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Electronic Musician©

October 1997

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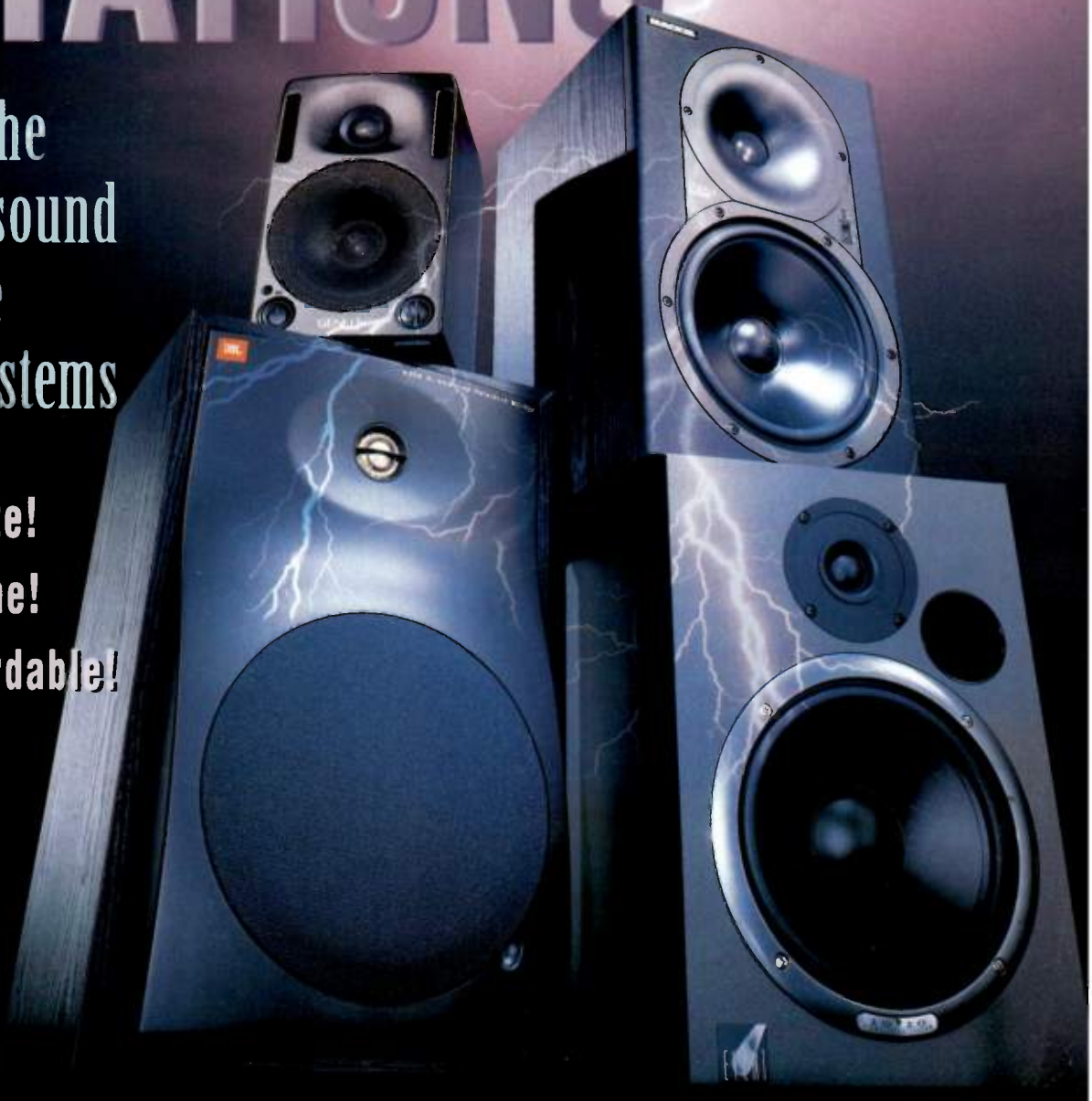

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M•1400AMP

We figured if the world really DID need VERY affordable, and loaded with lots

M•1400	4Ω bridge	8Ω bridge	2Ω load	4Ω load	8Ω load
at 1% THD	1400 W	960 W	700•700 W	480•480 W	280•280 W
at rated power*	1260 W	850 W	630•630 W	425•425 W	250•250 W
THD at rated power*	0.05%	0.025%	0.05%	0.025%	0.012%

■ **Selected M•1400 specs. Signal-to-Noise Ratio, ref 400 watts:** greater than 108dB ■ **SMPTE Intermodulation Distortion, 250 mW to rated power, 8-ohm load:** 0.025%; **4-ohm load:** 0.05%; **2-ohm load:** 0.15% ■ **Transient Intermodulation Distortion, 8-ohm load:** less than 0.025%; **4-ohm load:** less than 0.05%; **2-ohm load:** less than 0.096% ■ **Frequency Response, 1W, 8-ohm load:** +0, −1dB 20Hz to 40kHz; +0, −3dB 10Hz to 80kHz ■ **Power Response, 400 watts, 4-ohm load:** +0, −1dB 20Hz-20kHz ■ **Rise Time:** +4.4 microseconds ■ **Voltage Slew Rate:** greater than 50 volts per microsecond, greater than 100 volts per microsecond bridged mode ■ **Current Slew Rate:** greater than 32 amps per microsecond at 2 ohms ■ **Transient Recovery:** less than 1 microsecond for 20dB overdrive at 1kHz ■ **Gain:** 33dB **Input Sensitivity for full power:** 1.23V ■ **Weight:** 36 lbs.

■ **Detented gain controls** calibrated in both volts and dBu with constant sensitivity gain structure.

■ **Meters (with overload LEDs** display relative output level in dB.

■ **Signal Present LEDs.**

■ **A Mackie Designs exclusive: Short Circuit LEDs** that can save precious minutes of troubleshooting time. They light up only when the M•1400's protection circuits have been triggered by short circuits in cables, speaker crossovers, or driver voice coils.

■ **Protection circuit (and Protect LEDs).** The M•1400's protection circuits are there when you need them, but not so hair-trigger that they insist on kicking in every time the amp momentarily clips (you know how bad that can sound). Instead the circuits only activate **1)** for three seconds at power-up; **2)** when a short or near short is encountered; or **3)** when the output section's temperature rises to an unsafe level.

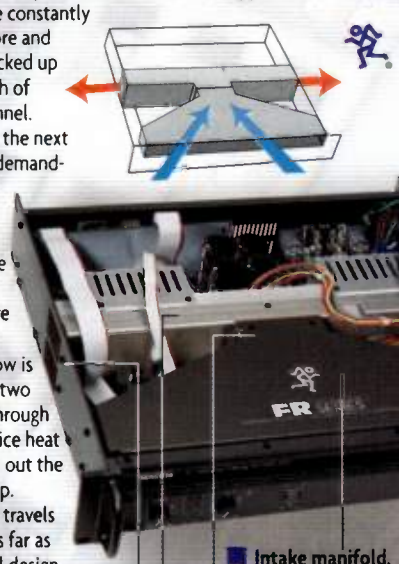
■ **Temperature Status LEDs. Cold** is lit during normal amplifier operation. **Hot** lights up when the amp's normally more-than-ample cooling abilities are exceeded.

■ **100, 110, and 220-volt models available.** All with UL, CSA, CLA, European, and several intergalactic safety approvals. Although we use plug-in IEC line cords on our mixers, the M•1400 uses a fixed cord...there are too many times (always the wrong ones) when a separate amp power cord can vibrate loose or pull out.

■ **Neutrik® Speakon® and multiway binding posts** spaced for standard ripe or newer unripe banana plugs.

■ **How can we** offer so much amplifier at such a reasonable price? It isn't because we chintzed on anything. It's because of our manufacturing and parts purchasing efficiencies. Mackie Designs' 160,000 square foot complex in Woodinville, Washington includes state of the art, automated surface mount, axial and radial insertion equipment as well as expensive machines that go "ping." We've also made the investment in our own metal fabrication, coating and screening departments.

■ **T-Design Constant-Gradient Cooling.** Output device cooling technology has constantly advanced over the last decade. From primitive "blow-air-indiscriminately-through-the-whole-chassis-and-hope-it-cools-something" approaches to sophisticated cooling tunnels that put the air only on the heat exchangers. The only drawback to this latter approach is that the air temperature constantly increases as more and more heat is picked up along the length of the cooling tunnel. Our T-Design is the next logical step. A demand-sensitive fan collects room air through a manifold whose intake extends across the entire front of the M•1400. Air flow is directed down two SHORT paths through the output device heat exchangers and out the sides of the amp. Because the air travels less than half as far as in a long-tunnel design, the temperature gradient between the first and last output devices remains nearly constant.



■ **Intake manifold.**
■ **Demand-sensitive fan.**
■ **Dual constant temperature gradient exchanger tunnels.**
■ **Side air exhausts.**

■ **"The amp's versatility lets us use it in our home studio with reference monitors or for PA and DJ gigs either full range or for subwoofers (the subwoofer filter is one of those Mackie innovations that make you guys leaders."**
P.S., St. Louis MO

*20Hz to 20kHZ

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another power amp, it had better be reliable, of extras. Introducing the M•1400.

No gimmicks. The M•1400 does NOT run on snake oil. It doesn't pull power out of the ozone or switch on and off at a zillion gigahertz. At its heart is proven "lead sled" construction with hefty toroid, big storage capacitors, robust power transistors, and an serious cooling system.

FR™ refers to Fast Recovery. Running a power amp right on the edge of — and into — clipping is just a fact of life. It isn't so much WHETHER an amplifier will "misbehave" when driven into clipping...it's how the amp SOUNDS when forced to "misbehave." If an amplifier latches ("sticks" in prolonged clipping mode, instead of quickly recovering) it's painfully audible. The M•1400 uses Baker Clamps (a circuit we shamelessly borrowed from digital technology) on positive and negative voltage amplifier stages. The "clamps" prevent saturation, which in turn prevents high frequency latching during periods of overdrive. An additional transistor senses Baker Clamp activity and activates the amp's output limiter. Also, since negative feedback is a primary cause of latching, the M•1400 uses VERY sparing amounts.

The M•1400 is the only amplifier in its price range to include built-in variable low-cut filters, a 2-position crossover filter, and variable constant directivity horn compensation. It also has the sorts of "extras" you normally find only on far more expensive amplifiers. Stuff like a full complement of status indicators plus output level LED ladders, both male and female XLR inputs, and Neutrik® Speakon® outputs.

The M•1400 is built to run all day long at the edge of clipping into fiendishly low impedances. And it's designed to sound verygood while doing it.

If this sounds like a bunch of pretty strong claims from a company that used to specialize in mixers, please understand that the M•1400's design team is composed of seasoned power amp veterans. Between them, they've developed some of the most notable amplifier designs of the last two decades. Working at Mackie gave this gang of misfits a chance to combine new ideas and proven electronic design concepts with our high-efficiency manufacturing capabilities.

We know that your livelihood depends on the reliability of the audio equipment you install. And that you naturally have a "wait- and-see" attitude towards any new amp design. All we can hope for is that you'll pick up an M•1400 and put it to the test. We think you'll agree that it's an exceptional value for its price.

Below: a few of the 400+ folks and one incontinent Chihuahua (not shown) who work at Mackie Designs in Woodinville, WA, 20 miles northeast of Seattle.

Air intake all the way across the front for our T-Design constant gradient heat exchanger (see below left) pulls in room air instead of hot air from inside the rack.

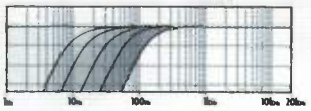
Rocker power switch and large, visible **Power indicator.**

More cooling: Filtered rear intake guides slower, secondary airflow across main amplifier electronics.

Amp mode switch.

Input-O-Rama. Along with balanced TRS and female XLR inputs, the M•1400 also has MALE XLRs for inputs or pass-thru (rarely if ever found on a power amplifier in this modest price range).

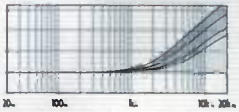
70-volt capability. While not exactly a Stripped-Down Contractor's Amp (one LED on the front, terminal strips on the back), the M•1400's high power output lets it directly drive constant voltage systems without the use of a step-up transformer.



Variable Low Pass Filter. If you subscribe to this magazine, we don't have to lecture you about the benefits of low pass filters. The only trouble with them has been that you either had to buy an extra plug-in module or settle for a few pre-set frequency positions. The M•1400 has separate left and right VARIABLE high pass filters. Each has linear-phase, 2nd-Order Bessel circuity and is sweepable from 5Hz (off) to 170Hz. Panel markings include a "typical" (35Hz) setting, as well as one at 100Hz that does wonders for stage monitors.

Application switch has full range w/limiter, full range w/o limiter, and subwoofer (low pass w/o limiter) settings.

18dB/octave subwoofer filter. The M•1400 can drive a subwoofer without the addition of an external electronic crossover or plug-in cards. Linear-phase, uniform-time-delay low-pass filter is switchable between 125 and 63Hz.



Constant Directivity Horn Compensation EQ. Instead of resorting to hard-to-find, harder-to-adjust crossover modules, you can now tweak CD horns' compression driver response right at the amp. The 6dB/oct. boost is sweepable from 2kHz to 5.6kHz. We extended it this high to provide "AIR" EQ for non-CD HF drivers.

