensive look at the DAW scene, see "The Budget Desktop Studio" in the September 1996 **EM**.)

MD. The new kid on the block was, like DAT, introduced as a consumer medium. There are two kinds of MiniDiscs: audio and data. Audio discs are 2-channel media and seem to be gaining some popularity as cassette substitutes. According to audio retailers, consumers are starting to buy bundles that combine a home player/recorder with a Walkman-style player, so they can record at home and then take the portable unit along to listen to music at the gym or in the car. At least one MiniDisc manufacturer also sees a major market for audio MDs in radio, as substitutes for the rather hoary medium of NAB cartridges that are used to play everything from ads and public service announcements to songs receiving heavy airplay. Another use for which MD is well suited is fixed-installation sound, such as audio for museum exhibits and music and sound effects for theme-park rides.

For this article, however, we are more concerned with the new 4-track ministudios such as those manufactured by Yamaha, Sony, and TASCAM. These units use *data* MDs, a format that was originally intended for computer data storage—an application that has not caught on yet.

Audio MDs cost approximately $7 to $10, and the data versions go for about $15 to $20. The current generation of MD ministudios (which typically retail for around $1,500) offer approximately 37 minutes of 4-track recording on a single data MD.

MD has the advantage of being a fairly robust medium—the discs are shock, heat, dirt, and wear resistant—but the format does employ Sony's ATRAC data compression. Although the issue is hotly debated, most audio professionals agree that you *can* hear a difference in sonic quality between the MiniDisc format and 16-bit, 44.1 kHz audio. (For more information on the effects of data compression on MD audio, see "The Digital Debate" in the August 1993 **EM**.) In addition, you will not find a digital output or computer connection on a MiniDisc system, which means there is no effective way to make digital clones or backups of your work.

MDM. If you were a rich and powerful artist in the 1980s, you could choose to record your album on multitrack digital tape. The rest of us, however, had to wait to bust into the digital multitrack club until Alesis unveiled the ADAT in 1992. The 8-track, S-VHS–based ADAT created a new category of multitrack recorder: the modular digital multitrack. The user-friendly, affordable MDM—the original ADAT cost approximately $3,995—began springing up in thousands of home, project, and pro studios and changed the hierarchy of the audio industry forever.

Originally, many audio professionals considered the MDM a toy (some snidely called the ADAT a "Bic" recorder, after the cheap and widely popular ball-point pen). However, when TASCAM entered the field with its own MDM, the Hi-8 mm tape–based DA-88, both formats flourished. (To check out the machines the MDM format spawned, see "Modular Digital Madness" in the May 1996 **EM**.)

Dream Date #1: Modular hard-disk recorders, such as Akai's DR-8, deliver the benefits of random-access recording without the computer but are usually hampered by dinky user interfaces.

Actual Size

Actual Price

$179

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ALESIS

MDMs use cheap media (it costs approximately $7 to $15 for 40 to 60 minutes of 8-track time), and you can easily slave multiple units together with a single cable. In addition, the machines can synchronize to SMPTE time code and, like MD, respond to MIDI Machine Control. Even hipper is the fact that the street price of MDMs often slips under $2,500.

M-HDR. Modular hard-disk recorders, like DAWs, record to (surprise!) hard disks. Unlike DAWs, however, they are stand-alone units that do not require a desktop computer as a host. This feature makes M-HDRs more portable but limits the size and function of their onboard display and controls. (By contrast, DAWs use an ASCII keyboard and the biggest monitor you can afford.) Most M-HDRs include SCSI ports, which allows some sort of computer backup peripheral to be attached, although the choice of supported peripherals is not as extensive as it is for DAWs.

Street prices of M-HDRs start around $2,500, but options such as additional hard-disk space can drive prices up fast. Still, you'd have to work awfully hard to spend as much money on an M-HDR as you could on a DAW. (For a comparison of current M-HDRs, see "The Magnificent Seven" in the November 1996 **EM**.)

THE DATING GAME

Having taken a cursory look at our suitors, let's see how each holds up under scrutiny. Before we do so, though, it is very important to note that there are few, if any, absolutes about which of these tools can be used for a specific

MODULAR HARD-DISK RECORDERS

Akai/Dist. by IMC (DR8, DR16) tel. (800) 433-5627 or (817) 336-5114; fax (817) 870-1271; e-mail akaiusa@ix.netcom.com; Web www.akai.com/akaipro

E-mu (Darwin) tel. (408) 438-1921; fax (408) 438-8612; e-mail info@emu.com; Web www.emu.com

Fostex (D-80, DMT-8, Foundation LE) tel. (800) 936-7839 or (310) 921-1112; fax (310) 802-1964; e-mail info@fostex.com; Web www.fostex.com

Otari (RADAR) tel. (415) 341-5900; fax (415) 341-7200; Web www.otari.com

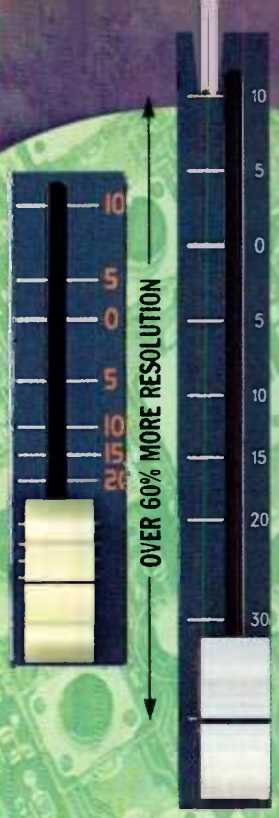
Roland (DM-800, VS-880) tel. (213) 685-5141; fax (213) 722-0911; Web www.rolandus.com

Vestax/Dist. by Tracoman (HDR-8, HDR-V8) tel. (954) 929-8999; fax (954) 929-0333; e-mail hdrtech@tracoman.com; Web www.tracoman.com

FOLIO F1 FADER 100

SPIRIT

High Performance Audio



100mm FADERS

Of all the small mixers on the market, ONLY Folio F1 offers the extra control and creativity of 100mm faders used on large professional consoles.

As you can see, the longer the fader, the smaller the change in level between each movement - making it easier to make fine level changes during complex mixes. With standard 60mm designs even the smallest movements can lead to large leaps in level, especially near the bottom of the fader's travel.

• UltraMic™ preamps

Copied but never equaled, our padless UltraMic™re Amp design with up to 22dB of headroom and noise-free transparent professional performance is the best MicPre you can buy at even 10 times the price. There's alot of marketing hype about MicPre's out there but simply put, Spirit's UltraMic Pre is as good as anything we've made for 25 years - comparable to Mic Pres in $50,000 consoles. We've had customers call and say "I've never heard a mixer sound so open and clean". Give us a listen... You'll be amazed!

• British EQ

Ask any major engineer why the top recording consoles in the business are British designs and you will soon discover that the SOUND of the EQ is at the top of their list. It's a knack they have for designing warm musical turnover filter points by paying attention to the selection of good sounding quality components - like polyester capacitors in the critical audio path. Spirit is no stranger to these specifications and we refuse to compromise (as others have) simply to reduce our cost.

• Total control

We believe that all of the elements in the signal path of a mixer should allow the engineer the widest range of control—afterall, YOU are the engineer and subtle changes can make or break the quality of a final mix. Unlike other small mixer manufactures that use off-the -shelf components, at Spirit we've paid meticulous attention to the "Law" of the rotary controls so you can use the entire 360 degrees while mixing without the worry of small movements creating large jumps in level or clipping the summing amps. We've also added 100mm faders (not 60mm) allowing 60% more fader resolution - putting YOU back in control.

• Surface Mount Technology

As one of the largest mixing console manufactures, Soundcraft has invested in the most advanced production systems available. Our new leading edge circuit construction using Surface Mount double-sided glass epoxy PCBs means lower manufacturing cost without any downside. The result: much more mixer for your dollar.

6 Channel $499* USD
8 Channel $599*

APPLICATIONS

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Submixing

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- Rackmount option
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http://www.spirit-by-soundcraft.co.uk

circle #585 on reader service card

back and forth to add parts. (However, your markers are only readable by machines from the same manufacturer.) On the MDM side, an S-VHS deck obviously cannot trade tapes with a Hi-8 mm machine—a compatibility issue that often plagues ADAT users when they compose music for film, because most audio-post houses are equipped with DA-88s.

The power and complexity of the M-HDRs move them somewhat up the cost scale (for both the device *and* the media). For example, M-HDRs can often be expanded with add-on boards that provide powerful new functions such as ADAT I/O or signal processing. When so enhanced, an M-HDR can provide an even more complete studio package than an MD ministudio. Furthermore, M-HDRs rarely use data compression, so they provide CD-quality fidelity.

The stand-alone nature of M-HDRs tends to slant their user interfaces toward easy and speedy operation, and that's a good thing when you're struggling to swiftly document an idea. DAWs, on the other hand, are often anything *but* rapid-fire sketchpads.

It is the amount of energy devoted to engineering that hinders DAWs in the demo/songwriting realm. A screen full of information can be, at best, a little distracting and, at worst, positively paralyzing. Similarly, a DAW's numerous windows, menus, and dialog boxes can gnaw at concentration and hamper creative flow. Only extensive use of macros—so that all crucial functions require but a keystroke—can render the DAW experience effortless enough for demo work.

CUTTING ALBUM TRACKS

When working in the studio to create a CD-quality release, your practical and creative priorities change. Speed is always helpful for the music-making process, but it is no longer the overriding consideration. For a typical pop album, the first step is usually recording basic tracks. In my mind, this step is clearly the domain of MDMs for a variety of reasons.

The first reason is familiarity. The tape-machine interface is so completely engraved in the minds of most musicians and all engineers that it takes them more thought to follow street directions to a new studio than it does to run the tape machines they find there. Tape machines are not only familiar, they are extremely simple to operate. Transport controls are always obvious on a tape machine, whatever the make, and once you've figured out how to set and recall locate points and how to punch in and out, you've mastered 90 percent of what you need to do.

Perhaps more importantly, tape is cheap and MDMs can be easily slaved to add tracks when needed. Want to do fifteen or twenty takes of the drum, bass, and guitar tracks of each song you record? If you value your bank account, don't try it with a hard-disk recorder. (Of course, MD can't even get to the starting block here, as the format is currently limited to four tracks.) But at $7 a pop for a tape that can hold at least 40 minutes of eight-track recording, you can try to top the Beatles for quantity of tape used and still afford to put gas in your car for the ride home. It's no problem using 16 or 24 tracks for basics, either—there are countless studios with multiple modular digital multitracks, and adding more tracks is as easy as hooking up a sync cable.

The number of studios outfitted with

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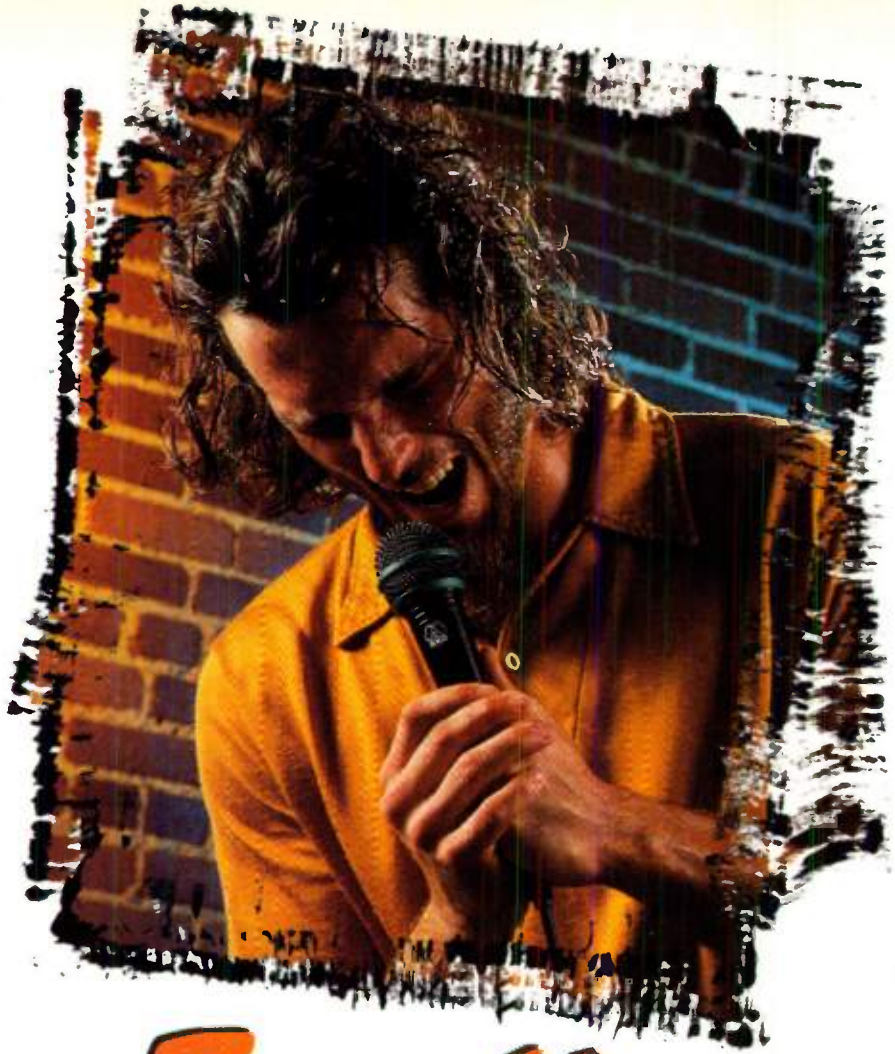
HARMONIOUS RELATIONSHIPS

Here are some creative pros and the digital systems they have chosen for their artistic endeavors.

User	Machine	Application	Credits
Christopher Fogel	MDM (Alesis ADAT)	Music	Alanis Morissette, *Jagged Little Pill*
The Dust Brothers	DAW (Opcode *Studio Vision Pro*)	Music	Beck, *Odelay*
Tom Size	M-HDR (E-mu Darwin)	Music	Steve Miller
Waylon and Shooter Jennings	MD (Yamaha MD4)	Studio Demos	n/a
Frank Macchia	MDM (TASCAM DA-88)	Film Scores	*The Summer of Ben Tyler* (Hallmark Hall of Fame)
Parri Troy	DAW (Digidesign Pro Tools)	TV and Multimedia Scores	Wired Television (MSNBC)
Simon Phillips	MDM (TASCAM DA-38)	Music	Toto, *Tambu*
Bruce Turgon	M-HDR (Vestax HDR-V8)	TV Score	*Boxing after Dark* (HBO)



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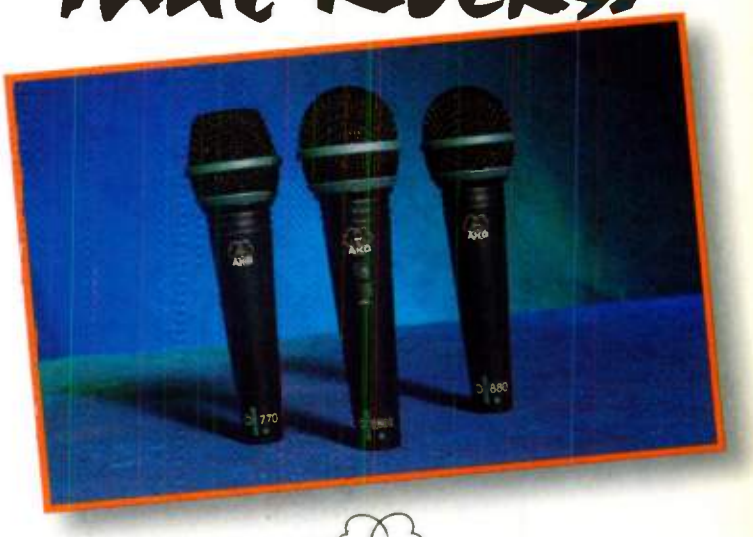

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more tracks is as easy as hooking up a sync cable.

The number of studios outfitted with MDMs is another winning card for the tape-based, digital multitrack format. The vast installed base of MDMs means that you can track in a commercial studio with a multimachine system and a great room, do a submix of your basics to two tracks, then take the tape home to overdub to your heart's content (for free). Need more tracks for your overdubs? No problem. MDMs are easy to borrow and cheap to rent, so just add eight tracks as needed, stir into a cookin' rhythm part, and serve. When you're happy with your tracks, you can return to a big studio to mix with all the hip toys. Finally, the process of making safety copies of your tracks is easy and inexpensive.

Dream Date #4: MiniDisc studios, such as the Yamaha MD4, are inexpensive gateways to basic editing and mixing functions, but fidelity is somewhat compromised by data compression.

OVERDUB CENTRAL

Overdubbing is another story. The big concerns are locating quickly to your punch points and executing repeated takes (playing back existing tracks while recording new ones). As the overdub process was developed using multitrack tape, MDMs can certainly fulfill this function, but hard-disk systems offer several important advantages over tape.

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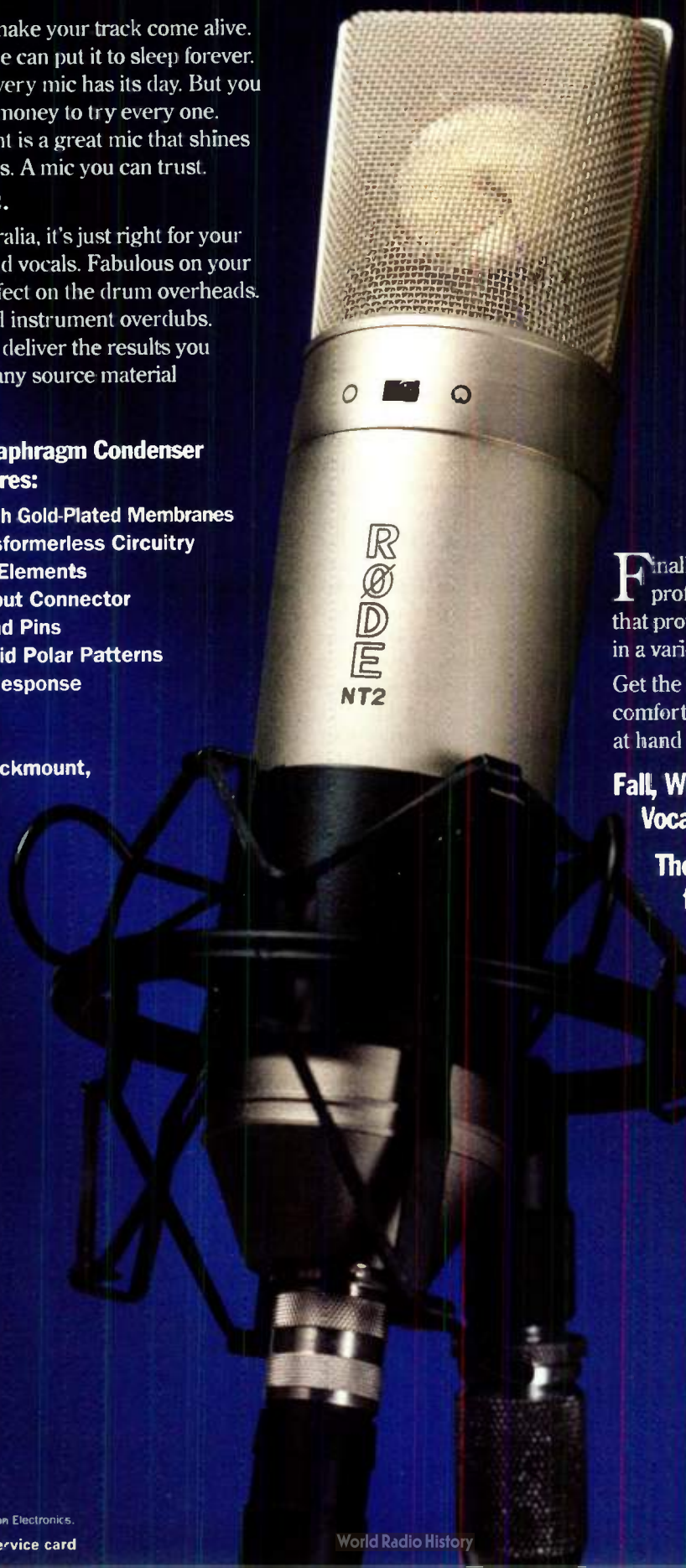

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First, tape requires rewinding, which introduces a delay that can be frustrating to an artist who wants to try another take immediately after finishing the previous one. Second, each take on tape records over the previous one, unless the new take is recorded onto a different track. This not only burns tracks quickly but requires another distracting delay to reassign the input signal to the new track. Hard-disk systems usually allow multiple takes to be recorded onto the same track, either replacing the previous take or giving the new one priority during playback.

The superior editing capabilities of hard-disk systems (which we'll discuss in a moment) also make it easier to comp a single overdub track from multiple takes or to fly parts recorded for one section of a song to another.

However, the ubiquity of MDMs does give them the edge for remote overdub situations. It is very easy to send tapes to other artists and have them perform their overdubs in their locales and then return the tapes to you. This enables you to have your old sax player who moved to New York add a solo to your song recorded in Omaha or to get big-name players to add tracks in their home studios without the expense of flying them in from out of town and putting them up at a hotel.

When it comes to editing, hard-disk systems are head and shoulders above tape. The biggest reason is that they are nonlinear and, usually, nondestructive. In this realm, the power of DAWs overcomes the ease of use of M-HDRs. DAWs have the most flexibility in creating crossfades and alternate versions of edits. With good editing chops on a DAW, performances can be constructed, when necessary, on a note by note basis. I've had to construct new lyrics; remove mouth noises, glitches, and goofs; and glue the attack of a word from one take to the conclusion of the same word from another take. Though I've done many of these same things with a mixer and multitrack tape, DAWs have unquestionably made better edits possible by allowing me to try a difficult edit over and over again, changing the duration and shape of the crossfade and even using different shapes for the outgoing and incoming material, all without changing one bit of the source material.

DAWs also provide the ability to open a waveform editor if real down-and-dirty editing on the source material is needed. And many DAWs provide access to plug-ins directly from their track-editing environment, yielding even greater possibilities for signal processing. It is largely this superiority that is driving the trend toward computer-based, front-end software for M-HDRs so these systems can gain broader access to the fruits of DAW-style editing.

MIXING THINGS UP

When overdubs are complete, it is time to mix your masterwork. Of course, MDMs have no onboard mixing facilities, so they can't even be considered from that standpoint. They do, however, have a separate output from each track, which is not always the case in hard-disk systems. That is an important consideration if you want to avail yourself of the sound or facilities of an outboard mixer, such as a vintage Neve. Once again, the MDM's permeation of the industry means you have a huge choice of facilities at which you can mix, from your own house to the most deluxe of your local mothership studios (which is likely to have a larger collection of the best toys around than your house does).

Regarding onboard mixing, DAWs have the strongest arsenal, with very flexible level and pan automation functions that are controllable through MIDI so you can use hardware fader boxes. With such systems, automation can be performed on the fly with a fader box and then tweaked to any level of detail using non-real-time breakpoint editing. EQ functions and automation can be a different story, as they usually depend on how much DSP your system has. Native processing (i.e., using the CPU for signal processing) is gaining in popularity as host systems become faster and more powerful. Watch this scene carefully: things in this area are likely to change for the better in the near future.

Most M-HDRs offer some kind of mixing capabilities, but the degree and features vary widely, making it difficult to generalize about these functions. Still, M-HDRs are the easiest systems to empower with real-time effects processing. A DAW can run real-time reverb or other effects if it has enough DSP, but the cost of the DSP and the reverb software is often much greater than the cost of real-time reverb on the M-HDRs that offer signal processing.

Without onboard signal processing, effects sends and returns become crucial.

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Actually, none of the systems discussed in this article excel in this area; serious effects routing remains the domain of outboard mixing consoles.

Most DAWs and M-HDRs have some capability to send to an effects device and accommodate some returns, but digital effects loops are hard to come by, and those effects loops you will find are usually limited in number (a single stereo pair of returns is common).

MASTERING

When you get to the mastering stage, there really is no choice: only DAWs offer the high-end software to do professional mastering. This is not to say that sequencing, level matching, and some amount of compression and EQ can't be done with M-HDRs—and this will be adequate for many projects, even many albums if they've been well recorded and mixed—but for critical, get-down mastering, a DAW is the real deal. This is especially true if you want to burn a one-off CD to check your mastering job, a highly recommended practice for an album project.

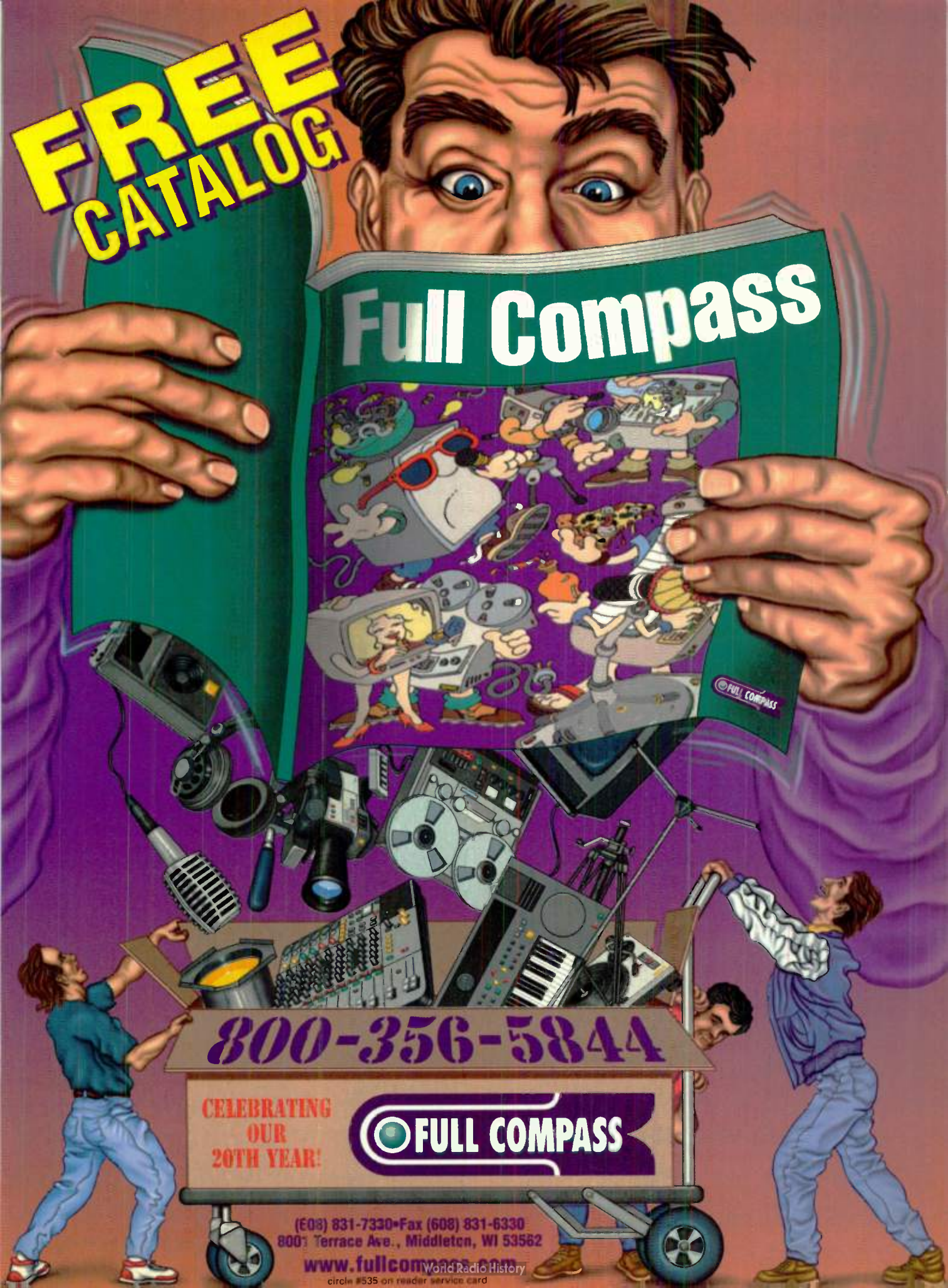
Through this whole discussion of album production, MiniDisc has been all but left out. We all know that there have been well-known albums recorded on cassette ministudios (most notably Bruce Springsteen's haunting *Nebraska* album). It stands to reason that there will be some people on a really low budget who have the chops to make a good-sounding album on MD. And MD studios have some amount of onboard mixing included, and even an effects loop. But MD falls short in many areas that are important to album production and are not, for the purposes of this article, considered good candidates for this level of work.

OUT ON THE TOWN

Both music recording and sound-for-picture applications often require location recording. In music, concerts are often recorded for use in live albums or, sometimes, just to get tracks that have the "live" feel that happens in front of an audience (and is almost impossible to capture in the studio).

MDMs have proven to be far and away the most popular for live recording. A number of units can be put into a rack, making setup and operation extremely simple—an important consideration in location environments. Once again, the cost and availability of the media comes into play: it's not expensive to record a long concert, and tape can be purchased anywhere there's a home-entertainment store.

If one of your units goes down, it's much easier to find a replacement at the last minute than it is to find the right kind of DAW or M-HDR. If there are special guests accompanying the artist on a given night, an additional unit (or more) can be brought in and slaved. And after the tour is over, the recordings can be supplemented with overdubs by slaving additional units. Lastly, with several units on the tour, the ease of making safety copies in a hotel room can bring the peace of mind



that only comes with knowing your brilliant performance is backed up.

In the portability category, DAWs come in last. That's not to say that they cannot be used for live recording; it's simply that their nature as add-ons to a personal computer makes them more delicate. Not only can hard disks be damaged in transport, but there are the myriad other touchy parts of the chain: a card coming partially unseated, a monitor getting damaged, etc.

M-HDRs are better packaged for the road because they are generally in a rack-mount chassis, their displays are internal, and their software is more stable. The primary limitation on using an M-HDR for location recording is the amount of available tracks and disk space. With enough of these, M-HDRs can do well in location situations, though this can be an expensive proposition. Still, for a band looking to record some local club dates for a live album, M-HDR could be a good way to go. Keep in mind that, if you develop a problem, finding a replacement unit or getting one repaired could be tricky.

MD *could* be useful for live recording as long as the limitations of four tracks, 37 minutes per disc, ATRAC compression, and no way to make digital backups aren't too daunting. The ease of setup, however, works in MD's favor as a medium for recording a live gig for a demo or cassette release.

Film and television also require location recording to capture production sound. However, most of this recording is achieved with 2-track systems such as DAT or a Nagra (digital or analog) recorder.

DAWs and M-HDRs can nonetheless be useful on the set. A hard-disk system, a few sound-effect CDs, and a little temp music—along with production dialog transferred using time code—can be whipped into a quick rough mix that can be locked to picture and played back to give a director immediate feedback on the day's work. M-HDRs have

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the edge in this case because they are portable, self-contained recording, mixing, and editing systems. (You don't need to drag a CPU, keyboard, and monitor to the set.)

The portability and random-access editing powers of M-HDRs suggest another interesting application. Multiple (identical) M-HDRs can be distributed to sound editors at different locations and then locked together for the final mix. Of course, this could be done with MDMs or even DAWs, but MDMs don't have the editing flexibility and DAWs don't have the portability.

MULTIMEDIA MATES

Multimedia was born on personal computers and runs on personal computers. Although tools like MDMs and M-HDRs can be useful during the production process, DAWs are clearly the leading candidate for multimedia gigs. One reason for this is the importance of authoring software and QuickTime, because running digital audio against a QuickTime movie is commonplace in multimedia production. Another reason is the variety of audio and video plug-in hardware, as well as software, available for the DAW format. Let's face it, multimedia is generally aimed at the computer; it only stands to reason that the computer is the superior development environment.

MDMs and M-HDRs will find their place primarily in the recording or, possibly, mixing phases, especially if original music is recorded using "real" instruments (as opposed to samplers and synthesizers, which may be sequenced on computer). In the end, all of the elements are generally going to be assembled on the computer.

Post-production for film and video is another fertile area for DAWs because of the need to move audio around freely in a medium that can lock to picture. However, post-production is not dominated by DAWs. The ease of mounting many tracks gives MDMs a strong place in the process, and as pointed out above, the portability of M-HDRs creates a niche for them. All of these have some ability to lock to time code. MD's complete inability to do this pretty well shuts it out of post-production jobs.

SHARING YOUR LOVE

Although settling on a single creative partner has its advantages—you're always aware of those little good and bad traits—playing the field and working with multiple collaborators has definite merits. The most frequent "multiple dating" combination I have seen involves DAWs and MDMs. This collaboration works extremely well because MDMs have the edge on recording and mixing (mainly from the standpoint of the number of tracks easily available), whereas DAWs excel at editing.

My current favorite music-recording strategy is to record the basic tracks on MDM, after which I do a rough mix of the tracks into a DAW. Then I do my overdubs and editing with the DAW and lay back the finished tracks to the MDM. The final mixdown is done with MDMs and a traditional analog mixer, although I often lock the DAW to the MDM during the mix to gain even more tracks.

There are any number of ways that these suitors can be used in conjunction with each other, depending, as always, on the job you need to get done. In other words, keep an open mind regarding multiple creative partners.

WEDDING BELLS!

The only way to make sense of the ever-increasing number of choices in the digital dating game is to look first, and very closely, at the work you have to do. I strongly suggest making a list of the actual steps in your typical project and then using that list to determine what would make your life easier as you move through the recording process. Once you've listed those life-preserving items, you've all but defined your ideal creative partner. So here's to many, many years of a successful and blissful artistic relationship!

Larry the O *is currently producing and performing on* Anarchy and Rapture, *the new CD from his Gonzo Celtic band, Annwn, and creates sound design for games at LucasArts Entertainment .*

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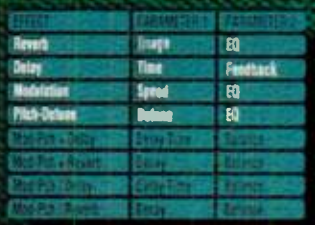

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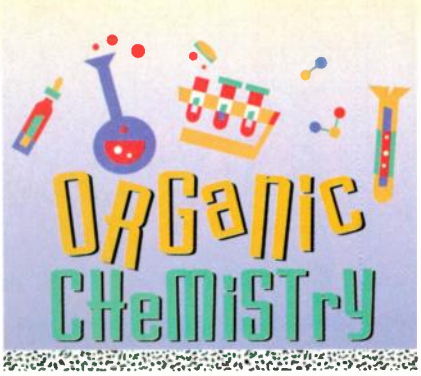
Psst! Here's the secret formula for bold and beautiful B-3 sounds.

By Jim Miller

Illustration by Robert Pizzo



WORDS OF WARNING

Most Hammond B-3s are getting up there in years; the last "real" B-3 was made in 1974, so we're dealing with instruments that are more than twenty years old. Many of the B-3s you'll encounter out in the real world have not been properly maintained (and these are instruments that require a lot of maintenance), so they may exhibit a variety of problems that can lead to less-than-perfect samples. Common symptoms include loud 60-cycle hums from old, noisy transformers, buzzing from loose connectors, or other electrical noises. Before investing a lot of time and energy, make sure you select a B-3 to record that has a minimum of such artifacts. However, a small amount of noise will be present in even the best B-3s around, simply due to the nature of their design. In performance, I promise, these noises will not be audible.

THE HAMMOND SOUND

The B-3 uses small metallic plates, or tone wheels, to produce its sound. There are 91 such wheels generating the 91 pitches that are used to produce both fundamentals and harmonics. The B-3 allows you to mix the volume of fundamentals and harmonics by setting the drawbars at the following "stops" (a pipe-organ term that's stayed with us into the synthesizer era): 16', 5⅓', 8', 4', 2⅔', 2', 1⅗', 1⅓', and 1' (see **Fig. 1**). These stops can be mixed in a virtually endless variety of combinations and volumes, which gives you a tremendous range of sounds.

JIM MILLER

FIG. 1: The drawbars on the B-3 let you mix the volumes of fundamentals and harmonics, giving you a practically unlimited variety of sounds. Also shown here are the controls for the Vibrato and Chorus effect.

In practice however, there are about twenty popular drawbar combinations that you really need to concern yourself with. Depending upon the styles of music you play, you probably won't even need all these. The table, "Pulling Out all the Stops," shows just a few of the "classic" drawbar combinations attributed to certain B-3 players.

Fortunately for us, the waveforms produced by the B-3's tone wheels are rather easy to loop, particularly when using the less complex drawbar settings. All you need is the attack portion of the sound, followed by a second or so of each pitch you plan to loop. Depending upon the amount of RAM in your sampler, you may find that you can sample almost every whole step, though B-3 samples typically pitch shift up and down rather nicely by as much as a third.

Figure 2 shows a B-3 sample that I created for the InVision Plus One expansion board for the Korg M1. In this particular sample, I had the first four drawbars all the way out for a Tom Coster/Santana sound. You can see how quickly the waveform stabilizes after the attack portion. The total size of this file, with eleven samples at a sampling rate of 31.25 kHz, is only about 100K. Higher sampling rates are not required for most Hammond simulations, unless you have a lot of upper harmonics present from the higher drawbars.

KEY CLICK

Because Hammond B-3s were designed in the 1930s, they exhibit some operational anomalies that might seem like faults, but these all add to the "total package" that is the B-3. One of these is *key click*.

Although the Hammond was initially designed to be a substitute for pipe organs (which it obviously isn't), its construction was essentially electromechanical. When the instrument was first released, players noted an attack transient that sounds like a click or high-pitched pop, which is certainly not something you would find on a pipe organ. Considerable efforts were made by the Hammond company to reduce this element, but they never could eliminate it. In the '60s and '70s, rock and blues players found this characteristic to be desirable, and some jazz organists consider it to be absolutely essential. Thus, any Hammond approximation will include some amount of key click.

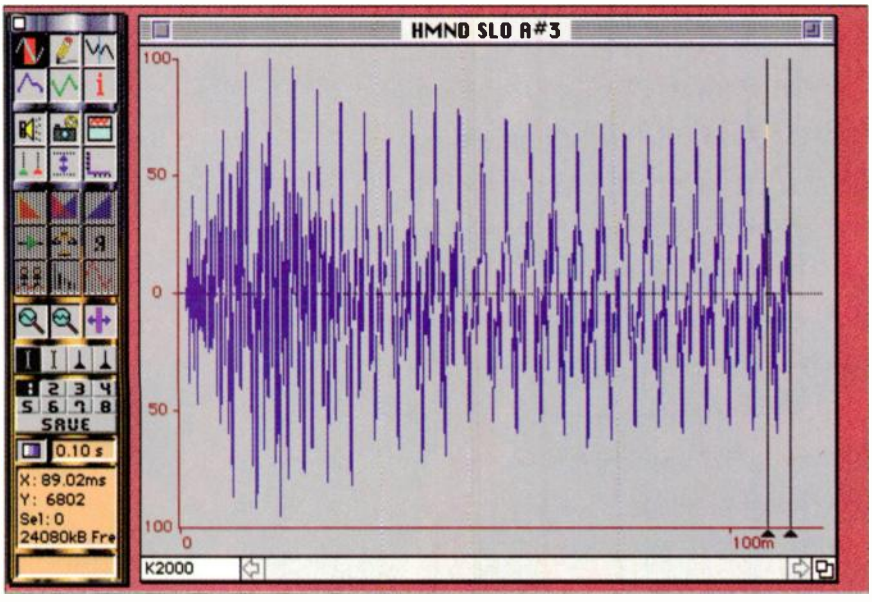
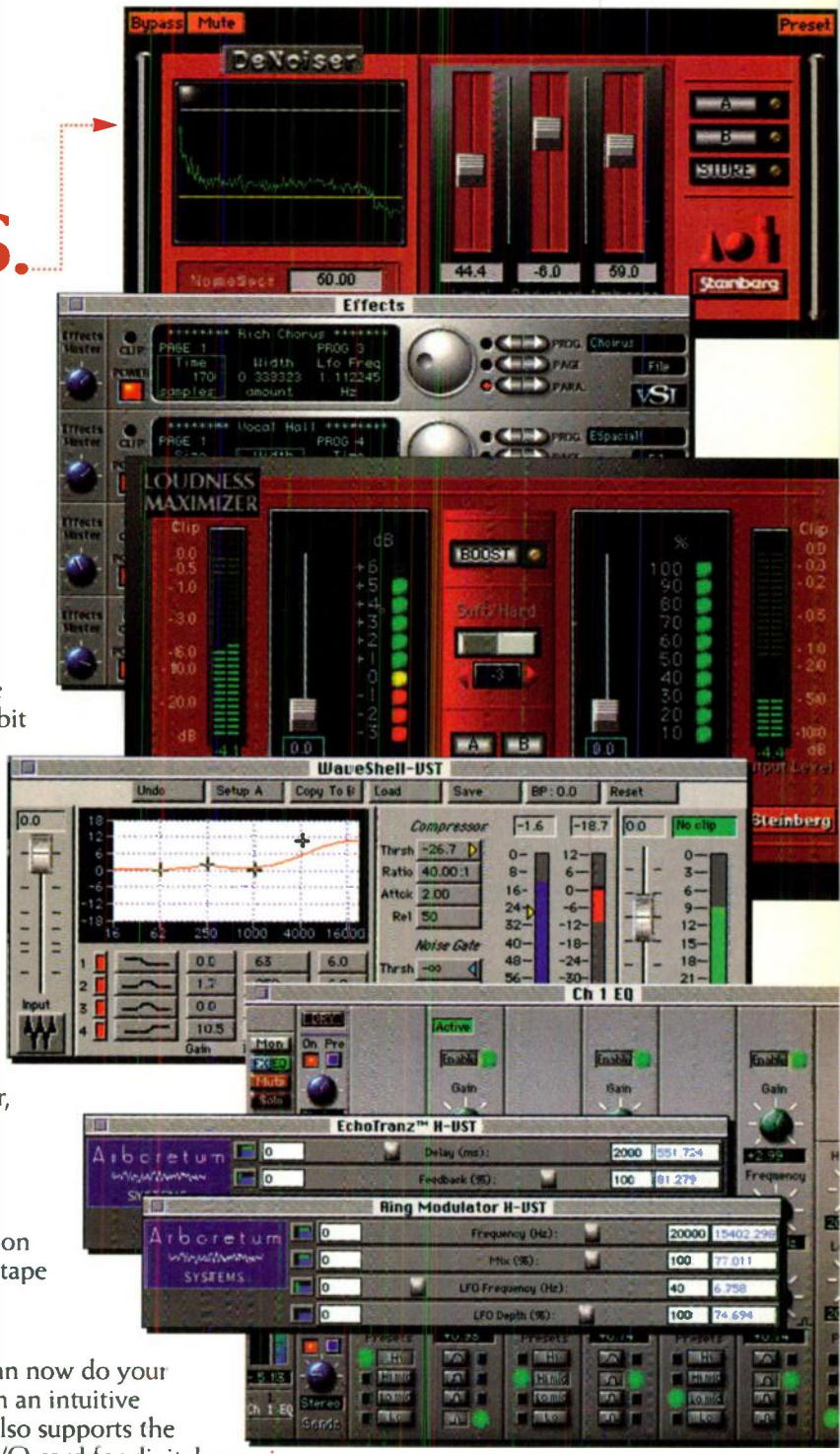


FIG. 2: This is a Hammond B-3 sample without Leslie effect. Note that it is only about 100 milliseconds long, though you needn't cut your own samples this short.

IT'S MULTIPLE CHOICE AND THERE ARE NO WRONG ANSWERS.



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In my experience, this click can vary depending on which notes you play, how you hit a key, and even how many times you retrigger the note. Be aware of this, and try to keep the key click consistent across the keyboard. Alternatively, you may want to get samples that have lots of key click and velocity cross-switch these with samples that have less click.

JIM MILLER

A typical "vintage" B-3.

PERCUSSION SETTINGS

In addition to the "accidental" key click, Hammond engineers designed a patented circuit that changes the attack characteristic of a note by adding an additional tone with the frequency of either the 2nd or 3rd harmonic of the depressed note. This is the Percussion effect. You should record your B-3 using both percussion settings.

Percussion is quite different from key click, although they are sometimes confused. The Percussion settings introduce a rapidly decaying, high, flute-y, chiff-like attack element that is easy to recognize once you have heard it but rather difficult to describe. On an authentic Hammond B-3, the Percussion is triggered only on the attack of a single note, meaning if you play a chord, only the first note to sound will have this Percussion effect. When you are playing a solo using single notes, this

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isn't a problem, but when you are trying to accurately capture the sound of a Hammond playing chords, it's best to record notes without Percussion. On a real B-3, enabling the Percussion effect also removes the ninth drawbar from your mix, disabling the 1' stop.

VIBRATO AND CHORUS

Hammond B-3s are equipped with both vibrato and chorus. These are engaged by two switches above the top keyboard and a rotary switch with the settings V1, V2, V3 and C1, C2, C3 (see **Fig. 1**). It's hard to believe that an instrument designed in the '30s includes effects like those found in modern instruments, but this is indeed the case. Vibrato is a periodic pitch-shifting effect. On the B-3, the chorus effect is produced by mixing the original sound back in with the pitch-shifted sound, thus creating something very much like the chorus effect found in most effects processors.

If you choose to record your B-3 with any or all of the various vibrato and chorus settings, you should be aware that this will use up more memory than a "straight" sample because you will need to capture at least one full cycle of the effect. Most of today's samplers can reproduce these effects via programming, but the original sound is rather more complex and worth considering for your "virtual B-3."

DRY RUN

Now we're ready to start with some "dry" samples (that is, without an active Leslie). You can either take a signal from the preamp of the Leslie speaker direct to your board, or place a microphone in front of the Leslie cabinet with the upper and lower rotors turned off. Unless you are recording directly from the Leslie preamp (and frankly, I wouldn't recommend this unless you are brave or know what you're doing), you will need to choose a mic (or mics) for your samples. You also need to decide whether you will be recording in mono or stereo. Remember that a Hammond B-3 is really a monaural instrument. It is only when we consider room ambience or a Leslie with active rotors (more on that in a minute) that we need to consider it as a true stereo instrument.

In practice, just about any high-quality microphone will do a great job on a B-3/Leslie combination—no need to rush out and buy Neumann U 87s (unless you just want an excuse to own a pair). I have personally used Shure SM57s, a Crown SASS-P stereo mic, and AKG C 414s (set to a cardioid pattern), all with great results, though each mic introduces its own particular coloration to the sound.

The Hammond B-3's tones are produced through a low-frequency rotor in the bottom of the Leslie cabinet and a high-frequency horn in the upper part of the cabinet, so you either have to move your microphone far enough away from the Leslie to get a good balance or use a separate mic for high- and low-frequency drivers. I recommend the two-microphone approach, but be careful. A close-miked Leslie may be too hot for a condenser mic and cause audible distortion (and not the kind we want, either). You might have to switch in a 10 dB pad or back off a bit on your mic placement. This typically isn't a problem for dynamic mics like the SM57; they can handle the sound-pressure levels quite well.

Personally, for a close-in mono sample, I find keeping my microphones about four to five feet away gives me a nice, open sound. The distance also seems to minimize a bit of the audible hum found in any B-3.

Now you're ready to start sampling. Record a lot more material than you think you will ever need. And by now, if you're a regular **EM** reader, you know that the right way to proceed is to record everything to DAT, so you can do all of your transfers and note selection at your leisure in your studio. Unless you don't have a DAT machine, never try recording directly to your sampler—trust me, you *will* kick yourself later if you do this.

Once you have recorded all of your various drawbar combinations, you eventually have to tackle the spinning-Leslie problem. In a nutshell: the Hammond B-3 really comes alive when played through a Leslie cabinet with fast or slow rotors on, which gives the instrument tremendous animation. A few years ago, I would have said it's imperative you record your B-3s with both

Pulling Out all the Stops

Below are some good starting points for getting the B-3 sounds associated with some well-known artists and styles of music. This table is available on the Internet as part of the Hammond FAQ at wcbi.com/organs/hammond/faq/faq.html.

Artist or Style	Drawbar Settings	Effects and Percussion
Keith Emerson	88 8000 000	
Tom Coster	88 8800 000	
Joey De Francesco	88 8400 080	
	83 8000 000	C3 Vibrato setting
Blues Style	88 5324 588	
Gospel Style	88 8000 008	
Steve Winwood	84 8848 448	
	88 8888 888	
Brian Auger	88 8110 000	2nd Percussion, C3 Vibrato
Matthew Fisher	68 8600 000	2nd Percussion, soft Percussion, short decay
Jon Lord	88 8000 000	2nd Percussion
Booker T. Jones	88 8800 000	(1st chorus)
	88 8800 008	(2nd chorus) 2nd Percussion
Rod Argent	88 0000 000	
Jimmy Smith	88 8000 000	3rd Percussion, C3 Vibrato

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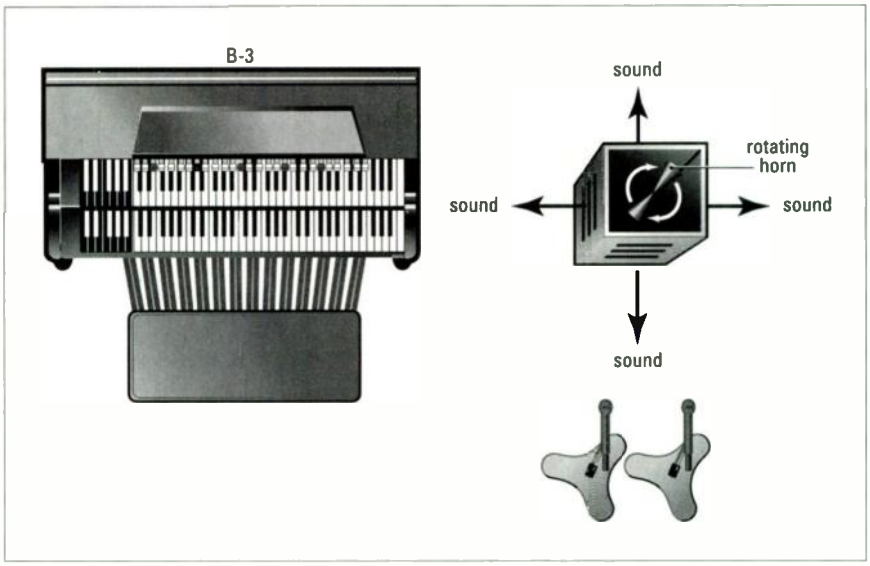

FIG. 3: When stereo miking a Leslie speaker, place your mics where your ears tell you the Leslie sounds best. Try to keep the cabinet away from room corners and walls. Place mics approximately eight to ten feet away from the Leslie and at least that far from walls.

fast and slow Leslie effects. It's such an integral part of the sound, just as Jimi Hendrix's Marshall amps were an important element of his Stratocaster's sound.

Today, there are a number of great-sounding Leslie simulators, and I've even heard incredible Leslie simulations created on a Kurzweil K2000 by Daniel Fisher of Sweetwater Sound's Soundware Development Facility. Personally, my favorite is the Korg G4 Rotary Speaker Simulator, which even gives you a room simulator with various microphone placements along with convincing high- and low-frequency rotating speakers. The G4 also allows you to add that classic overdrive sound you'd get from a Leslie that's being driven to the brink of total destruction.

I've also had great success with a Roland RSP-550 (now discontinued) and the Motion Sound Pro-3, which has an electronically produced low-frequency rotor simulator, plus a real high-frequency rotating horn. All of these allow you to speed up and slow down the Leslie effect, as you can with the real thing.

The main problem with sampling real Leslie rotating speakers is that you can't crossfade smoothly from a slow rotor to a fast rotor. For some performing musicians, this isn't a big deal; they just program a mod-wheel crossfade that switches between slow and fast Leslie effects. For purists, however, this problem is nothing short of sacrilege because slowing down and speeding up is so much of what the Hammond B-3's sound is all about.

But let's say you don't own a Leslie simulator and don't want to spend the bucks on one right now, or maybe to you this particular element of the overall sound just isn't critical—you just want to get the sound of those rotors into your samples.

Again, a few years ago I would have suggested sticking with monophonic samples, but today, what with the increased polyphony available on many of today's samplers and the huge amounts of RAM available at relatively modest prices. I strongly suggest stereo samples. The resultant sound will always be more detailed and infinitely more lifelike. Check out the article "Polishing Your Image," in the January 1997 issue of **EM**, for a more thorough discussion of stereo-sampling techniques.

For right now, let's mic your Leslie. When sampling in stereo, I almost always opt for microphone placement where my ears say the best sound is. Have someone play the B-3 with the Leslie rotating, and then walk around until you feel you've found the sweet spot. Usually, that spot is about eight to ten feet from the speaker. If you mic closer than this, you'll get a darker, more muffled sound when the rotor is pointed 180 degrees away from the microphone. By moving the microphones away, you allow the room to bounce back that out-of-phase sound, diminishing its negative effects. If you

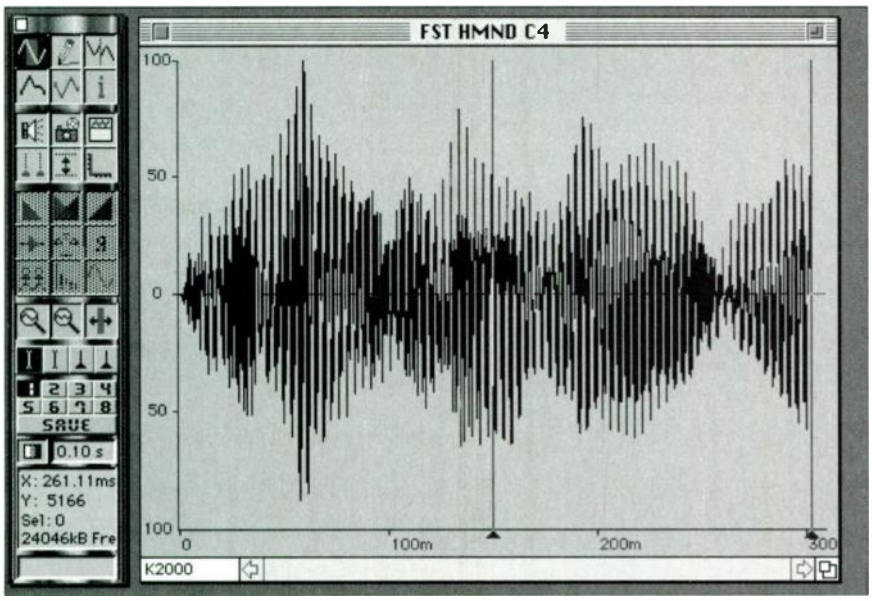

FIG. 4: Our Hammond B-3 with Leslie. Note that even with the fast rotating speaker, our sample is only about 300 ms long. You can clearly see the "key click" (seen as a peak in the waveform) at the start of this sample.

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Sound Forge 4.0, the award-winning digital sound editor for Windows, now supports ActiveMovie audio plug-ins. Sonic Foundry has selected ActiveMovie (a component of Microsoft's Interactive Media technology) as the foundation for the Sound Forge plug-in architecture. ActiveMovie plug-ins will be supported by a variety of audio software companies including Sonic Foundry and Waves.

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Organic Chemistry

have the time during your recording session, it's worth the few extra minutes to move the mics in and see what I mean.

I also recommend keeping the microphones fairly close together, at more or less the width of your average head (see **Fig. 3**). You can magnify the rotary effect by moving the microphones apart, but to my ears this creates a "hole in the middle" effect or overemphasizes the rotary effect. It may also lead to terrible phase cancellation when your signal is summed to mono. An alternative might be to try a wide *x-y* mic configuration in which the microphones are placed a bit farther apart but pointed inward.

The B-3's key-click anomaly was considered an essential feature by many artists.

Of course, there's no substitute for experimenting. Although I've been very pleased with my own results, your tastes may be totally different. You may savor the phase-cancellation effect or the "room spinning around your head" sound of wide microphone placement, so by all means, give it a go if you're so inclined.

Once you get into samples with rotary-speaker effects, the size of your samples will multiply enormously, particularly with the slow-rotor effect, because you have to capture at least one full cycle of the rotating speakers. The fast Leslie is just that—fast—so you can usually grab a fairly short sample similar to the one in **Figure 4** and still get the full rotary effect.

OVERDRIVE

Aside from key click, Percussion, and Leslie effects, most people who are looking for rock-oriented B-3 samples want that classic overdrive effect. You've heard it on tons of albums, but capturing it in a sample is harder than you'd think. Simply turning everything up to ten would seem to be the way to get overdrive, but this isn't really what you're hearing in the classic recordings. True B-3 crunch is a result of the interaction between several notes played at the same time, combined with an amp driven to extremes.

Go back and listen carefully to those old recordings and you'll note that the overdrive really kicks in when a nice handful of notes are being played. A single note won't generate enough intermodular distortion to push the amp over the edge.

One sound-module manufacturer made an error by using Hammond B-3 samples run through a distortion box to create their overdriven organ effects—ugh! Big mistake. This is totally unlike what happens in real life. Again, here's where you ultimately benefit by having a rotary simulator that also adds some crunch to your sound, although even this doesn't quite pin down that exact tone.

The truth is that I have not yet come up with a really good method of capturing that snarling B-3 timbre. I can only suggest that you keep the volume pumped up (if the ancient amplifiers can take it) and your fingers crossed. Some amount of overdrive will get onto tape and sneak into your sampler, but don't be disappointed when the final set of samples just doesn't quite go all the way over the edge like many of those great old recordings.

FINAL THOUGHTS

The B-3 isn't heard as much right now as it once was, but there are cycles to everything. I find it hard to believe that the B-3 sound will ever go out of style. It's extremely doubtful, though, that any manufacturer will ever be so "retro" as to want to retool to build these grand old instruments. As many of the older Hammonds begin to deteriorate or fail (after all, many B-3s out there are 30 to 40 years old) it will be all the more important that we have great samples of this classic instrument upon which to draw in the future.

Jim Miller *is a freelance sound designer and a frequent contributor to* **EM**. *His samples have appeared in libraries from Sweetwater Sound, Roland, InVision, Peavey, and Kurzweil as well as in many ROM-based instruments.*

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PRODUCTION VALUES

Musical Chairs

BY JENNIFER CONRAD SEIDEL

PHOTOGRAPH BY MARK TRACKER

Charlie Peacock's life is like a game of musical chairs. He is constantly changing seats and trading places. On any given day, he might be found sitting on a stool recording vocals for his next CD, sitting at a piano bench composing or arranging a pop hit, or sitting behind the mixing board producing an up-and-coming artist.

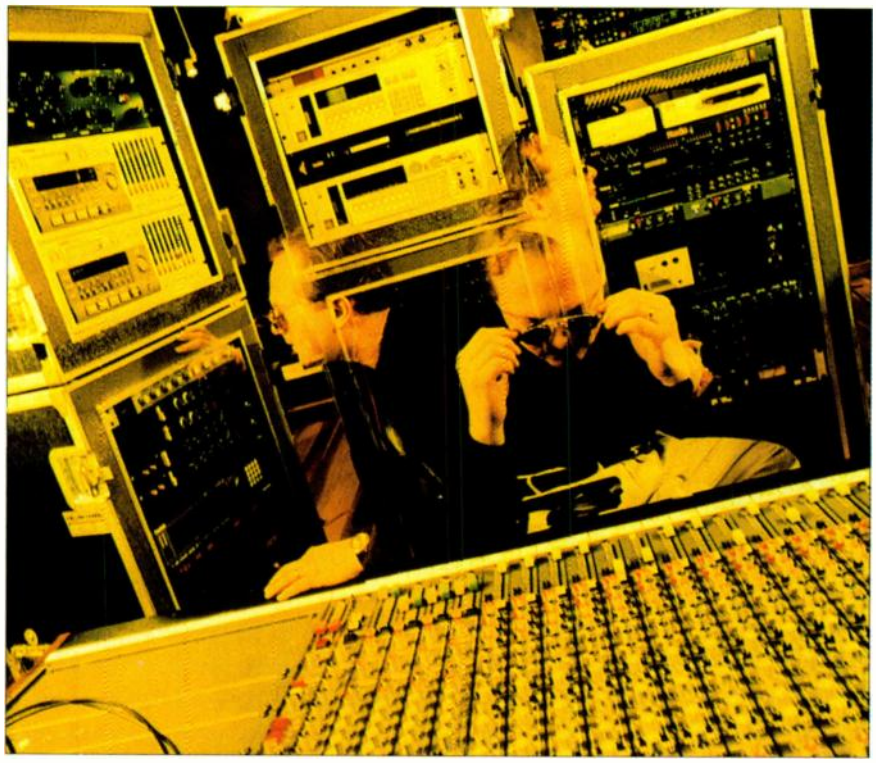
The multitalented Peacock began his career almost fifteen years ago as a solo recording artist and has found consistent success in the contemporary Christian music genre (aka CCM). He has received several Dove Awards (the highest honor in the Christian music industry), and in 1991, his *Secret of Time* was nominated for a Grammy for Best Rock/Contemporary Gospel Album. His songs have been covered by dozens of artists—including DC Talk, Philip Bailey, and Bourgeois Tagg—and he cowrote the hit "Every Heartbeat" with Amy Grant for her platinum album, *Heart in Motion*.

Peacock (who traded his given name, Ashworth, for jazz musician Gary Peacock's) has been producing almost as long as he has been recording, helming records for prominent CCM artists such as Out of the Grey, Cheri Keaggy, Margaret Becker, and Eric Champion. Even more remarkably, Peacock is as successful a producer as he is a songwriter and recording artist; he received a Dove Award for Producer of the Year in 1995 and 1996 and an American Songwriter Professional Songwriter Award for Top Christian Producer in 1994 and 1995.

So how does a triple threat maintain creative objectivity when assuming all three roles—songwriter, musician, and producer—at once? Can he really approach his own music with the same critical ear that he brings to other artists' projects? These are the questions I posed when I called Peacock at the offices of re:think, the record label he founded in late 1995.

CHARLIE PEACOCK DISCUSSES THE RISKS OF SITTING ON BOTH SIDES OF THE CONSOLE.

Musical Chairs



BEN PEARSON

Peacock keeps his gear in racks to facilitate working at other studios. "I have a complete portable studio apart from my regular studio," he says.

The proliferation of home and project studios has made it common practice for musicians to produce their own music. You've produced seven of your nine solo records. What are the pitfalls of producing yourself, and how do you guard against them?

Not all artists have developed the ability to make a choice and then reflect upon that choice—the ability to create and then assess. Having a producer is having someone who can be more objective than you are, who can stand away from the process and help you assess it, and who can help you search out what your intentions are.

If you can articulate your artistic intentions, you can measure them against what you've put on tape and ask whether you've met your goals. And the producer is the one who can say, "Based on what you're telling me you want to do, I think you've missed it a little bit. Here's what I think we ought to do. Let me make some suggestions, and you pick one." Unless you can cultivate this type of dialog inside your own head—and unless you also are aware of your own fallibility and how impressed you could become with yourself—it's helpful to have an outside producer assist you in the discernment process.

You really need to be honest enough to let other people into the process and self-aware enough to receive their lack of enthusiasm. For instance, you can do something as basic as having your spouse or your children come into the control room and measure their reactions to a track. I think that music incites immediate reaction—immediate pleasure, disdain, all the points in between. It has to communicate; it has to hit a person on an intellectual level, an emotional level, or both. And if you're not connecting that way, you might not be making compelling music.

I actually rely on my children a lot. I have two sophisticated kids, sophisticated in that they've been around the music business their whole lives. And they're very opinionated. They have two different kinds of tastes: my daughter is a consummate David Wilcox and Shawn Colvin fan, and my son likes everything from Morphine to XTC to the Beatles. So I rely on both of them when I'm looking for a really honest opinion.

BEN PEARSON

Peacock likened the process of recording his latest CD, *strange-language*, to that of making a movie: shooting a lot of film, editing it down, and leaving a lot of footage on the cutting-room floor.

But would you change something on your record if your kids suggested it?

Yeah. However, I would also put their comments in perspective. If I feel that their opinion is formed because they haven't lived as long as I have or experienced as much as I have, then I go with my instincts. But, particularly when I'm listening to new groups, I play the music for them and get their opinions.

Once again, it is very important to get opinions from people who listen to music and who plop down their $15.98 for a CD. They expect to listen to a record a bunch of times, not just the relatively few passes it takes an engineer or producer to reference some kind of production value in the studio. I may have a gut feeling about a piece of music, but as someone who sits in a recording studio all day long, I can be very removed from the street.

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Musical Chairs

Tommy Sims [session bassist and former member of Bruce Springsteen's touring band] did a riff while he was tuning, and I kept that as part of the performance. Or a player would do a run through and say, "Okay, roll it again. I think I got it." And I'd say, "No, that's it. I recorded it." At first they thought I was kidding; they didn't know that I was only going to use part of their performance. During the mix, I edited my own performance, as well. I worked on an SSL mixing console where I could automate my mix choices, listen to them, and then ask myself, "Do I like that?"

It's all a way of changing it up, of creating interest not only for myself but for the listener. It's a way of keeping life and music fresh and interesting. And it's a way of learning: setting up a set of circumstances different from the norm so that you can listen and learn and grow as an artist or as a producer.

Even when you find a combination that works, though, you don't necessarily stick with it on the next record. Your record isn't an accumulation of everything you've learned.

Absolutely not. It would be a horrible record if it was. That's what you tend to do when you're younger: you try to put everything you can think of and everything you know on tape because you're afraid it's going to be the last time you'll get to record. For example, I got really into background vocals for a while and got my chops together, and that's cool because if I want to do that kind of record in the future, I've got the ability and a lot of experiences and choices to draw from. But the records I've produced lately have used minimal background vocals.

When making music is your vocation, you can relax and choose more carefully what ultimately finds its way onto the record. You feel comfortable with what you do, and you're able to laugh at yourself and see some of the silly choices you've made in the past and learn from them.