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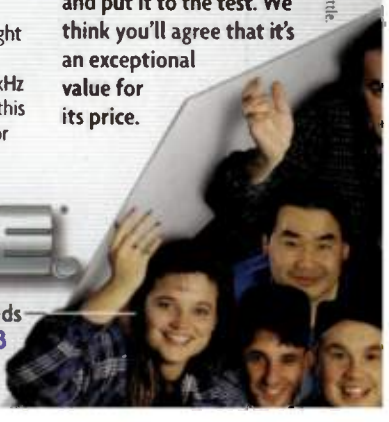

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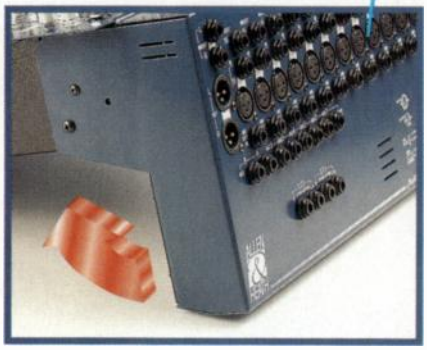

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I N S I

FEATURES

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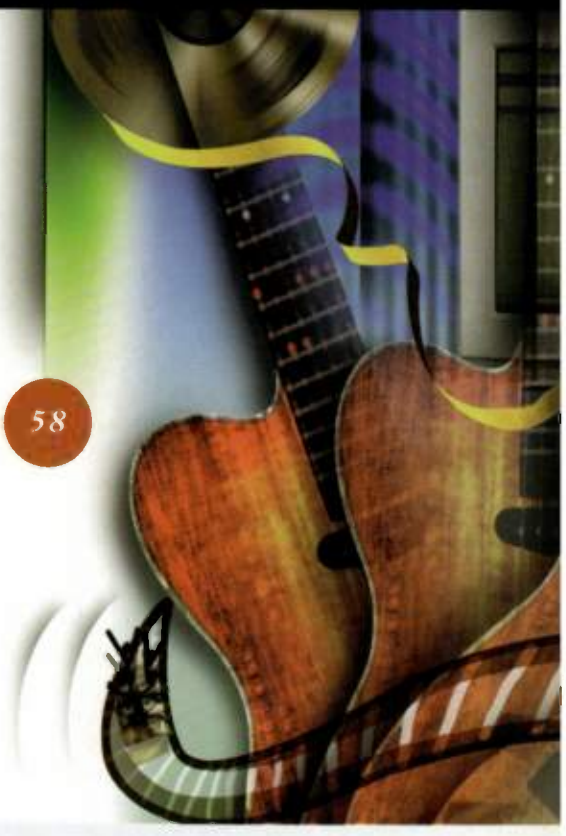
Electronic Musician®
OCTOBER 1997 VOL. 13, NO. 10

COLUMNS



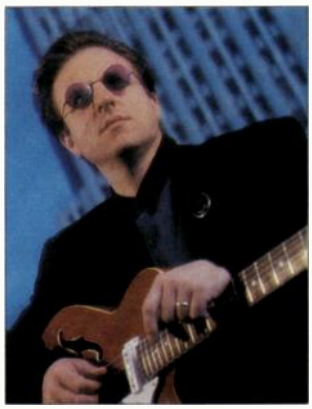
REVIEWS

Cover: Photography by Robert Perry.

Special thanks to Event Electronics, Genelec, JBL Professional, Mackie Designs, and Westlight.

Moving forward, looking back

Truly hip music technology celebrates human foibles.



ROBERT PERRY

Technological advances are pushing the personal studio toward an unprecedented level of power and versatility. Tools such as sound cards, hard-disk recorders, and software plug-ins have energized the desktop-audio community. In addition, active monitors are finally within financial reach of the home-recording set (see "Power Stations" on p. 44), and just around the proverbial corner is a new generation of affordable, digital mixers. It's a darn good time to be a musician.

At times, however, the excitement that surrounds the increasing power, complexity, and affordability of new gear threatens to diminish the human element in making music. As we pay homage to technology at this month's 103rd Audio Engineering Society (AES) Convention in New York, I hope gear manufacturers continue to remember that the benefactors of their largesse—the end users—are talented fleshpods awaiting a muse. They are not always techno-junkies eager to replace old methodologies with new paradigms. In fact, many musicians are somewhat superstitious and resistant to change. (Don't believe me? Check out the analog versus digital or tube versus solid state battles still raging in newsgroups, clubs, and rehearsal halls.) And when one of us is lucky enough to be kissed by inspiration, it is critical that our fragile ideas are brought to life without trauma.

Unfortunately, the fruits of technology sometimes overshadow the fleeting and delicate nature of inspiration. A new tool might be introduced with complex features that force users to get lost in the details of execution—and ultimately lose the creative juice that prompted them to tweak something in the first place. Now, I'm not implying that a learning curve is a bad thing or that electronic musicians are incapable of mastering complex gestures *and* maintaining creative focus, but music-making is one heck of a lot more enjoyable when the machines aren't fighting you.

Ancient tools such as analog mixers and stomp boxes may be anathema to futurists, but at least they offer near-instant gratification. You turn a knob and something happens. Then you can assess what happened and either freeze ("Eureka, I have found it!") or start the process over until you hear something you dig. This type of process is really no different than, say, a jazz guitarist reacting to the improvisational forays of his or her bandmates. A good musician is trained to react to stimuli and to create something wonderful from that reaction. A good creative *tool* should recognize the importance of that symbiotic relationship and nurture it.

So as we rapidly approach the era of the desktop studio, I encourage musicians and manufacturers to work together to ensure that this new frontier of powerful, software-based tools enhances, rather than impedes, creativity. I really think that most of us are looking forward to a world where music making is still a blast; where inspiration is still the fountainhead of creative thought; and where our tools and our muse can enjoy glitchless collaboration.

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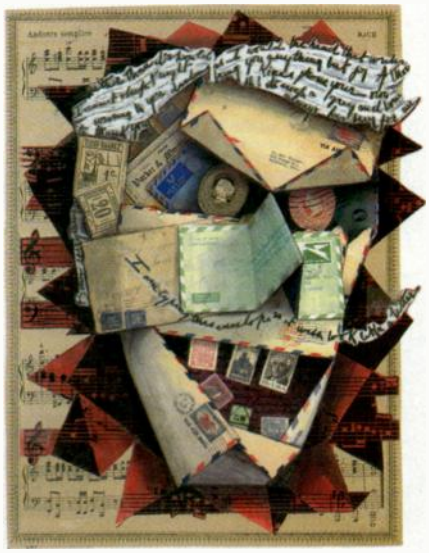

MIC PREAMPS

I have just finished reading your article "Rich Man, Poor Man" in the June 1997 issue of **EM** with intense interest because the Mackie mixer mic preamp was used as the baseline standard for stand-alone microphone preamplifier comparisons.

It is clear that substantial effort went into the entire review process. Certain sonic signatures, however, can be mistakenly ascribed to a product's performance, when in reality, the observable phenomena may be caused by any one or combination of the following:

1. The product's performance itself (the goal of the test).
2. System interface issues.
3. Faulty test and evaluation procedures.

The article states that seven of the units tested were plugged into the balanced inputs of the ADAT. The Mackie, having an unbalanced patch-point output, was plugged into the RCA line input of the ADAT. Here is the first potential source of error. The balanced inputs are +4 dBu inputs, while the RCA inputs are -10 dBV inputs. There is a 12 dB difference in gain and a subsequent 12 dB difference (or more) in preamplifier headroom. Because this is the case, it is impossible to test the microphone preamps *under identical* gain conditions. This is a system-interface issue and brings to light the technical competency of the review process.

It is well known that slight differences in level and in frequency response are readily detected in a listening test. This means that the levels of the channels must be closely matched because frequency response and level differences of as little as 0.1 dB in level are clearly differentiable when evaluating broadband program material.

Many of your observed differences between the mic preamplifiers most likely have nothing to do with the mic preamplifiers' absolute performance. For example, the specified gain and frequency response of the XT is ± 0.5 dB from 20 Hz to 20 kHz, a good specification but sufficient to be responsible for audible differences between the channels in the ADAT alone.

If (as the article suggests but does not implicitly state) each mic preamplifier was assigned to an input channel and then each track sequentially laid down, then we have another set of problems in addition to the aforementioned track-to-track frequency and level balance. Specifically, it is not possible for an artist to perform the same composition exactly the same way eight times in a row. Any slight movement can alter the acoustical pickup of the microphone and hence the sonic signature. Effectively, here we have the case of using eight different sources. If this approach is employed, any technical evaluation is completely specious because the source material used in each case is different.

Different sources, different levels, and different frequency response in the ADAT will either exacerbate or mask some of the subtle tonal differences between the products in the audition process, therefore leading to false conclusions.

Lastly, the output of the ADAT XT was connected to a Mackie 16•8 console. The article suggests that the XT outputs were connected to eight of the input channels, ostensibly into the line input jacks. Of particular irony here is the fact that the line input to the 16•8 is the same mic preamp reviewed, simply with a 7.5 kΩ build-out resistor that forms a 15.5 dB pad at the input to the mic preamp. This means that each and every mic preamp auditioned passed through the Mackie mic preamp! Does it not seem strange that the very same preamp that "came out sounding bright, crisp, and a tad thin" was able to differentiate the sound of the Tube-Tech unit that sounds "musical and open with no sense of being constrained by a low ceiling" or, as in the case of the A.R.T. Dual MP, produced the "warmest, fattest sound of the mic preamps that we tested"? How does one reconcile these findings that are diametrically opposed?

In the conclusion of the article, the author acknowledged that the testing was "admittedly limited and subjective" and that they (the mic preamps) "don't sound all that much different, either." Unfortunately, the adjectives used in the body text of the article are what stick with the average reader. If the published conclusions and opinions of such a review are not done under controlled conditions (including double-blind testing), then you have done your readers a disservice.

Cal Perkins
Vice President of Technology
Mackie Designs Incorporated
Woodinville, WA

Cal—To offer our readers real-world evaluations on how gear performs under the pressure of actual sessions, we assess recording products the same way any professional engineer would: he or she sets up the choices, matches the signal levels, and listens. *(I haven't met an engineer who does "double blind" testing during a recording session.)*

The intent of our mic preamp face-off was to show that tonal differences between high-end and low-end models are often very subtle. If anything, the tests proved that you can do marvelous work with a Mackie onboard mic preamp and that you certainly do not need a $2,000 outboard mic preamp to make excellent recordings. As a vast number of home recordists own Mackie consoles and are familiar with the sound of the onboard mic preamps, it made sense to employ the Mackie preamp as a "baseline standard." The subjective comments about the Mackie preamp should only be considered

DAVID BALL

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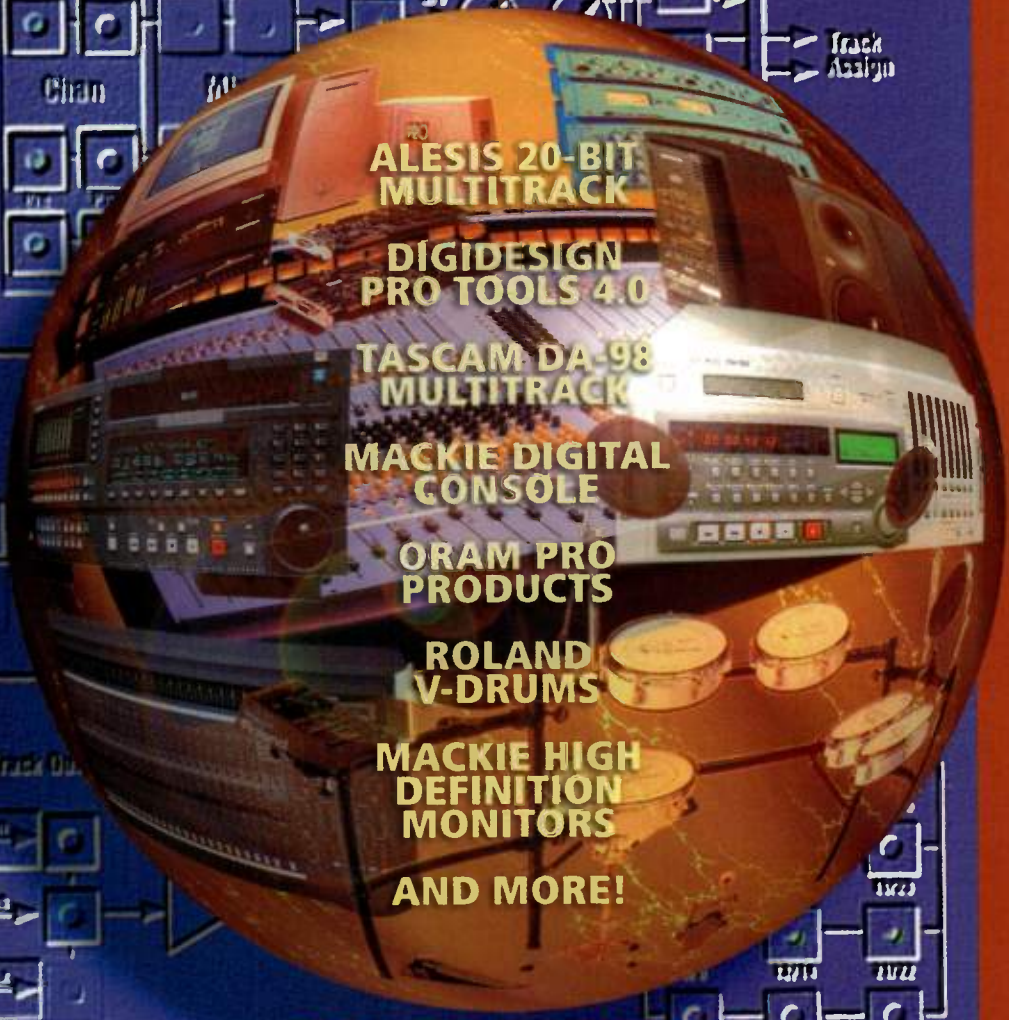

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as compared with *the sound of the other models. The article took pains to make this critical point very clear. We did not mean to imply that Mackie preamps sound thin. Our previous tests of the 8•Bus series, in fact, lauded the preamps as "transparent."*

Please be advised that our evaluation methods—allowing for the fact that these were real-world tests rather than bench tests—were set up to ensure consistency. Signal input levels were matched as closely as humanly possible. We also evaluated complete performances by the artists (rather than brief snippets) to minimize the chance that slight fluctuations in dynamics would hamper our ability to discern timbral differences between the preamps. In addition, although we did record these performances to an ADAT XT, Dan Tinen, Director of Technical Specifications at Alesis, says that most XTs exhibit no frequency anomalies from track to track and in fact spec out at ±0.2 dB from 20 Hz to 20 kHz. (We also critically listened to the live performances before *they were recorded to the ADAT.) Finally, we did not connect the outputs of the ADAT to the Mackie's line inputs. We returned the signals using the console's dedicated tape returns. It's true that there is an op amp in the tape-return signal path, but according to Mackie tech support, it is simply a level-matching amp (switchable between +4 dBu and -10 dBV) and not equivalent to a mic preamp.*

Once again, if any conclusion is to be gleaned from "Rich Man, Poor Man" it should be that expensive mic preamps are not the holy grail of audio. Our tests found that most of the timbral differences between high-end preamps and low-end preamps are extremely subtle. The end user must decide whether those subtle differences are worth the additional thousand dollars or more.—Michael M.