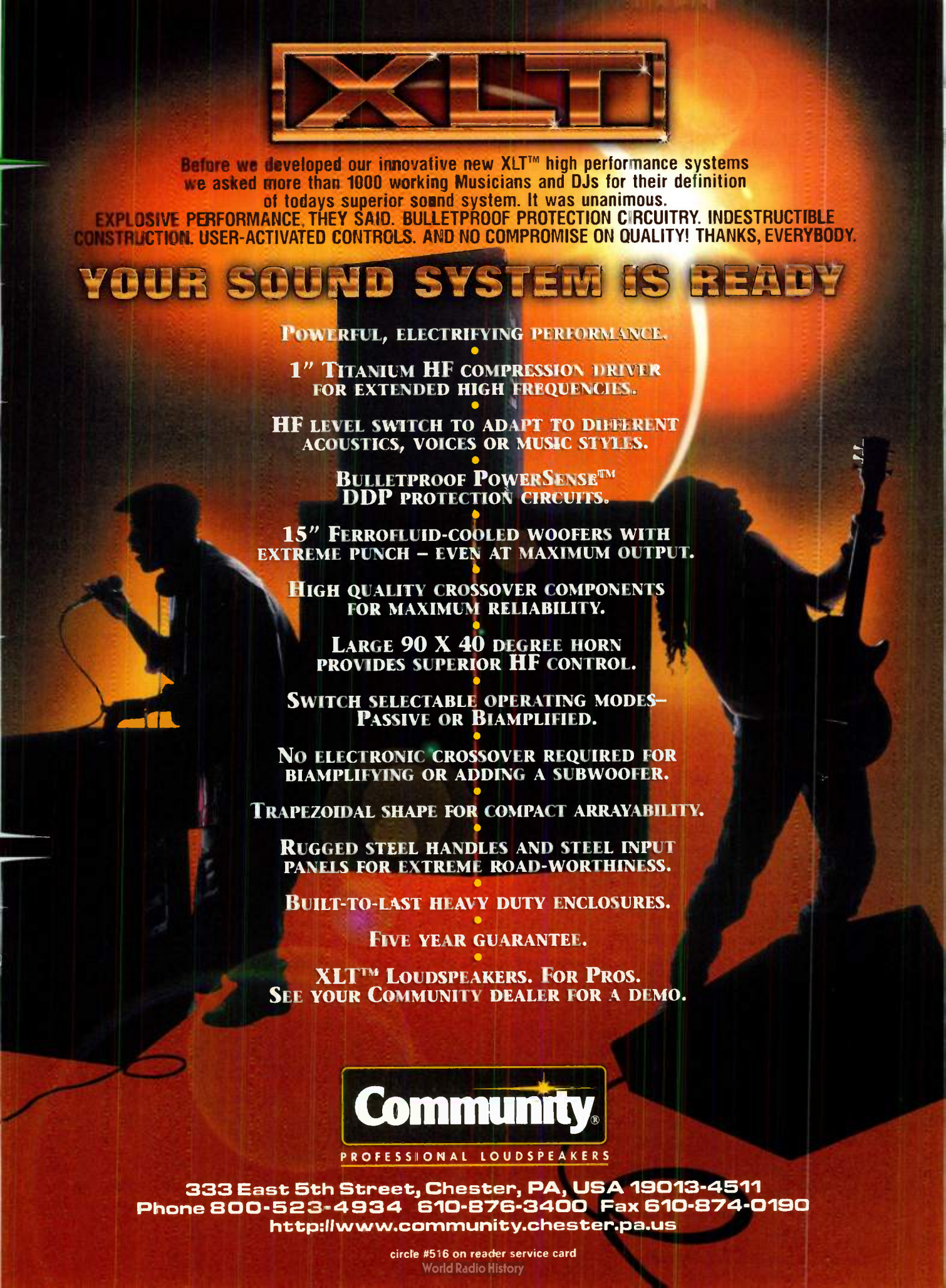
But what about those musicians who are putting out what may be their only record? Is a lot of experimentation realistic for them?

It's easier for me to do that because my job is secure, but as I said before, as an artistic principle, it's important to be a risk taker and to experiment. Then, you have to cultivate the ability to discern whether your experiments are really worthwhile. You can't just say, "Because I experimented and because I risked, it must be good!" It might not be. Only maturity helps you to make that distinction.

A big part of producing is problem solving. That's why it's so creative. You're looking at all of the options. When you're with young musicians, they often get really excited, like, "I've got an idea!" They just don't realize that you have been doing this for a long time and that you don't just have one idea, you've got sixteen ideas. And the issue is not whether I have an idea; the issue is whether I will be able to choose the best idea from all of the ideas available.

My own records are research and development labs for the outside productions I work on. I try out ideas and,

Peacock recently added two new seats to his game of musical chairs: president and director of A&R for re:think, an enhanced-CD label. He has spent most of the last year working with re:think's flagship artist, 21-year-old singer-songwriter Sarah Masen.



Musical Chairs

because it's easier for me to accept failure than for an artist who may only make a record every two or three years, I can try out sonic ideas that may or may not work. On my own solo records, not only do I experiment with various methods of making records and with production values, but I experiment with song forms and everything about the music.

There's no such thing as a neutral creative choice, and as technology changes, the sound of records also changes. If I decide to record on my analog machine as opposed to my digital machine, it's going to change the sound of the record. If I decide to use 8-bit sampling as opposed to 16-bit, it's also going to change the sound. There is no neutral choice in the process.

And as time flows, your ears grow bored with particular sounds. You switch and change. One year you may have thought it sounded really groovy to have the vocal drenched in reverb, and then a few years later, you may end up recording dry vocals for a while. And then after a season, you may say, "That vocal is just too dry; I'll put a little delay on it."

> *"There's no such thing as a* NEUTRAL CREATIVE CHOICE."

What are some liberties you take when producing other artists?

I experiment in moderation. It might be a situation where we do the bulk of the record with one style of recording that really fits that artist. But then, just to change things up a little bit, I might ask the artist to hang out after a session. I'll make a few phone calls and bring some musicians down to cut a song in a completely different way than we cut anything else. I'd have the musician play—and maybe he or she hasn't even played on any of the artist's other records—and when we're finished, the artist says, "It sounds cool, but it will sound much better when we get [session musician] Gordon Kennedy to come in and do the acoustic guitar parts." And I say, "Are you crazy? That's it. That's the record."

This is a way of keeping things fresh: using surprise elements and setting things up so people don't know exactly what's going on. Like when artists don't know that they are playing on the record—their part might sound great and be perfect for the song, but if you set it up beforehand that they're playing for "real," they might be so wigged out and nervous that the performance wouldn't come off well.

You've often described yourself as a perfectionist, so I'm a little surprised that you take these risks: for example, that you may not always work with the best session musicians available.

That's where the intangibles of a person's aesthetics—or the intangibles of the vibe—and the ability to recognize them are really important. And at other periods of my career, not using session musicians would have been difficult for me. But maturity changes those things.

I still want to retain the ability to be a craftsperson. There *is* freedom in skill. If you want me to make you a mahogany chair that is detailed, defined, and elegant, I want to be able to do that. But if you want something to flop around in that is loose, undefined, and maybe not even something people would pay a lot of money for—but that you think is the greatest thing in the world—I want to be able to do that, as well. I want to experience artistic freedom to the extent that I am free enough to be very disciplined, articulate, and skilled in my craft and also free enough to say, "I know that's loose, but it's cool, too."

The best artists are the ones who give themselves the freedom to fail. Risk is a big part of artistry. You can take really foolish risks and really positive risks. I think the key is to take those risks that spur you on to better and more compelling music.

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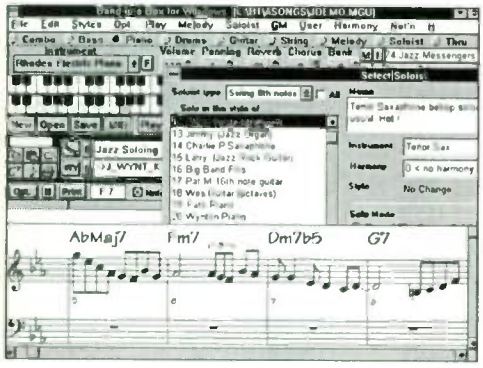

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Plugging into AudioSuite

Will Digidesign's new architecture become a standard for Mac plug-ins?

By Mikail Graham

In every fine hotel, you always find several suites that are reserved for special situations, such as when the president comes to visit or some happy honeymooners seek a palatial getaway. The virtual Digital Hotel boasts a new room you might want to try out. It's called AudioSuite, and the basic furnishings are provided by long-time digital audio leader Digidesign, along with some of the best names in the DSP software business.

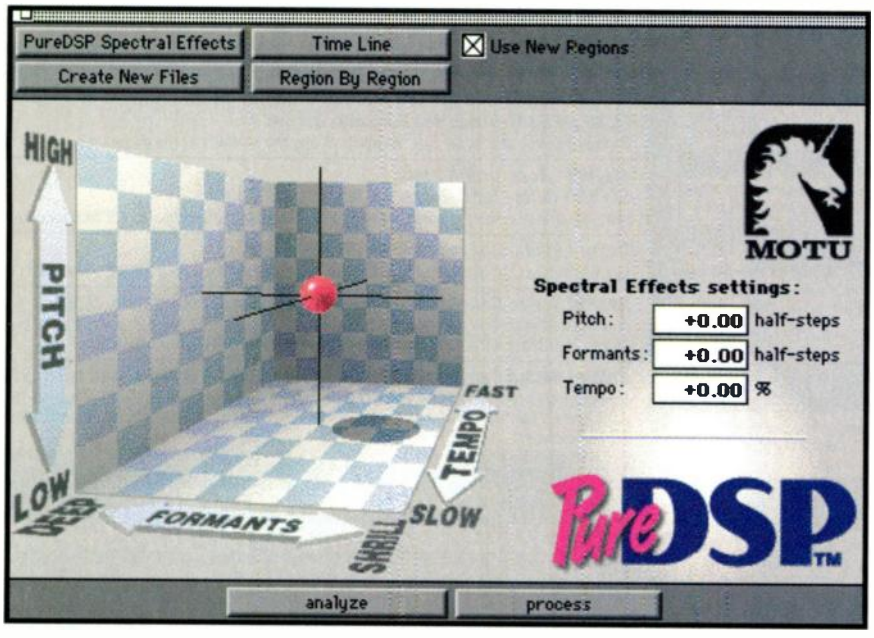

FIG. 1: One of the first AudioSuite plug-ins will be Mark of the Unicorn's *PureDSP*, which uses the formant-preserving pitch-shifting technology from MOTU's *Digital Performer*.

AudioSuite arose from the ashes of the original Sound Designer II plug-in architecture when Digidesign (tel. 415/842-7900; fax 415/856-4275; e-mail prodinfo@digidesign.com; Web www.digidesign.com) decided that its SDII specification simply could not meet the needs of today's users. For instance, *Sound Designer II* cannot address more than one stereo file at a time. This limitation makes the older program's plug-in architecture incompatible with Digidesign's announced plans for incorporating most of SDII's feature set into *Pro Tools* 4.0's multitrack environment.

In addition, *Sound Designer II* requires a Digidesign audio card. Digidesign is well aware that some *Pro Tools* 4.0 users will want to use Sound Manager–based audio on the Power Mac instead of, or in addition to, using an audio card. To move its product line ahead, Digidesign had to sacrifice its old, faithful *Sound Designer II*—and its SDII plug-in architecture.

WHERE TO PLUG-IN

Digidesign is introducing AudioSuite in *Pro Tools* 4.0, which works with all of Digidesign's currently available audio cards, and it can also use Sound Manager audio on the Power Mac without an audio card.

The current list of third-party developers working on host support for AudioSuite includes Emagic *(Logic Audio)*, Mark of the Unicorn *(Digital*

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FIG. 2: AudioSuite makes its debut in Digidesign's *Pro Tools* 4.0, which ships with eight DSP plug-ins.

Performer), and Steinberg (*Cubase*). Opcode is still evaluating AudioSuite, but it seems likely that the company will support it in a future release of *Studio Vision Pro*.

Have you noticed that all of the prospective host programs also support Digidesign hardware via the Digidesign Audio Engine (DAE)? This is not coincidence; AudioSuite requires DAE, so companies that aren't DAE developers can't create AudioSuite plug-ins. DAE developers must license the technology from Digidesign; no comparable limitation exists for companies that develop plug-ins for non-Digidesign Mac formats or for Microsoft's ActiveMovie plug-in format on the Windows platform.

TALE OF SIX FORMATS

There are currently six Macintosh audio DSP plug-in formats: Macromedia's X-tra (which only works with particular Macromedia host programs, such as *SoundEdit 16*); Steinberg's VST (which only works with *Cubase*); Adobe's Premiere; and Digidesign's Sound Designer II, AudioSuite, and TDM. Of these, Adobe's Premiere is the only non-Digidesign format that works with host programs from several different developers.

TDM may be the best known of the six architectures, and it's certainly the most powerful. It's also the most expensive because it's not just a software architecture. TDM is part of a full-blown Pro Tools system that includes at least one DSP Farm multiprocessor card and a high-speed data bus to move the audio within the computer.

Sound Designer II plug-ins require a Digidesign audio card but can't use TDM hardware. VST, X-tra, and Premiere plug-ins don't use Digidesign cards for their processing power; they rely on the Power Mac's CPU and Sound Manager. AudioSuite is a switch-hitter: although it can't use TDM hardware, it can use either a Digidesign audio card or Power Mac Sound Manager audio.

REALITY CHECK

There are two basic types of plug-ins: those that support real-time effects processing and those that are file based. File-based plug-ins process the audio offline. Furthermore, their edits are destructive; that is, they alter the original data, rather than just changing an edit decision list that points to the untouched original.

The advantages of nondestructive real-time processing are obvious: you can add effects during playback without altering the original data. This saves time and hard-disk space, which is great. But most important, it means you can hear your changes as you make them, much as you do when working with a hardware effects processor.

TDM, of course, is a real-time architecture, thanks to its powerful hardware. Steinberg's VST also works in real time. In fact, it is currently the only real-time plug-in architecture that runs on a Power Macintosh without requiring an audio card. (Waves' new MultiRack system allows real-time processing on a Power Mac using the company's Native PowerPack plug-ins. But used in this way, the Waves processing modules operate like an integrated suite of stand-alone processors rather than as plug-ins within a host program such as *Pro Tools*.)

The Premiere, AudioSuite, SDII, and X-tra plug-in architectures are file based. Because their operations are destructive, the processing can't be undone. Fortunately, AudioSuite gives you

the option of saving a backup of your original file before processing. Furthermore, a file-based architecture such as AudioSuite has the advantage of being able to run on almost any current Power Mac CPU with or without a Digidesign-supported audio card. True, AudioSuite plug-ins won't process in real time, but their prices are likely to be lower than TDM plug-in prices. (At least, they had better be!) Digidesign has promised to deliver a real-time version of AudioSuite by late 1997 or early 1998.

INSPECTING THE SPEC

Like the Premiere and SDII formats, AudioSuite has a Preview mode that allows you to hear what the effect will sound like before you actually process the file. Unlike the Previews in Premiere and SDII, though, AudioSuite's Preview mode is not limited by the amount of RAM you have allocated for previewing. AudioSuite (courtesy of DAE) lets you preview the entire length of a selection as it is read directly from disk. Pretty cool stuff.

Another place where AudioSuite differs from Premiere and SDII is its ability to handle multiple files. If you select various regions on, say, four tracks and open the AudioSuite *Gain Change* plug-in in *Pro Tools* 4.0, the plug-in will automatically examine all regions on all four tracks to find the highest peak. You can then adjust the gain for all four tracks simultaneously. Regions on up to 48 tracks can be concurrently selected for any AudioSuite-related task, so you can batch-process the work. No other Mac-based audio program currently offers this kind of functionality. A big thumbs up to Digidesign for this intelligent, flexible design.

Another useful feature of AudioSuite is the ability to automatically "spot" a processed region; that is, it can precisely replace the original region with the processed version. AudioSuite plug-ins also allow you to decide whether you want to write a new audio file or overwrite the original one with each edit you make.

In my tests with a Quadra 840AV, I found that processing was significantly faster using AudioSuite plug-ins than when I performed similar tasks using SDII or Premiere plug-ins. Minimizing your production time can be crucial when you are working to complete a project by a client's deadline, so this is an important point in AudioSuite's favor.

WILL IT CONNECT?

One feature missing in the old SDII format is support for true-stereo interleaved files, which means the left and right channels are fully integrated in a single file. Due to the design of DAE, AudioSuite (like *Pro Tools* itself) only supports split stereo, noninterleaved files, which means you have linked left and right channels rather than complete stereo integration. Some people really don't like to work this way.

Also missing from AudioSuite is support for 24-bit files, which are supported by *Sound Designer II*. As a result, you might have to keep *Sound Designer II* around for last-minute edits before final mastering to CD or DAT. This also means that none of the third-party sequencer developers that rely on DAE can support these features. This limitation definitely does not score big points for Digidesign.

Mark of the Unicorn is one of the first DAE developers to release an AudioSuite plug-in, a formant-corrected pitch-shifter called *PureDSP* (see **Fig. 1**). MOTU Director of Marketing Jim

Cooper has a few things he'd like to see added to AudioSuite. For example, when MOTU introduced its *PureDSP* technology in *Digital Performer*, the company implemented background processing and preemptive sound-file analysis. (With the latter, as soon as audio is introduced to the program, *Digital Performer* analyzes the audio to make future time stretching and pitch shifting much faster.) "We'd love to see these features implemented in AudioSuite," says Cooper. "It would also be cool to see AudioSuite go real-time soon." That last comment is one that has been echoed by every DAE and AudioSuite developer I spoke with.

WHAT CAN YOU PLUG IN?

Pro Tools 4.0 ships with eight DSP AudioSuite plug-ins: Invert, Duplicate, Normalize, Gain, Reverse, DC Offset Removal, Time Compression Expansion, and Pitch Shift (see **Fig. 2**).

Currently under development at Digidesign is *LoFi/SciFi/RectiFi* for AudioSuite ($395), a trio of plug-ins that helps create a "retro" sound by adding low-fidelity grunge *(LoFi)*, analog synth–like effects *(SciFi)*, and waveform rectification *(RectiFi)*. (For more on these plug-ins, see "An Embarrassment of Riches" in the March 1997 "What's New.") Digidesign also is preparing a multitap delay, a stereo delay, and a multi-effects bundle. Curiously missing is Digidesign's popular *DINR* noise-reduction plug-in, which is available for SDII and TDM. Let's hope *DINR* joins the list of AudioSuite plug-ins soon.

▼

AudioSuite offers only destructive non-real-time processing.

What else is on the way for AudioSuite? In alphabetical order (by manufacturer), we have the following:

Arboretum Systems (tel. 415/626-4440; fax 415/626-4439; e-mail info@arboretum.com; Web www.arboretum.com) will offer an AudioSuite version of *Hyperprism* ($945), a collection of 23 dynamic effects algorithms with an innovative user interface in which you

change parameter values by moving the mouse around an *x-y* window. *Hyperprism* 1.1 was a 1994 **EM** Editors' Choice award winner (see the January 1995 issue) and was reviewed in the August 1994 issue. Expected to ship the first quarter of 1997.

Liquid Audio (tel. 415/562-0880; fax 415/562-0889; e-mail info@liquidaudio.com; Web www.liquidaudio.com) will soon release *Liquifier PT* for AudioSuite ($595; see **Fig. 3**). This plug-in prepares audio that can stream in real time from a Web site to a Web browser using an exclusive, Internet-enabled version of Dolby AC-3 technology. A comprehensive preview function allows users to easily hear the Internet audio at all modem speeds before processing. (For more on Liquid Audio, see **EM**'s January 1997 "Tech Page.") Expected to ship the first quarter of 1997.

As noted earlier, *PureDSP* ($495) from Mark of the Unicorn (tel. 617/576-2760; fax 617/576-3609; e-mail info@motu.com; Web www.motu.com) is a formant-based pitch-shifter based on much-heralded technology introduced in *Digital Performer* 1.7. It should be shipping by the time you read this.

QDesign's *i-Media Audio* ($395; tel. 604/688-1525; fax 604/688-1524; e-mail inquiries@qdesign.com; Web www.qdesign.com) offers high-fidelity MPEG audio compression at the widest range of compression levels. *i-Media Audio* enables real-time, studio-quality audio encoding from a live or recorded audio source without the need for compression hardware. Fully compliant with the MPEG Layer 1 and 2 standards for audio bit-rate reduction, it also employs an advanced implementation of the MPEG standard. Expected to ship the first quarter of 1997.

Spatializer Audio Laboratories (tel. 818/227-3370; fax 818/227-9750; e-mail pt3d@spatializer.com; Web www.spatializer.com), through subsidiary Desper Products, has incorporated its 2-speaker surround-sound processing into its *PT-3D* plug-in for TDM. The AudioSuite version brings this powerful processing to Pro

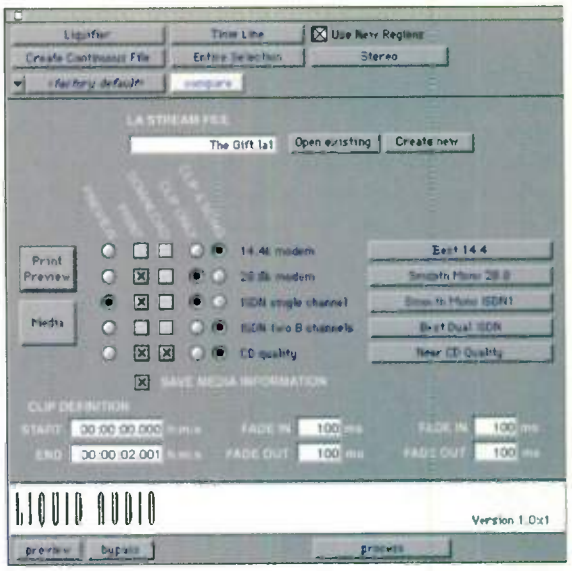

FIG. 3: Producers of audio for the Web should check out Liquid Audio's *Liquifier PT* AudioSuite plug-in, which prepares audio files so that they can stream in real time from a Web site to a user's Web browser.

Tools at a very reasonable price (under $200). Expected to ship the first quarter of 1997.

The *Loudness Maximizer* ($399) is Steinberg's (tel. 818/993-4091; fax 818/701-7452; e-mail steinberg@aol.com; Web www.steinberg-us.com) first AudioSuite plug-in. Using adaptive methods, the *Loudness Maximizer* finds the optimum relationship between acoustic density, level, and subjective loudness. This procedure results in dynamically optimized audio up to 0 dB without losing punch or adding distortion.

Synchro Arts' *VocAlign* AudioSuite plug-in ($1,495; tel. 44-0-1372-811934; fax 44-0-1372-817976; e-mail info@synchroarts.co.uk; Web www.SynchroArts.co.uk) automatically synchronizes two audio signals at the touch of a button. It works by automatically microediting the new or replacement audio signal to align the timing of its modulations to match a guide signal. This is useful for lip-synching; foreign dialog replacement; tightening up of double-tracking, backing vocals, and instruments; and modifying the timing of one music track to match another. Expected to ship the first quarter of 1997.

Waves' Native PowerPack for AudioSuite ($600; tel. 423/689-5395; fax 423/688-4260; e-mail waves@waves.com; Web www.waves.com) includes the company's *L1-Ultramaximizer* peak limiter/level maximizer/requantizer, *Q10* EQ, *C1* compressor/gate, *S1* stereo imager, *TrueVerb* reverb, *WaveConvert* audio file-format converter, and *TrackPac Lite*, the shareware version of Waves' lossless audio compression utility. Expected to ship the first quarter of 1997.

HOW SUITE IT IS

Is AudioSuite the answer to your plug-in prayers? To be honest, not exactly; at least, not the current version. Its lack of support for 24-bit files and true-stereo interleaved files is unfortunate, though the former limitation won't be important to most users until 24-bit recording moves more into the mainstream.

But the real issue is AudioSuite's dependence on destructive, non-real-time processing. There is no doubt that real-time processing is what users want. Right now Mac users who want to use DSP plug-ins in real time have to pay big bucks for TDM or abandon all other host programs to work exclusively with Steinberg's *Cubase VST*. But VST technology is new, there is no indication that any non-Steinberg host program will ever support it, and its market appeal is unproven.

On the other hand, Sound Designer II plug-ins are tried and true, and AudioSuite picks up where SDII left off. Furthermore, Digidesign has a lot of marketing muscle and a long list of third-party development partners with which to back the new architecture.

Finally, between the third-party developers' desire for real-time processing capabilities (generally based on end-user feedback) and competition from new real-time formats such as VST and Microsoft's ActiveMovie format on the increasingly popular Windows platform, a real-time version of AudioSuite seems almost inevitable. If that happens—and maybe even if it doesn't—AudioSuite seems likely to be a solid success.

Mikail Graham *performs and records with Terry Riley and with Rites of Passage, which features Roger Hodgson. Mikail's weekly radio show has aired on KVMR-FM in Nevada City, California, since 1978.*

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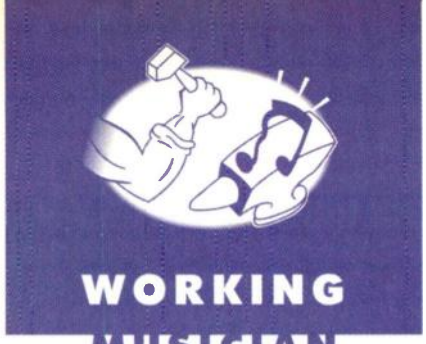
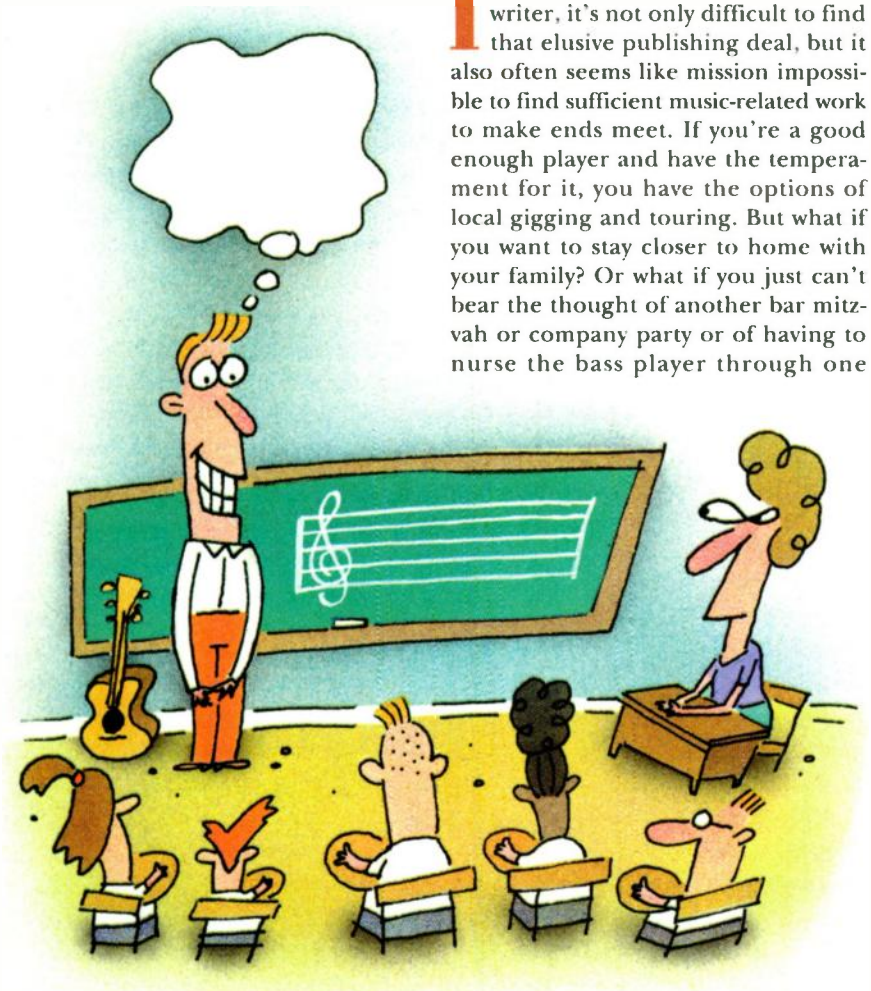


Schoolhouse Rock

Share your love of music with kids by creating your own workshops.

By Jeff Silver



JACK DESROCHER

I've been wrestling with a tough issue for a long time. As a songwriter, it's not only difficult to find that elusive publishing deal, but it also often seems like mission impossible to find sufficient music-related work to make ends meet. If you're a good enough player and have the temperament for it, you have the options of local gigging and touring. But what if you want to stay closer to home with your family? Or what if you just can't bear the thought of another bar mitzvah or company party or of having to nurse the bass player through one more tequila-induced epiphany? My quest has been to find a solution that will let me continue to hone my craft, maintain my self-respect, get a sense of fulfillment, *and* keep my creative spark alive. Fortunately, I have managed to come up with a worthwhile answer to all of these concerns.

I happen to love kids and working with them. As a result, for several years I have been trying to figure out a way to bring songwriting into the schools. In particular, I have focused on upper-elementary grades (third through fifth), mainly because my daughter happens to fall within that group. Also, those kids are old enough to deal with the abstract thought required for lyric writing, but they're young enough that they are not yet constrained by rigid musical tastes.

Teaching songwriting provides a way for me to continue working at my craft, and in this day and age, it provides an incredibly valuable resource many schools are lacking. As you know, cuts in many school districts' budgets have reduced, if not completely eliminated, music and art classes from the regular curriculum. Research shows that exposure to the arts benefits children by helping them become better learners, better thinkers, and well-rounded individuals. (For more on this research, see sidebar, "Research and Development.") If you're with me so far, it's

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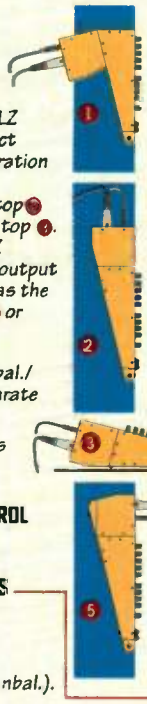

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clear that you, as a musician-songwriter, can offer something that is desperately needed and wanted, which is always a good situation when you're developing a product or service.

GETTING STARTED

The first step is to determine the approach and structure of your proposed program. This process took a lot of my time over a three-year period. I had to figure out how to develop ideas that would be age-appropriate for elementary schools, give students the opportunity to work within professional songwriting parameters, *and* still be interesting to me.

This planning is somewhat akin to a traditional lesson plan but, in my case, less structured. After all, part of cowriting—which is how I like to view these writing workshops—is being open to your cowriters' ideas. If your plan is too detailed, you might not be open to the possibility of unplanned turns that can take you to unexpected but fruitful places.

My final, ingenious, and deceptively simple plan was this: within the allotted time (about one and a half to two hours), have two verses and a chorus completed. For the first fifteen minutes I would explain song form in pop music (what verses do, how choruses work) and find out what different kinds of music the kids listen to. From there, we'd talk about what kind of song we'd write (a lyric theme) and then just start writing.

When I went to my daughter's third-grade class to put "Operation Cadence" into effect, it went great! The kids were attentive and involved (not many people come in the classroom to do this kind of cool stuff with them). We made our theme choice (a song about being friends, *not* about being in love with someone) and wrote the chorus together. Once that was finished, we talked about what the verses could say and then split into two groups, each with an assignment as to what their verse should say and how the lyrics needed to be structured to fit the music. I then guided the Verse 2 group and checked in periodically with the teacher, who was with the Verse 1 group.

SEE JANE COWRITE

I was thrilled with the results of that first session, but it was hard work. Even though the framework was set beforehand, I still left a lot of room for creative decisions to be made by the class. Of course, that meant whenever the class was stuck for a brilliant idea, I had to come up with one, and *fast*. No laying down on the floor with my face in my hands while mulling over a particularly difficult rhyme or musical phrase, like I would in a "professional" writing session. I have to say that between explaining rhythm patterns and rhyme schemes, keeping track of story ideas from 25 kids, and trying to stay on top of both Verse groups, I broke a sweat before the class was finished.

Having followed this scenario and used the process in several classes since, I can offer a few fundamental guidelines to keep in mind when planning your own class.

There are no wrong answers or bad ideas. As anyone who's been involved in any kind of creative process knows, the *journey* is at least as important as the arrival at your final destination. I stress to my classes the wide range of things we need to talk about in order to find the lyrics we ultimately like. In one group, backpacks, food, car accidents, and fist fights were just some of what we touched on as we discussed how it might feel to be the new kid at school and then have someone (who you thought was a bully) befriend you. If we hadn't had each one of those ideas, we wouldn't have gone through that "stepping stone" process that led to our final ideas.

Admittedly, some ideas are just not appropriate in a particular context. However, I make a point of telling kids that it doesn't mean their idea wouldn't work as part of another song at another time. I keep a notebook full of just such ideas that haven't found the right home yet.

Keep the class interested and entertained. As mentioned earlier, laying down on the floor to think probably wouldn't work, although *telling* the class that this is what you'd usually do or even showing them could be fun and might actually buy you a few seconds while you find a solution. Aside from obvious clowning like that, draw the students in by offering "insider" songwriter tricks, such as ways of finding rhymes (how you "cheat" rhymes if you're a country songwriter, as I am) or actual experiences you've had in writing or recording sessions or on gigs. Not only will this tactic help keep the

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kids focused, but they'll feel you're connected with them enough to share those things. This is a good way to let them know you like them and enjoy doing this work with them.

Stay one step ahead. It is important to strike a balance between guiding the class and allowing them to take ownership of the process. The students need to feel that when the song's done, it really belongs to them. I try to do this by asking *a lot* of questions. "How would it feel if...? Is there anything that would make you feel...? Has anybody ever done...?" Sometimes I know the kind of idea I want at a particular spot in the lyrics, and in other instances I'm really searching for the next idea with the class. Either way, I want the students to find the ideas themselves; I'm just the guide.

Be prepared, though. The same ownership the kids have invested in their work gives them veto power if they don't like an idea. Remember that they are your (shorter) colleagues. While working on a "being friends" song, I thought a really funny idea would be something like: "I'll be by your side like Barbie with Ken/I'm always going to be your friend." As it turned out, that idea went over like—well, use your favorite punch-bowl analogy here.

Be honest. If you're stuck on a line and have no idea where to go with it, just say so. I was panicked when this happened the first time. In front of 25 kids who thought I was a songwriting genius, I was stumped. With no better alternative and the clock ticking away, I told them I had no idea what that part of the verse should be and that we should keep going, put all the pieces together, and see what happened. Lo and behold, once all of the other lyrics were up on the board, the solution for filling in the missing line occurred to me. In that situation, the best advice I can give is to rely on the process. If you stay open to the ideas and perspectives of all the brains in the room, something's bound to evolve, even if it's not what you had in mind when you walked in the door.

Involve the teacher, and stay age-appropriate. Check with the teacher to find out what he or she has been discussing in class. By doing this, you show respect for the teacher by incorporating his or her efforts into your work. Furthermore, this information is a good source for suggesting the style of song you write and can often be the catalyst for creative lyrics and hook ideas.

By involving the teacher before and *during* your sessions (often a big plus for behavior considerations), you also get guidelines for keeping your ideas age-appropriate. The differences between one grade level and another can be subtle. In one second-grade class, I was trying to get ideas for how it felt to be hurt, i.e., sad. They kept coming up with ideas like falling down, scraping your knee, etc. After I explained I didn't mean that kind of hurt, there was silence for a moment, and then one kid answered, "Well, if someone stabbed you with a knife, that would hurt." We finally did come up with

RESEARCH AND DEVELOPMENT

Once you've had a chance to get in front of a few classes and see which of your ideas work better than others, it's time to start thinking about how to get money for putting your plan into action. Because public schools are on tight budgets, I suggest you check out three alternatives: become part of your local arts organizations' ongoing programs; approach parents' groups that raise money for projects outside the standard curriculum at individual schools; and find your own funding.

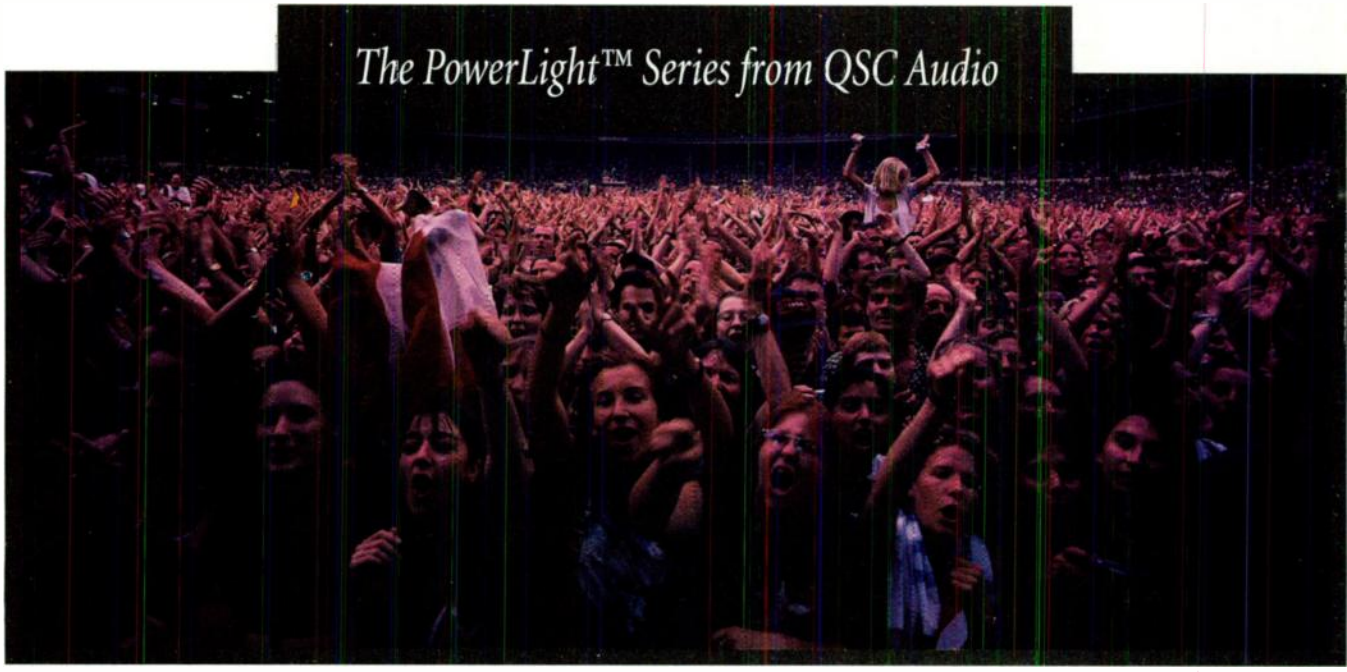
Regarding that last approach, many charitable trusts throughout the country give grant money for various projects. Each of these trusts has a particular area of interest, such as arts, public health, education, at-risk youth, etc. Some funding organizations are also limited to the region where the trust is located, although others are national in scope, so you'll need to research which trusts are appropriate for your project. Again, local arts organizations can be very helpful in this process because they have experience preparing and submitting grant applications.

One wrinkle is that most trusts will not give money directly to individuals, but they will fund projects that are associated with established nonprofit organizations. Therefore, one of the most important connections you can make is to find a nonprofit group with a 501(c)(3) tax classification (a technical IRS category) that would be interested in sponsoring your workshop. As you contact each local group, be creative as to how your workshop could be used to benefit whatever their target audience might be. You open up a lot more possibilities by looking outside arts and education organizations.

For further assistance in researching funding, an excellent resource is the Foundation Center Headquarters in New York City (tel. 800/424-9836; Web www.fdncenter.org). They can provide you with a list of 200 libraries across the country that are part of the Foundation Center Cooperating Collections. Many of these libraries have *FC Search*, a database that allows you to search an index of potential charitable trust organizations by geographic location and area of interest. If you can't make it to one of the member libraries, try contacting the one closest to you, and find out whether they will conduct a search for you over the phone (expect to pay a fee for such a service).

As you put your grant proposal together, there will be specific questions each organization will want answered. Wherever appropriate, be sure to include references to research that's been done showing the benefits of arts education. This is a crucial area to stress in your grant application because it shows scientific, objective studies that clearly link children's well-being and healthy development to what you have to offer in your program.

A good place to find this kind of information is the Music Educators National Conference (Web www.menc.org), which is a valuable resource for many different studies on arts education. You should also check out the following texts in the course of your research: *Schools, Communities and the Arts: A Research Compendium*, published by the Arizona Board of Regents; *Frames of Mind, Multiple Intelligences*, and *Unschooled Mind*, all by Howard Gardner; and *How Your Child is Smart*, by Dawna Markova.



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some good ideas, but I had really been trying to get the class to think too abstractly for their age level.

BRAIN TEASERS

If you're fortunate enough to set up a program that runs for several weeks, you will have the time to develop specific exercises for the kids to work on. For instance, you can have groups each develop different stories based on the same hook. Use hooks that are open to a variety of interpretations so the class can hear all the different perspectives the same basic ideas can generate. Another exercise is to pick words out of a hat. Make sure you have plenty of all word types (nouns, pronouns, verbs, adjectives, etc.) and have students draw slips of paper, each with one word on it. Then, using the words that have been drawn, try to develop lyric ideas from what may initially sound like nonsense phrases.

Also try to help the students find new ways to express old ideas. Don't rely on trite, overused phrases. Show students how to develop fresh perspectives to keep things more interesting and be more poetic (e.g., instead of "I'm afraid," "I'm reaching out in the darkness/Not sure of what I'll find").

You can also have kids bring in their own hook ideas. Then mix and match the best ones to create new jumping-off points for new songs. Lastly, talk to the kids about their favorite songs and what the most interesting musical ideas are in those. Consider combining several of those ideas to generate a musical starting point for new work.

WHERE THE KIDS ARE

Once you've figured out how to best structure your class, the next step is to actually find the kids to teach. As mentioned earlier, my first step was my daughter's school. If you don't have children, check with everyone you know who does. Also try going to a school in your neighborhood. It's better to have a personal connection rather than just walking in off the street. Local arts organizations are good resources, too. They often have their own "arts in education" programs that you can join.

Other possibilities for finding teaching outlets are private schools, after-school programs, or any such place that charges tuition for its services. Because they are private operations, they might have spending money available that

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public and nonprofit groups don't. You also might find that they are not quite as "needy" for arts programs as the public schools. However, I believe the nature of a true songwriting workshop is unique and offers something completely different from the usual chorus and band courses.

In addition to finding students, you'll need to secure financing for your project. Many arts organizations and trusts provide funding for projects such as the one outlined here. See sidebar, "Research and Development," for further details on how to locate these organizations and how to approach the task of grant writing.

Once your money is in place, your workshop should run for at least six to eight weeks, but the ideal is to meet on a weekly basis throughout the school year. This gives you the freedom to explore more creative options and the relief of not having to finish a song in a one-shot meeting. It also opens the possibility of putting together end-of-semester or year-end performances of work your classes have written.

YOUR TRAVELING RIG

When it comes to deciding what gear to bring with you, *make it as simple as possible!* Remember that the focus of the class is on the creative process. Most people (kids *and* adults) will become extremely distracted if there's a rack that goes to the ceiling, a mixing board, two or three keyboards, and a computer behind you while you're trying to explain why "napkin" doesn't really rhyme with "happen" (even though it's close enough for a country song). Of course it's great to be able to present your ideas with a whole "band in a box" arrangement, but if you do that right from the start, I guarantee it will take a tremendous amount of time to shift the class' focus back to the writing and away from the hardware.

I go in to my workshops with an acoustic guitar, a stand to put it on, and a pocket tape recorder. If you're a keyboard player, keep your rig as low-key as possible. A remote, over-the-shoulder model could be a cool "oddity" to get the group's attention at the beginning, but most of your time should be spent talking, writing down ideas, and moving from table to table or kid to kid. A good idea for a one-shot meeting is to arrange time at the end of the class for kids to ask any questions they have about your equipment, your own writing and playing, or about the music business in general.

▼

Try to keep track of lyric ideas from 25 kids, and you'll break a sweat before class is out.

In the meantime, while the rest of the world frets over teen pregnancy and drugs in the schools, spitballs are still a real and present danger in grades K though 5. Forewarned is forearmed. Be careful out there.

Jeff Silver *is a songwriter currently based in San Francisco, but he is moving soon to a Southeastern city near you!*

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By Brian Knave

In the February "Recording Musician," we looked at techniques for tracking awesome-sounding acoustic guitar. That column stressed the importance of each element in the audio chain: the guitarist, the guitar, the recording environment, and the signal path. When each of these elements is first rate, you should be able to produce superb acoustic-guitar tracks without touching the console's EQ knobs.

CARLA GAHR

Solo artist Rory Block is a highly accomplished veteran of traditional finger-style blues. The guitar she is holding here is a custom-made Soloist by Schoenberg Guitars.

Unfortunately, mixing sans EQ is not always an option—especially for home recordists who rarely have access to world-class guitarists and handmade, pick-of-the-litter guitars. Moreover, we typically record in marginal acoustic spaces using gear that's a far cry from what you'd find at, say, Quad Recording Studios in Manhattan (a six-floor facility with four SSL rooms). So no matter how carefully we proceed, we may still end up with less-than-sumptuous tracks.

This is the point where a few EQ tweaks can save you. Obviously, EQ is no magic kiss that can turn a frog into a prince. But if employed musically, onboard EQ can improve the tone of second-rate acoustic-guitar tracks as well as salvage downright dismal ones. Even stellar tracks can occasionally benefit from a touch of EQ to help them "sit" better in the overall mix.

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The lone singer-songwriter armed with a steel-string guitar is hardly an anachronism. In fact, for many of us who operate small project studios, these latter-day balladeers constitute our primary clientele. And let me assure you, it pays to be able to make that troubadour's guitar sound bigger than life.

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ALESIS

FLATPICKIN' IN TENNESSEE

In bluegrass music, the acoustic guitar serves alternately as a rhythm and lead voice. The rhythm parts require vigorous, downstroke strums played on the offbeat, whereas the solos are traditionally made up of fast, single-note runs in which each note is "flatpicked" using a plectrum. You can add punch and twang to those fast runs by boosting 2 kHz by 3 dB or so. Another slight boost at 12 kHz will increase "sizzle" and further enhance string articulation. If the rhythmic downstrokes aren't crisp or percussive enough, try cutting the lows a bit around 230 Hz.

WRING YOUR BOTTLENECK

The distinctive strains of acoustic slide guitar are characterized chiefly by the composition of the slide itself. Metal slides, often made of brass or stainless steel, make for a bright, gutsy tone with an in-your-face scraping quality that's especially noticeable on wound strings. Glass slides, which can be made of anything from old pill bottles (Duane Allman favored a Coricidan bottle) to real bottlenecks, tend to sound smoother and warmer and are less noisy than the metal ones.

The question is, Do you want to emphasize or de-emphasize the sound of the slide? Personally, I like to emphasize it, which is easy: you simply boost between 3 kHz and 4 kHz (slightly higher for lightweight glass slides). This can make for a wonderfully strident sound on a lowdown blues. But if you prefer more note and less scrape, a boost around 350 Hz will help to de-emphasize the slide by overshadowing it with some low-end rumble from the guitar. To further dilute the slide, cut 12 kHz by 2 or 3 dB. Still not enough? Try cutting 4 kHz.

BACK TO LIFE

Even the finest acoustic guitar can sound dull and lifeless if the strings are dead. Hopefully, you'll be blessed with players who know to change their strings regularly—especially before an important recording date. If not, your best bet is to boost 12 kHz during the mix (being careful not to add too much hiss). This will restore a semblance of the jangly high end that a new set of strings provides.

Ideally, strings should be changed a day or two before the recording session—not during it. Freshly changed strings not only go out of tune a lot,

ONE-MAN BAND

We've all heard players who occasionally thump on their acoustic guitars for percussive effect. I recently recorded a Bay Area artist who pushes this technique to the limit. Songwriter Jon Lukas plays chords and single notes with his left hand while using his right hand to play complex, multitimbral drum patterns on the side and top of his custom-built Nicholas Peringer acoustic. (He simultaneously sings, scats, whoops, and chatters, too, but that's a different story.) The resulting sound suggests a kick drum, conga slaps, snare brushwork, and even walking bass lines.

When performing live, Lukas uses a line out from his guitar's built-in Fishman Thinline pickup, plus another signal from a Beyerdynamic MC-5 omnidirectional condenser mic he has installed inside the guitar. He processes the line signal with a Fishman preamp and Rane PE-15 5-band parametric EQ and the mic signal with a Rane FMI-14 mixer input channel cascaded (using a Rane Flex Bus) into a Rane FPM-42 line mixer.

I told Lukas to bring all his equipment and set up as though he were performing live. I then miked the guitar with a pair of Earthworks OM1 omnidirectional condenser microphones: one close in, pointed just beneath the strings and soundhole, the other aiming down at the body of the instrument from several feet back. Altogether, I had four tracks of guitar to work with.

To start with, we soloed each track to determine which best emphasized the guitar's various sounds—percussion, bass, chords, melody, and so on. The line signal captured the least percussion, so we designated it the "bass" track. To bolster its bass qualities, we boosted 230 Hz (with a 2-octave Q) by 9 dB and 80 Hz by 4 dB. We also boosted 4 kHz (with a 3-octave Q) by 6 dB, which nicely enforced the harmonics and "plucked" quality of the highs.

LISA WEBB

Jon Lukas opening for Robin Trower at the Ballard Firehouse in Seattle, Washington.

Not surprisingly, the internal mic captured the most visceral percussive hits. To foreground the percussion, we boost 6 kHz by 9 dB with a 3-octave Q. This shored up the brushlike quality of the palm slides and intensified the finger slaps. A 7 dB boost at 3 kHz added weight to the thump action, while a 2 dB cut at 80 Hz got rid of an annoying rumble. Finally, I boosted 12 kHz a couple of dB to add more high-end clarity.

The EQ on the stereo mics was less extreme. For the close mic aimed beneath the soundhole, we boosted 1.5 kHz by 4 dB, which gave a nice "throatiness" to the sound of the strings, and 350 Hz by 1 dB, which added "girth" to the low end. On the other mic, we boosted at 4 kHz by 3 dB to amplify the instrument's upper-harmonic structure and 300 Hz by 1 dB to further augment the lows. Finally, both stereo-mic tracks got 3 dB boosts at 80 Hz and 12 kHz.

Of course, all of this boosting added a fair amount of audible hiss. I managed to squelch some of it with the hiss-reduction circuit on a dbx 296 Spectral Enhancer. But in the end we decided we could live with the remaining noise in exchange for the raging intensity we gained from the EQ tweaks.

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which can ruin a half dozen takes before they settle in, but they can also be *too* bright sounding. If this is the problem with your guitar tracks (and you should pray that you'll be so lucky), you can remedy it easily enough with a small cut at 12 kHz or higher.

SLIP SLIDIN' AWAY

Of course, the newer the strings, the more finger noise you'll hear as the guitarist changes chords. On a song with numerous, quick chord changes, all those high-pitched slips and slides can become bothersome. A very slight, broadband cut centered around 4 kHz may help, but don't overdo it or you'll end up with a sound duller than a bad poetry reading. You can also boost the lows a bit (try 300 Hz) to mask finger noise.

Frankly, in this age of synthetic music and purified digital samples, I enjoy the sound of finger noise on an acoustic guitar. If you're looking to buttress that "be there now" factor on an acoustic-guitar track, then go ahead and *accent* the finger noise. A boost around 4 kHz should do the job nicely.

BUZZ OFF

A buzzing string can be caused by a bum guitar or a badly held chord. If the take is superlative except for that single, recurrent buzz—and your console offers a band of parametric EQ—you may be able to locate and turn down the offending noise.

First, narrow the bandwidth to one-twelfth of an octave (that is, one note of a chromatic scale). Now, boost the EQ by 9 dB or more and slowly sweep from 60 Hz to 2 kHz. You're listening for the buzzing string to jump out of the mix. Of course, if you know which is the offending note, you can do the math and perhaps get there sooner.

Once you've pinpointed the bugger, cut however many dBs it takes to sufficiently diminish the buzz without destroying tonality. You may have to widen the bandwidth ever so slightly and be prepared to live with a bit of buzz. But better a bit of buzz than a lot.

TO BOOM OR NOT TO BOOM

We all know that mic placement is critical to recording balanced acoustic-guitar tracks. Unfortunately, engineers are sometimes careless, clueless, or in too much of a hurry when setting up mics. Moreover, an overzealous player can easily step outside the sweet spot of a carefully positioned mic.

LON CLARK

Roy Rogers, here seen cradling his vintage Gibson ES-125T ¾, is considered by many the reigning master of bottleneck slide guitar.

If you get handed a tape with a boomy acoustic-guitar track, it was probably recorded with the mic pointing directly into the soundhole. You can reduce boominess by cutting 220 Hz by 7 to 10 dB. It may also help to boost somewhere around 7 kHz.

More problematic than a boomy tone, however, is one that's too tinny. That's because it's easier to get rid of something that's there than add something that's not. A thin-sounding acoustic-guitar track is usually caused by a directional mic positioned at too severe an angle to the guitar, especially if the mic is aimed away from the soundhole. A hearty boost at 80 Hz and 250 Hz can restore some of what's missing, but the results may still be unsatisfactory. Good luck.

PERSONALITY SHIFT

If you're familiar with the frequency response of the microphone that was used to record an acoustic guitar, you can sometimes compensate for the mic's deficiencies—or excesses—by using EQ.

For example, I was recently asked to mix some acoustic-guitar tracks that had been recorded with a Shure SM57. Knowing that the SM57 has a 6 or 7 dB presence peak between 5 kHz and 7 kHz, I was able to make the guitar sound a bit more natural by cutting 6 kHz. The SM57's boost starts at around 1.6 kHz and builds gradually to the peak, so I employed a wide, 3-octave bandwidth for that cut. And to compensate somewhat for the SM57's steep rolloff at 15 kHz, I boosted 12 kHz by a few dB.

TOUCH THAT DIAL

As you experiment with some of the EQ tweaks proffered here, keep in mind that not only can the sound of one acoustic guitar vary widely from the next, but the same is true of mixers, as well. That is, EQ settings that sound premium on one board may not provide the optimum sound on the next. Also, whenever you find a combination of microphones and EQ adjustments that really slams, take notes. Finally, remember never to finalize any EQ settings except in the context of a complete mix.

Hopefully, you'll use my EQ recommendations as starting points, not as rules set in stone. From there, it's your job to determine if they work for *your* mixes or not. In the process, you can't help but learn—and the more you familiarize yourself with the creative options provided by your console's EQ section, the better prepared you'll be to find the ideal tonal tweak for each instrument in the mix.

If Assistant Editor **Brian Knave** *played acoustic guitar, he would want to sound like a cross between Robert Johnson and Paco de Lucia. Special thanks to Mike Lawson, Jon Lukas, and Jack West.*

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Hard-Disk Recording

Expand your creative options with a "musical word processor."

By Scott Wilkinson

Ultimately, most electronic musicians want to record their music so it can be played and enjoyed (and hopefully bought!) by others. Most of us are familiar with analog tape, such as ¼-inch reel-to-reel or cassette, which has been widely used for many years. These days, however, more and more musicians are recording their material digitally, which is fundamentally different from analog recording. (For the basics of digital audio, see "Square One: Digging into Digital Audio" in the February 1996 **EM**.)

Digital audio signals can be recorded to tape, hard disk, MiniDisc, or computer memory (RAM or ROM). For long musical parts (e.g., vocals, acoustic guitar parts), tape, MiniDisc, and hard disk are the preferred media because they can hold much more data than RAM or ROM, and they provide permanent but changeable storage.

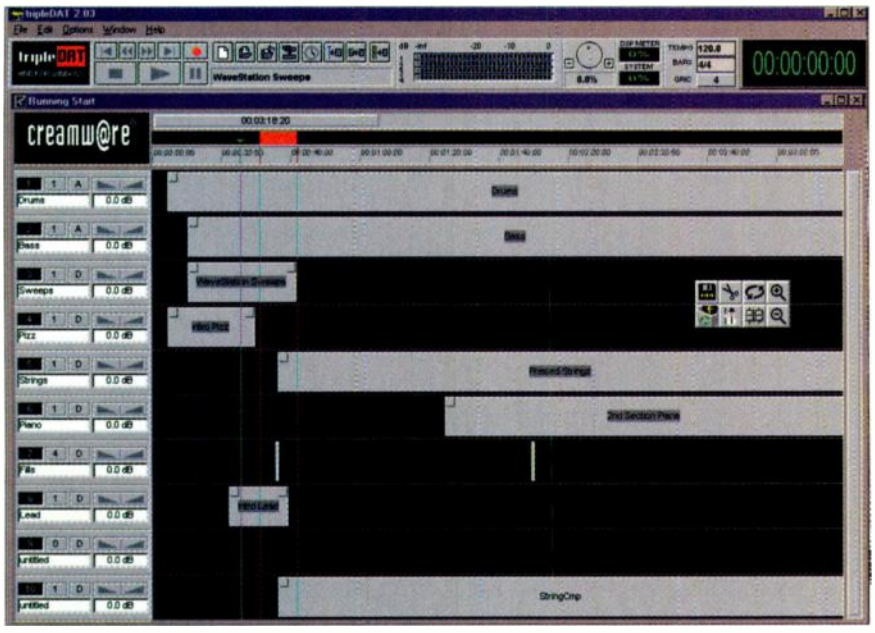

FIG. 1: CreamWare's tripleDAT HDR system for the Windows platform lets you place blocks of audio data in different tracks.

DECISIONS, DECISIONS

Once you decide to digitally record your tracks, you must then decide whether to record to tape or hard disk. If you decide to use a hard-disk recorder (HDR), you must choose between a computer-based or modular system. (For an in-depth discussion of this important decision, see "Dream Dates" on p. 40.) For now, we'll focus on hard-disk recording.

Computer-based HDRs (which are also called digital audio workstations or DAWs) require a PC, Macintosh, or other general-purpose computer and include a software package (see **Fig. 1**) and perhaps a hardware interface to get audio into and out of the computer. These systems offer a large graphic display (the computer monitor) and, in some cases, integration with MIDI sequencing. Effects are sometimes incorporated into the basic software and often can be added in the form of DSP plug-ins (more on this in a moment). Of course, computers are relatively

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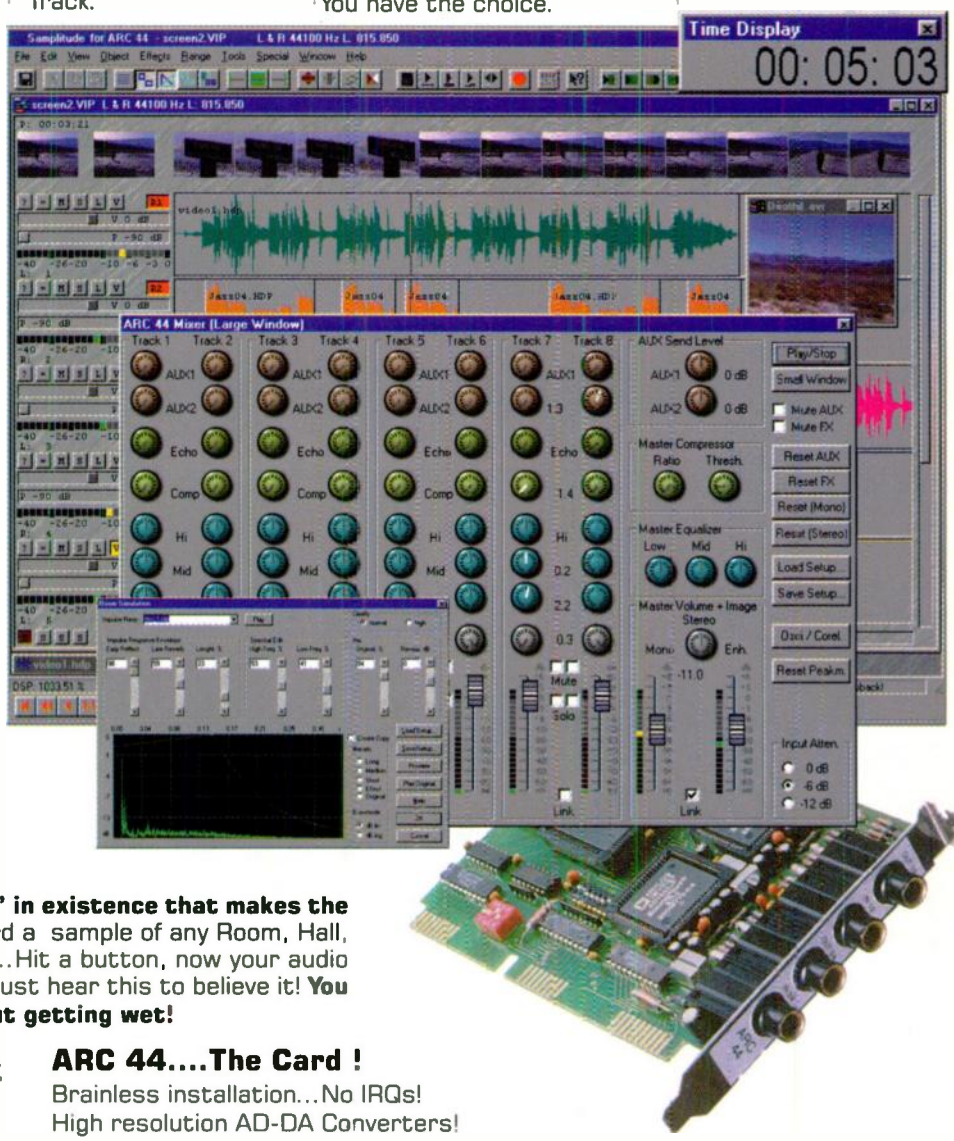

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expensive, especially those with enough horsepower to handle hard-disk recording. Desktop computers are not easily portable, but modern laptops can often perform hard-disk recording, as well.

Modular hard-disk recorders (M-HDRs) are self-contained units with built-in hard disk, mixer, and, in many cases, effects (see **Fig. 2**). Their "brains" are nothing more than computers dedicated to hard-disk recording. In most cases, you can combine several M-HDRs as need requires and budget allows, and you can sometimes control multiple M-HDRs from a single control panel. This is similar to modular digital multitrack (MDM) tape decks.

M-HDRs are dedicated devices with familiar, tape deck–style controls. In addition, they are quite portable. However, they offer far fewer editing features than are available in most computer-based DAWs. M-HDRs have a relatively small display, which makes even basic editing more difficult than with a DAW. In addition, they require external synchronization to integrate with a MIDI sequencer. On the up side, M-HDRs are much more stable—crashes are far more common with computer-based systems—and because they have fewer in-depth editing features, they are generally easier to master.

STORAGE CAPACITY

Digital audio that is recorded at a sampling rate of 44.1 kHz with a resolution of sixteen bits requires about 88 KB per second per track or 5.3 MB per minute per track. As a result, a 3-minute song with eight tracks would consume 127 MB of space. I recommend that you use a hard drive with at least 1 GB for digital audio data.

Some HDR systems use data compression to reduce the storage requirements. Common forms of compression include µLaw (pronounced "myu-law"), Macintosh Audio Compression/Expansion (MACE), and Adaptive Differential Pulse Code Modulation (ADPCM). Some types of compression, including most of the types currently in use in audio systems, can degrade the sound quality. *Lossless compression* does nothing to the sound quality, but it yields the least amount of storage savings. *Lossy compression* actually removes some of the data, which can degrade the sound quality, but it yields greater savings, typically from 4:1 to 6:1 or more.

OTHER IMPORTANT CRITERIA

HDRs can use several types of hard-disk media (which I'll cover shortly). However, they must all meet certain minimum criteria to be practical for this application. The most important of these criteria are *average access time* and *throughput*.

Access time (also called *seek time*) is the time it takes the drive to find a piece of data anywhere on the disk. Of course, if the disk drive's read/write head is near the location of the desired data, it takes less time than if the head is far away from the data. As a result, the *average access time* is calculated and used as a benchmark.

Throughput (also called *data transfer rate*) is the amount of data that can be sent to and from the disk per second. You can record many tracks on most hard-disk systems, up to the capacity of the disk. However, you can only play a limited number of tracks simultaneously, depending in part on the processing speed of the computer and the average access time and throughput of the disk.

If you're shopping for a hard-disk drive to use for digital audio recording, you might think it's as easy as finding a drive that meets certain seek time and throughput specs. As a general rule, any hard disk used for digital audio recording must have an average seek time of 12 milliseconds (ms) or less and a sustained throughput of 3 to 4 MB per second (MB/s) or more. However, it's actually a bit more complicated than that. For one thing, the minimum acceptable specs depend on the number of tracks the system must deal with simultaneously; an 8-track HDR requires a faster hard disk than a 2-track system.

In addition, many hard drives perform a routine called *thermal recalibration*, which compensates for slight changes in the size of the disk platter due to temperature variations. If this occurs during recording, you might miss several milliseconds of data. You can sometimes turn this function off or tell the drive to perform it only when it is not writing or reading data. Fortunately, many modern hard drives now use other means of compensation for temperature changes.

Finally, the type of connection between the computer's central processing unit (CPU) and the hard disk affects how much data can be transferred to and from the disk in a given amount of time. Some of the more common types include SCSI, IDE, and ATA. In addition, each type of connection includes at least two variations, each with its own maximum throughput. For example, the original version of SCSI can deliver a theoretical maximum throughput of 5 MB/s, while the newer Fast SCSI-2 can sustain 10 MB/s. Then there's Fast and Wide SCSI-2, which can sustain up to 20 MB/s. (For more on these hard-disk connections, see "The Windows Studio" in the July 1996 **EM**.)