WELL GROUNDED

I operate a small home studio. I recently bought a Samson MPL2242 mixer and a Mackie Mixer-Mixer. My problem developed once all my units were hooked up. I am experiencing what I think is a ground loop problem associated with my computer's monitor. When I unplug the monitor from the wall outlet, the buzzing sound stops. This is a major problem because my studio is computer based. I cannot run my studio without the monitor and the CPU. And I cannot mix with this annoying buzzing sound. Can you please help me?

H. Hall
13105@aol.com

H.—The buzz is probably not a ground loop; ground loops usually sound like 60 Hz hum. It is more likely that you are getting electromagnetic interference (EMI) from the coil on the back of your computer monitor. If your monitor is located near unshielded or poorly shielded speakers or audio cables, the result can be the symptoms you describe.

The first level of defense is obvious: Assuming your speakers are not shielded (many are not, especially older models), keep your computer monitor and speakers as far apart as possible. Keep audio cables well away from the computer monitor, too.

It also is possible that you are getting EMI and/or radio-frequency interference (RFI) in your main AC power. If so, this interference can be filtered out with a power conditioner that offers RFI and EMI filtering. There are many such products available; just check with any manufacturer of multi-outlet power conditioners, such as Tripp

In the words of the reviewers:

"...All you really need to know is that it is a Lexicon, it sounds as good as the name implies and it is affordable. Now go buy one."

Roger Nichols, EQ Magazine

"I highly recommend that you get your hands on one of these units and check it out for yourself. Even if it doesn't change your musical life...I'm sure you'll agree that the MPX 1 is simply stunning. It offers outstanding effects and a brilliant user interface at a reasonable price."

Barry Cleveland, Mix Magazine

"It beams with intelligence and shimmers with outstanding sound...an excellent choice for live and studio applications."

Jon Chappell, Guitar Magazine

"...they'll have to pry it out of my cold, stiff fingers."

Jim Aikin, Keyboard Magazine

The MPX 1 — get your hands on one today.

circle #563 on reader service card.

Lite, Furman, Juice Goose, MidiMotor, Equi=Tech, and American Power Conversion (APC). Put your computer monitor on a separate outlet (on the multi-outlet power conditioner) from your audio gear.

While you're at it, consider getting an uninterruptible power supply with filtering and voltage regulation for your computer system. That way, if your power fails, the UPS gives you power for long enough to save your files and properly close down your computer. The voltage regulation smoothes out sags and spikes, delivering the proper amount of juice. For more on this subject, see this month's "Square One" column on p. 124.—Steve O.

WHAT'S NEW WITH WIN 95

Everything I know about sound production and recording I learned from **EM**. The first piece of rack gear I bought was a patch bay—the benefits predicted in your "Square One" column have all come to pass as I've amassed additional gear. Every piece of gear has been chosen based on reviews in your magazine. I have no qualms about throwing all my eggs in this basket.

Consequently, I've avoided upgrading to Windows 95 based on timing problems described in Charles Brannon's August 1995 article, "Windows 95 Preview." I've not seen any updates or assurances from your writers (or letters to the editor) that these problems have been resolved (perhaps I missed something).

Have the timing problems been resolved, and if so, what additional upgrades can I expect to make? I'm running *Cakewalk* 4.5 (5.0 for Win 95 is on the CD), a Roland RAP10, and a Midiman 4×4 on a Pentium 60 with 16 MB RAM.

Karl Henning
kbennet1@aol.com

Karl—The article that you refer to was written when Windows 95 was still in its infancy and a few nagging compatibility issues remained. The operating system is now much more mature, as are most of the music software programs that run with it. Early problems with drivers and questions concerning multitasking have been largely resolved; so now is as good a time as any to make the switch to Win 95: it's stable, versatile, and easier to use.

As far as upgrades go, you can run Cakewalk *5.0 on your current system, but according to* Cakewalk Music Software, *you'll only get about four to six tracks of audio and no real-time audio effects processing. I suggest upgrading to version 6.0, which makes better use of Windows 95 and supports DirectX audio plug-ins. I also recommend upgrading your CPU to at least a Pentium 100 and increasing your RAM to 32 MB or more, if you can afford it.—David R.*

A THANK YOU

I was impressed by your courage to publish the article on the musical aspirations of prisoner Bobby BeauSoleil, profiled in your June 1997 issue ("Jailhouse Rock"). It is a great story, and I cannot recall another article like it.

Name witheld by request

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.*

There's lots of hype these days about PCI digital audio recording systems. Companies spend a ton of money on advertising, claiming future support by a myriad of different software companies. What are we supposed to do? We need instant solutions! Our projects are due now not "soon".

Emagic, known for it's integrated professional MIDI, Digital audio and Scoring software has created a cross-platform, PCI busmaster digital audio recording card with 8 discrete outputs for less then $800: Audiowerk8. Since the product's launch last Spring, thousands of users worldwide have attested to the incredible ease of installation and use and the warmest analog to digital conversion in the business. The Audiowerk8 works on both Windows and MacOS computers just like Logic Audio, the sequencing software it was designed to work with from the start.

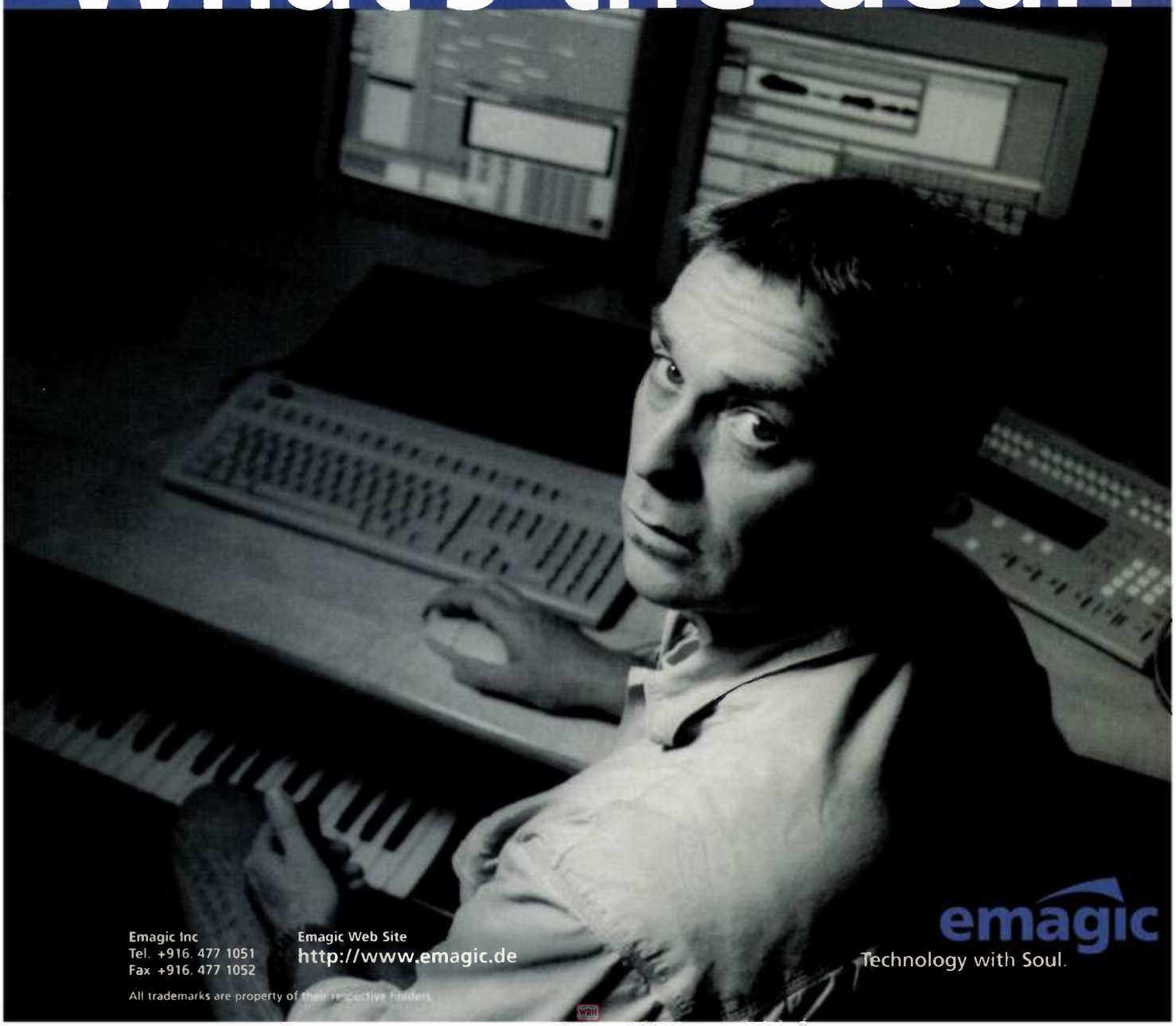
Version 3.0 of this award winning music production tool now offers a rich compliment of real-time DSP effects such as Equalizers, Filters, Reverbs, Chorus, Flangers and Delays with up to 8 inserts and sends per track, depending on

There's a whole slew of new features such as: punch in on the fly, cycle recording, contiguous synchronization of audio to MTC and much more. You can even use 2 Audiowerk8 cards and get a total of 24 physical audio tracks and 16 outputs.

Rather than calling a dozen companies to get a technical issue resolved, make a single call to a single source and get back to work. Compatibility and support problems become a thing of the past.

So what's the deal? Logic Audio & Audiowerk8, true integration, guaranteed compatibility, professional results. See your dealer or give us a call. The choice is simple. One company, one complete solution.

What's the deal?



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WHAT'S NEW

By the EM staff

▲ EVENT EMP-1

Outboard mic preamps are increasingly popular. In fact, the last time we counted, there were at least 47 companies making them. Event Electronics has joined the crowd with the EMP-1 ($299), a ½-rackspace, monaural mic preamp. The unit includes several features for ensuring low noise, such as a transformerless design, wide-bandwidth differential input and output, special circuitry for suppressing radio-frequency and electromagnetic interference, and an internal, toroidal power transformer.

The diminutive EMP-1 is housed in an arched-top, extruded-aluminum case. The front panel provides switches and LED status lights for low-cut filter, phase reverse, and phantom power as well as signal-present and clip LEDs. A rotary control provides continuously variable input gain from 20 dB to 60 dB. The unit's rear panel has balanced XLR input and output connectors, a balanced/unbalanced ¼-inch output connector, an on/off switch, and an IEC power-cord receptacle. Frequency response is rated 5 Hz to 60 kHz, S/N at 122 dB, and THD at 0.02%. Event Electronics, Inc.; tel. (805) 566-7777; fax (805) 566-7771; e-mail info@event1.com; Web www.event1.com.

Circle #401 on Reader Service Card

▶ YAMAHA QY70

Yamaha's new QY70 ($599.95) updates the QY line of portable music sequencers, adding compatibility with the company's XG MIDI format. This hand-held unit (7⅜ x 4⅛ x 1 1/16 inches) features a 2-octave minikeyboard and 128 x 64-dot graphic LCD. The unit is 32-note polyphonic and 24-part multitimbral, and its 4 MB of ROM hold 519 AWM2 voices and 20 drum kits. The QY70 also has three effects blocks with eleven reverbs, eleven chorus programs, and 43 variation effects.

The QY70 has a 480 ppqn resolution, 20-song, 32,000-note sequencer with sixteen linear tracks and eight phrase tracks. You can record in real or step time from the built-in keyboard or via MIDI and then edit by song, measure, track, or event. More than 4,000 preset phrases, including drum and percussion loops, bass lines, and a variety of instrument riffs, are stored in ROM. There are also 128 preset Styles, each with six sections (intro, main A, main B, fill AB, fill BA, and ending), and there is RAM for 64 user styles.

An Auto Bass Chord feature provides automatic accompaniment according to chords you supply or using preset chord progressions in a variety of musical styles. You can apply nondestructive Groove Templates that change the timing and Velocity of playback without changing the original data.

In addition to MIDI In and Out, the QY70 has a serial Mac/PC interface and includes *QY Datafiler* software for both platforms that lets you save and load data to a computer's hard disk and transfer SMFs in both directions. There's also an ¼-inch stereo out. The unit is powered by six AA batteries or an optional wall-wart AC adapter (model PA-3B; $18.99). Yamaha Corporation of America; tel. (714) 522-9011; fax (714) 739-2680; e-mail info@yamaha.com; Web www.yamaha.com.

Circle #402 on Reader Service Card

▼ KRK ROKIT

Following on the success of their unusual-looking K•RoK monitors, KRK announces the release of the RoKit (pronounced "rocket") Personal Shielded Monitor ($329 pair). Based on a new, lower-cost driver design, the RoKit is a passive, 2-way, shielded monitor system that is aimed at first-time and budget-conscious buyers. It features a 1-inch silk-dome tweeter and 6.5-inch, polyvinyl long-stroke woofer inside a trapezoidal cabinet with the same gray, custom-texture finish used for the K•RoKs.

The monitors are rated at 75 watts RMS and exhibit a frequency response of 69 Hz to 24 kHz (±3 dB). The crossover is positioned at 1.5 kHz and sensitivity is 91 dB (1 watt @ 1 meter). Maximum sound pressure level is rated at 104 dB (nominal impedance 8Ω). Group One, Ltd. (distributor); tel. (516) 249-1399 (east) or (310) 656-2521 (west); fax (714) 375-6496; e-mail sales@krksys.com.