Fortunately, you don't typically need to worry about these issues. All you need to look for is an "A/V capable" drive, which should meet all minimum requirements for recording digital audio. In fact, most modern hard drives are A/V capable. Some computer-based DAWs, such as SADiE Inc.'s SADiE 3, supply a turnkey system, complete with suitable hard drive, while others, such as the various systems from Digidesign, provide a list of drives that have been tested for compatibility.

TYPES OF MEDIA

There are several types of hard-disk media, and most are available in external boxes or as internal units for computers or M-HDRs. The traditional type of hard disk is called a *fixed disk*, which is permanently sealed within an enclosure (see **Fig. 3**).

Removable cartridges behave much like floppy disks, but they hold much more data. Most of the older removable-cartridge drives are not fast enough for hard-disk recording, but recent advances in removable technology have enabled a few such products to be used for this purpose. Examples include the Iomega Jaz (1 GB) and SyQuest SyJet (1.4 GB) and SY270 (270 MB). Akai uses magneto-optical (MO) removable media in their 8-track DD1500 M-HDR. This requires a custom controller chip and some sophisticated buffering of the data because MO technology is otherwise too slow for hard-disk recording.

One of the most important advantages of removable media is the fact that you can easily store the audio for each project on a separate cartridge.

FIG. 2: The E-mu Darwin is an M-HDR with internal mixer and optional effects. The mixer is controlled with an external MIDI fader box or computer software.

This makes it easy to keep track of your data and lets you take the cartridge to other studios. Removable media are also great for backing up your data (more on this in a moment).

MiniDisc is a relatively new type of removable MO cartridge that is being used in low-cost M-HDRs from Yamaha, TASCAM, and Sony (see **Fig. 4**). These units resemble the ministudios of the past, except that they use MiniDisc cartridges instead of cassette tapes. They can record and play up to four tracks of audio (no virtual tracks are possible), and the storage capacity of a cartridge is 140 MB. These units use lossy 5:1 compression to record up to 37 minutes of audio per track. (You can also record in stereo for a total time of 74 minutes per track or in mono for a total time of 148 minutes.) According to the manufacturers, if you want to record four tracks, you must use MD Data cartridges, but for stereo recording, standard MD Audio cartridges work fine.

RECORDING AND PLAYBACK

Basically, recording on an HDR is similar to using a traditional analog tape deck. Most HDRs provide tape-style transport controls, such as Play, Record, Rewind, Fast Forward, and Pause. Unlike tape decks, however, HDRs take virtually no time at all to jump from any point in the music to any other point thanks to *random access*. This means that the hard disk can find any piece of data in roughly the same time as any other data. By contrast, tape is *linear;* it must be shuttled to find a particular spot in the music. You can also punch in and out, and this does not necessarily replace the material in the punch section.

Most HDRs let you record lots of tracks (though rarely more than eight at once), and you can typically play between two and eight tracks simultaneously from a single unit. Some systems (such as Digidesign's Pro Tools III) allow expansion to sixteen tracks and more. Even though an HDR might be called an 8-track device, it can typically hold many more tracks of data. These are sometimes called *virtual tracks*, which let you record many takes of each part and select the best one for playback.

In most cases, random access, nondestructive punches, and virtual tracks are possible thanks to the use of *pointers*, which are internal indicators the computer uses to identify and manipulate different sections of the audio data. For example, let's say you've recorded a guitar solo, and you punch into the middle of the solo to correct some mistakes. On tape, this would destroy the original material in the punch section.

With nondestructive editing on an HDR, however, the new material is stored on a different part of the disk, leaving the old material untouched. When the solo is played back, the computer uses pointers to jump to the new material and back to the old material at the correct moments. This lets you use either version of the punched section.

Pointers are also used to select the virtual tracks you want to play; you can even assemble material from several tracks into one composite track without destroying the original data. The user doesn't work with pointers directly. Instead, you tell the HDR which parts of which tracks you want to use by creating a *playlist* (sometimes called an *edit decision list*, or *EDL*), which is a list of the audio sections you want to play back in a certain order.

Many studio operators need to sync the HDR with a MIDI sequencer and/or tape deck. This is not a big issue if you are using a digital audio sequencer that integrates hard-disk recording and sequencing. If you are using separate programs to sequence and record to hard disk, internal synchronization usually works well but not always. There

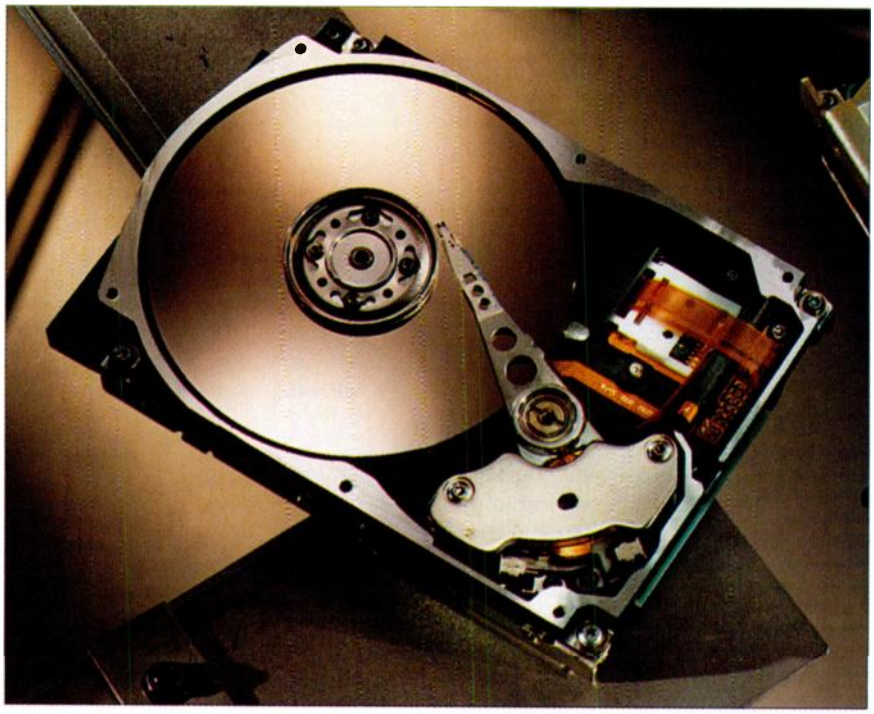

FIG. 3: The Seagate Medalist 2132 is a 3.5-inch fixed disk with 2.1 GB capacity and 12.5 ms average seek time, and it uses the Fast ATA-2 bus to connect with the host CPU.

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are different degrees of sync: some systems just trigger the audio files and MIDI files and hope they stay together, and other systems repeatedly check the synchronization and adjust the playback as required. Obviously, the more often the system checks its synchronization, the tighter the sync is likely to be.

Most M-HDRs include some form of synchronization capability, such as MIDI Time Code (MTC) or SMPTE. In some cases, these devices can only be the master time-code source, which means that the other devices in your system must sync to the HDR. In other cases, the HDR can be master or slave. If you are using a tape deck in conjunction with an HDR, the tape deck must be the master, so your HDR should be able to sync to it.

FIG. 4: The Sony MDM-4X is one of a new breed of MiniDisc-based M-HDRs.

EDITING AND MIXING

One of the biggest advantages of HDRs is their editing capability, which is not available on tape decks for the most part (unless you like editing with a razor blade). Typical editing functions let you cut, copy, and paste sections of digital audio. When you copy and paste a section of digital audio in a nondestructive system, the data is not actually copied and pasted. Instead, pointers are used to play the data at any moment you want during the song. This lets you record a short riff and repeat it as many times as you want without using up valuable storage space. Similarly, when you cut a piece of data, the data is not actually erased from the disk, only the pointer to that data. You can also merge the data in several tracks to one track so they all play back together.

Other common editing functions include fade ins, fade outs, and crossfades between different sections of data. Normalization adjusts the amplitude of the material so the highest peaks correspond to the system's highest allowable level to maximize the signal-to-noise ratio. You can also reverse a section so it plays from back to front.

In most cases, these operations are nondestructive. If you edit a piece of data and you don't like what you did, you can undo it, and the original material returns unchanged. A few operations might be destructive, but the HDR will typically warn you of this before it proceeds with the operation.

Most HDRs include various effects-processing operations that can be applied to any section of the data. These include reverb, delay, chorusing, flanging, compression/limiting, and EQ. In many cases, the effects can be applied in real time as the data is playing back. This is much like sending the audio through an outboard effects processor.

In other cases, the computer must take some time to process the data with the desired effect. In this case, you must wait for the computer to finish its processing before you can play the material. This is sometimes called *offline* processing, which is often destructive, but the computer typically warns you before it proceeds.

Computer-based HDR software often accepts ancillary programs called plug-ins, which let you add various forms of signal processing. For a complete rundown on plug-ins, see "The Budget Desktop Studio" in the September 1996 **EM**.

In the end, you will probably want to mix your tracks and record them onto a stereo master tape. Most HDRs include their own internal mixer. In computer-based HDRs, the mixer appears on the screen. The faders and other controls can be manipulated with the mouse, but this is inefficient and sometimes impractical. It's much better to use a MIDI fader box or other dedicated mixing surface, such as JLCooper's FaderMaster or CS-10 or Peavey's PC 1600. Mixer manipulations can usually be stored and recalled during playback, which provides automated mixing.

Some M-HDRs, such as the Roland VS-880, include a physical mixing surface, which makes it easy to mix. Other M-HDRs, such as the E-mu Darwin, have an internal mixer with no physical controls. In this case, the mixer is controlled from a MIDI fader box or computer software. Because the internal mixer and effects are usually digital (i.e., the digital signals never leave the digital domain), there is none of the degradation of signal quality that so often accompanies conversions from analog to digital and back again.

CARE AND FEEDING

Despite their popularity, hard disks are finicky creatures; they crash and corrupt data. As a result, it's critical to back up your data regularly (preferably after each and every session). Removable cartridges provide the easiest solution; if your primary storage crashes, the cartridge can be used immediately. You can also use a data DAT deck, but in that case you have to restore the data to a hard disk before you can use it. Many modern computers and some M-HDRs include a SCSI port, which lets you connect an external device, such as a removable-media drive or data DAT deck. (Some PCs require an add-on SCSI card.)

A few systems let you back up to an audio DAT deck or MDM, such as an Alesis ADAT or TASCAM DA-88, but this also requires that you restore the data, and it's a bit of a kludge. For example, the Fostex DMT-8 has no SCSI port, but it backs up two tracks at a time to audio DAT via the S/PDIF digital audio outputs. The Digidesign HDR systems can also back up to audio DAT

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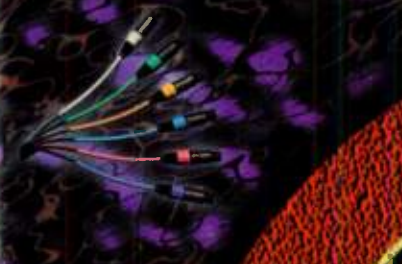

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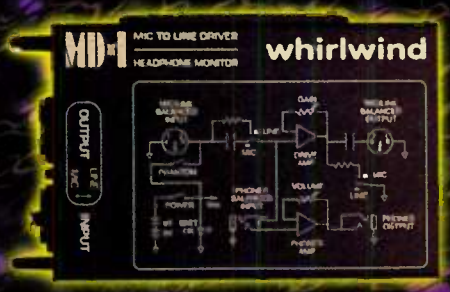

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using a program called *DATa*. This program backs up the playlist information followed by the actual audio data, all of which is sent to the DAT deck from the digital audio outputs on the interface hardware.

As you record and edit material, it is stored in different places on the disk. If data already exists on the disk and the system is unable to write an entire file in one contiguous area, the data must be stored in bits and pieces that are reassembled by the computer upon demand. Eventually, the data is so *fragmented*—spread out—that the computer can no longer find it efficiently. This also occurs when you do a lot of destructive edits, resulting in data being added and deleted. If the data becomes fragmented enough—and this can happen surprisingly quickly—disk access is slowed, and eventually crashes can occur.

As a result, the disk should be *defragmented* or *optimized* every so often, depending on how much you use the system. (Defragmenting puts each file in a contiguous space; optimizing not only defragments each file but reorganizes the entire disk so that data files are stored contiguously, applications are stored contiguously, and so on.) This is easy on a computer-based system; simply run a disk-maintenance program and defragment the disk. (Of course, make sure to back up the disk before performing the defragmentation; see "Desktop Musician: Don't be a Crash Dummy" in the September 1996 **EM**.) Most M-HDRs defragment automatically or provide a method to initiate the process manually.

If you opt for a computer-based HDR, I recommend that you dedicate a separate hard disk to your digital audio data. Of course, you can record onto your primary hard disk, which also holds your operating system, applications, and other data files. But dedicating a hard disk to digital audio makes it easier and safer to defragment and back up the disk on a regular basis.

Affordable hard-disk recording is a great boon for musicians everywhere. This technology lets you record and edit audio with unprecedented ease and flexibility. All that remains is to try it out in your system.

EM *Technical Editor* **Scott Wilkinson** *backs up his hard disk after every session to keep the crash gremlins away.*

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Reviews

Digidesign Pro Tools Project (Mac)

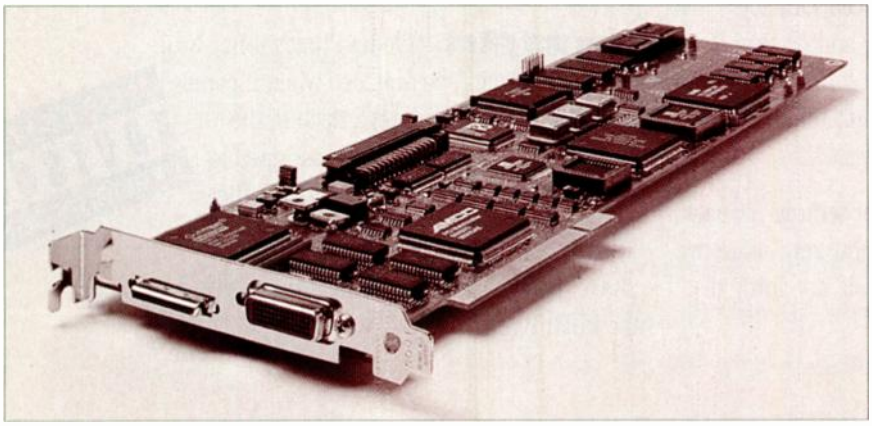
By Parri Troy

Does this DAW for the project studio have the right stuff?

Digidesign's Pro Tools systems have long been the tools of choice for professional desktop audio production on the Macintosh. The full-blown Pro Tools III system is a potent digital audio workstation that includes *Pro Tools* software, Digidesign's high-speed TDM bus and DSP Farm processing card, and a Disk I/O interface card that interfaces with your choice of external I/O boxes and has a dedicated SCSI bus that routes the audio data to and from disk. The Pro Tools III system can be expanded with additional I/O and additional DSP Farms. But all this comes at a stiff price for owners of small project studios, not to mention for serious nonprofessional users.

Of course, the company's entry-level products are the well-known Audiomedia III card and *Session* software. But what if you have a professional project studio or serious home studio and need more I/O and better converters, but you can't afford Pro Tools III? Until recently, Digidesign's answer was Session 8 Mac, an 8-in, 8-out digital harddisk recording workstation that had Pro Tools' high-quality digital audio converters but could not be expanded and did not include the TDM bus. (Actually, the Session 8 Mac card was a Pro Tools card with TDM disabled.)

Digidesign has recently modified its strategy. Session 8 for Macintosh is now history (although Session 8 for PC is still available), and the company offers two mid-level Pro Tools–based alternatives. One is *Pro Tools PowerMix*, a host-based version of *Pro Tools* that uses Apple's Sound Manager and the Power Mac's built-in audio capabilities to run without a hardware card. The other alternative is Pro Tools Project, a modified version of Pro Tools with hardware and software that directly replaces Session 8 Mac.



Digidesign's Pro Tools Project system for Power Macintosh includes a Pro Tools PCI card with the TDM bus disabled and the same software as the high-end Pro Tools III PCI system. The required I/O box (either of two models) is a separate purchase.

HARDWARE

The Pro Tools Project system includes the software and a Disk I/O card that goes in the first slot of your PCI slot–equipped Power Mac. (A NuBus version is also available, and both versions are the same price.) Installation is easy.

As with Pro Tools III, Pro Tools Project works with either of two external I/O boxes. I used Digidesign's 882 I/O box ($995), which offers eight balanced ¼-inch (TRS) analog inputs, eight balanced ¼-inch analog outputs, and one S/PDIF digital I/O pair on RCAs. If you need more flexible, professional I/O, you can opt for the 888 I/O ($2,995), which gives you eight balanced XLR inputs, eight balanced XLR outputs, and four stereo AES/EBU digital inputs and outputs on XLRs.

As with other Pro Tools systems, you plug the analog or digital sound source into your I/O box, which relays the signal to the Disk I/O PCI card. The sound then gets recorded onto a dedicated SCSI drive.

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Don't depend on your salesperson to know, but for every track of your recorder, a live board wastes 1 input (8 tracks = 8 wasted inputs). Not very efficient. A true recording console, like the M1600, has dedicated ins/outs specifically for your multitrack, so all input channels remain available for necessities like guitars, keyboards, mics — whatever you need.

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The M1600 has the EQ you need. Three bands including a semi-parametric mid sweep with more range than anything in its price class. Plus, the M1600's next-generation mic preamps are optimized for digital recording. Much cleaner and quieter than those on a live board. Check out the specs.

Serious Monitoring. Inputs a Plenty

You'd be hard pressed to find the M1600's monitoring capability on another mixer — let alone a live board. With 6 AUX sends you can create stereo cue mixes and still have plenty of AUX power to spare. Plus, you get 4 fully assignable effects returns. Thanks to its inline design the M1600/16 gives you 32 inputs at mixdown.

You Can Expand It, Too!

Best part is you can buy the M1600 and its optional meter bridge for about the price of a basic live board. How can TASCAM do it? By not making you pay for stuff you'd never use — like mic inputs. When was the last time you used more than 8 microphones simultaneously for recording? Chances are never. But if you ever do, you can easily expand your M1600 with the optional TASCAM MA8 eight channel mic preamp — giving you 8 more killer mic preamps.

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*16 input model gives you 32 mix positions; 24 input model gives you 48. Manufacturer's suggested list prices. $1699 for 16 inputs and $2,199 for 24 inputs

SOFTWARE

The *Pro Tools* software (I reviewed v. 3.21) has an intuitive and easy-to-use graphic interface. The same software is used for all of Digidesign's current audio-card configurations. Previous versions of the Pro Tools system have been reviewed in **EM**, and the upcoming version 4.0 will also be reviewed, so I'll just describe the software briefly here. It's important to note that, whether you use Project or Pro Tools III, the software interface remains the same. You don't have to relearn basic operations as you work your way up the Pro Tools ladder to more professional, feature-enriched systems.

When you launch the application and create a session, you are introduced to three main windows: the Transport, Edit, and Mix windows. The Transport Window provides the transport controls, which are just like those found on an analog tape recorder. The recording process is equally traditional. You arm a track by putting it into Record mode and adjust the level. Then, hit the Record button on the Transport Window. If you don't like what you hear, simply record another take. Alternatively, if you don't want hard-disk space glutted by duff takes, you can enable Destructive Record in the Options menu, and your next attempt at recording a better take will overwrite the previous sound file. And if you don't like being tied to your mouse while working, keyboard shortcuts are provided for virtually all operations.

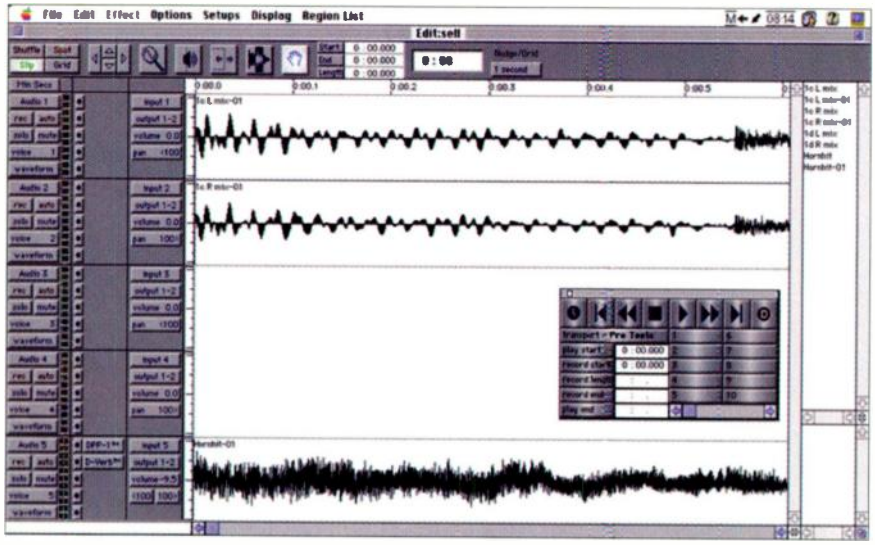

FIG. 1: In *Pro Tools'* Edit window, the sound files are located in a central area, flanked by the playlist on the right and track controls on the left. This makes the Edit window large enough to take over a single computer monitor. Tracks 3 and 4 in this example hold no sound files, so I used the free space for the Control window.

Once you have all the parts recorded, you can start editing the tracks or the overall structure of the music itself. Because this is extremely easy, you can end up with several different versions of a single piece of music (which is very useful for remixers). By the way, I suggest you avoid storage problems by working with a 2 GB or larger hard drive.

The Edit Window is where graphic representations of your sound files are viewed and manipulated (see **Fig. 1**). The sound files appear between two sidebars. On the right side of the window is the Region List, where sound files are listed by name. From here, it's a simple matter of drag, drop, point, and click to introduce files into the PlayList for placement and editing. The sidebar on the left is for track controls: record, solo, mute, etc.

The drawback with having only eight tracks is that they'll get eaten up pretty quickly, so bouncing (submixing) is unavoidably in your future. As you'd expect, you mix down and bounce tracks in the Mix window (see **Fig. 2**). You can mix your tracks internally to stereo using *PowerMix* or the Pro Tools Project system before you get to your outboard mixer.

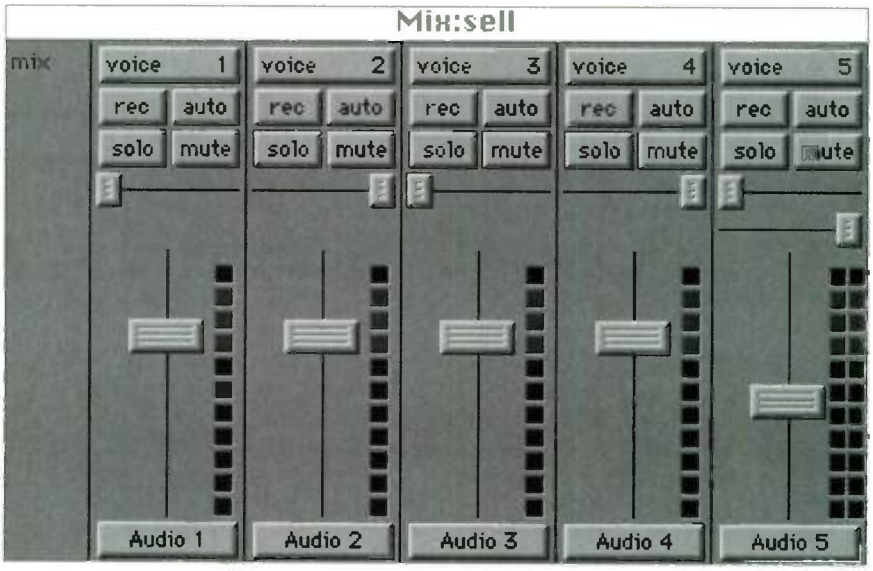

FIG. 2: In the *Pro Tools* Mix window, you can mix down eight tracks to stereo or submix tracks by bouncing them internally. One big advantage to this type of system is that you can completely automate the mix.

With Project, tracks can be bounced by playing them in real time through an external mixer or by merging them internally in the digital domain. However, when bouncing tracks internally, there's no dynamic mixing on the fly. Once you assign the parameters of the

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bounce, the software crunches numbers to complete the operation. Then you listen to the results and decide whether you like what you got. If not, just trash it and try again.

This style of working may be counterintuitive if you're not used to hard-disk recording, but it's a pretty standard method and will be old hat in no time. When doing destructive edits in Pro Tools Project and other such systems, remember not to throw away your source sound files; if you change your mind about putting the dulcimer and tuba on the same track after the fact and you haven't saved the original files, you're in trouble.

Similarly, you can digitally mix all tracks to stereo through the software's virtual mixing board (again offline), or you can assign each of the eight tracks to its own output and then mix to stereo on a conventional mixer.

There's a lot more to the software, including SMPTE sync, OMS compatibility, and a time display that can be configured as bars and beats, feet and frames, SMPTE time, or minutes:seconds. But as noted earlier, this is just a quick overview of version 3.21, and version 4.0 will probably be shipping by the time you read this.

Product Summary

PRODUCT:
Pro Tools Project 3.21 hard-disk recording system

PRICE:
Basic system (without I/O box) $2,495
882 I/O $995
888 I/O $2,995

SYSTEM REQUIREMENTS:
Power Mac with at least 16 MB of RAM; System 7.5.2 or later; Digidesign-qualified hard drive

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AUDIO QUALITY	● ● ● ● ◖
VALUE	● ● ●

PRO TOOLS UNPLUGGED

The TDM bus is disabled in Pro Tools Project—the hardware actually exists on the card but doesn't work—which means that you can't use TDM real-time plug-ins. Although Project costs approximately half as much as a Pro Tools system with TDM capabilities, its lack of plug-in support is still a major drawback in terms of versatility and expandability.

The concept of effects-processing plug-ins should be familiar to most **EM** readers by now. Digidesign and its long list of development partners produce highly sophisticated, professional reverbs, compressors, noise-reduction software, EQs, and so on, that extend the capabilities of Pro Tools. But without the TDM bus, you've eliminated many of these options. Why limit the potential of your studio and future business possibilities?

To make the situation worse, Pro Tools Project cannot run Sound Designer plug-ins (which are not real time) on PCI Power Macs. The plug-in problem will be solved when *Pro Tools* 4.0 ships, as it includes the new AudioSuite plug-in architecture. (For more on AudioSuite, see "Desktop Musician" on p. 86.) AudioSuite isn't real time—although you *do* get real-time preview—but at least you'll have some type of plug-in architecture. (Digidesign has promised to make AudioSuite a real-time architecture by the end of 1997 or early 1998.)

I question the wisdom of shipping a system for the project studio with no plug-in architecture. In fact, I think it's fair to demand a real-time architecture, even if it isn't as elegant or as powerful as TDM. (After all, Steinberg's VST for the Mac and the ActiveMovie architecture on the Windows platforms are real time and don't require expensive hardware.) It seems Digidesign has some rethinking to do.

CONCLUSION

Pro Tools Project is easy to use and easy to understand. It always worked and never crashed. The sound quality is high, and you can make good records with it. So I can recommend this product—but not unconditionally—to the home novice or to studio entrepreneurs who already have outboard gear and want to get their feet wet in hard-disk recording and editing.

I found Pro Tools Project better than Session 8 Mac, as Project does offer some operational improvements over the Session system: compatibility with Digidesign's sync peripherals, an ADAT

Pro Tools Project I/O Specifications

	882 I/O	888 I/O
Analog I/O	8-in, 8-out, balanced (TRS) ¼"	8-in,8-out, balanced (TRS) ¼"
Digital I/O	1 stereo pair, S/PDIF on RCAs	4-in, 4-out AES/EBU on XLRs
Sample Clock	256x Super Clock I/O on BNC	256x Super Clock I/O on BNC
Sample Rate	44.1 or 48 kHz (selectable)	44.1 or 48 kHz (selectable)
A-D Converters	Delta-Sigma; 128x oversampling, 16-bit output	Delta-Sigma; 128x oversampling, 16-bit output
D-A Converters	18-bit, 64x oversampling	18-bit, 64x oversampling
Operating Level	+4 dBu/-10 dBV (switchable)	+4 dBu
Frequency Response	20 Hz–20 kHz (±1 dB)	20 Hz–20 kHz (±1 dB)
Signal-to-Noise Ratio	91 dB (22 Hz–22 kHz band-limited)	104 dB (A-weighted)
THD	0.007%, 0 dBFS @ 1kHz (22 Hz–22 kHz bandwidth)	0.004%, 0 dBFS @ 1 kHz (22 Hz–22 kHz bandwidth)
Weight	5 lbs.	7 lbs.
Dimensions	1 rackspace x 7.5" (D)	2 rackspace x 9.75" (D)

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The IT-1220's heart is a specially wound and shielded toroidal isolation transformer with a center-tapped secondary, allowing the AC power to be balanced at its source. The current-carrying wires are no longer "hot" and "neutral" (0V), but two 60V lines of opposite polarity (referenced to the safety ground connected to the center tap), whose difference is 120V.

The IT-1220 provides 14 balanced outlets (two front and 12 rear) and includes an accurate, self-checking "smart" AC voltmeter, an Extreme Voltage Shutdown circuit, and a "Soft Start" circuit to prevent large inrush surge currents.

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interface, and the ability to work with SampleCell. Also, Pro Tools Project is compatible with the 888 I/O box—Session 8 Mac was not—which gives you access to better converters and professional XLR connections. In addition, Session 8 Mac does not let you remove items from your PlayList or destructively record. Both limitations have been remedied in Pro Tools Project. Like its predecessor, Pro Tools Project continues to offer limited MIDI sequencing as well as the capability to synchronize to other MIDI sequencing software, such as Opcode's *Studio Vision Pro.*

Pro Tools Project works with either of two I/O boxes. The 882 (pictured) has eight balanced ¼-inch analog inputs, eight balanced ¼-inch analog outputs, and one coax S/PDIF pair. The higher-end 888 I/O offers eight balanced XLR inputs, eight balanced XLR outputs, and four stereo AES/EBU inputs and outputs on XLRs.

However, I can't wholeheartedly recommend upgrading from Session 8 Mac to the Project system. In the long run, your money would be better spent on the Pro Tools III Core system, which would be a much bigger step up. In particular, the lack of real-time DSP plug-ins and expandability is a major downfall, and you can't do post work via QuickTime. (*Pro Tools* 4.0, which is scheduled to ship by the time you read this, will offer built-in QuickTime support.) Your buying decision is made more difficult by the fact that by the time you read this, you'll be able to purchase several less expensive systems (such as Korg's new 1212 I/O card) that offer enough functionality to lure potential Pro Tools Project users. As a result, Project is not exactly a compelling, must-buy product for the project studio.

I question the wisdom of shipping a project-studio system with no plug-in architecture.

That said, Pro Tools Project delivers a Mac-based, 8-in, 8-out system that sounds fully professional. When *Pro Tools* 4.0 with AudioSuite is released, you'll have non-real-time plug-ins, too. The product is certainly well built; the question is whether it is as well equipped as it should be. At this price level, a few more improvements would have allowed a more ringing endorsement of Pro Tools Project.

Parri Troy *is the owner of Hbourne Interactive Digitalmedia, Inc. The company is currently working on Wired Television's* The Netizen *for MSNBC and can be reached at hbourneint@aol.com.*

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Korg N364

By Julian Colbeck

An old friend gets an upgrade and a new name.

Korg's N364 keyboard workstation is a direct descendent of the best-selling M1. Space barely permits me to list the number of times Korg has trailed around this particular block of synthesizer parameters, but familiarity doesn't have to breed contempt. There is much to admire about the late '80s–vintage M and subsequent T, 0, and X series.

These are quality instruments that offer basic Programs (single patches) and Combinations (up to eight Programs combine to create complex sounds and Performance setups); a groovy, linear sequencer that also allows pattern-based recording; high-quality, imaginatively styled, dual effects processing; and straightforward, sample-based, subtractive synthesis.

Korg has nipped and tucked rather than reinvented, giving the N364 a fresh bank of 100 spangly new Programs and 100 new Combinations, a handy arpeggiator, ear-catching loop triggering direct from the keyboard, 2 MB of new sample waveforms in ROM (most of which were introduced in the X5D but not fully exploited), and some new effects routings. Keep in mind that the X5D is not a workstation—it doesn't have a disk drive, an Aftertouch-sensitive keyboard, or a sequencer, for instance—and the X3 doesn't have the extra 2 MB of sample ROM. So the new synth combines the best of these two instruments.

But chip away the toys and new patches, and the brand-new synth you've just lovingly coaxed out of its styrofoam coffin is an improved version of last year's Korg X3 with the aforementioned new samples and Programs. Are we talking cheeky cosmetic surgery here or justified enhancement of a winning formula? Let's investigate.

ON THE SURFACE

The N364 even looks like an X3, with its deep control panel, rectangular LCD display, and dual-purpose pitch/mod joystick. In fact, the two synths look identical aside from the bluish tinge to the N364's panel, from which the pitch/mod lever sprouts.