Circle #403 on Reader Service Card

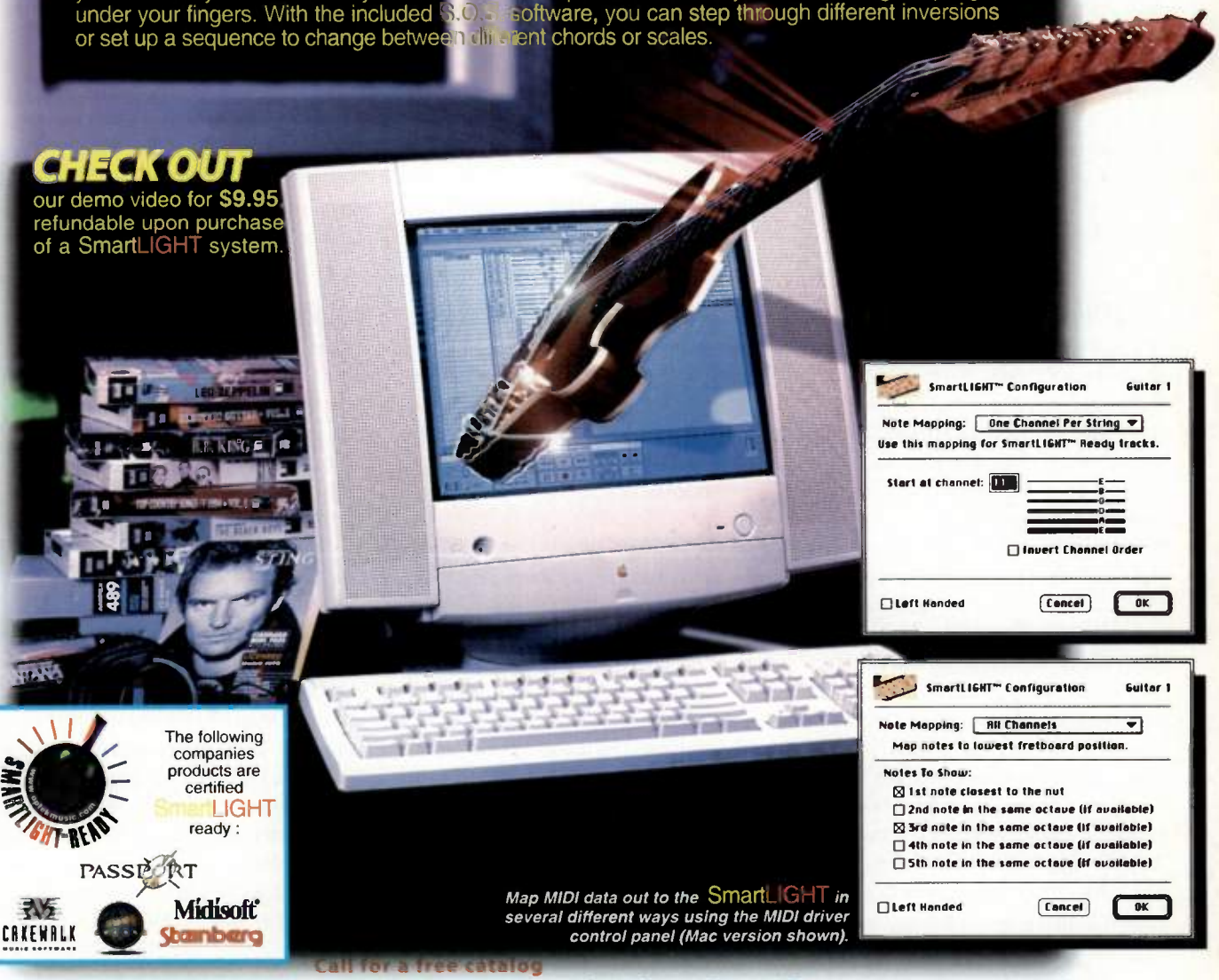
WE'RE BREAKING THE RULES...

...so that you can play those awesome guitar riffs and songs, note for note, without using tablature or sheet music. Hear AND see SmartLIGHT ready™ songs by artists such as Eric Clapton, B.B. King, Carlos Santana, Rush, Sting, Fleetwood Mac, Bob Marley, and hundreds more! By using your favorite MIDI sequencer, you can assign any track to play on the SmartLIGHT™ Guitar. Slow down the tempo WITHOUT changing pitch, repeat and loop difficult sections, mute individual instruments- Use all the power of your MIDI sequencer!

...so that guitar teachers can teach guitar more effectively than ever before. By using a MIDI guitar connected to a computer (PC or MAC) with the MIDI thru "on", and a student having a SmartLIGHT guitar, the teacher can play notes or chords on their guitar while the student watches them light on the SmartLIGHT. Very powerful. Now teachers, imagine connecting up to twenty students on one computer. Extremely powerful and efficient.

...for all of you players out there that are stuck in a rut, using the same chords and scales, year in and year out. Now you can learn new patterns instantly. See them light up right under your fingers. With the included S.O.S. software, you can step through different inversions or set up a sequence to change between different chords or scales.

CHECK OUT
our demo video for **$9.95**
refundable upon purchase
of a SmartLIGHT system.



Map MIDI data out to the SmartLIGHT in several different ways using the MIDI driver control panel (Mac version shown).

SMARTLIGHT-READY

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circle #576 on reader service card

▲ LEXICON STUDIO

With the introduction of the Lexicon Studio ($3,000 for the core system; prices for options and components tba), Lexicon has joined the world of project-studio hard-disk recording. The heart of the system is the Core-32 PCI card, which routes up to 32 channels of 24-bit input or output. The Core-32 also provides DSP power and 2 MB RAM to take the strain off your system's processor. Serving as clock master or slave, the Core-32 distributes digital clock signals to the rest of the system. An onboard variable-rate oscillator is included for solid synchronization to external time code. A 24-bit, 29-channel bus connects the Core-32 to other cards in the Lexicon Studio system.

Two rack-mount I/O interfaces are available. Both employ 20-bit A/D and D/A converters with either 44.1 or 48 kHz sampling rates. The LDI-12T has two channels of analog I/O on balanced XLR connectors that accept +4 dBu signals. Two RCA inputs are also provided for -10 dBV signals. Two channels of S/PDIF I/O are available on RCA and optical connectors, and the latter also accept ADAT Lightpipe signals. There's also a balanced XLR input for LTC and a 9-pin connector for Sony 9-pin serial control.

The LDI-16S features sixteen simultaneous I/O channels. The base version has eight channels of analog I/O on balanced XLR connectors (operating at +4 dBu) and a 25-pin connector for TASCAM TDIF signals. The AES-8 option adds eight channels of AES/EBU I/O on balanced XLR pairs, and two RCA jacks let you substitute S/PDIF signals for one pair. The ADT-8 option adds optical connectors for ADAT Lightpipe signals and ADAT sync in and out. The STC-1 sync option reads and generates LTC and VITC. It can lock the system to house sync and create a time-code window on its video out, and it provides eight programmable triggers on an RS-232 general-purpose interface.

The PC-90 daughtercard adds Lexicon's famous reverbs to the system. Using the same engine as the PCM 90, the PC-90 gives you six stereo dual-reverb algorithms and 100 new presets with custom software controllers. The card's two stereo pairs of ins and outs are available via the Core-32's routing matrix.

The Lexicon Studio system is designed to allow expansion to a total of eight cards, one or two of which may be Core-32s and the rest PC-90s or other cards that are not yet available. The system is currently supported by Steinberg's *Cubase VST* for Mac and Windows. Lexicon; tel. (617) 280-0300; fax (617) 280-0490; e-mail info@lexicon.com; Web www.lexicon.com.

Circle #404 on Reader Service Card

▼ SYMETRIX 562E

Gates can provide the silence you want between signals, but they can be difficult to set due to the unpredictability of organic sound sources (drums, vocals, etc.). Also, they may sound unnatural or even introduce unwanted sounds while opening and closing. To address these concerns, Symetrix presents the 562E Windowing Expander/Gate ($579), a dual-channel, 1-rackspace unit designed to smoothly handle the inconsistencies of natural audio waveforms.

The 562E does its thing via two new, proprietary features: AutoWindowing and Window Advance. AutoWindowing is a dynamic smoothing process. By deriving the trigger signal from the "time center" of the waveform's leading edge, AutoWindowing reduces pops, clicks, and other distortion commonly associated with fast-attack settings, resulting in a more natural-sounding envelope. It also attenuates the signal smoothly and continuously at the end of the release cycle, eliminating the artificial-sounding "drop off" that may occur with gates.

Window Advance is a detection system designed to see even the fastest attack transients. By subtly delaying the signal (the switch offers three settings: Min, Max, and Off), it allows the gate to open slightly ahead of the signal, thereby passing the entire leading edge of the waveform and eliminating the chopped-off waveforms and coloration that plague conventional gates.

Each channel on the 562E provides rotary controls for threshold, attack, hold, and release. A fifth knob provides control of gate range (maximum 80 dB) when turned counterclockwise and control of expansion ratio (maximum 1:3) when turned clockwise. (The center detent setting, marked "0," is equivalent to Bypass.) This design allows for identical threshold-control calibration for both gating and expander functions. A 4-LED ladder monitors gain reduction (maximum 20 dB in expander mode) on each channel.

Sidechain sections offer frequency-control knobs for low- and high-cut shelving and an output-assign switch that toggles between key listen, filter, and expander/gate settings. The 562E's rear panel provides balanced XLR and unbalanced ¼-inch I/O and external key inputs for both channels. The unit has an internal power supply with detachable cord. Frequency response is rated 10 Hz to 40 kHz, dynamic range at 112 dB, and S/N at 94 dB. Symetrix, Inc.; tel. (800) 288-8855 or (425) 787-3222; fax (425) 787-3211; e-mail symetrix@symetrixaudio.com; Web www.symetrixaudio.com.

Circle #405 on Reader Service Card

What software offers 32 tracks of simultaneous digital audio, 128 real-time digital EQs, eight real-time DSP effects including reverb, 24-bit open plug-in architecture, multi-I/O and runs on both MAC and PC?

NONE.

Until now.

Introducing Cubase VST

Cubase VST is a fully-featured music production system incorporating MIDI sequencing, scoring and audio processing that requires no additional hardware. VST also supports multiple I/O with AudioMedia III,™ Korg™ 1212 I/O, Lexicon Studio and others.

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Virtual Studio Technology

Its open plug-in architecture gives you access to the most advanced real-time plug-ins available, including Spectral Design,™ Waves,™ Arboretum,™ and ProSoniq,™ just to name a few. Cubase VST. The future's sounding better all the time.

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To download a demo program, visit our website at http://www.steinberg-na.com or call Steinberg for a free CD-ROM demo.

circle #595 on reader service card

NAMM REPORT: Great, But Can They Model Jack Daniels? ▲ ▲ ▲ ▲

If you had told me that a couple of new DSP modeling–based synthesizers would be the most interesting products at the 1997 Summer NAMM show in Nashville, I'd be convinced you were hitting the old Jack Daniels a bit too hard. Yet at an otherwise undistinguished show that featured lots of nice products but few that were downright exciting, two synths stole the show, at least from my point of view.

The number one attraction was Korg's new Z1 ($2,600; Korg USA; tel. 800/645-3188 or 516/333-9100; fax 516/333-9108), a 12-voice polyphonic (expandable to eighteen voices) DSP-based synth with a 61-note, Velocity- and Pressure-sensitive keyboard. A nifty *x-y* vector touchpad and more conventional pitch and mod wheels, knobs, and assignable switches and pedals provide extensive real-time control. The synth, which should be available by the time you read this, includes a PC card slot that lets you save user Programs and Multis on PC flash-ROM cards, and there is an ADAT interface option.

The Z1 incorporates Korg's Multi-Oscillator Synthesis System (MOSS) synth architecture, which is based on Korg's OAsys development platform, a modeling-based supersynth described in the April 1995 "What's New" but never released to the public. In the Z1, the architecture provides thirteen types of oscillator algorithms, including imitative models (brass, plucked string, bowed string, reed, etc.) and synth models such as Variable Phase Modulation synthesis, cross modulation, ring modulation, and more.

Korg's innovative Z1 synthesizer

You get five types of filters, including a bandpass type with two simultaneous center frequencies, and can use two filters per voice. Dedicated knobs control filter cutoff, resonance, envelope-generator intensity, and the filter and amplifier envelope ADSR values. The synth also has polyphonic portamento and four LFOs, which can be synched to MIDI Clock.

You can further enhance the sound using stereo insert effects (the usual flavors) and stereo master effects with real-time control, plus a 2-band EQ for each Program. The polyphonic arpeggiator, which syncs to MIDI Clock and can be controlled via dedicated knobs, should be very popular with the techno crowd.

The architecture on this baby is extremely impressive. I was especially thrilled that you could have models interacting with other models in this synth; I haven't seen this before. This is going to be a killer sound-design tool, and I think it was easily the most innovative and exciting product at the show.

The other DSP-based synthesizer that caught my attention was Clavia's Nord Modular (distributed by Armadillo Enterprises; tel. 800/793-5273 or 813/796-8868; fax 813/797-9448; e-mail armadillo@packet.net; Web www.armadilloent.com/music), which models a modular analog synthesizer. One of the cool things about this 4-part multitimbral synth is that you program it using object-oriented Windows 95 software. As of this writing, Clavia is seeking a programmer to write a Mac version. The synth should be shipping by the time you read this.

You create up to four independent virtual "analog" synths onscreen by dragging "patch cords" between any of more than 70 "modules" that represent "voltage-controlled" oscillators, filters, amplifiers, gates, sample-and-hold, and a long list of modulation sources. Clavia plans to release more modules, which should be easy to add considering they are software objects. There's plenty of DSP power in this thing, and you can create some very complex patches. You can even morph between four different parameters in a patch. And the user interface looks like

Clavia Nord Modular software front end

an awful lot of fun! Polyphony varies from four to sixteen voices, depending on the patch, and can be doubled with an optional expander.

The Nord Modular is available as a 4U rack-mount module (price tba) or with a 2-octave Velocity-sensitive (but not Pressure-sensitive) keyboard (price tba). It has four independent audio outputs, one for each part, and two analog inputs that allow it to process line-level signals. The patches can be stored in onboard memory, and you can edit from the front panel using eighteen knobs, so you aren't tied to the computer. In addition, all editing parameters can be MIDI controlled. I didn't get a chance to properly audition this thing, but I love the Nord Lead sound, and I anticipate the Nord Modular will sound great.

AGAINST ALL ODDS

This year, for the first time since its move to Nashville, the summer NAMM show expanded beyond the friendly confines of the Nashville

Create killer vocals

Jon Anderson/YES

©Roxi Cook

Imagine creating the harmony styles of your favorite singers instantly and automatically. Imagine correcting the pitch of a vocal track and saving time with automatic doubling. Now, imagine creating your own virtual vocal group that sings exactly what you want.

Imagine no longer. From the leader in vocal harmony technology comes the **Vocalist Work Station.**

It's easy to use. We put the controls up front where you can get to them quickly. And the sleek desktop design allows you to make level and reverb adjustments on the fly.

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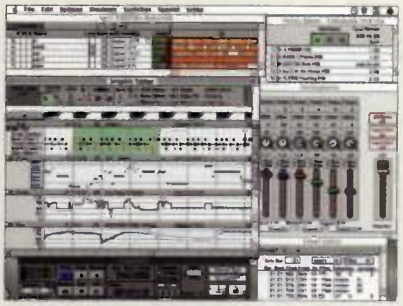
NAMM REPORT: Great, But Can They Model Jack Daniels? ▲ ▲ ▲ ▲

Convention Center and invaded the turf of the new Nashville Arena. The two buildings are connected by a convoluted pedestrian tunnel.

This NAMM invasion, however, was somewhat like Robert E. Lee's first invasion of the North, which ended with the Battle of Sharpsburg (Antietam). It looked like a good idea at the time, and it had its moments, but it turned out to be rough going for the invading horde, culminating in a stalemate at best.

As showgoers emerged from the tunnel, just before the doors to the arena,



Cakewalk Music Software *Metro* (Mac)

they reached a small room on the left side that held the software companies.

I wandered into the software ghetto, thinking I would see the usual suspects. Then came the shocker: *Wait a minute! What the heck is a big MacOS logo doing in the Cakewalk booth? Why is this leading Windows digital audio sequencer company sharing its booth with the* Metro *sequencer folks? Oh my, it looks like* Metro *is now a Cakewalk product! This isn't real!*

Yes, it is strange but true. In an era when Windows is in the ascendancy and Apple is fighting for its life, the leading PC sequencer developer has purchased a user-friendly but aging (and never particularly hot-selling) Macintosh sequencer with no audio features except hooks that let it synchronize tightly with Macromedia's *Deck II* multitrack audio editor.

According to CEO Greg Hendershott, Cakewalk Music Software (tel. 800/234-1171 or 617/926-2480; fax 617/924-6657; e-mail sales@cakewalk.com; Web www.cakewalk.com) often receives requests for a Mac version of its flagship program. Hating to turn away business but recognizing that their engineers were not Mac programmers, the company execs decided to buy *Metro* (now in version 3.5) and, in doing so, add a veteran Mac programmer—*Metro* creator Jeremy Sagan—to the staff. The long-term plan is to morph *Metro* into a Mac variety of *Cakewalk,* retaining its Mac look and feel but enhancing it with *Cakewalk*'s high-end MIDI features. And this is just the beginning; the company plans to develop a full line of cross-platform products.

So indeed there is a method in Cakewalk's apparent madness. And as Hendershott remarked, "We like doing things people say we can't do. We did DOS and Windows products back when everyone was saying the Mac was the only place to be. Today, we're doing a Mac product at time when there's a lot of hysteria and teeth-gnashing about the Mac. I guess the one consistent thing is that we've been somewhat contrary all along."

Hendershott is backing his brave words with a brave deed, to be sure. And who am I to argue with a company that keeps proving everybody wrong?

DRAGONS BE HERE!

Few showgoers ever reached the arena because it was poorly marked and far from the main show floor. Only a fraction of the arena was in use, and the farther from the door one walked, the thinner the crowd became.

At the farthest booth to the left, Radikal Technologies (tel. 201/836-5116; fax 201/836-0661; e-mail jsk1@gramercy.ios.com) showed Quasimidi's synths for the techno crowd. Unfortunately, the techno crowd never found the booth; the only people in sight were exhibitors. Beyond the Radikal booth, the show abruptly ended at a curtain. I joked with the Radikal staff that the rest of the arena was not on the other side of the curtain; that was the end of the earth and the Eternal Pit. Dragons be here!

Unamused, the Radikals assured me that although they had no idea what was beyond the curtain, their booth at the end of the show was most certainly hell.—*Steve O.*

▶ SIGNAL TRANSPORT PROJECT PATCH

New from Signal Transport is the Project Patch TRS ($275), a 48-point, ¼-inch patch bay that's considerably less expensive than the company's original, 96-point Tiny Telephone Project Patch ($795). The Project Patch TRS features PC-board-mounted TRS front-panel jacks, with each group of eight top and bottom jacks appearing on one rear-panel, gold-plated, multipin connector. The mating cable connectors can be

stacked end-to-end for easy subdividing into any combination of 2-, 4-, or 8-channel circuits. This design allows easy reconfiguration with no need to solder, punch down, or crimp wires.

The Project Patch TRS also provides a wide range of jumper-cable options for normalling, multing, or daisy-chaining any group of front-panel jacks, again without any soldering, punching, or crimping. Connectors, wires, and jumpers are not included; they can be ordered separately or as part of a preconfigured Project Patch Studio Kit. Signal Transport; tel. (510) 528-6039; fax (510) 528-6043; e-mail sales@signaltransport.com.

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GET SMART

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Alfred Publishing has created an instructional CD-ROM based on its popular method book *Alfred's Basic Guitar Method* and featuring an interactive multimedia adventure with sound effects, video, and animation. *Guitropolis* ($49.95; Mac and Win) is organized as a game in which students explore a city, meet its inhabitants, and visit ten areas that contain lessons, songs, and exercises. Students must prove they have completed the course work by winning a game before moving on to the next lesson. It is possible to bypass the game and access the instructional materials directly.

The course material starts with types of guitars, tuning and holding a guitar, and reading music. It then progresses through 47 lessons that teach simple chords and fingering techniques and even some advance techniques such as bends, pull-offs, and hammer-ons. There are more than sixty songs with full accompaniment. Rock, blues, country, heavy metal, jazz, and folk styles are represented. A guitar tuner (tone generator), fingerboard chart, and chord dictionary are also included.

The Windows version requires an 80486DX/66 or faster PC with Windows 3.1 or later and a sound card. The Mac version requires a 68040 or higher processor and MacOS 7.1 or later. Both versions require 8 MB RAM and a 2x CD-ROM drive. Alfred Publishing Co., Inc.; tel. (818) 891-5999; fax (818) 891-2182; e-mail 70740.475@compuserve.com; Web www.guitropolis.com.

Circle #407 on Reader Service Card

OPTEK

Optek Music Systems' SmartLIGHT Interactive System uses a guitar with LEDs in the fretboard to help you learn guitar fingerings without having to look back and forth from the guitar to tablature. Complete systems, which include a guitar and either a computer interface or a stand-alone control box, range in price from $379 to $729. The three Telecaster-style guitar models, manufactured by Samick, each have 132 inlaid LEDs. The 30-A features one piezo pickup in the bridge saddle whereas the 30-B and 30-C have dual pickup systems with separate outputs for the piezo pickup in the bridge and single-coil (30-B) or Seymour Duncan humbucker (30-C) pickups. Left-handed 30-Bs are available.

The PC and Mac Connection Kits consist of a footswitch, software, and a SmartPORT interface box that connects the computer, one or two guitars, and a footswitch. The *SmartLIGHT Operating System* software lets you choose chords, scales, and notes from pull-down windows; the appropriate fingerings light up on the fretboard. You can enter your own chords and scales if the ones you want aren't in the menus, and you can link entries together into songs that play back in sequence. The footswitch turns the LEDs on and off to help with memorization.

Optek's *SmartLIGHT MIDI Driver* lets you route MIDI data from a sequencer to the SmartLIGHT guitar so you can use Standard MIDI Files to drive the LEDs. The company sells Tune 1000–brand SMFs that have been modified to ensure that the lighted LEDs correspond to correct guitar fingerings. Standard SMFs will work but may not produce accurate guitar fingerings, although the program has features to help compensate for this. The *MIDI Driver* also lets the footswitch control playback.

The Fretlight PLUS Connection Kit, which doesn't require a computer, comprises a control box and footswitch. The control box has three knobs that allow you to select scales and chords for the LEDs to display. It connects to one or two guitars and has a wall-wart power supply.

An optional SmartHUB ($89.95) lets a teacher connect up to five SmartPORTs together, allowing one footswitch and computer to control the lights on ten guitars. Optek Music Systems; tel. (800) 833-8306 or (919) 878-7997 ext. 26; fax (919) 954-8389; e-mail info@optekmusic.com; Web www.optekmusic.com.

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NESLO

Practicing music can be tough if you aren't sure when you're playing in tune. Neslo Software's *Pitch Mentor* (Win, $20) listens to what you play and displays, in real time, the nearest note and how far from it you are. The program can analyze tones from most string, woodwind, and brass instruments as well as vocals. Users can select an instrument and key signature. Notes are displayed by name and on a staff, and a pointer indicates pitch accuracy. *Pitch Mentor* requires an 80486/66 or better PC, 4 MB RAM, Windows 3.1 or 95, a 16-bit sound card, and a microphone. Neslo Software; tel. (801) 796-9445; e-mail neslo@itsnet.com; Web www.itsnet.com/~neslo.

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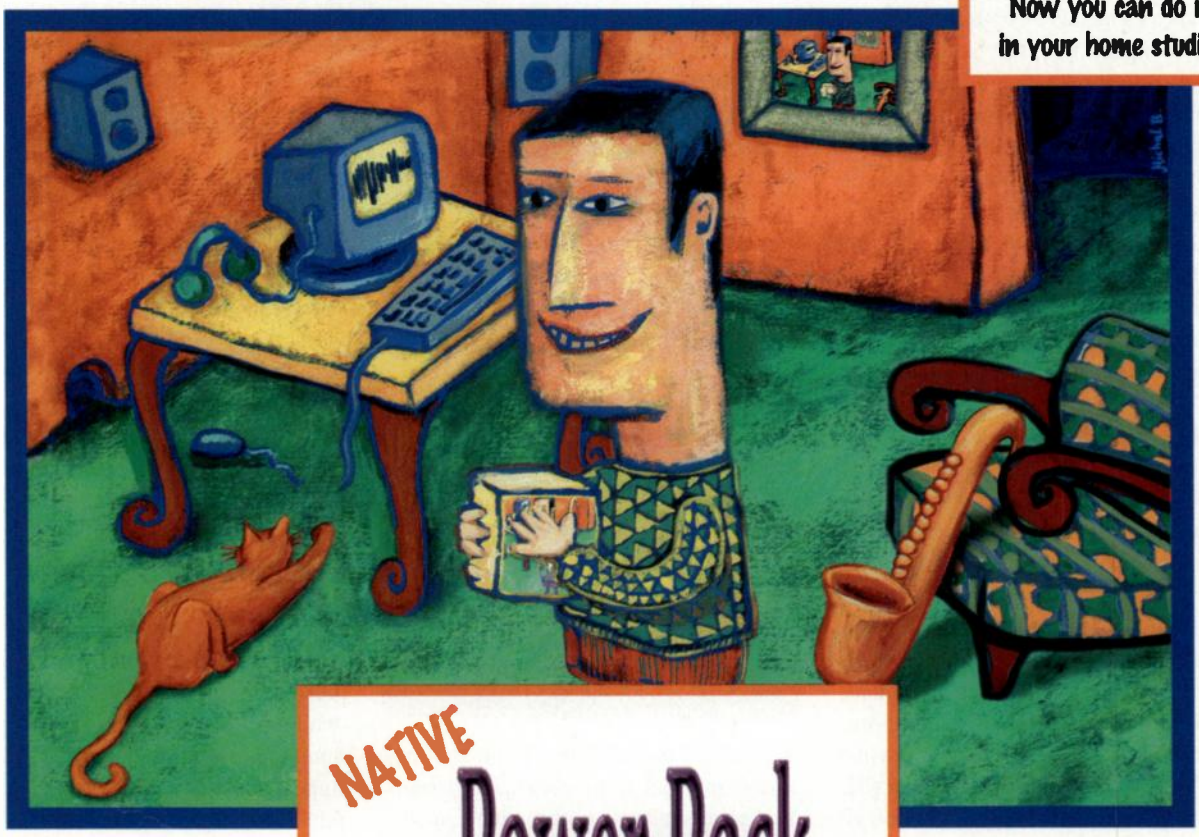

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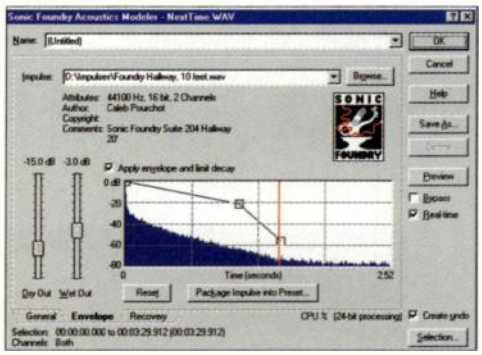
SONIC FOUNDRY ACOUSTICS MODELER

Reverb processors are primarily designed to emulate acoustic spaces. In contrast, Sonic Foundry's *Acoustics Modeler* ($249) is a DirectX plug-in that adds the acoustical coloration of real environments to existing recordings. To accomplish this, the developer has miked real acoustic spaces (such as recording studios, concert halls, warehouses, tunnels, bridges, and forests) to create an impulse response that represents the actual acoustic signatures of the original spaces. When you run your source signal through the program's processing, the program imposes the acoustic signature of the real space so that your signal sounds as if it occurred within the real space.



The *Acoustics Modeler* includes an extensive library of these acoustic signatures, including multiple miking positions within a space. An Impulse Recovery function lets users record and add their own environments. The sonic signatures of several classic mics have also been sampled.

The acoustic signatures can also be modified, with control over wet/dry mix, stereo expansion, response delay, volume envelope, and high and low shelving EQ. The program requires a Pentium PC (Pentium Pro recommended), 24 MB RAM, Windows 95 or NT 4.0, a sound card, and a CD-ROM drive. Sonic Foundry; tel. (800) 577-6642 or (608) 256-3133; fax (608) 256-7300; e-mail sales@sonicfoundry.com; Web www.sonicfoundry.com.