On the rear panel you'll find four audio outputs; a headphone jack; a Contrast knob for the LCD; the power switch; and MIDI In, Out, and Thru ports. There's a sustain-pedal input with switchable polarity and an assignable jack that can accept a footswitch for stepping through Programs, controlling the sequencer transport, or enabling/disabling either onboard effects processor. Alternatively, you can use the assignable jack with a continuous footpedal to control Volume or Expression, sweep the filter cutoff, control an effects wet/dry mix, or change the value of a selected parameter in one of the Edit modes.

The keyboard features a 61-key, unweighted action with Velocity and Aftertouch. For those who want a larger keyboard, Korg also offers the N264 ($2,400), which has a 76-key, unweighted action but is otherwise identical to the N364. The unit has an internal power supply and a standard IEC 3-conductor power cord.

One notable absentee, and one for which there is no whisper of an explanation at this time, is a PCM card slot. Granted, you're armed with lots of sounds, and earlier Korg PCM waveform cards were quite expensive. This is not exactly a catastrophic omission, but I'd have preferred to see a PCM slot included.

If you need instant editing, you can use the eight dedicated Program Parameter buttons that cover oscillator balance, filter cutoff, filter envelope amount, amplifier attack, filter or amplifier release, oscillator level, Velocity sensitivity, and the wet/dry effects balance. (You can even edit values on the fly using a footpedal.) Korg has offered this system of instant editing since the M1, and it's good to see it retained.

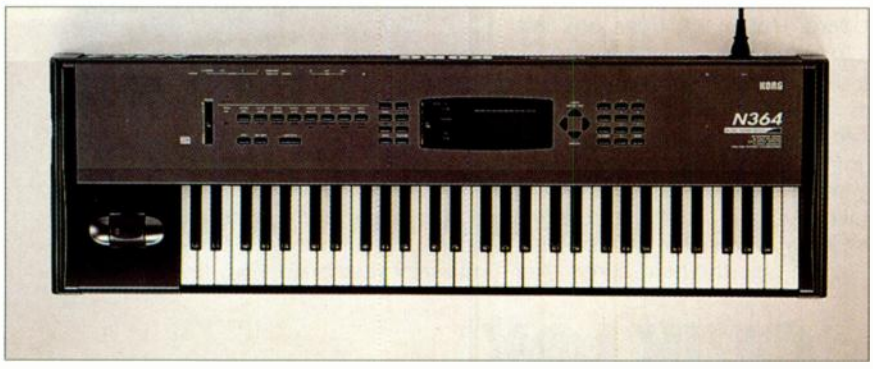
Considering the healthy number of dedicated panel controls, the user interface remains as unsatisfactory as it was on Korg X-series synthesizers. Even seasoned Korg owners such as myself continually push the Page Up button when we should have pushed Yes, or use the Across arrow when we needed Page Up. Why? Because all of the buttons look the same, and the prompts are far from clear. It's not an insurmountable problem, but I would like to have seen Korg address it on this nth time around.

If the user interface is lacking, at least the underlying system is steady and logical. You've heard it all before, but for those recently returned from a mission to Jupiter, we'll briefly recap it.

ARCHITECTURE

The core of the N364's voice architecture is 8 MB of PCM-sampled waveform memory that manifests itself as 430 Multisounds and 215 drum sounds. Multisounds are nuggets of sounds ranging from full multisampled pianos, organs, guitars, and flutes to bishes, bashes, bings, and bongs. They are also useful for creating such complex structures as arpeggiated runs and evolving, Wavestation-like textures. The pool of drum sounds is used for multi-instrument drum kits. The N364's Multisounds and drum samples are identical to those found on Korg's X5D, though Korg has added some fresh drum Programs in the new synth.

In Korg's AI² synthesis world, a basic



Korg's 61-key N364 keyboard workstation and its sibling, the 76-key N264, use the same PCM-based synthesis engine found in the X-series synths but add a bank of 200 cool new Programs and Combinations, a nifty arpeggiator, and some flashy, rhythmically looped Multisounds.

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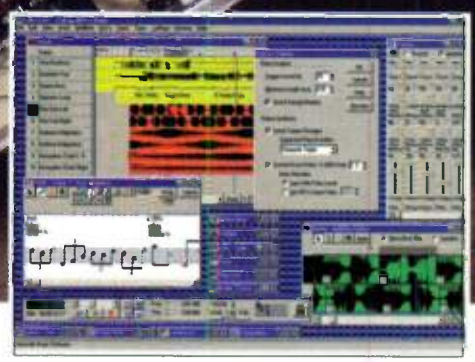

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patch is called a Program, and its life begins with a choice of Single, Double, or Drums mode, followed by choice of Multisound, with level and tuning control. Single mode is straightforward: it uses one Multisound and gives you the unit's full 64-note polyphony. Double mode Programs use two oscillators, each with its own Multisound, so the polyphony is cut to 32 notes. Pitched Single, Double, and Drum Programs can be shaped using traditional, analog-style filters and amplifiers; a variety of modulation sources and destinations; and a pair of effects processors.

Drums mode opens up the box of drum sounds with different instruments mapped across the keyboard. In light of instruments such as the Ensoniq MR-76, which allows any resident sound to become part of your drum/percussion environment, this system is looking dated these days. But the sounds here are beefcake strong. Drum Programs can use all of the programming parameters available to regular Programs. Effects can be selectively applied so that some drums can be processed while others remain dry. (The synth doesn't have a dedicated dry bus, but the same result can be easily obtained with a little creative programming.)

A Combination includes up to eight Timbres (which are simply Programs assigned to a Combination). Each Timbre/Program is assigned to its own MIDI channel, keyboard zone, maximum level, pan position, effects bus, and Velocity range. Global parameters govern overall tuning, temperaments, memory protection, pedal assignments, drum-kit management, and Velocity and Aftertouch curves.

N364 Specifications

Keyboard	61-key, unweighted*
Synthesis Type	AI² sample playback, subtractive
Polyphonic Voices	64 (Single mode)
Multitimbral Parts	16
Programs (RAM/ROM)	200/336
Combinations (RAM/ROM)	200/200
PCM Waveform Memory	8 MB
Stereo Effects Processors	2
Effects Types	47
Sequencer	16 Tracks/10 Songs/100 Patterns
Total Sequencer Events	32,000
Audio Outputs	4 ¼-inch
Floppy Disk Drive	3.5", 1.44 MB, MS-DOS format
Dimensions	50.75" (W) x 13.3" (D) x 4.2" (H)
Weight	28 lbs.

* N264 model has a 76-key, unweighted keyboard.

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1998

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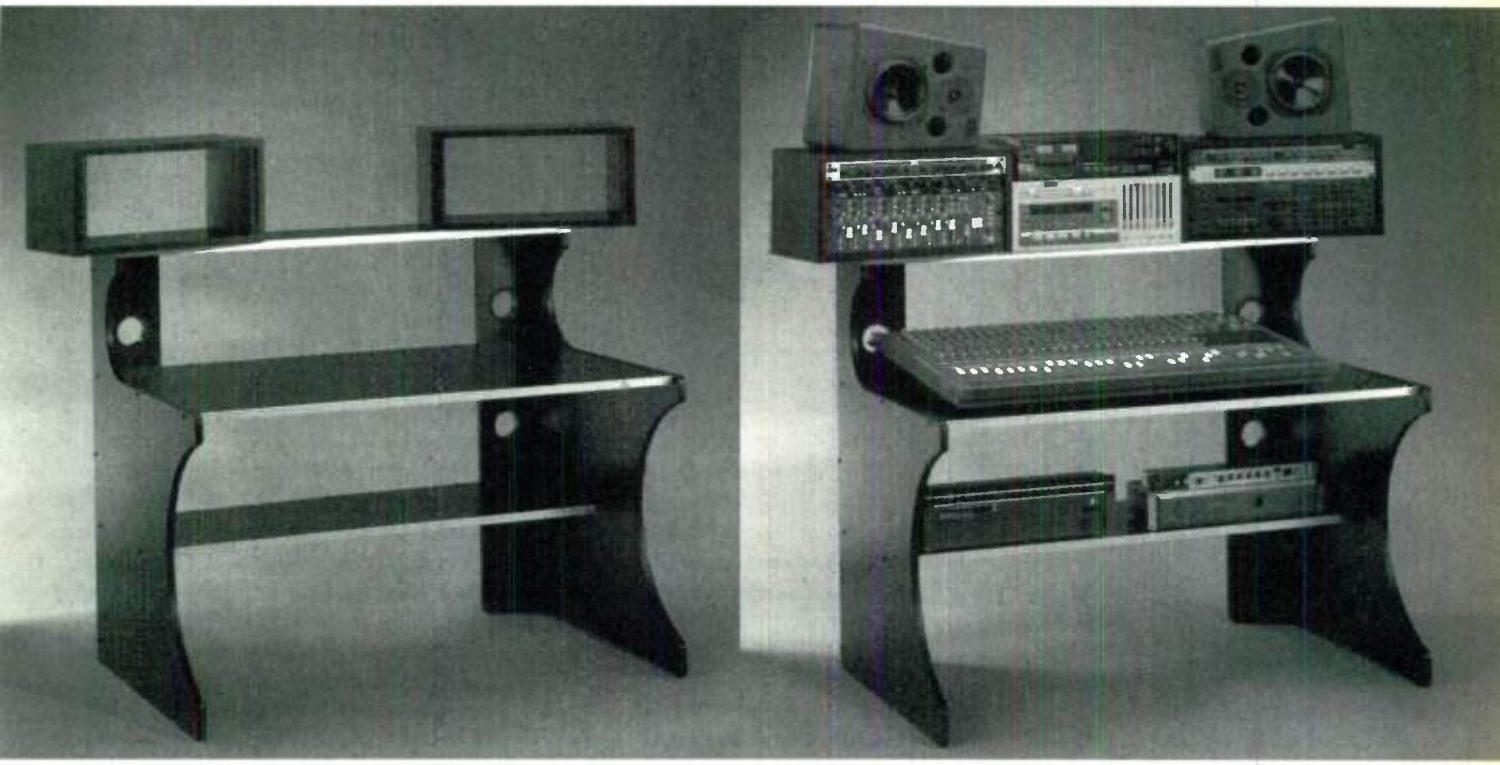

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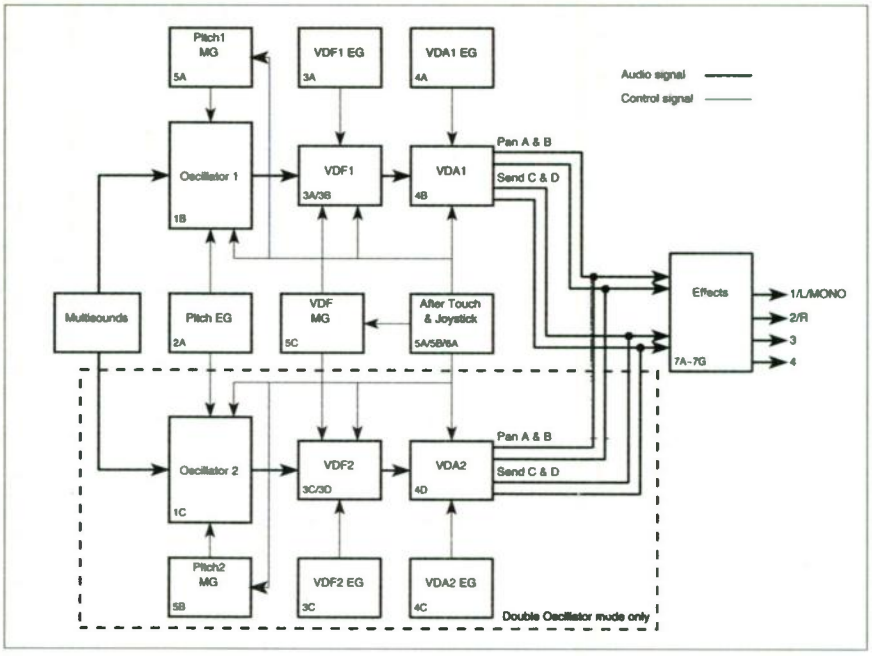

FIG. 1: Korg's AI² synthesis architecture is based on a Program that contains up to two Multisounds (multisampled waveforms), each using one oscillator. A Single sound uses one Multisound and has 64-voice polyphony; a Double has two Multisounds and 32-voice polyphony. (Courtesy Korg USA)

THE INSIDE STORY

A closer look inside the N364's voice architecture reveals that each oscillator has its own level, pan, fine tuning, octave transposition, and effects-bus setting. The pitch envelope generator (with rate and level control) is shared between the two oscillators in a Double Program, but individual rate and level amounts can be set for each oscillator, and the second sound's start time can be delayed.

Each Multisound has its own fully independent lowpass filter, which Korg calls a Variable Digital Filter, or VDF (see **Fig. 1**). A multistage envelope generator (again with rate and level control) determines how the cutoff frequency changes over time and provides Velocity and keyboard-tracking control over the filter cutoff. A separate but similar EG can be applied to the Variable Digital Amplifier (VDA).

A separate multiwaveform LFO (which can generate triangle, forward sawtooth, reverse sawtooth, square, or random waveforms) can be applied to pitch modulation for each oscillator. You can preset an intensity amount, and modulation can be varied using a host of sources, including the joystick, Aftertouch, and keyboard tracking. The modulation start time can be delayed, and modulation can be faded in. A similar LFO is available for each filter.

Flipping through the new Programs, you could be fooled into thinking that here is a resonant filter–sporting, wave-sequencing, ultracontrollable synthesizer of the old school. Not exactly. Clever people, these Korg folks; almost all of the sweeping and rhythmic textures are actually fossilized within a particular multisample. Classic analog-and-beyond synthesizer tricks have been skillfully simulated with careful selection, application, combination, and modulation of sounds, but you are ultimately rendered observer more than controller.

Although you can modify the overall tone of a Program such as "Ultra Rez," if you want to boost its resonant burble, sorry, chum, you're stuck with the amount of resonance present within the "Rez Bass 2" Multisound that "Ultra Rez" uses. The best you can do is finagle the effect you want by using the effects processor. For instance, you could try to flavor "Ultra Rez" by using the resonance parameter within the overdrive or distortion algorithms.

Back in the days of the 01/W, Korg offered the Waveshaping parameter as a passable, though unpredictable, alternative to resonant filters. Although this parameter is not present in the N364, the new synth offers the curious, frequency-boosting Color parameter found in the X3.

This hierarchy will be as comfortable as an old pair of slippers to most users, Korg and otherwise, which makes the freshness and vitality of the new Bank A Programs remarkable.

GET WITH THE PROGRAMS

There are five banks of Programs. Two of these banks are identical to the Korg X3's Banks A and B, one is taken from the X5DR's preload Bank A, and one is a General MIDI set common to all Korg X- and i-series instruments.

The remaining bank, the N364's Bank A, is brand-new. Its 100 Programs and 100 Combinations have been programmed by Korg USA Product Voicing Manager Jack Hotop, and they are extremely good. With Hotop's plethora of squeaky, squelchy, rezzy patches, the N364 is going to make a big play for the techno enthusiast. Programs such as "DanceMix," "CyberTrash," "Lo-End-Rez," "Mod:Matrix," and Wavestation sound-alike "HyperWave" will ping, pong, zip, slither, and squeak their way into your techno files in no time.

"Ultra Rez" has just the right amount of rubber-band twang to double as a *Dr. Who* theme bass sound if you nudge back the filter envelope amount and add a touch of release Velocity. The more trashy twang of "Arpeggiate" lends itself to relentless feats of arpeggiation, a trick you can now control directly from the N364's front panel. I particularly like the new Clavinet patches, not only the swirling "MutronClav" (great sound, but where's the hiss?) but also the thinner "WireClav" and the highly playable "StereoClav."

Also impressive are the multifaceted patches that employ rhythmically looped Multisounds. "MusicaLoop," a

Product Summary

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N364 keyboard workstation
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sort of phantasmagoric amalgam of world percussion, is based around a 6-segment multisample of gongs, ethnic percussion, harp glisses, and flute trills that combine to form an instant new age album.

Bank A is not a complete technophobe's wipeout, however. There's a new acoustic piano ("N264 Piano") that has excellent Velocity response and is only let down by the inherent clunkiness of the Korg piano Multisound in the mid to high registers.

"N-Strings," a useful new strings patch, is happily neither saccharine sweet nor dependent upon the flattery of effects. With its medium attack and good Velocity programming, "N-Strings" is the sort of all-purpose real strings patch a lot of us have been looking for. And there are a fair number of workhorse guitars—the electric 12-strings are particularly effective—as well as basses and mono lead synths. There are no real duds, but I found Korg's brash and honky brass Multisounds a bit tiring on the ear.

COMBINED EFFORTS

Although Combinations are essentially collections of Programs and can be used for multitimbral sequencing, they can also be an excellent source of new sounds. Because they use more than one Program at a time, Combis offer less polyphony than single Programs. They have their own set of effects parameters, which override the effects built into a particular Program.

The new Bank A Combis draw heavily, though by no means exclusively, on the new Bank A Programs. "Rave Vox," for instance, enhances the new "DanceReMix" Program by combining it with an older Program from Bank D, implementing inventive keyboard mapping, and making more dramatic use of the phaser. "OB-Analog" beefs up and enhances the new "Alaska" soft synth Program by throwing in "FatFilterZ" and "Xanalog" from the B Bank. The "XY Joystick" Combination highlights the fun you can have by assigning only certain sounds within a Combination to joystick control. (In this instance the joystick only affects the 'background' sounds.)

The great thing about Korg Combinations is that although they comprise combinations of Programs, each of which can be assigned its own MIDI channel, you are still allowed to assign the same MIDI channel to all used Programs, thereby simplifying the creation of giant, multifaceted patches for which Korg has become famous. As Jack Hotop shows in this new clutch of Combis, judicious use of mapping and effects assignment also greatly add to the fun.

FAMILIAR EFFECTS

The N364's two 47-algorithm, stereo multi-effects processors are fundamentally the same as those used on the Korg 01/W and X-series synths. Using Korg's clever (if potentially confusing) system of input paths, pan pots, and output routings, it is possible to elicit four separate, simultaneous effects.

The effects include reverb, delay, flanger, exciter, distortion, overdrive, phaser, rotary speaker (with controllable fast/slow rotation), parametric EQ, and chorus settings from gentle to full grunge. Effects can be modulated in real time from a long list of control sources, and effects changes can be recorded into a sequence.

Overreliance on effects (such as stereo panning, phaser, rotary speaker, auto-pan, and exciter) can be like an addiction. I really appreciate the fact that many of the most effective presets do not rely on effects. Remove chorus and reverb from, say, the "N-Strings" Program, and if anything the sound is more lifelike and no less yummy.

ARPEGGIATORS R US

Ear candy comes in lots of flavors, and the "sweet *du jour*" in synth land is our old friend, the arpeggiator. The N364's arpeggiator has dedicated button controls over direction, style, speed, gate, and Velocity, and is activated simply by hitting the Arpeggio key, a feat you can perform in Program, Combination, or Sequence mode. Unsurprisingly, the arpeggiator can run off its own internal clock, but unfortunately, you cannot sync the arpeggiator to MIDI Clock.

If you set the arpeggiator to latch (arpeggiate incessantly once you've hit some keys), you can still spin through the presets, which makes this a handy audition tool. You can even do some simple tweaking using the instant edit parameters, though in this instance you access them via the cursor buttons rather than the Function buttons because the Function buttons are now being used by the arpeggiator.

Arpeggiator controls of Velocity and gating can make fairly drastic changes to the sound in themselves. With Velocity set high, the arpeggiator can be wonderfully expressive: prod gently at a chord, the sound will be moody and muted; give it a sharp stab, and the sound will jump out. I can see great potential here for techno music or for a keyboard player's solo number within a set.

Arpeggiation data is kicked out over MIDI, which means you can arpeggiate any instrument in your rig directly from the N364 keyboard or via a sequence into which an arpeggiated part from the N364 has been recorded. Being somewhat of an arpeggiator fan, I also discovered that you can record on-the-fly arpeggiator changes to the gate, Velocity, octave, and so on into your sequencer. The N364 doesn't let you record real-time Program parameter changes via MIDI (a real shame), but recording the arpeggiator is definitely some compensation.

There are many tricks and treats in this department. For instance, try using the arpeggiator as a quasi drum machine by applying it to a drum Program, controlling gate time in real time with a sustain pedal, arpeggiating chords by building up one-note chords in a Combination, and creating multitimbral/multipattern arpeggiations by recording "tracks" of arpeggiation into the sequencer. You can even trigger multiple arpeggio patterns with the N364's Realtime Pattern Play and Record feature. Having recorded these patterns, you can use the RPPR part of the sequencer to sync them via MIDI Clock.

GET REAL

That brings us to the Realtime Pattern Play and Record feature, aka RPPR. (What is it with Korg's naming department? RPPR? N364? Sheesh!) RPPR allows you to trigger parts and patterns directly from the keyboard, which is fun and impressive. This is not a new concept; Roland offered its key-initiated Phrase Track feature on the MV-30 and JS-30 and more recently on the XP-50. But the RPPR is not a mere lift from Roland. In fact, once you are up and running, the Korg system is generally more flexible.

You can record RPPR phrases into the N364's sequencer, and you can extract phrases from the sequencer. Phrases can be set to play once, as in a

single hit, or they can loop for as long as you hold down a key, or they can play endlessly until you terminate playback. You can also effect transpositions that won't screw up the tempo (remember, this is MIDI, not a sample), and you can decide which keys will trigger specific phrases. That done, you can hold down a key that triggers a nice, kickin' drum groove, add in a funky little bass line by holding down another key, and perhaps fire off a slick keyboard part on a third key.

You can also extract snippets from third-party Standard MIDI Files and set these to trigger from designated keys. I found it surprisingly difficult to make this valuable tool work properly, though I achieved success in the end.

As an ear-catching demo tool, the RPPR system is impressive, and it can be great fun. It also features some nicely performed parts. However—and this is a very important point—the way Korg has presented RPPR makes it far too complex. The rigmarole that you have to go through in order to access this "instant" music rather misses the point, in my opinion. Loading the factory RPPR phrases from disk requires around ten button pushes and assignments, and there are no dedicated panel controls for the feature. All of which smacks of RPPR as an afterthought rather than a feature that was built in from the start. Too bad.

FAMILIAR SEQUENCER

The N364's sequencer is a full-fledged 16-track affair, complete with Korg's own special Pattern Record feature (from whence the RPPR's came, incidentally) and SMF compatibility. Sequences can be stored or loaded to the N364's high-density floppy-disk drive.

You can solo and mute tracks, record in real time or step time, loop record, set track level and pan, and punch in manually or use auto-punch. Quantization can be applied during recording or afterward to recorded tracks. Tracks can be overdubbed, merged, copied, and erased, and an entire song can be appended to the end of another song. Tempos range from 40 to 240, and the sequencer can sync to external MIDI Clock.

The base timing resolution can be set at 48 or 96 ppqn, but choosing the higher resolution gives you fewer available time signatures. At 48 ppqn, available time signatures range from ¼ to ¾ and ⅛ to 16/8, but at 96 ppqn, you can't get higher than ¾ or 16/8. At either resolution, you can use time signatures from 1/16 to 16/16.

The input filter can block out note, Control Change, Poly or Channel Aftertouch, Pitch Bend, and Program Change messages. You can edit individual events, and a Compare function lets you check your latest edit against the previous version. The sequencer supports a limited set of 24 Control Change messages, but these include the messages you are most likely to need. All of this conforms precisely to the sequencers on Korg X-series instruments; in fact, all the sound and sequence data is compatible between the X2/X3 and N-series instruments.

FINAL THOUGHTS

There is no question that the N364 is a fine and worthwhile workstation. A great deal of it is not new, but the importance of this depends on whether you already own a Korg X3 (in which case the N364 is hard to recommend) and how keen you are to investigate new methods of producing and controlling sounds. If you're an X5D owner, you won't find new Programs here, but the N364 gives you a lot of other cool new features.

On the other hand, the new sounds are very well done. Of the new gadgets, the arpeggiator is great, the four outputs are a welcome improvement, and the RPPR is fun, though severely hampered by the procedural contortions required to use it. And you will need to exercise some patience with the unit's user interface.

Korg will not be able to continue with AI²-based synths forever. But I don't think the N364's persistence with AI² synthesis is a problem, especially in light of the remarkable new Programs and the potential for still more offered by the carefully chosen pool of waveform ROM. If you are a fan of the fat PCM sound for which Korg is justly renowned, it might be sensible to avail yourself of this remarkable synthesis system before its technology fades into history.

Sadly, **Julian Colbeck** *will find little use for arpeggiators as keyboardist with Steve Hackett and friends on the Genesis Revisited tour in Japan, his winter break from the rigors of writing and cracking the whip at Keyfax Software U.S.*

Sonic Arts Sounds of the '70s

By Gerry Bassermann

Sample the classic sounds of yesteryear.

Sonic Arts' *Sounds of the '70s* is no mere niche offering for cover-band keyboardists. This dual CD-ROM set for E-mu Emulator III and Kurzweil K2000 features great sounds for the studio as well as the stage. (A single-disc, condensed version for the Ensoniq ASR-10 is also available for $199.) True, it delivers samples from an array of acoustic pianos along with such vintage keyboards as the Fender Rhodes, Hammond B-3, Hohner Clavinet, Wurlitzer electric piano, Vox Continental, and Farfisa organ. But it also boasts excellent drum and bass sounds and an exquisite nylon-string guitar.

The discs are divided by instrument type, and they're available separately or as a set. Disc 1 covers acoustic pianos, Clavinets, electric pianos, and organs, and Disc 2 gives you basses, guitars, drums, drum loops, and percussion.

You'll want lots of sample RAM; Sonic Arts tells you that on the first page of the manual. With the EIIIx or K2000, 16 MB is enough to load even the largest instrument or to combine smaller versions of the sounds into a multitimbral bank. (You can get away with, say, 4 MB, but you really should have more.) With the K2000, it's also good to have enough program RAM to take advantage of the all the cool macro loads Sonic Arts has prepared.

In fact, sample size is one of the core secrets to the consistent excellence of these sounds. The samples are larger than those in most such collections, so the natural decay of each instrument is preserved before the loop begins. And each instrument was sampled at two or three dynamic levels and then programmed for Velocity switching, so there are seemingly endless tonal variations. The EIIIx doesn't support more than two Velocity-switching layers, so instruments that were sampled at three levels are often represented by three separate, 2-level presets: soft to medium, soft to hard, and medium to hard. (A native EIV version is being developed that will support more layers.)

The manual recommends that you use a control-voltage pedal for continuous parameter control over wah-wah, tremolo speed, phase depth, etc. This is the first clue that these sounds are going to be intricately voiced. Typical program variations include alternate envelope shapes, alternate Velocity curves, EQ balance, shifts in phase and stereo image, and a host of real-time controls set up for pitch and mod wheels, data slider, two footswitches, and a footpedal. In addition, the K2000 version offers in-depth effects programming. Ultimately, you'll find that your sampler feels more like a synthesizer because the sounds can be so fluently and musically modulated by touch as well as continuous controllers.

Mono instruments such as electric bass, Clav, Wurlitzer, Farfisa, and Vox are represented by stereo samples. The left side was recorded through an appropriate vintage amp, and the right side was recorded directly from the board or through a quality preamp, such as a Neve or Massenberg.

Sonic Arts' 2-volume *Sounds of the '70s* CD-ROM set is a tour de force of sound design, offering convincing samples of classic keyboards, guitars, basses, and percussion instruments.

ORGANIZATION

For the E-mu platform, Sonic Arts organizes the sounds into large banks, which are subdivided into groups of programs that have been logically organized according to memory size, note range, Velocity layer, filtering, and so on. The piano banks, for example, with over 200 presets, have groupings (e.g., Darker, Short Release, and Octave Stacks) every five or ten presets to help you find what you're looking for.

The K2000 discs are organized according to Kurzweil's hierarchical directory system. For example, the rock Clavinet was sampled direct and through a Fender amplifier; the path to the memory-conserving version of the amplified rock Clavinet is: Eleckeys/Rockclav/Amp/Rclva_sm. Within that bank alone are 100 program variations, so it's fortunate that Sonic Arts provides a detailed manual.

On both platforms, suffixes indicate presets of various size, offering the user many options: NC (no compromise), ST (stereo samples), M (mono samples), SM (small), and so on. Both platforms allow you to load layers and range-specific versions.

Those who aren't sure which variation of a particular instrument they need can load a Chooser bank that includes several versions of the instrument. This allows you to easily hear the differences between, say, the B-3 with all stops out, the B-3 with medium distortion, and the "Smokey B-3" with its touch of percussion and lounge attitude.

When I set out to produce some backing tracks for a new song, I used the Chooser banks to decide on the sounds. To create the basic parts within my sampler's limited memory, I combined compact versions of my selections to build a "virtual band" bank. I worked out the sequence, tweaking all the parts so the feel and phrasing was right, and synched my tape deck to the sequencer. Having established the parts with the smaller samples, I recorded my final tracks, one at a time, using the large versions of each sound. (For this piece, I used the full-on "Funk Kit/1"; the big "Fender Jazz Bass"; a distorted, stereo B-3; and a complete battery of Latin percussion.)

Because the programming is so consistent between similar programs with various memory allotments, I didn't have to retweak any part of the sequence. With the big samples on each track, the digital multitrack sounded like a fat, 2-inch machine running at 30 ips.

Splitting out the drums to separate tracks was also trivial because some presets are preprogrammed for separate outputs on the EIIIx. Sound designers Dan Hess and John Vitale clearly anticipated how their work would be used in the studio.

KEYBOARDS

The piano banks alone are worth the price of admission. Miked from the player's perspective, both the Steinway 8-foot grand and Baldwin 10-foot grand closely simulate the real thing when played from a weighted, 88-key keyboard controller. The Steinway is my choice for a smooth, centered, "round" tone, and the Baldwin features bright hammers and a wider spread.

The funk and rock Clavinets play beautifully because they are programmed to control the pickup selectors and emphasis filters of the original instruments. The "Funk" tone emulates Stevie Wonder's Clavinet in "Superstition," whereas the "Rock Clav" aims at Led Zeppelin's "Trampled Underfoot."

The Rhodes and Wurlitzer electric pianos are extremely authentic. For instance, you can hear the tone-producing tines break up in the low end as you play harder. And because the original instruments featured panning and tremolo effects, you'll find those programs here with even more creative variations.

The amazing thing about the organs on these discs is the amount of natural "badness" left in the samples. The real Hammond B-3 is a noisy contraption that is traditionally played through a Leslie speaker that shakes and rumbles a lot. Sonic Arts left it that way, and the effect is completely realistic, including the crossfading Leslie speeds.

But the organs don't stop there. The Farfisa and Vox Continental are alive and well on these discs, bringing back the sounds of groups like the Monkees and the Doors. Farfisa 1 will have you playing "Light My Fire" in no time.

BASSES AND GUITARS

Three electric bass guitars are completely represented: the Fender Jazz,

Fender Precision with flatwound strings, and a custom-built 5-string bass with an additional low B string. Sonic Arts calls these the "Big Bad Basses," and indeed, all have big attacks and incredible sustaining strength. Along with the full tones and ever-popular, slap-style playing, these basses have a small array of idiomatic sounds: dead notes, string noise, and belly dives are placed along the first octave, so it's easy to pepper your playing with sonic virtual reality.

At one point I needed some muted, funky rhythm guitar and discovered to my surprise that it was not included. The triple-layer nylon guitar is a gem, featuring Velocity-switched dynamics, recorded in stereo, with extra idiomatic string slides and gorgeous harmonics. It's extremely satisfying for classical guitar simulations, but it doesn't seem to fit in the thematic spirit of the rest of *Sounds of the '70s*. In the end, I used a wah-wah version of the amplified Funky Clav instead of the rhythm guitar I had sought, and now I wouldn't have it any other way. Eventually, I overdubbed a real guitar on top, and the blend was perfect.

DRUMS AND PERCUSSION

After a few playbacks, I became aware of how natural the drum and bass parts sounded—not at all like MIDI tracks. The four drum templates offer keymaps that make it easy to play convincing drum parts from the keyboard. Some maps place each drum's multiple dynamic levels on adjacent notes so keyboardists can play flams and ghost notes just by rolling the hand. Each drum bank also contains General MIDI mappings. The keymap for "Latin

Product Summary

PRODUCT:
Sounds of the '70s
sample library
PRICE:
$250
MANUFACTURER:
Sonic Arts
tel. (313) 513-2222
fax (313) 513-7443
e-mail sonicarts@aol.com
CIRCLE #438 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
QUALITY OF SOUNDS	● ● ● ● ●
DOCUMENTATION	● ● ● ● ●
VALUE	● ● ● ● ●

Percussion" places shakers in a layout that makes it almost impossible to sound inauthentic. (Check out the egg shakers!)

There's even more on these discs. Banks of funk and rock drum loops map sampled kit grooves to the white keys of the keyboard; fills are mapped to the black keys. These beats can be tuned, and their tempos can be altered with the mod wheel or data slider. The best way I found to sequence with this system was to get the loops in the tempo ballpark with the mod wheel while keeping the sequencer in Record mode. Then I erased all but the last version from the sequencer track. I needed to fine-tune it in the sequencer by tweaking the Modulation value up or down because it's rarely possible to get sufficient precision by moving the wheel.

▼

The piano banks alone are worth the price of admission.

There's no mention of the samples' original tempi. The first one I investigated turned out to be comfortable at 102.41 bpm, and I was unable to successfully juggle Modulation values to attain a reliable 102 bpm. This could cause real trouble if your sequencer doesn't support hundredths of a beat. Overall, I think the grooves are groovy, but I recommend retriggering them constantly from your sequencer to maintain a solid downbeat. (In fact, some versions of the sounds, labeled "Trig," have been programmed specifically for this application.)

The "Drum Loops," "Congas/Bongos," "Latin Percussion," and "Cowbells" banks are a preview of a forthcoming Sonic Arts *Drums and Percussion* CD-ROM. The percussion instruments feature the same kind of elegant Velocity switching and detailed layouts as found in the other banks. All the sounds are clear and deep, and the "Cowbells" bank is amazingly complete. There's even more potential to be mined from drastic transpositions of the bells. I would like to have heard each sample stretched out across a keymap with the full Sonic Arts treatment of filters, envelopes, and real-time modulation. With these bells, the gamelan-esque possibilities are endless.

DOCUMENTATION

The documentation is an encyclopedic volume that directs you through a vast archive of banks and programs. Familiar names spill out of the text, including the Temptations, Stevie Wonder, Ray Charles, Billy Preston, Led Zeppelin, the Doors, and the Beatles. The first few pages provide background information, including some history of the instruments and notes about artists whose sounds inspired the programs. The introduction contains applications, suggestions, and technical tips for conserving memory and customizing programs.

Each section presents an overview of recording methods, instrument playing styles, and how they've been simulated on your sampler, as well as program information and playing tips. One glance at the layout tables, and you know exactly what's happening under your fingers. I've never seen such thorough and absolutely useful documentation.

CONCLUSIONS

Sounds of the '70s succeeds because of an obsessive love and patient expertise lavished on every aspect of this product. The designers spent a lot of time with both the E-mu and Kurzweil voicing architectures to optimize these elegant samples for both platforms. When you play these samples, you'll experience the kind of detailed and musical programming that makes it easy to sound great. On every level, these CD-ROMs have sounds everyone will want to own and use, on stage and in the studio.

Sonic Arts offers these discs for sale separately ($150/disc), but I highly recommend purchasing the set ($250). If you ever play classic keyboard sounds, you'll love Disc 1, and if you sequence drums and bass, you'll absolutely want Disc 2. These are great sounds that have been beautifully sampled, carefully programmed, and superbly documented to make it easy to find what you want. And after all, when was the last time someone went far out of the way to make your life easier?

Gerry Bassermann *is a composer and sound designer who owns and operates Opus Nine, a project studio in San Francisco.*

Symetrix 551E EQ

By Rob Shrock

Take control with this 5-band parametric EQ.

Each year, the recording market is deluged by multitasking wonders and all-in-one, studio-in-a-box packages. So it's nice to occasionally come across a piece of hardware that does just one thing and does it extremely well. The 551E parametric EQ from Symetrix is just such a unit. It delivers extensive, versatile, high-quality equalization—and nothing more.

The 551E is a single-channel equalizer with five identical parametric bands. Each band has a variable bandwidth and is sweepable throughout the audible frequency range. The unit also features variable low-cut and high-cut filters. That's a lot of tone-shaping control for a monaural equalizer.

FACTS OF THE MATTER

The front panel of the blue, 1U rackmount box is logically laid out in seven sections: one for the input-level control, clip indicator, and bypass switch; one for the cut filters; and one each for the five parametric bands. The unit's rear panel provides gold-plated XLR and ¼-inch input and output jacks. Both input jacks will accommodate either balanced or unbalanced signals, and both output jacks can drive either balanced or unbalanced inputs.

All the knobs and switches on the 551E feel sturdy and have a smooth operational throw except for the active/bypass button, which seems flimsy in comparison. I suspect this switch would be the first thing to malfunction with prolonged use. I mention this because not all Symetrix button switches are this fragile. Comparable switches on my Symetrix SX202 mic preamp, for example, feel much more solid. But aside from the bypass switch, the unit is solidly built.

The 551E has an internal power supply with a detachable cord and comes with a one-year limited warranty. The detailed User's Guide covers not only controls, various applications, and troubleshooting but also offers "helpful" hints such as "If you plan on plugging a mic directly into the 551E's XLR input...don't bother. It will not hurt anything, but it just will not work."

CONTROL FREAK

The 551E's low-cut and high-cut shelving filters are musically very effective. Although the attenuation is fixed at 12 dB per octave, the available frequency ranges are broad and accommodating. The low-cut filter is (predictably) especially useful for getting rid of unwanted low-end noise. The frequency control, sweepable from 6 Hz to 260 Hz, allows you to easily tailor the rolloff to a frequency appropriate for the material. And the high-cut filter, which extends from 3 kHz all the way up to 65 kHz, is particularly useful for filtering signals that may have extremely high upper-harmonic distortion. (Such distortion, though inaudible, can still adversely affect a mix.)

Each of the five parametric bands is sweepable from 10 Hz to 20 kHz and offers 12 dB of boost and 20 dB of cut. Although the frequency knobs have silkscreened labels around them that range only from 100 Hz to 2 kHz, they are accompanied by toggle switches that multiply or divide the settings by a value of ten (see **Fig. 1**). For example, the 850 Hz setting (×1) can be toggled to 8.5 kHz or 85 Hz, depending on whether the switch is set to ×10 or ×0.1, respectively. This smart design essentially divides each band into three overlapping sections of the available frequency range, allowing the knob finer control of each section. Once you get used to the toggles, operation of the 551E is simple.

In addition, each band also has a Q control that offers variable bandwidth from 0.05 (one twentieth) octave to 2 octaves (see **Fig. 1**). The extremely narrow settings are great for "notching out" troublesome frequencies (or boosting specific ones), and the broader settings are generally preferable for tonal sweetening. I would prefer a 3-octave maximum bandwidth to allow for even smoother, "vintage-style" tonal adjustments. However, the 551E's 2-octave maximum is sufficient for most purposes. And what little you lose in individual bandwidth control is definitely made up for by the number of bands on the unit.

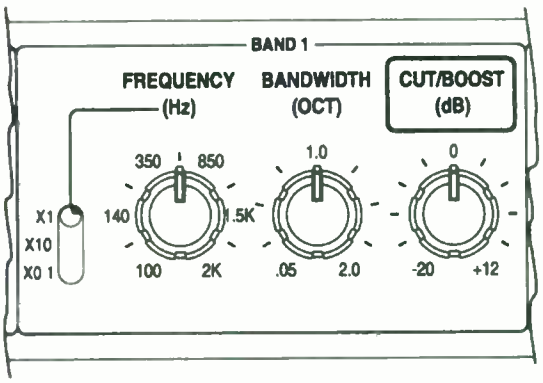


FIG. 1: Each parametric band of the 551E can be swept from 10 Hz to 20 kHz with bandwidth variable from 0.05 to 2 octaves. The toggle switch changes the range of the frequency-control knob. (Courtesy Symetrix, Inc.)

The unit's extensive control makes it possible to painstakingly sculpt the frequency content of any mono source material. Of course, with all that power, you have to be careful not to overequalize signals. For example, several times I dialed in a perfectly suitable sound using both cut filters and, say, three bands of EQ. Realizing I still had a couple of bands at my disposal, I then proceeded to make something good into something worse. The moral of the story is, sometimes more is just too much. But it sure is nice to have that many bands when you need them!

UNBOUND SOUND

Sonically, the 551E is open and transparent. And it's versatile, too: no matter what signals you throw at it, the unit performs consistently well. This is not the case with all equalizers. Typically, EQs—especially vintage tube

The Symetrix 551E parametric EQ is a versatile mono unit that offers five identical parametric bands plus variable low- and high-cut filters. Operation is quiet, and the sound is open and transparent.

units—need to be matched (subjectively) with complementary source signals. During the two months I worked with the 551E, I processed kick and snare drums, timpani, bass guitars, vocals, and numerous guitars. The unit did an equally fine job on all the instruments.

The only drag was that I didn't have *two* 551Es. I was therefore unable to test how the units would perform in a home-mastering environment, equalizing final mixes. However, the 551E's quiet, clean operation leads me to believe that a pair of them would be good candidates for analog EQ in a stereo application. In fact, the 551E's sound is so transparent that I sometimes felt as if I were working with a digital EQ or digital audio plug-in. Of course, that also means that the 551E is probably *not* the best unit for creating highly "colored" sounds. Instead, it is better suited for detailed, corrective equalization and mild tonal shaping.

A good example of this application is how I used the 551E to improve several samples from my extensive collection of drum sounds (both commercial samples and custom hits I recorded). Some of my favorite samples always needed the same treatment before recording them to tape.

My custom hi-hats, for example, had to be filtered below 80 Hz to get rid of rumble and proximity artifacts from the original recordings. Several of my favorite kick drums usually needed a little bump between 60 and 70 Hz. And a particular ride cymbal I like typically required a very small, but broad, boost at 3.5 kHz. Finally, one of my favorite snare drums had an annoying ring that would hang at around 1.75 kHz. Having lived too long with these imperfections, I decided to give the 551E a shot at fixing the samples once and for all.

To do so, I carefully equalized each drum hit as I resampled it from the original source material. Every one, with the exception of a particular kick-drum sample, benefited from being equalized with the 551E. For example, the troublesome low-frequency gunk in my custom hi-hat sample was easily removed by the low-cut filter. In addition, a small cut somewhere around 5 kHz smoothed them out even further. (The settings on the 551E's front panel aren't extremely detailed, so you must work mainly by ear.)

Three of my kick-drum samples were easily transformed into more powerful and articulate hits with low-end boosts around 70 Hz, low-mid cuts around 600 Hz, and various boosts in the mids and highs. However, one TR-808 kick sample for the Kurzweil K2000 didn't benefit from being EQ'd with the 551E; it broke up sonically and started to thud in a nasty way. As I said earlier, sometimes more is just too much.

What pleased me most was getting rid of the obnoxious ring in the snare sample. As expected, the narrowest bandwidth proved too narrow, so I ended up dialing the bandwidth to about halfway between 0.05 and one octave. Presto, no more ring.

When sampling some new drum sounds for the first time, I was hesitant about equalizing them wildly. As a precautionary measure, I first sampled them flat before experimenting with EQ tweaks. But my worries proved mostly unwarranted. For example, several crash cymbals benefited considerably from presampling EQ when I opened up the top end around 15 kHz, which restored some of the "space" and upper harmonics that are so often lost in cymbal samples.

Product Summary

PRODUCT:
Model 551E parametric EQ
PRICE:
$449
MANUFACTURER:
Symetrix
tel. (206) 787-3222
fax (206) 787-3211
e-mail 102102.1126@compuserve.com
Web www.symetrixaudio.com
CIRCLE #439 ON READER SERVICE CARD

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

COOL DOWN

I like the Symetrix 551E a lot. It is versatile, providing five full-range, fully parametric bands of EQ in addition to variable low- and high-cut filters. This is much more EQ than is typically found on consoles and more than you get on many outboard EQs. However, the 551E *is* a mono unit, so you'll need two of them for stereo applications. And unfortunately, they are not stereo linkable, which means you'll have to match the stereo settings manually.

But for what it is, the 551E offers a lot of control as well as superb sonic quality. It is extremely quiet and transparent, making it well suited for corrective EQ and tonal shaping (as opposed to creating signature sounds). And except for a somewhat flimsy bypass switch, the unit is durably built. Designed to be a quality, stand-alone, monaural equalizer, the 551E performs its duties musically and with the greatest of ease.

Symetrix 551E Specifications

Frequency Range	10 Hz–20 kHz (each band identical)
Cut/Boost Range	-20 dB/+12 dB
Bandwidth	0.05–2 octaves
Low-Cut Filter	6 Hz–260 Hz (12 dB/octave attenuation)
High-Cut Filter	3 kHz–65 kHz (12 dB/octave attenuation)
Maximum Input Level	+21 dBu balanced
Maximum Output Level	+21 dBu balanced, +17 dBu unbalanced
Frequency Response	20 Hz–62 kHz (-0.5 dB, -3 dB)
Dynamic Range	>114 dB
THD + Noise (1 kHz @ +4 dBu)	<0.002% (EQ in, all bands flat)
Signal-to-Noise Ratio	>96 dB (unweighted, referenced to +4 dBu; EQ in, all bands flat)
Dimensions	1 rackspace (8 inches deep)
Weight	8 lbs.

Composer-producer **Rob Shrock** *is the keyboardist-arranger for Dionne Warwick and Burt Bacharach. He can be reached through Avatar Productions at avatarprod@aol.com.*

Sion QuickScore Elite Level II (Win)

By Allan Metts

Solid sequencing and scoring on a shoestring.

Each sequencer has its own personality. Some offer every feature under the sun with a high price tag and a steep learning curve. Others have comprehensive MIDI capabilities but are weak when it comes to non-MIDI features, such as notation and digital audio. Still others let you create great-looking musical scores, but you pay the price with ineffective or overly complicated MIDI sequencing and editing.

Given its name and $179.95 price tag, I expected Sion Software's *QuickScore Elite Level II* to be a notation program with some MIDI sequencing thrown in for good measure (pardon the pun). But this sequencing program is surprisingly capable. *QuickScore Elite Level II* offers powerful notation capabilities, and it also boasts 48 tracks, graphical MIDI-controller editing, MIDI Time Code (MTC) synchronization, guitar tablature, automatic chord generation, and rudimentary digital audio. (Sion Software also sells a 16-track version without chord generation and guitar tablature for $79.95).

WARM-UP

The program installed without a hitch, and I quickly saw a familiar set of editing windows (see **Fig. 1**). Like many sequencing programs, *QuickScore* provides a Track Sheet to manage entire tracks, a Song Editor to arrange the measures of your music, a Piano Roll Editor and Event List, a Score Editor, a Mixer Screen, a Controller Editor, and a window for comments. Across the top of the screen are buttons for selecting note durations, transport controls, punch-in and looping controls, a status bar, a tempo control, and a panic button.

Unfortunately, you can open only one of each type of window. However, all of *QuickScore*'s windows can be locked together by track so that they all change tracks when you do. With a separate setting, you can also lock the windows by cursor, which ensures that they're all located to the same point. You can assign four markers to SMPTE times or bar:beat:step values and jump to them with two mouse clicks. You can also move to any MIDI event or musical symbol by searching for it.

Instead of starting with a completely empty file, *QuickScore* includes templates that provide a collection of tracks and settings appropriate for the music you want to write. There are eight templates available, including Classical Orchestra, Choir, Instrument and Piano, and String Quartet. I like the templates, but I want more. Fortunately, you can create your own templates by saving any file to the Templs directory, which automatically configures the file as a template.

QUICKSTART

Recording in *QuickScore* is simple: just press the Record button and start playing, and all MIDI data will be recorded into the selected track. You can punch in and out, and you can filter or quantize MIDI events during recording. You can also remap MIDI channels, but you cannot automatically remap incoming MIDI data to the channel of the current track. (This feature is found in other sequencers, and it really cuts down on channel changing when working with several tracks.)

In theory, the MIDI and notation resolution is variable from 1 to over 9,000 ppqn; the default is 96. Just for fun, I tried to set the resolution as high as I could, and I found that the system works with values up to 8,000, after which the performance degrades. A value of 9,000 or higher crashes the system. Despite these absurd settings, resolutions up to 960 ppqn are easily achieved. According to Sion, this field will be limited to a range of 24 to 960 ppqn in future versions.

You can also tap the beat as you play using any MIDI note or controller. However, this feature doesn't work as I thought it would. I expected and hoped it would automatically insert tempo changes to align the beats with a free-form performance, as with Voyetra's *Digital Orchestrator Plus*. Instead, *QuickScore*'s Tap Beat feature is more of a step-entry tool. You mark each beat with a MIDI event (e.g., Sustain Pedal) as you enter notes, after which *QuickScore* plays the passage at the currently selected tempo. As a result, the playback could sound drastically different from the recording.

Speaking of playback, *QuickScore* provides a host of options. You can set up a loop, "chase" controllers when starting in midsong, and determine whether or not each window scrolls during playback. *QuickScore* can sync to MTC or MIDI Clock, and it can send MIDI

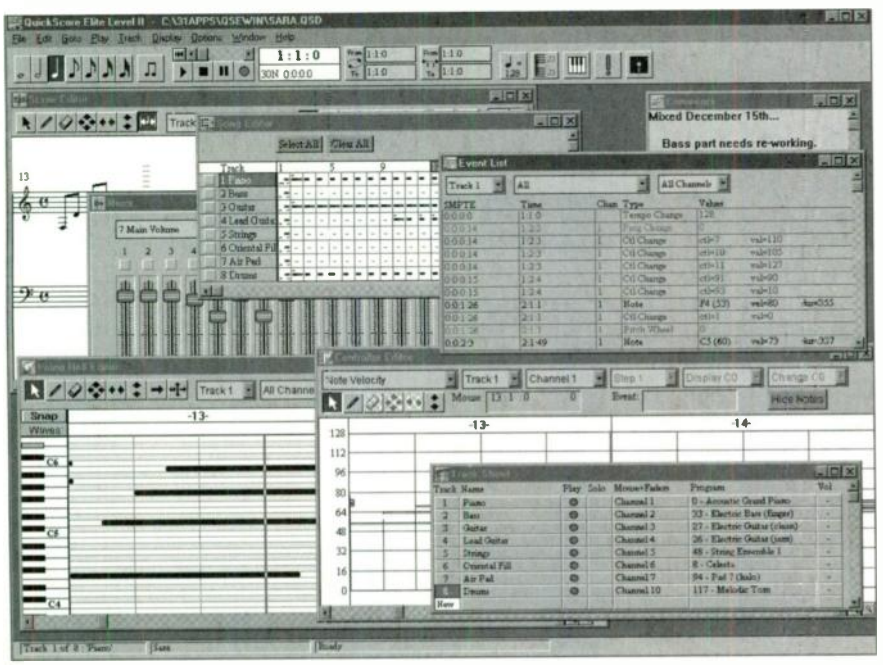


FIG. 1: Sion Software's *QuickScore Elite Level II* provides all the familiar sequencing windows, coupled with comprehensive notation and an intuitive user interface.

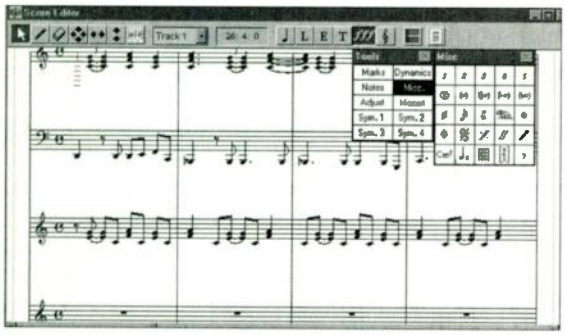


FIG. 2: The Score Editor provides powerful notation editing and easy-to-use controls. You can place and edit notes, symbols, and text.

Clock information to other programs or devices.

QuickScore's Track Sheet is simpler than most. It contains controls for each track's name, mute/solo status, channel, patch, and Volume. (There is no Record-enable control because the program records all incoming MIDI data to the currently selected track when you hit the Record button.) Unfortunately, *QuickScore* does not support multiple MIDI ports. Several sets of patch names are available (you can also create your own), and each MIDI channel can use a different patch-name list.

One feature I really like is the program's ability to ascertain whether instrumental parts in the currently selected track exceed their full or practical range. The ranges.ini file includes the lowest and highest MIDI note numbers in the practical and full ranges for 32 common instruments, and you can add your own.

With respect to selecting patches, *QuickScore* is missing a feature I use quite often: there is no support for Bank Select messages unless you enter them manually using the program's Controller Editor. Most modern sound modules hold several hundred patches, and I want to scan through the banks from the Track Sheet. Every time I try out a new sequencer, I create custom patch-name lists for every bank in my synths. Thereafter, my sequence files accurately reflect the patch I used for a particular track. Unfortunately, *QuickScore* doesn't let you do this.

The Song Editor includes the basic functions for arranging your material on a measure-by-measure basis. You see every track and measure with color codes that indicate the type of events in each measure. You can cut, copy, paste, and insert blank measures. Pasted data always merges with what's there; you can't replace or insert the data during a paste. Right-clicking a measure in the Song Editor pops up a menu that takes you to the Piano Roll, Score, Event List, or Controller Editor.

SCORE ONE

Notation editing is definitely *QuickScore*'s strongest suit. This program combines an intuitive approach to editing symbols on the staff with a slew of goodies to put just what you need into your printed music.

All notation editing takes place in the Score Editor (see **Fig. 2**). There are two important groups of controls at the top of this window. In the upper left, the Toolbar chooses what the mouse does (select, enter, erase, move), while the Object Type palette determines the type of object (notes, lyrics, expressions, text, symbols, clefs) affected by the mouse. While working in the Score Editor, you can see one track or the entire score, and you can preview just how the page will appear when printed.

Clicking on an item with the Arrow tool selects it for editing. You can also Control-click with this tool to select discontiguous objects or drag to select all items in a range of time. Unfortunately, you cannot drag a rectangle and select only the objects enclosed within it.

However, you can refine your selection by using *QuickScore*'s Note Filter, which allows you to restrict your editing operation to only those notes that fall within user-specified ranges of pitches, Velocities, channels, beats, and/or steps. You can also filter by Voices, of which there are four types: Default (stem direction determined by user-specified break point), Voice 1 (stems up), Voice 2 (stems down), or Grace (grace notes). I like the Note Filter, but I don't like the fact that *QuickScore* provides no visual feedback about what is filtered. You must take it on faith that only the filtered notes will be altered, even though you might have selected an entire range.

After you select something for editing, the Edit menu drops down and presents you with several operations that can be performed on the selected events. (The Edit menu changes depending on the selected Object Type.) For notes, the basic operations include cut, copy, transpose, and quantize.

Other note-editing operations let you change the stem height, Voice, staff type (single or grand), accidental position, and ties (on, off, or default). I particularly like the Generate Chords feature, which analyzes the music and automatically inserts appropriate chord names or guitar chord symbols. I also like the Explode feature, which splits chordal music into individual tracks.

Also present in the Toolbar are Pencil and Eraser tools, which add and remove objects of the currently selected Object Type. The directional tools include NS (north-south), EW (east-west), and NSEW. The NS tool can move an object up and down on the staff, the EW tool can move something left and right, and the NSEW tool can move an object in any direction. This is the first time I've seen such specialized moving tools, and I heartily applaud such creative thinking.

The Spacing tool moves notes left or right without affecting the music. This tool is handy for tweaking the score's appearance on those rare occasions

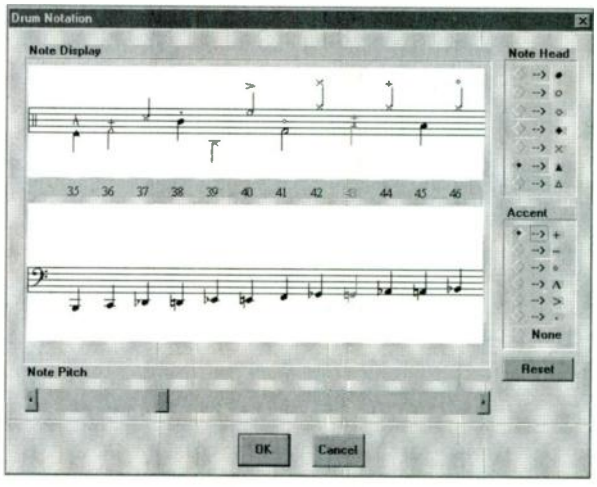


FIG. 3: *QuickScore* provides a drum clef with customizable notation. Drum parts can use a normal or single-line staff.

when the notes and symbols get a little too close together.

IT SHOOTS, IT SCORES!

Of course, *QuickScore* automatically transcribes MIDI data in the sequencer tracks. You can also insert individual notes using the Arrow tool and the Note object type. You select a note duration from the program's main control panel and a Voice. Then you simply click where you want the note, and *QuickScore* inserts it and advances the cursor by the note's duration. It's that easy. You can also use a MIDI keyboard to enter notes in step time.

QuickScore offers many different types of text, and each type uses its own fonts and positioning tools. Expression markings, such as *a tempo*, can be placed anywhere in the score, and you can type in your own or select from a drop-down list of common ones. With the Text object type, you can put multiple lines of text anywhere you want in the score.

You can enter up to four lines of lyrics per staff, using the Tab key to move to the next note. Typing Control-Hyphen before hitting the Tab key inserts a hyphen between syllables, and Control-Shift-Hyphen inserts a double hyphen. Unfortunately, the hyphens' positions don't shift when you change the positions of the notes. The lyric text attached to a note doesn't move when you move the note, either, which is a real drag.

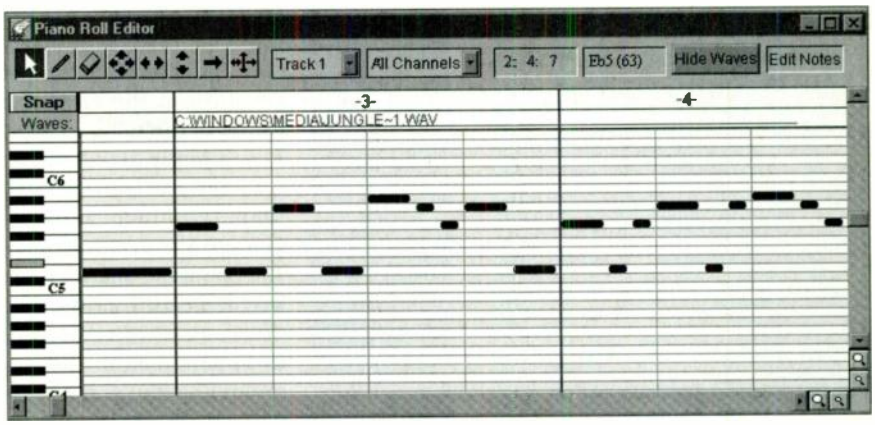


FIG. 4: The Piano Roll Editor operates in much the same way as the Score Editor. You can place a WAV file in this window, but the audio features are rudimentary and, as of this writing, problematic.

QuickScore provides hundreds of musical symbols that can be placed anywhere in the score. All the basics are covered here, including dynamics, embellishments, multiple endings, and accents. Of particular interest is the ability to create your own chord names, guitar-chord symbols, and figured bass markings. Many symbols, such as phrase and crescendo markings, include "handles" that let you adjust their size, shape, and position on the screen. In addition, you have complete access to every symbol in the Mozart True-Type font (which is installed with

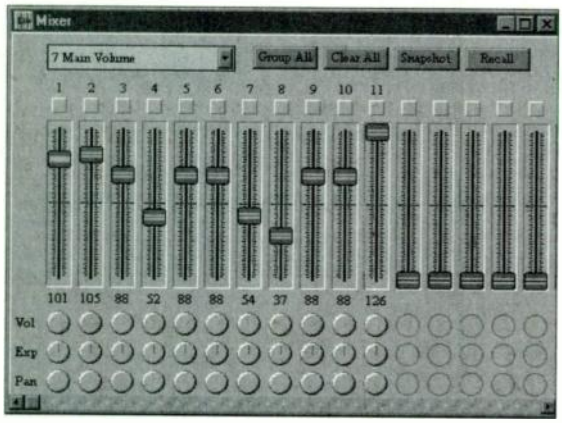


FIG. 5: *QuickScore*'s Mixer faders can record movements using any controller. I especially like the snapshot feature, which puts the value of each fader into each track at the press of a button.

QuickScore). If you have favorite symbols in other fonts, you can use them, as well.

The Toolbar and Object Type palette are great for entering and editing individual notes, symbols, and text elements in your score. To affect entire measures or tracks at once, use the program's Display menu, which lets you change settings for the current score, page, track, or bar. This menu gives you complete control over the appearance of the score. You can adjust stems, beaming, rests, ties, clefs, key signatures, time signatures, and spacing. You can also control how the display is transposed or quantized. There are settings for bar numbering, track and score titles, multiple bars of rests, braces, and clefs.

Speaking of clefs, a magical thing happens when you choose the Guitar Tab clef: the music is instantly transformed into guitar tablature! I'm not a natural-born guitarist, so I got a real kick out of playing tunes on my guitar that I could previously play only on keyboards. *QuickScore* makes conservative choices of strings and frets—the notes always seem to be in the first five frets—and I seldom ran into tablature that was impossible for my feeble fingers to play. In addition, you can edit the tablature directly.

You can set the clef to Drum 5-line or 1-line. These two options turn the track into a percussion track, with complete control over note-head style and placement (see **Fig. 3**).

Interestingly, the program's resolution is specified by selecting the Score item in the Display menu. This parameter also affects the notation in an unusual way: if you have existing notation in the current file and you change the resolution, the rhythmic values of the notes change. For example, if you record quarter notes with a 96 ppqn resolution and then change the resolution to 192 ppqn, the quarter notes become eighth notes. The documentation warns of this phenomenon and recommends that you set the desired resolution before recording or loading a file.

All in all, the Display menu is highly intuitive and easy to use. I especially like the font settings, which let you completely configure the fonts for every type of text object that appears on the page. After counting them, I realized you can put 24 different fonts on one printed page. (Can you say "add printer memory"?)

Once the score looks just the way you want it, you can print any part or the entire score. You can also export the score to a BMP, TIFF, or Copyist file. You can even print blank score and part paper.

ROLL OVER

In addition to *QuickScore*'s comprehensive notation capabilities, the program also includes a traditional Piano Roll Editor (see **Fig. 4**). I was happy to see that this editor works in much the same fashion as the Score Editor. The Toolbar includes the same Arrow, Pencil, Eraser, and movement (NS, EW, NSEW) tools. The Score Editor's spacing tool isn't appropriate here, but you get a Duration tool and a Multi tool (which can change the pitch, start time, or duration of a note). You use the note-duration buttons in the Main Control bar to enter notes in step time, and the Edit menu offers an assortment of note-editing operations after you select one or more items.

Unfortunately, there is no partial quantization or humanization (randomization) feature. You can set (but not scale or offset) Velocities and durations, and you can scale note start times and stretch or squeeze a passage to fit within a specific amount of time. However, you cannot offset notes by a fixed amount of time.

The Piano Roll Editor also provides access to *QuickScore*'s rudimentary digital audio capabilities. You can insert a WAV file above the Piano Roll display using the Pencil tool. This feature is useful only for simple digital audio needs, such as inserting short special effects. Long audio files take a second or two to sound, and files that require more than the available RAM cannot be used. In addition, when I first got the program, it crashed when two WAV files overlapped. Sion sent me a file to fix this, but now the program ignores the second overlapping WAV file. The company is working on expanding this capability in future versions.

I like *QuickScore*'s Controller Editor, which offers the same familiar Toolbar plus selectors for controller type, track, and channel. Controller events are displayed as vertical bars with notes optionally overlaid in piano-roll style for reference. To edit controller events, use the NS tool to change their values and the EW tool to change their placement in time. The Pencil tool draws a stream of controller events of varying density, depending on how fast you move the mouse. Support for tempo events, Program Changes, Velocity, and Aftertouch (Channel and Polyphonic) are provided here, as well.

Selecting controller events drops down the Edit menu, which includes some additional operations. You can

Product Summary

PRODUCT:
QuickScore Elite Level II sequencing software
PRICE:
$179.95
SYSTEM REQUIREMENTS:
PC running Windows 95 or Windows 3.1; 4 MB of RAM; sound card; MIDI interface
MANUFACTURER:
Sion Software
tel. (604) 222-2454
fax (604) 222-4708
e-mail sionsoft@infoserve.net
Web www.infoserve.net/quickscore
CIRCLE #440 ON READER SERVICE CARD

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

interpolate between events, scale event values from 0 to 1,000 percent, or limit them to the nearest value between a user-defined ceiling and floor. You can also copy them to the clipboard or fit them to a specific time.

If the other windows don't provide enough resolution, you can always use the Event List Editor. All events in the song appear with color codes that match those in the Song Editor (including Symbol and Text objects). As in the other Editors, you can cut, copy, and paste contiguous and discontiguous events, and you can double-click an event to change its values. However, you can't enter anything into the Event List; you can only change or delete existing events.

Rounding out *QuickScore*'s bag of goodies is the Mixer (see **Fig. 5**), which can be used to record any type of controller information (including Aftertouch and Pitch Bend) into all sixteen channels at once. You can even record real-time tempo changes in this screen. Faders can be grouped together and moved as one, and their relative positions are maintained. Knobs for Volume, Pan, and Expression are always available beneath the faders for each of the program's 48 tracks.

I especially like the Mixer's snapshot feature. You can move to a specific point in your song, set the faders as you want them, and hit the Snapshot button. A user-selected controller event representing the fader position is inserted into each track at that position. This feature is perfect for abrupt changes in the song.

SCOREBOARD

QuickScore Elite Level II is a solid package. The program's documentation is equally good, with a well-written manual and context-sensitive help. If I were building a MIDI sequencer, this is what it would look like, albeit with a few additions. Specifically, I would add support for multiple MIDI ports and enhanced support for Bank Select messages. I would also add more MIDI editing operations, such as Velocity scaling and partial quantization.