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ALESIS WEDGE

The latest offering from Alesis is the Wedge Desktop Master Reverb with Impulse Audition ($499), a uniquely designed multi-effects processor featuring four real-time edit/control faders and a tap/audition button. The tabletop unit's small footprint (9.5 x 6.75 x 2 inches) allows it to be positioned on top of a mixing console, guitar amp, video editor, etc., for convenient, "sweet spot" operation, and its four 45 mm sliders provide adjustment of numerous effects parameters in real time.

The Wedge provides 128 presets and 128 user programs, including a variety of hall, plate, room, gated, and "virtual stereo" reverbs as well as delay, chorus, flange, tremolo, rotary-speaker simulation, autopanning, pitch shifting, and numerous multi-effects. It also offers special effects for broadcast, multimedia, film/video, and post-production.

In addition to the four faders and Tap/Audition button, the Wedge's top panel offers a large, backlit LCD screen; a value wheel; and Edit, Bypass, Compare, and Store buttons. At the touch of the Tap/Audition button, the Impulse Audition feature emits a sound that produces every frequency in the audio spectrum, which allows users to audition and compare programs.

The rear panel provides balanced/unbalanced ¼-inch TRS input and output connectors and MIDI In and Out/Thru ports. The unit is powered by a 9 VAC wall-wart power supply. Frequency response is rated at 20 Hz to 20 kHz, dynamic range at >90 dB, and THD+N at 0.009% typical (1 kHz @ 0 dBV). The Wedge samples at 48 kHz and uses 18-bit delta-sigma converters. Alesis Corporation; tel. (310) 558-4530; fax (310) 836-9192; e-mail alecorp@alesis1.usa.com; Web www.alesis.com.

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E-MU E-SYNTH

E-mu has extended its E4 sampler line to include a complete keyboard workstation, the E-Synth ($3,995). The 76-key keyboard has the same voice architecture and external features as the E4K (reviewed in the March 1997 **EM**) but adds 16 MB of ROM sounds (expandable to 32 MB) and a more powerful sequencer. The ROM sounds include more than 700 multisamples and 260 presets. A variety of acoustic, electric, and electronic instruments are represented.

The 48-track linear sequencer features graphic cut/copy/paste editing, rechannelization, swing and input quantizing, and loop-recording functions. It can import and export type 0 or 1 SMFs.

E-mu also offers an E-Synth Rack ($3,595), which has the same external features and accepts the same expansion options as the E4X. The E-Synth sample ROM can be added to any E4 product ($495). A factory-authorized service provider must install the ROM in E4 keyboards, but the rack-mount units are user upgradeable. E-mu Systems; tel. (408) 438-1921; fax (408) 438-8612; e-mail info@emu.com; Web www.emu.com. ●

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LOREN ALLDRIN. PRO AUDIO REVIEW.

As if inventing the MiniDisc format weren't enough, Sony took that technology one step further, with the introduction of the MD Data format rewritable optical disc—the heart and soul of all four-track MiniDisc recorders. It made it possible to record digitally on four tracks instead of two, which in turn led to the creation of the MDM-X4 MiniDisc Recorder. So don't be fooled by imitations. If anyone understands the capabilities of the MiniDisc format, it's Sony.

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MAY 1997. KEYBOARD MAGAZINE.

Sony's exclusive Track Edit function allows you to edit freely over all four tracks, so you can combine the best parts of a multi-track recording to create the perfect take. And with MixWrite you can continually mix four tracks down to one or two, freeing up the third and fourth for additional recording. But best of all, you can use Track Edit to make a digital backup of each track, allowing you to complete as many mix downs as you want, without losing any of your original elements. Listen to the experts, without Sony's exclusive individual track editing you'll be settling for a lot less than the MD format has to offer.

"THE SOUND (OF THE MDM-X4) IS ALMOST AS GOOD AS DAT, AND LIGHT YEARS AHEAD OF CASSETTES."

CRAIG ANDERTON. EQ MAGAZINE.

Sony's MDM-X4 uses version 3.5 of ATRAC, the latest generation MiniDisc technology. It improves the resolution of mid-range sounds and expands the dynamic range even further, so the music you record will stay true to your original performance. And what's more, version 3.5 delivers sound that's as close to DAT as you can get in an MD multi-track. It simply blows away the old cassette based four-track machines, not to mention some of the toughest critics in the business.

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MiniDisc MD DATA

SONY

PRO FILE

Digital Atmospherics

Kenneth Newby conducts Opcode's MAX.

By Diane Lowery

Its power to arrange and manipulate vast "orchestras" of sounds makes the sequencer an incredibly useful tool. But sequencers typically can only play back what you program into them, and according to Kenneth Newby, hearing the same sequence over and over can sometimes be a creative straitjacket. On his CD, *Sirens*, Newby endeavored to transcend the limitations of written sequences.

"I get bored pretty fast when things such as sequences are fixed for too long," says Newby. "I like to keep the creative process fluid so that when I play my part, which always has some element of improvisation to it, I can feel like I'm playing with something that's alive."

To create this sense of fluidity, Newby used Opcode's *MAX*, an object-oriented programming environment for generating and processing MIDI data, to compose the ambient soundscapes for *Sirens*. First, he assembled the samples, including suling, piri, gamelan, didgeridoo, harp, and human voices, that would become the "pool of resources" for *MAX* to trigger. Then, he wrote a *MAX* patch (or *object*) that randomly selected samples from the pool as he played the keyboard.

"On 'Sirens I,' for example, there's a long chanting section that was composed from 128 samples of singer Patti Clemen's voice," explains Newby. "Within this pool of vocal samples, the *MAX* patch used weighted probabilities to choose from the different samples. So some samples were triggered often and others only infrequently.

"Most of the vocal samples had a very short, gating-type envelope that opened for about 300 milliseconds," he continues. "I had created a large library of these samples, and I listened to all of them before I chose the 128 that would ultimately be made available for *MAX* to trigger. *MAX*'s controlled randomness—or *stochastic*—algorithm, created a lively sequence of fixed vocal gestures with patterns that were never repeated."

Although *MAX* randomly selected the samples, Newby's keyboard performance gestures—specifically, MIDI Note On Velocity—determined the point within each sample where playback began. This was made possible by the Velocity to Sample Start feature of his E-mu ESI-32 sampler.

Inspired by shamanism, Newby uses dissonance, timbral ambiguities, rhythmic syncopation, and curious tunings influenced by Javanese and Balinese music to capture what he calls "the qualities of extraordinary states of consciousness."

"My goal was to create a sonic universe that was mediated by the human voice," says Newby. "Sirens were mythological women who had irresistible singing voices. Sailors who approached their island were so seduced by the Sirens' voices that they would run their ships aground and sink. Although the CD is certainly not as intense as the Sirens' songs, I think I succeeded in creating music that draws you in."

For more information contact City of Tribes, 3025 17th St., San Francisco, CA 94110; tel. (415) 621-1549; fax (415) 621-3924; e-mail citrpm@aol.com; Web www.cot.com; or e-mail Kenneth Newby at knewby@sfu.ca.

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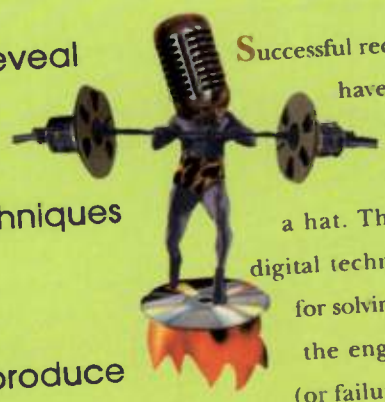
WRH

Illustration by Jaime Hogan

EXTREME *recording* Feats

Pro engineers reveal the bizarre techniques they used to produce brilliant tracks.



By Brian Knave

Successful recording engineers are a mixed lot, but one thing they all have in common—aside from good ears—is a quick mind. The fact is, you simply can't survive in this business without being able to improvise solutions at the drop of a hat. This was especially true in the past, of course, before digital technologies streamlined many studio tasks. But a capacity for solving problems is still a necessity in the control room. Indeed, the engineer's creative input often plays a role in the success (or failure) of the final product.

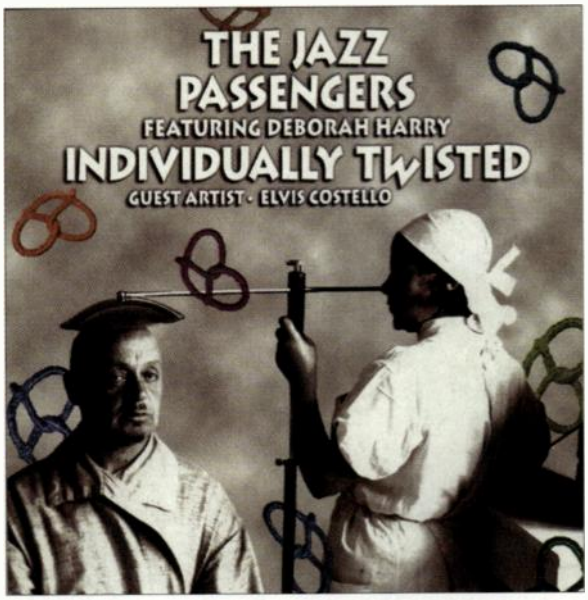
To encourage creative "sound play" in the home studio, we asked pro engineers to divulge some of the unorthodox studio techniques they used to create a particular sound or vibe on a major release. So roll up your sleeves, and check out the following anecdotes. Then find the records and listen to the tracks. You'll get not only a behind-the-board look at the engineer's creative process but also a true hands-on sense of how these unusual, sometimes ingenious applications contributed to the final mix.

JOE FERLA

Jazz engineers aren't typically known for being experimental, but in their quest for capturing unadulterated sound, they may still have to improvise on occasion—if only to accommodate the idiosyncrasies of jazz musicians. New York City–based Joe Ferla, who has recorded Betty Carter, David Sanborn, Paul Motian, John Scofield, James Carter, and numerous other jazz artists, ran into just such a situation recently while tracking *Individually Twisted* (32 Records, 1996), the latest release from the Jazz Passengers.

"Roy Nathanson, the saxophone player, really moves around a lot when he plays," explains Ferla. "One moment he'd be bent completely over at the waist, and the next he'd bend back the other way, so the horn was really flying all over the place. He was completely off the mic. I didn't want to stop him from doing his thing, of course. After all, that's the way he plays—he shouldn't have to be conscious of a mic and trying to stand still in front of it. So I had to come up with a way to mic him so he could move around and I could still capture his sound."

Of course, the obvious question here is why Ferla didn't simply attach a clip-on mic to the bell of the saxophone. "I really wanted to use a great quality mic, such as a Neumann," he says. "Unfortunately, I just couldn't put a mic up and use an omnidirectional [polar] pattern, either, because this was a jazz session with all the guys playing at once in the same space. It was a very live room with a high ceiling, and with an omni pattern I would have picked up too much of the room and the other instruments. Besides, I wanted to get as much presence as I possibly could."



Joe Ferla had to devise a wacky floor-to-ceiling mic placement to capture the "flying saxophone" of moving, grooving Roy Nathanson on the Jazz Passengers' *Individually Twisted*.

Ferla improvised a solution on the spot. "I took two microphones—Neumann U 47s in their cardioid settings—and placed them at about 90 degrees to one another, with the two capsules close together," he explains. "It was kind of like an *x-y* pattern, but with one mic pointing toward Roy's head and the other pointing toward his knees. That way, I covered his full movement. And if he did happen to be standing stationary, the two polar patterns overlapped enough that they still picked him up fine. I gave both microphones equal gain, balanced the sound properly, and combined the signals onto one track. It was something I had never done before. I had to come up with some kind of solution to the problem pretty quickly."

Incidentally, Ferla pointed out that the album was completed using no EQ or compression during the recording or the mix. "That's really the idea, if you can do it," he says. "My favorite place to work is Avatar Studios, which is the old Power Station in New York City. Those rooms are just wonderful acoustically. They sound so good that you don't have to process the heck out of everything."

THE OLD "HIDE THE VOCAL" TRICK

How do you make the best of a bum vocal track? Renowned West Coast engineer Fred Catero came up with an effect so bizarre that listeners focused on the strangeness of the effect—and overlooked the lame singing altogether.

"We were recording a Canadian group for Columbia Records," recounts Catero. "They were kids, really, just in their teens. Anyway, one of the songs was written by the drummer, and for some reason he had to sing the song himself or else he wouldn't let it be on the album. And without that song, the producer wasn't going to make his deadline.

"So we started recording the drummer singing, and the producer turned to me and said, 'This is unacceptable. This kid can't sing at all. What are we going to do?' So I went home that night and pondered it. I thought, geez, what if I play the track backwards, bounce it to another track, and add echo? Then, when we play it forward again, the echo will *precede* the voice. And then we can add a different kind of reverb afterwards, following the voice, and it will be such a freaky effect that by the time the listener gets used to the sound, the song will be over!

"Well, we tried it and it worked. The producer said, 'This is fantastic. You saved the day.' No one really gave a hoot about the singing anymore—they were paying more attention to the sound than to the singing. This was way back in the early 60s. To the best of my knowledge, it was the first time anyone ever used backwards reverb. I take credit for that one."

MARK NEEDHAM

In this day of sophisticated drum machines, who would think to record a song using the schmaltzy built-in rhythms from a Wurlitzer organ? Engineer Mark Needham did, and it gave Chris Isaak's song "Round 'n' Round" (from the album *San Francisco Days*, Reprise Records, 1993) precisely the "nouveau vintage" beat Isaak was looking for.