I like this program. If your musical endeavors take you anywhere near musical scores and notation, I highly recommend it.

Allan Metts *is an Atlanta-based musician, producer, consultant, and software designer.*

Spectrasonics Heart of Africa and Asia

By Steve Wilkes

Mysterious aural landscapes of Africa and the Far East.

In his landmark autobiography, *Memories, Dreams, Reflections*, the noted Swiss psychologist Carl Jung recounts his travels to Africa and Asia and describes in stunning personal detail the outer and inner landscapes he found there. Spectrasonics' sample CD-ROM *Heart of Africa*, vol. 1, and 2-disc set *Heart of Asia* evoke the distinctive musical landscapes of Africa and Asia like nothing I've ever heard. (*Heart of Africa*, vol. 2, is now available, but I did not have a chance to review it.)

These two sample libraries serve as broad palettes from which to paint indigenous (or imagined) landscapes. On these discs you'll find all the sounds you need to take a trip to Africa or Asia without ever leaving the console of your studio.

Either library requires 16 MB of sample RAM. Each set is available on audio CD and CD-ROM in Akai, Kurzweil, Roland, and SampleCell formats. I reviewed the Kurzweil edition using a Kurzweil K2000RS with 18 MB of sample RAM and OS 3.0.

OUT OF AFRICA

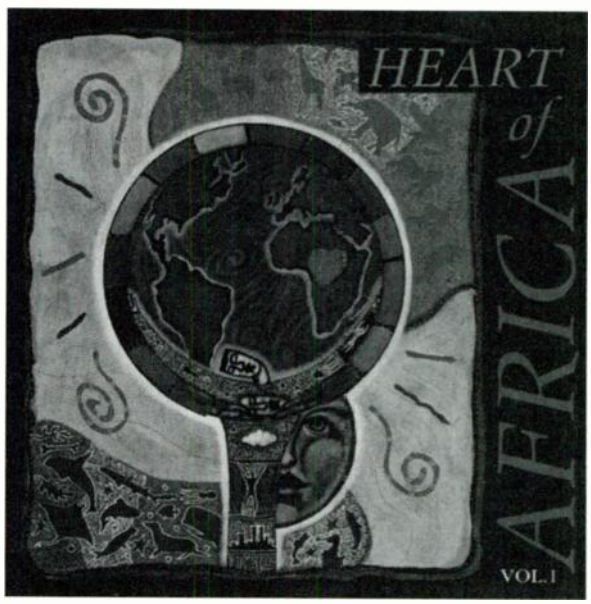
The *Heart of Africa* CD-ROM was produced by sound designer Eric Persing. Persing, Robert Daspit, and Scott Hunter are credited with the sound design. A team of five engineers (including Persing) recorded the samples in Africa over a six-year period. Some were recorded in the field, some in studios. The liner notes thoughtfully provide a list of all the equipment used to gather, record, and (where necessary) process the samples.

The audio quality is generally outstanding. In fact, I often had near revelatory experiences hearing many of these African instruments for the first time—or recorded clearly for the first time. Some samples (such as "Balaphone") are a bit noisy, but this is to be expected from field recordings of unusual instruments. The "dirt" is often in the instrument, not the recording process.

The library is divided into phrases (including loops) and multisampled sounds (single hits on an instrument). In the K2000 version, the multisamples are organized in a hierarchical directory structure with parent directories entitled Afro SFX, Human FX, M'biras, Mallets, Perc, Preview, Remix, Stringed, Tribal, Vocal, and Winds. Each directory contains several subdirectories, which hold various bank files.

I opened Afro SFX and loaded "AF Atmos" (African Atmospheres). To my utter delight, I found the most gorgeous jungle soundscapes (crickets, splashing water, animal cries, etc.). Most of the effects are looped so they play continuously (and seamlessly) while you hold down a note.

I once traveled to Bali and spent some time at a "home stay" in the center of the island. One of my greatest joys was walking out to the porch in the evening, turning on my DAT recorder, and listening to and recording the night as it came to life. The wonderfully recorded atmospheres on *Heart of Africa* took me back to those times.



Spectrasonics' *Heart of Africa*, vol. 1, CD-ROM sample library contains compelling vocal, instrumental, and atmospheric sounds.

It's the unexpected sounds and atmospheres of *Heart of Africa* that make it so compelling. The natural tendency is to expect this volume to focus on membranophones and idiophones. After all, when musicians think of Africa, we think first of drums. But this collection features the gamut of musical sound creation, from vocals to finger snaps and everything in between.

A DANCE BY THE FIRE

I decided to try an unusual experiment to test the musical and atmospheric qualities of *Heart of Africa*. In his autobiography, Jung recounts an episode from his travels in Africa when the chief of a local tribe wanted to give a *n'goma* (dance) for Jung and his companions. They assented, and later that night the entire tribe appeared and gave a stirring drum and dance performance by the fire under a full moon. I decided to see whether I could musically re-create that night using *Heart of Africa* and the K2000.

I began by opening the Tribal directory and loading "Ritual" into the K2000. I randomly pressed the E above middle C on my keyboard and was totally taken aback by the orchestrated 12/8 groove of drums and shakers. "Ritual" includes four loops: "Ritual Song" is mapped to C, "Ritual Drum" is mapped to D, "Ritual Percussion" is mapped to E, and "Ritual Whistle" is mapped to F. Each of these is also mapped over the entire keyboard in other programs (though the loops stop ascending "melodically" after the octave above middle C). An extra program provides ambient ritual claps and percussion, as though heard from a distance in the forest.

I recorded the "Ritual Drum" loop into Opcode *Vision* on my PowerBook as a 2-measure phrase. The loop recorded easily and accurately. However, the 130 bpm tempo didn't sync up well with Vision at that tempo. I found that the groove felt best at 136 bpm, and I decided to record it at double time (272 bpm) with each beat being half as long as the original. This sounded great!

I then wanted to find a nice, low drum I could add to Jung's night out. Starting with the parent directory Perc, I browsed through the subdirectories "Perc Inst" and "Hand Drum," where I found a program called "Ugandan," which is a lovely Ugandan low drum. I programmed this drum to strike on beats 1 and 3 of each measure of the "Ritual Drum" loop and set my 2-measure phrase to repeat for about five minutes. It was absolutely hypnotic and convincing, as though a real group of master drummers had invaded my PowerBook.

Next, I needed a mysterious atmosphere. Returning to "AF Atmos," I added a quiet loop of crickets on a separate sequencer track to underpin the drumming. I finished off by adding an eerie, looped, electric guitar pad from another sound library and *voilà!* All that was missing from Jung's night out was the dancing.

I was duly impressed by the capabilities of *Heart of Africa*. The term "cinematic" came to mind. This collection of African sounds could be a film composer's or sound designer's dream come true. In fact, my 5-minute ambient groove was so inspiring that my partner from the group Fordham Wilkes heard it and began writing lyrics and a melody to it on the spot.

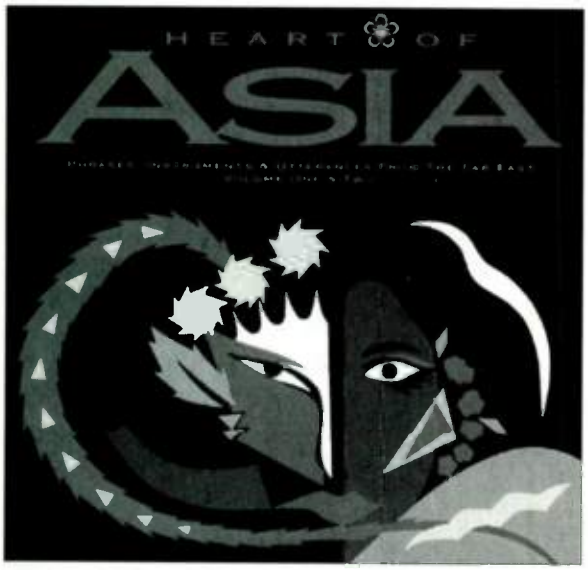
HEART OF ASIA

After working with *Heart of Africa*, I had high expectations for *Heart of Asia*, and I was not disappointed. If anything, its two discs offer an even broader scope of musical instruments and effects than *Heart of Africa*. This set was produced by Mashor Shawn Letts, and Eric Persing was again part of the sound-design team. One difference between this set and *Heart of Africa* is that there are not as many field recordings here. Most of

Product Summary

PRODUCT:
Spectrasonics *Heart of Africa*, vol.1, sample library
PRICE:
CD-ROM $299
Audio CD $129
DISTRIBUTOR:
Ilio Entertainments
tel. (800) 747-4546 or
(818) 707-7222
fax (818) 707-8552
e-mail ilioinfor@ilio.com
Web www.ilio.com
CIRCLE #441 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
QUALITY OF SOUNDS	● ● ● ● ●
DOCUMENTATION	● ● ● ●
VALUE	● ● ● ●



Heart of Asia is a 2-disc tour of Thai, Tibetan, Malaysian, Chinese, Indian, and Indonesian musical instruments.

the samples were recorded at or near a studio in Singapore, with some samples recorded at a monastery in Tibet.

Thailand, Tibet, Malaysia, China, India, and Indonesia are the countries represented on *Heart of Asia*, which provides a virtual tour of these countries' musical legacies. Among a mind-boggling array of sounds, you will find some knockout Chinese cymbals; Indian sitar and tabla; a huge variety of flutes, strings, and brass; chanting monks; drums of all sorts; and even Yang Ching, the Chinese hammered dulcimer heard on many Dead Can Dance albums. Interestingly, Japanese instruments and phrases are nowhere to be found. Perhaps they will show up in a future volume.

The sounds fall into three groups: loops, phrases (unlooped rhythmic patterns of varying lengths), and multisampled sounds. As with *Heart of Africa*, the sounds are arranged in a hierarchical structure. I started off by loading "Gamelan" from the Loops subdirectory. Pressing the synth keys, I found heartbreakingly dreamy and beautiful loops of entire gamelan orchestras, usually two to four measures in length, some of which included lovely singing. All the loops feature the metallophone variety of gamelan orchestra. This is the most common type, and it was reminiscent of Tirta Sari, one of Bali's best-known gamelan groups and residents of Peliatan, the village where I stayed.

To my disappointment, one of my favorite gamelan styles, Jegog (a bamboo gamelan orchestra from the village of Sangkar Agung), was not to be found. However, the "Gambang" and "Angklung" samples and loops come close to the Jegog style and sound.

These gamelan loops immediately sparked some interesting ideas. Their sixteenth-note patterns could easily become the rhythmic bed for all sorts of songwriting or sound-design projects. In particular, I can easily imagine a techno artist turning one of these loops into the basis for a dancefloor hit.

One of my favorite applications for this set is what I call "drum landscaping": combining seemingly divergent musical pastiches from different countries and sculpting a new sonic landscape with them. Using *Vision* once again, I tried this by combining an "Indian Ensemble" loop (with some very funky tabla grooving) with a "Gamelan Orchestra" loop, a "Chinese Cymbal" phrase, and a hip-hop groove that I programmed on a Novation DrumStation. The result not only had the street feel of New York but the street feel of Den Pasar, as well. These sonic landscapes blur preconceived musical boundaries and open the user to some inspiring new and creative ways of thinking about composition.

Product Summary

PRODUCT:
Spectrasonics *Heart of Asia* sample library
PRICE:
CD-ROM $399
Audio CD $129
DISTRIBUTOR:
Ilio Entertainments
tel. (800) 747-4546
fax (818) 707-8552
e-mail ilioinfo@ilio.com
Web www.ilio.com
CIRCLE #442 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
QUALITY OF SOUNDS	● ● ● ● ●
DOCUMENTATION	● ● ● ●
VALUE	● ● ● ● ◖

DOCUMENTATION

The documentation for both CD-ROM sets is good but could be improved. The liner notes provide extensive information on the vast array of instruments found on the discs. This includes descriptions of most of the instruments and their most common musical usage. *Heart of Asia* provides a supplemental listing of every sample, loop, and phrase and where these can be found in the hierarchical directory structure. This lets the reader quickly grasp the layout of the discs. I did not receive such a listing with *Heart of Africa*.

I wish the liner notes provided detailed tempo information for the loops and phrases in each set, but this information is part of the file name. For instance, "African Slit Drum, Phrase 1," appears on the sampler's screen as "80: Slit Dr Ph 1." The 80 refers to the tempo in beats per minute.

According to the manufacturer, only the Kurzweil version lacks this information in the documentation, and it should be included in all versions by the time you read this.

Although both sets are copyright free, the liner notes urge the user to respect the sometimes centuries-old traditions from which these instruments and phrases come. In fact, the manufacturer encourages those who make money with these sounds to donate some of their profits to organizations such as African Relief, and several such organizations are listed with contact information. Of course, this is not required, but it demonstrates respect for the cultures from which these sounds come and makes it easier to gather more sounds from indigenous peoples. Kudos to Spectrasonics for taking the high ground here.

IT'S A WRAP

The greatest quality any product can bring to one's musical endeavors is the creative inspiration to explore new musical worlds. And these two sound libraries bring just that to your studio. They are the next best thing to a trip to Africa or Asia with your DAT recorder. It costs $700 for both sets on CD-ROM, but they're more than worth the price.

Steve Wilkes *is one half of the vocal/electronic percussion duo Fordham Wilkes. Their CD,* From the Earth Below, *is distributed by New Leaf.*

Rane Mojo Squeeze MC 22

By Rob Shrock

An affordable stereo compressor with automatic expander.

Thanks to the inexorable march of technology, audio recording gear keeps getting easier to use and more affordable, yet it frequently offers more sophistication at the same time. Such is the case with Rane's new Mojo Squeeze MC 22 Stereo Compressor, one of five new processors composing the company's Mojo Series. (The MH 4 Mojo Cans Amp headphone amplifier is reviewed in the sidebar "Screamin' Cans." For information on the other Mojo units, see "What's New" in the September 1996 **EM**.)

At $299, the MC 22 comes in at less than you might spend taking your wife and in-laws out to dinner at a four-star restaurant. Yet it's more capable than some compressors that cost at least a bottle of Cristal more than that fancy dinner. Choose the four-star feast, and you may be squeezing into your jeans the next day; choose the MC 22, and you'll be squeezing your signals for years to come.

APPETIZER

If a colorful presentation whets your appetite, the Mojo Series will have you salivating. Each unit in the series features aqua trim, pink or white level-control knobs, and green, yellow, and/or red LEDs on a black chassis. I imagine a stack of Mojo units would look pretty impressive.

The MC 22's controls are logically laid out and, for the most part, are all but impossible to misconstrue. The front panel is divided into channels 1 and 2, with a link switch (for stereo operation) in between. Each channel offers input-level, threshold, and ratio knobs. (Note that there are no output-level control knobs—an omission I will address later in this review.) Threshold is variable from -40 to +20 dBu and ratio from 1:1 to 10:1. Each channel also features an Active/Bypass button, a 5-LED gain-reduction meter, and LEDs indicating +4 dBu operation (green) and input overload (red). (To get the complete technical scoop, see the sidebar: "MC 22 Mojo Squeeze Specifications.")

What's different about this compressor? For one thing, each channel also includes an automatic downward-expander circuit and accompanying yellow LED that lights when the circuit becomes active. Rane calls the expander circuit "adx." The purpose of the adx circuit is to act as a gate to keep the system quiet when no signal is present. The expander's threshold and ratio are preset and nonadjustable: when the input level drops below -55 dBu, downward expansion occurs at a ratio of 2:1. (I'll also discuss the adx circuit more later.)

The MC 22 provides a front-panel power switch, an internal power supply with fixed power cord, and balanced XLR and ¼-inch I/O connectors. The ¼-inch inputs can accept either balanced or unbalanced signals, but the ¼-inch outputs are unbalanced only. The unit comes with a thorough, instructive user's manual and a two-year warranty. And get this—you can have the warranty extended from two to three years simply by filling out and mailing in a form.

MAIN COURSE

Another feature that sets the MC 22 apart from other compressors and makes it easier to use, if less versatile, is its preset, dynamics-dependent attack and release times. Attack time is 30 milliseconds per 10 dB step, which means the hotter the signal, the slower the unit attacks it. Release time is fixed at 0.3 dB per millisecond. These settings proved to be both versatile and musical. I was easily able to add punch to kick and snare drums with minimal fuss by simply twiddling the threshold and ratio knobs. The preset attack and release settings also worked well on prerecorded, uncompressed vocals. (Unfortunately, I didn't get a chance to track vocals through the MC 22. My sense, though, is that, used mildly, it would do a good job of taming peaks when cutting vocals, exhibiting only the usual anomolies inherent in low-cost, solid-state compressors.)

I didn't care for the MC 22 on bass guitar. For some reason, it was difficult finding the right amount of compression—either I could hear it too much or not enough. And when I could hear the compression, it made the bass sound small and thin.

On other mono sources, however, the unit performed admirably. Distorted guitar, acoustic guitar, mallet cymbal rolls, and synthesizer bass all fared well through the MC 22. Frequency content was well preserved except when drastic compression settings were used. (It's typical of hardware compressors in general—and this unit is no exception—that when you overcompress a signal, a loss of highs occurs.)

MISSING LINK

Yet another thing that distinguishes the MC 22 from some other compressors is the design and operation of its stereo-link mode. In certain lower-end compressors, for example, when two channels are linked in a master/slave configuration, the left side is the master and the right is the slave. In this setup, the slave obeys all of the master's settings. But when the MC 22's two channels are linked, each channel's input-level, threshold, and ratio settings remain independent. Only the VCAs are linked.

What this means is that either side can be master or slave, depending on

Rane's Mojo Squeeze MC 22 Stereo Compressor is cheap and easy to use, and it does a good job of maintaining frequency content and stereo imaging. However, the unit features a nonbypassable expander that proves a liability in some applications.

which channel first detects a signal crossing its threshold. For example, when a signal crosses channel 2's threshold, channel 2 kicks in and simultaneously activates channel 1 (or vice versa). But unlike some units that employ a similar stereo-link design, the same amount of compression occurs in both channels of the MC 22, based on the ratio setting of the channel which is the momentary master. (Rane also employs this design in their DC 24 Dynamic Controller.)

Therefore, if you want the same response from both channels of the MC 22—say, for processing a stereo mix—you have to dial in the same settings for each channel. The purpose of the stereo link, then, is to guarantee that both channels receive the same amount of process so as to maintain stereo imaging. Without the link function, if one side of the mix gets hotter than the other momentarily, it could cause the dynamics-dependent attack and release times to differ between the channels, which in turn could screw up the imaging.

I can't think of an application for which I would want different threshold and ratio settings on linked stereo channels on a compressor. Of course, that's not to say that there may not be some cool, creative ways to utilize this feature; there probably are. But for novice users and those accustomed to master/slave configurations, the MC 22's stereo-link design could cause some initial confusion.

One last thing about the stereo-link feature: the control—a sliding switch—is almost flush with the unit's front panel, making it difficult to grasp. However, the upside is that it's practically impossible to inadvertently knock the switch to an unintended setting.

MC 22 Mojo Squeeze Specifications

Inputs	balanced XLR and balanced/unbalanced ¼" TRS
Outputs	balanced XLR and unbalanced ¼" TS
Frequency Response	20 Hz–20 kHz
Compressor Threshold Range	+20 to -40 dBu
Compressor Ratio Range	1:1–10:1
Compressor Attack Time	30 ms/10 dB step
Compressor Release Time	0.3 dB/ms
Expander Threshold (fixed)	-55 dBu
Expander Ratio (fixed)	2:1
THD + Noise	0.02% (1 kHz @ +4 dBu)
Signal-to-Noise Ratio	90 dB (unity gain, +4 dBu, 20 Hz–20 kHz)
Size	1.75" H x 19" W x 5.3" D (1U)
Weight	5 lbs.

TWO FOR ONE

I got better results using the MC 22 channels independently on single sound sources than with the channels linked on a complete stereo mix. Typically, a stereo mix will contain greater dynamic diversity (e.g., multiple instruments, some with extreme transients, others without) than a mono source, so the ability to fine-tune attack and release times is critical. For my taste, the MC 22 just doesn't provide enough envelope control to process stereo mixes.

I also encountered problems while trying to compress a pair of stereo drum overheads with the MC 22. In particular, several loud floor-tom hits either caused pumping in the ride cymbal hits that immediately followed or weren't affected at all when I backed off the compressor threshold. I never could get the MC 22 to jump in, grab the floor tom, tame it, and then get out of the way of subsequent percussion hits. Admittedly, drum overheads can present a challenge for any stereo compressor, but this illustrates a limitation of the MC 22 in a common stereo application.

The MC 22 fares better when used to smooth out stereo keyboard pads or clean electric guitar parts. (Attack and release times are generally not as critical with less transient sounds.) Furthermore, when used moderately,

SCREAMIN' CANS

Rane's single-rackspace MH 4 Mojo Cans Amp is a hard-rocking, 4-channel stereo headphone distribution amplifier. Its beauty lies in its simplicity and superior performance.

The back panel provides two ¼-inch left and right inputs. The unit's four channels each sport a ¼-inch stereo TRS headphone jack and a level control on the front panel. In addition, there is a front-panel power switch and global mono/stereo source switch.

I was truly astonished by how hot an input signal I could crank into the MH 4 before the signal started to break up. I have two other headphone-distribution amps in my studio, and neither can handle nearly as high an input level without crapping out. Also, the unit's internal amplifiers allow for extreme output levels. With the MH 4, you can simultaneously drive four pairs of headphones to painfully loud levels well before causing the unit's red overload LED to light.

When you or your musicians are relying on headphones for performance inspiration, it's important to hear a faithful representation of the stereo bus in the cans. However, a common problem with headphone-distribution amps is their tendency to squash the stereo image to a "narrower" representation of what you hear in the studio monitors. The MH 4 maintains a wide stereo image at the headphone output, providing a great-sounding headphone mix. This fact was duly noted by two singers who had recorded in my studio before. I could only attribute their compliments to the MH 4.

the MC 22 does a nice job of maintaining the source's stereo image and frequency content—an area where many other inexpensive compressors fall painfully short. I really liked the MC 22 on a stereo pair of background vocals. I was also impressed by how well it maintained imaging on a stereo acoustic piano track.

DESSERT

Unfortunately, another of the MC 22's more sophisticated features—the adx expander—is also potentially its biggest liability. That's because the expander circuit is always active in the unit. I don't have a problem with the expander settings; they seem to work well on a large variety of material. But the fact that you can't control or bypass the expander can be a problem. For example, if you want a cymbal crash to decay naturally at the end of a song, that's too bad, because as soon as the signal drops below -55 dB, the attenuation kicks in. Basically, the only way to "control" the expander is to push the signal further above the preset threshold by increasing the input level.

The fact that the MC 22 offers no output-level controls doesn't help matters. For example, if you jack up the input to a level sufficient to keep the expander circuit from chopping off the tail of a signal, the output level could be too hot for -10 dBV inputs (which is what many of us use, for example, on our ADATs). In +4 dBu environments, the increased level is not so much of a problem; the Mojo Series, however, is presumably targeted at home and project studios, and these typically operate at -10 dBV levels. Output controls on each channel would assist proper level settings; without them, you may have to resort to an outside gain stage at the end of the audio chain to keep from distorting -10 dBV inputs.

Altogether, I found the interaction of the MC 22's already limited feature set, coupled with the uncontrollable expander circuit, a bit too much to handle at times. In lieu of a threshold-level control, there should at least be a dedicated bypass switch for the expander circuit.

▼

Drum overheads can present a challenge for any stereo compressor.

CHECK, PLEASE

For the money, the MC 22 provides solid functional compression, both in stereo or in dual-mono modes. Although the attack and release times are preset, the settings are musical and useful for most applications. I preferred the unit in dual-mono mode; however, stereo material that isn't riddled with transients fares well when compressed moderately in linked mode. And the MC 22 does an excellent job of maintaining stereo imaging and frequency content.

The adx expander is potentially a bonus, but the inability to control or bypass the circuit makes the MC 22 more finicky to work with than I like. Of course, you can always set the compression ratio to 1:1 and use the MC 22 as a stand-alone (albeit limited) expander/gate. But for compression applications, the MC 22 would benefit greatly from having an expander bypass switch or at least output-level controls to compensate for the fussy interaction between input levels and the expander circuitry.

These criticisms aside, the MC 22 is an effective and easy-to-use tool for smoothing out many audio signals. And at a price like this, you should have more than enough money left over for a good cup of coffee. ●

Product Summary

PRODUCT:
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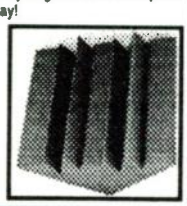

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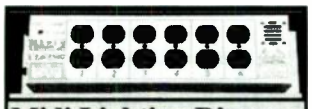

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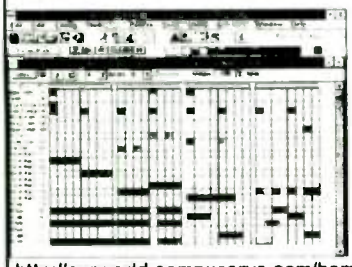

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TECH PAGE

Hypernet

This new networking technology is a force to be reckoned with.

By Scott Wilkinson

As every Internet surfer knows, the World Wide Web has become the World Wide Wait. This makes the dream of online self-distribution hard to achieve; streaming previews often sound pretty bad, and downloading them takes so long that potential customers become frustrated and less likely to buy your product.

An incredible solution to this problem was quietly demonstrated in a hotel suite at NAMM this year by a company called R^2D^2 ("Twice the Research, Twice the Development"). Hypernet is a system that bypasses the Internet completely, offering almost unlimited bandwidth and instantaneous transmissions using the principles of quantum physics. You might think that such a system would be introduced at COMDEX rather than NAMM, but the company's founder, Leia Organic Skydancer, is a musician as well as a physicist and computer scientist. She created Hypernet so she could market her own material.

Hypernet uses quantum computers, in which the individual elements within an IC are single atoms or even photons. In such a machine, the principles of quantum physics, especially the idea of parallel universes, affect the computational process. In particular, this increases computation speed immensely because it occurs in many parallel universes simultaneously.

Skydancer developed a prototype machine she calls a *hypercomputer*. The processing speed is measured in terahertz (THz), which is equivalent to millions of megahertz, thanks to the massively parallel processing made possible by quantum computing.

To bypass the bottleneck of the Internet, Skydancer needed a new form of telecommunication, and quantum physics provided an answer here, too. It has been known for some time that photons and other subatomic particles wink into and out of existence in the intergalactic void, creating a momentary, virtual electromagnetic field. Cosmologists call this the *zero-point field* because it occurs at temperatures near absolute zero, which R^2D^2 engineers refer to as "luke warm."

Skydancer discovered that these virtual photons allow instantaneous communication via the *multiverse* from which they come and to which they return, because the speed-of-light limit doesn't apply there. She then invented a *quantum modem* that sends data through this multiverse by modulating and demodulating the virtual photons. With this device, every hypercomputer can be directly connected to every other hypercomputer simultaneously using a new transmission standard called Organic Communication via Photon-to-Photon Protocol (O-C3P).

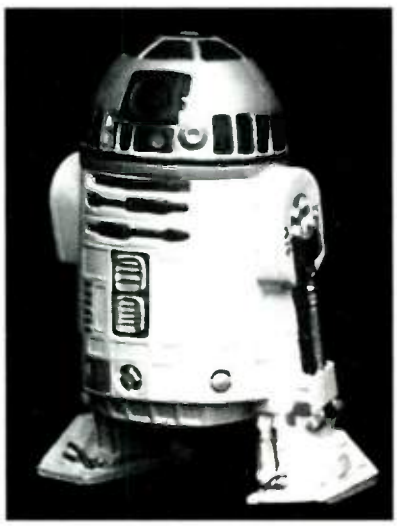

FIG. 1: The R^2D^2 hyperdrive stores many terabytes of data using quantum principles.

As mentioned earlier, Hypernet accommodates essentially infinite bandwidth, which supports an almost unlimited number of simultaneous, uncompressed audio and video streams. To hold such vast amounts of data, Skydancer developed the *hyperdrive,* which uses quantum principles to hold thousands of terabytes in a physical package the size of a *Star Wars* action figure (see **Fig. 1**). She also wrote some new real-time graphics and audio software called Java Hyper Utilization Transfer Technology (HUTT).

The NAMM demo I saw included full-motion, real-time video of several musicians at different physical locations jamming together. Each one was in a separate window on the screen with none of the herky-jerky effect we've come to expect from current technology. (When one of them began improvising on an unfamiliar instrument, our host explained that it was a han solo.) Then, Skydancer logged onto a prototype hypersite and downloaded a 10 GB video clip in under a second. With capabilities like this, Hypernet is bound to replace the old, clunky Internet as quantum computers and modems become widely available. Until then, may the hyperforce be with you! ●

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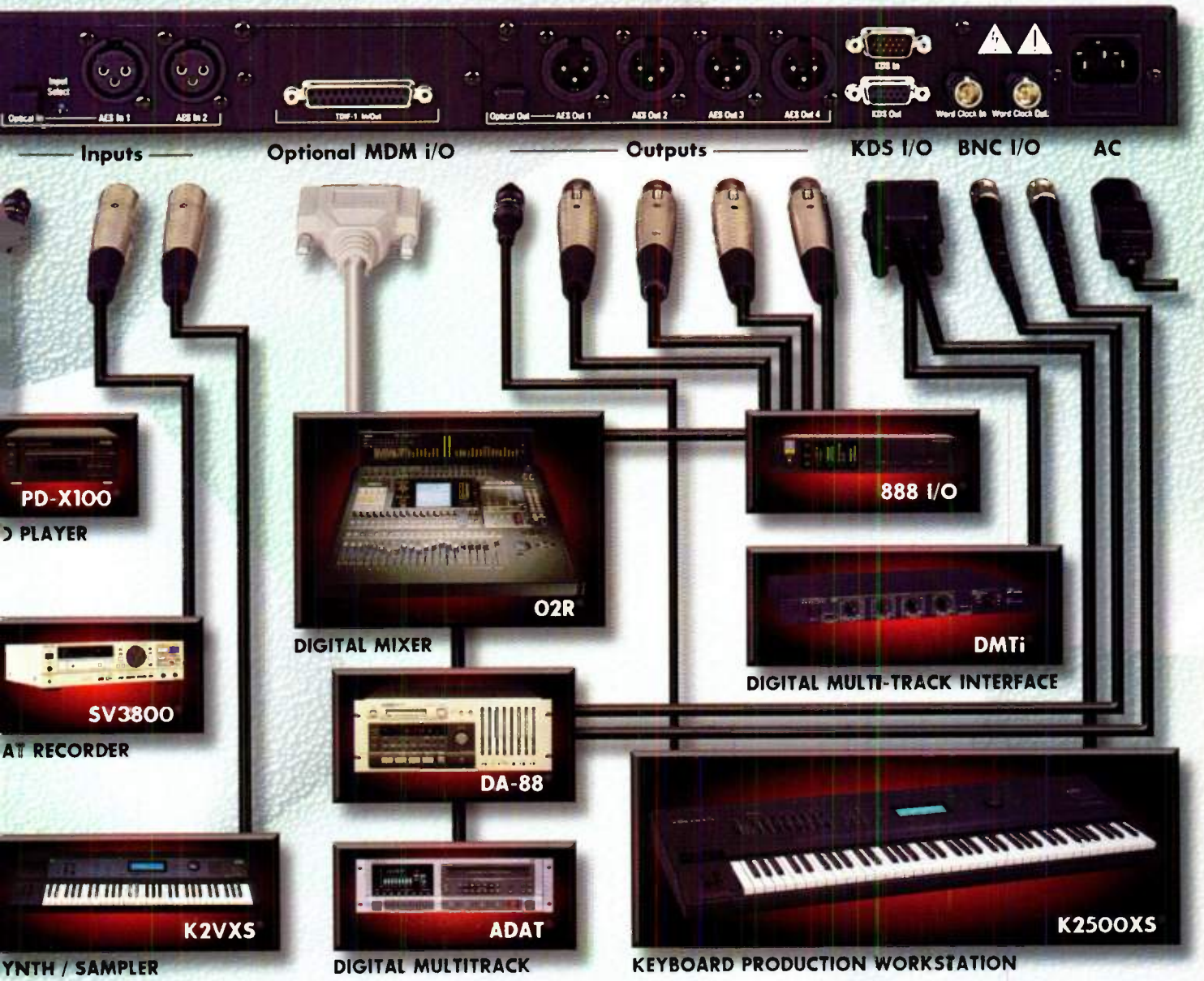

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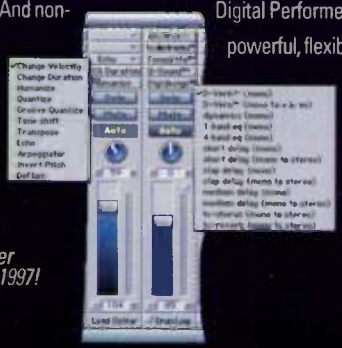

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