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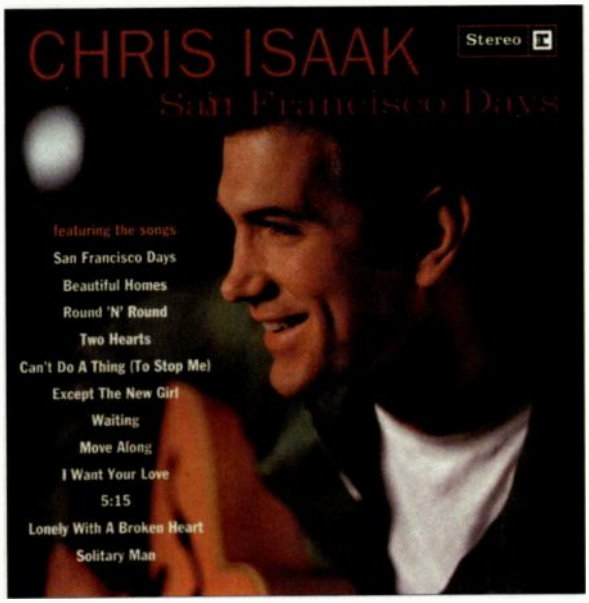
"What I did," explains Needham, "is take the rhythm box out of a Mighty Wurlitzer—the big one with the three tiers of keys—and hook it up to a control-voltage-to-MIDI converter. That way, we could use the electrical pulses from the rhythm box to trigger some sampled drum sounds. We wanted that hokey little rhythm feel from the Wurlitzer, "Swing II" or whatever it was called, but with the sound of real drums. Actually, we ended up using some of the Wurlitzer sounds, too, such as the steam hi-hat sound. That really lent the tune a nice retro feel."

To extend the roller-rink vibe, Needham sought out a unique guitar from the same era. "We weren't getting a screwy enough guitar sound, and we wanted something that complemented the Wurlitzer beat," he says. "So we ended up buying one of those old Sears Silvertone guitars with the built-in amp and 3-inch speaker inside the guitar. We miked the little speaker and also took a direct out from the little amplifier—I got inside, unwired the thing, and ran a direct off the amp. Those two signals mixed together gave us a really screwy guitar sound for that song. It worked perfectly with the Mighty Wurlitzer drum beat."

REVIVING DEAD SNARES

Have you ever recorded a great drum track only to discover later that the snare sound was just too dead? Here's a technique for adding real snare buzz to a dead backbeat, compliments of veteran Nashville engineer Bil VornDick. It's not just a parlor trick, either. VornDick, who has recorded Chet Atkins, James Taylor, Doc Watson, Alison Krause, and many other artists, has used this technique on several albums, including early ones by Marty Robbins.

First, connect one end of a cable to a small (3- or 4-inch) speaker, and connect the other end to the output of a headphone amp. Tape the speaker to the top of a snare drum. Mount the drum on a stand or suspend it between two chairs so it is free standing and the snares are free to buzz. Gate the signal of the poorly recorded snare, and patch the noise-gate output to the cue-amp input. Now, adjust the gate threshold, attack, release, and output level until the amplified sound of the recorded snare causes the snares to buzz the way you want. Finally, mic the drum, and return the signal on an available input module during the mix. (To add natural reverb, put the snare drum in a hallway or stairwell—or in a bathroom, suspended over the toilet seat—and mic it with a condenser set to the omni pattern.) Bring up the fader until you hear enough rattle to energize the snare sound.



Mark Needham wired a voltage-to-MIDI converter to a Mighty Wurlitzer so that the organ's rhythm box could trigger drum samples. The cheesy groove is what drives Chris Isaak's "Round 'n' Round" on *San Francisco Days*.

ROGER NICHOLS

Until sequencers came along, a loop was precisely what the word suggests: a length of tape joined at the ends so that it would play back or "loop" continuously. The problem was, on a machine running at 30 inches per second, even a short segment of music required a considerable length of tape. This could prove unwieldy for engineers—particularly in cramped quarters.

Recording engineer Roger Nichols, known for his superlative work with Steely Dan, recalls an experience with a long loop. The song was "Show Biz Kids" on the album *Countdown to Ecstasy* (MCA Records, 1973). "Donald [Fagen] had this idea for a song that would be mechanically and repetitively hypnotic," says Nichols. "He wanted all of the rhythm tracks—guitars, keyboards, bass, drums, even the background vocals—to play the same thing over and over, with only the lead guitar and vocal changing over the top. I suggested we use a 4-bar tape loop, so when the band came in, we told them just to play eight bars. That way, we had two bars before and two after the middle four bars.

"We recorded bass, drums, and piano first. Next, I copied the tracks a bunch of times to 2-track and cut and edited all the pieces together. Then we had to listen until we found a loop that was perfectly smooth and didn't have a little hitch at the top of the four bars where the tape was spliced. We did the overdubs the same way, stacking up the parts until it was all done.

"Then it was time to make the master tape. We were using a 3M M79 24-track analog machine. So we made this loop at 30 ips, and it was so long—about 25 or 30 feet—that we had to open the door from the control room and stretch the loop out into the studio. We needed something to hold the other end of the tape, so I mounted a spare turnaround idler on a camera tripod and positioned it in the other room. We started the machine and let the tape roll around and around while we copied the tracks to another piece of 2-track tape. Finally, we put a count on the beginning of the new tape, tracked the lead vocal, guitar solo, and

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some percussion, and the whole thing was done. It was about as low tech as you could get."

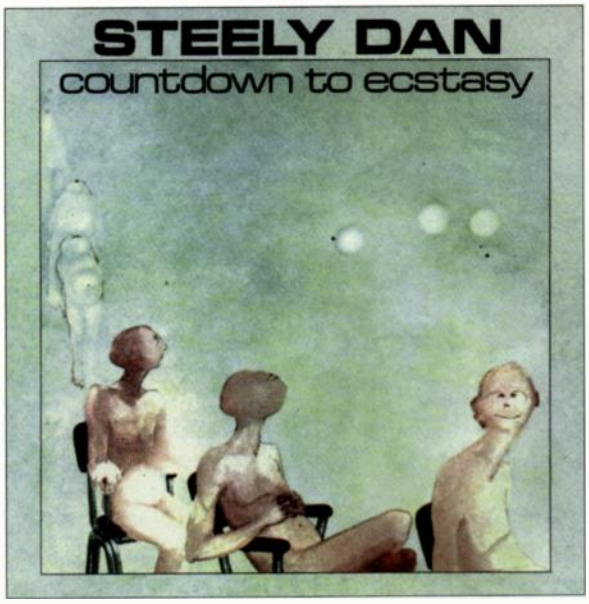
With today's digital audio workstations, of course, making "tape loops" is about as challenging as operating an ATM machine, but that doesn't mean there aren't new obstacles to overcome. In fact, each new technology seems to spawn its own set of problems. Nichols was reminded of this phenomenon recently while recording Walter Becker's solo album, *Eleven Tracks of Whack* (Giant Records, 1994). There were numerous digital hurdles to clear—including multiple sample-rate conversions and radical pitch and tempo adjustments—yet one of the more insidious problems arose from the use of sequencers. Indeed, it wasn't until guitarist Dean Parks attempted to play over a rhythm track Becker had composed in *Vision* that anyone even noticed there *was* a problem—that's how insidious the problem was.

"We printed the tracks from *Vision* to tape, and they sounded just fine," explains Nichols. "But then we brought Dean in, and he had a very hard time playing along with the first verse. That seemed strange because the second verse was easy—just one take and it was done. But even after twenty takes, the first verse never sounded as good as the second verse.

"Next, we tried taking Dean's guitar from the second verse and flying it into the first verse, but we encountered the same problem. Even though the sections were quantized and supposedly metronomically perfect, the first verse just didn't feel the same as the second. Finally, we looked at the problem with an oscilloscope and realized there was some slop coming from the sequencer. We could see, for example, that the hi-hat and kick came in at exactly the same place on one downbeat, but on another downbeat, the hi-hat was 7½ milliseconds behind the kick drum. And on another downbeat, the kick drum was 15 milliseconds behind the hi-hat.

"This is something that happens physically during playback. It's not because the sequencer isn't doing a good enough job figuring out where the notes go. In fact, it doesn't matter how good the sequencer is, how high you set the resolution, or whether or not you quantize. Apparently, it's a problem built into the Mac operating system, though you find it on machines running Windows, as well. If you record the tracks into, say, Pro Tools and zoom way in, you can see the slop. Usually it's in increments of 3½, 7½, or 15 milliseconds—very precise amounts of drift but strewn randomly throughout the measures.

"To correct the problem, we ended up having to use two digital multitrack machines. We took the second verse—the good one—and simply copied it into the first verse. We did the same with the choruses, pasting in the ones that were easiest to play to. Then we had Dean play his part again so there was some sort of human, organic flow over the top of the whole thing. This time, he did the whole song in one take."



In the days before DAWs, Roger Nichols had to use a 30-foot long tape loop to create a repetitive groove thang for "Show Biz Kids" on Steely Dan's *Countdown to Ecstasy*.

TRACKING THE JET SET

Creating good sound effects requires a kind of poetic sensibility: just as the poet uses metaphor to describe one thing in terms of another, the sound-effects artist uses unlikely sources to suggest entirely different sounds. For example, on a children's CD I produced, there's a giant flying tortoise that the characters zoom around on, and I needed a sound to represent his jet engines. We discovered a decent jet-engine patch on a Korg 01/W, but it was too "perfect" sounding—and too distant—to suggest the harrowing ride I had in mind.

I ended up using a toy balloon to add wind, sputter, and immediacy to the sound. I simply blew up a balloon, pinched the nozzle with my fingers to regulate the flow of leaking air, and aimed the stream of air to blow across the element of a large-diaphragm condenser microphone. This, mixed with the Korg patch and an occasional explosion (backfire), made for a convincing sounding jet engine while also managing to convey the windswept precariousness—and absurdity—of the situation.

Producer Tony Visconti discovered a different solution for a similar problem. He needed a jet sound for a forthcoming album by Christian Lane (Geffen Records), but the jet from his sound effects library wasn't as convincing or as emotive as he would have liked. "After an hour of experimenting," says Visconti, "we blended the sound of a Black & Decker power drill on guitar strings with the jet from the effects library and got what we wanted. The sound of electric induction from the drill nearing the Telecaster pickup really did the trick! Also, we ran the sound through a Zoom 9030 with lots of long delay."

AL SCHMITT

The late '60s was a time synonymous with experimentation. Al Schmitt, who produced four albums for Jefferson

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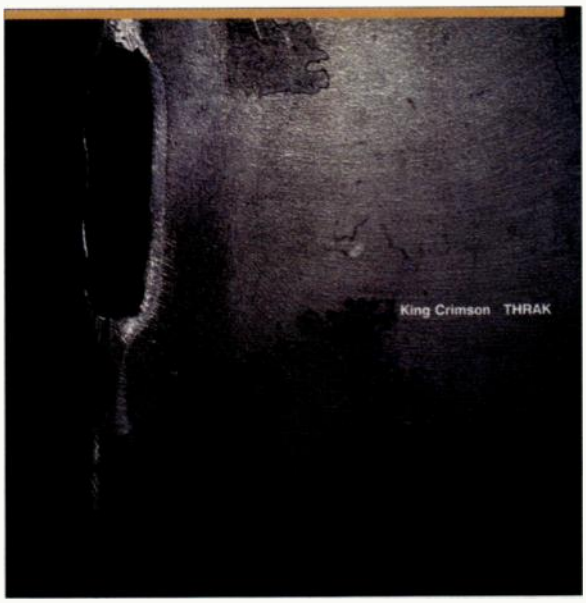
Airplane (*After Bathing at Baxter's, Bless Its Pointed Little Head, Crown of Creation,* and *Volunteers*), recalls the period fondly. "We did bizarre stuff on practically every album," says Schmitt. "For example, on the song 'The Ballad of You & Me & Pooneil' from *After Bathing at Baxter's* [RCA, 1967] we rewound the whole take during the fade. The result is that you hear the entire song go flying by in reverse while the song is fading out. It didn't revolutionize the business or anything, but at the time it was quite an unusual technique."

Creating the effect was easy enough. Using another take of the song fed from a separate multitrack machine, Schmitt played the song through in rewind mode and recorded the result onto a spare track during the section where the fade would start. Then he simply mixed that track into the final version of the song.

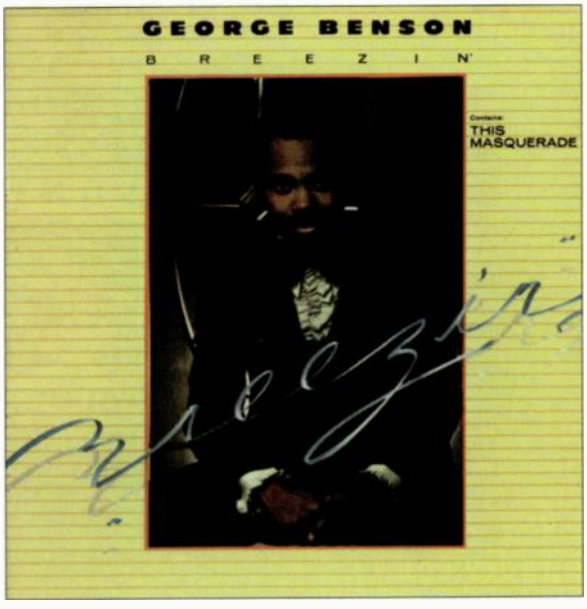
"Working with the Jefferson Airplane taught me a great lesson," says Schmitt. "I learned that there are no rules. The band members would say, 'Let's try this,' and I would answer, 'No, you can't do that,' and they would say, 'Why not?' I would be stuck for an answer, and then we'd wind up doing it. Sometimes it would work, and sometimes it wouldn't. But the point is that we gave everything a try. As you try, you learn.

"I learned the same thing again while doing a record for Henry Mancini. He wanted to make an edit from one take to another at a point where some bass flutes and French horns were sustaining. I said, 'No, you can't cut there. The levels aren't the same, plus it's right in the middle so you're going to hear the edit.' But Mancini insisted, so finally I said, 'All right.' I didn't even mark the tape. I just grabbed it, made the cut, took the other cut, put it down, put the thing together, and said, 'There.' And it was perfect. So I looked at him with a red face, and he looked at me and smiled, and that was the last time I told anyone you can't do something."



Although David Singleton used a DAW to produce sound collages on King Crimson's *Thrak*, home recordists can achieve the same effect by flying in found sounds from DATs, cassettes, and samplers.

Schmitt learned another valuable lesson while recording the album *Breezin'* (Warner, 1976), the smooth, funk-styled jazz record that won Grammy awards for both him and George Benson—including Best Jazz Vocalist award for "This Masquerade," the only noninstrumental song on the album. You would think a work that did so well for so long (it stayed at number ten on the Billboard Top 40 chart for eleven weeks) would have been recorded with the best of gear, but in fact, the vocal was tracked with an ordinary hand-held dynamic mic. "We were going to do just a rough vocal as a guide," explains Schmitt, "so I just grabbed a mic, and it happened to be an old Electro-Voice 660. Anyway, we did the recording live with all the instruments—acoustic piano, electric keyboard, rhythm guitar, percussion, and Benson singing and playing electric guitar—and got it on the first take, vocal and everything. When we listened back, it felt so good that we just left it."



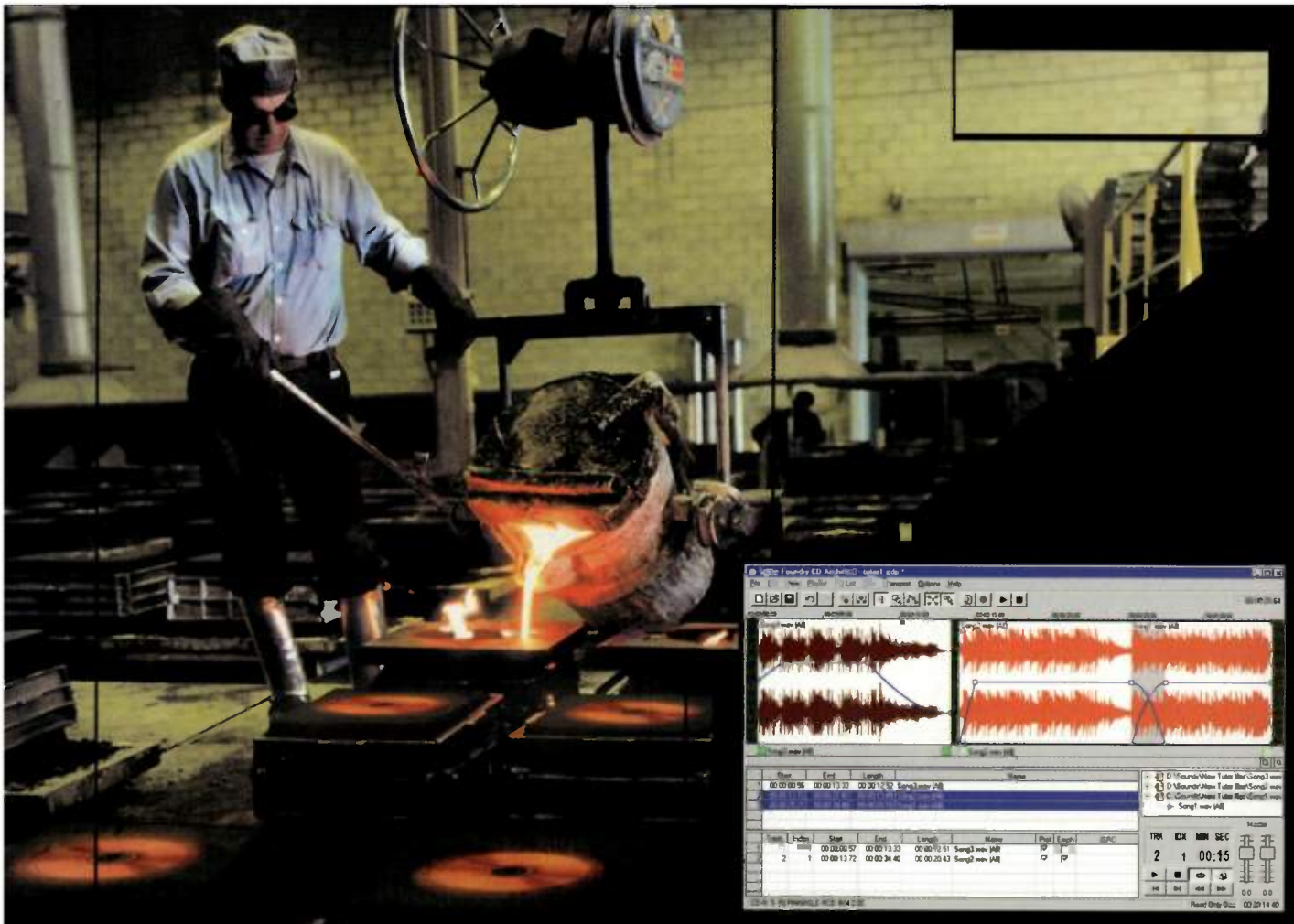
"It's not what it sounds like but what it feels like," says Al Schmitt, who recorded George Benson's Grammy-winning vocal on "This Masquerade" (from *Breezin'*) with an inexpensive dynamic mic.

The lesson here, Schmitt stresses, is that the most important part of any record is "not what it sounds like but what it *feels* like. If I had had a great mic up there, maybe the vocal track would have sounded better—but who knows if the song would still have been a hit? What people want is a good song with a good feel. I know a lot of records that sound perfect and nobody cares—except maybe the engineer and his buddies."

The other lesson, of course, is that it pays to be set up on time. "Don't let a moment go by while you're piddling around trying to find the perfect mic," says Schmitt. "If the group is ready to go, stick something up there and hit the record button. You can worry about the rest later."

DAVID SINGLETON

Known primarily for his work with King Crimson, David Singleton has also recorded the California Guitar Trio, the Orb, and Camilla's Little Secret. King Crimson is a pretty experimental band already, of course, so it's not as if Singleton is on the lookout for studio techniques to extend the group's tonal palette. Just the same, though, he finds occasion to experiment.



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On Crimson's last studio release, *Thrak* (Capitol Records, 1995), Singleton used a SADiE hard-disk system to build up collage effects. "We flew in lots of bits of Robert Fripp's soundscaping," he explains. "For example, the record starts out with a strange 'whoosh.' That was actually a half-speed backward-reverb decay from a DAT recording of a solo performance that Robert gave in Argentina back in 1994. There are many extraneous noises, built up one on top of the other like a collage, floating all over that record, most of them from various solo things Robert or Adrian [Belew] had done previously."

Singleton stresses that you don't need a digital editor for this collage technique—you can simply fly in the parts in real time from DAT, cassette, or whatever medium you like. "The most useful pieces tend to be those that sound like keyboard pads—they're just swirling guitars, floating tones, and other odd bits of music in a particular key. Once you find the right sounds in the right key, they're easy to fit into the song.

"The interesting thing is that the pieces you insert seem to pick up the tempo somehow," says Singleton. "Provided you have a song with a strong backbeat, they naturally sound as though they're fitting into the groove. Because they're not 'time conscious,' you can literally just put them where you want and, more times than not, never have to move them again."

Singleton employed a really bizarre technique for the song "Tantalizing Eyes" (S&R Cressidia, 1993) by the British pop group Camilla's Little Secret. The record, as released on 12-inch vinyl, is what Singleton calls a multigroove single. It contains three versions of the song on each side, with each version containing a different guitar solo, for a total of six versions. The unique thing is that, rather than being laid end to end, the tracking grooves for the different versions are cut side by side in the vinyl in continuously intertwining spirals. This means you can't choose which version to listen to; instead, you're at the mercy of where the needle drops. Furthermore, the single has identical labels on both sides—so you can't even choose a side A or B!

The idea came to Singleton as he tried to decide which guitar solo to use for the final mix. "I had asked [guest artist] Robert Fripp to play six solos in six different styles," explains Singleton. "Later, when I listened to the solos, I felt that all six were equally valid. So I wanted to come up with a way for the listener to hear all six. The beauty of the multigroove single is that it's like a live performance: you never know which solo you're going to get. Each time you hear it, it's different."

Producer Tony Visconti "went organic" during the recording of David Bowie's *Scary Monsters*, instructing the engineers to mic the stairwell at New York's Power Station to create natural reverb.

The only hitch was that Singleton had to attend the record-cutting session to ensure that the cutting engineer did the job correctly. "It's basically a trial and error process," recalls Singleton. "The engineer sets the gap between the spirals to be as large as possible and then makes one pass onto the master. He then places the needle at the very beginning in the gap of the first spiral and does it again, making sure it doesn't jump over into the other groove. Then he does a third pass. After the master is done, you just take it off to the pressing plant, and it's no further problem."

Singleton is pushing for King Crimson to release their next album on CD-ROM so they can employ the same idea, only applied much more extensively. "The problem is that recording technology has saddled us with the notion that a song is fixed," says Singleton. "This causes people to get too hung up on one 'final' version of a song. But with the CD-ROM approach, there could be several different vocal takes, guitar solos, bass lines, and even drum fills, all against a common backbeat. If the

GLOBAL DRONING

Don't have a collection of world instruments available to add tonal colors to your productions? No problem, just improvise. Tony Visconti often "emulates" a tamboura (the four-stringed Indian instrument used to create the buzzing, background drone in East Indian classical music) with an acoustic guitar and an E-Bow.

"This is one of my *big* secrets," says Visconti (knowing full well that we would publish it!). "First, tune the B string really slack, to the note you want to drone (dropping it, say, to a D). Next, tune the low E, A, and D strings accordingly so they vibrate sympathetically with the chosen drone note. Place the guitar on its back, and position the E-Bow over the B string, resting it on the high E and G strings. The B string will start vibrating almost immediately. Now move the E-Bow along the strings until you find a spot that makes a 'fizzy' buzz. The drone will sound until the battery runs out! You can go have lunch and come back two hours later, and that guitar will still be droning. Add a little flange and you have a very convincing tamboura!"

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CD-ROM were programmed to randomize regularly—say, every verse—you might have to listen to a song a million times to hear the same version twice. It would be almost like listening to a live band—different every time you hear it."

TONY VISCONTI

Like Joe Ferla, producer Tony Visconti (featured in "Anatomy of a Mix" in the July 1997 **EM**) really loves New York's Power Station. But much as he loves the main rooms, Visconti isn't one to resign himself to their confines. In fact, on David Bowie's *Scary Monsters* (RCA, 1980), Visconti had bigger things in mind—such as the 5-floor stairwell at the Power Station, which he used to create a monstrous stereo reverb.

"I had my assistant plug dozens of mic cords together so we could position one Neumann U 87 on the ground floor and another on the third floor of the stairwell," explains Visconti. "Then we pumped the sound into the stairwell really loud from the fifth floor. Lots of the guitars on *Scary Monsters* had that as their reverb."

Visconti is also fond of miking in bathrooms. "That's a great place to do hand claps," he says. "For example, we recorded all the hand claps for T-Rex's *Electric Warrior* in the toilet at Trident Studios in London. In fact, the hand-claps sounded so great that we moved [guitarist] Marc Bolan's amp into the 'gents' room, as well. The sound was incredible. Unfortunately, the merchants in St. Anne's Court didn't think so. It turns out that the air vent went straight out into the street. Trident was threatened with a shutdown because those merchants had no concept of our place in rock history!"

"A lot of records sound perfect and nobody cares." —Al Schmitt

Always on the lookout for unique solutions and bizarre studio techniques (see the sidebar "Global Droning"), Visconti recently came up with a neat way to stereo-mic a mandolin. (The track is for a forthcoming acoustic record by singer-songwriter Alex Forbes.) Visconti used two AKG C 408 clip-on condenser mics. He attached one to the pickguard of the mandolin and the other to the bill of a baseball hat worn by the mandolin player. "For the mix, I panned the mics hard left and right," says Visconti. "The mandolin appears in the center but with a lot of 'space' on both sides. It sounds great."

Assistant Editor **Brian Knave** *has added a baseball hat to his studio gear. Special thanks to Crystal Hays at The Plant.*

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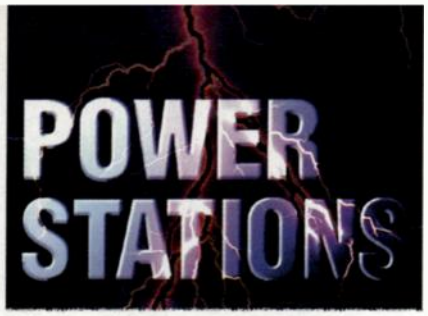
POWER STATIONS

By Stephen Webber

FOUR ACTIVE MONITOR SYSTEMS FLEX THEIR SONIC MUSCLES.

The movement to bring affordable, high-quality gear into the personal studio has embraced yet another tool that was once the exclusive domain of large recording facilities: active monitor systems. Until very recently, active monitors were priced only for the fat cats, but now these critical audio references are within financial reach of many home recordists.

Active, close-field reference monitors have become extremely popular with professional recording engineers. Big-bucks models from Genelec and Meyer Sound sit atop consoles in classy recording studios and mastering labs that demand absolutely precise frequency reproduction. In addition, many top freelance engineers and producers carry their own systems from studio to studio. Why have these monitors become so prized by the pros? Well, the active electronics and integrated components help these systems reproduce sound more accurately than passive reference monitors, and this, of course, means that the engineer can hear extremely subtle tonal nuances and make more educated recording and mixing decisions. Active systems typically offer an extended frequency range, better stereo imaging, and higher volume with lower distortion.



Having this caliber of reference monitor available to the average home recordist is a huge boon for personal music production. Obviously, the better you can discern timbral shades—and audio anomalies such as hiss and digital artifacts—the cleaner and more dynamic your mixes will be. So "get your ears on" as we compare the virtues of four systems under $1,500: the Event 20/20bas ($999), JBL 6208 ($998), Genelec 1029A ($1,070), and Mackie Designs HR824 ($1,498).

ACTIVE PARTNERS

An active monitor is more than just a passive speaker with an amplifier slapped on. That configuration is sometimes identified as a *powered* monitor system, but do not be fooled: a true active system utilizes active equalization and active crossovers to precisely contour the system's sound. All four models tested for this article are bona fide active, biamped systems.

Of the lot, the Event 20/20bas—with its black-vinyl laminated fiberboard cabinet—looks the most traditional. A green LED on the front of the monitor illuminates when the system is powered up, and the light flashes if the input signal overloads the internal amps. The user can pad the input volume by up to 20 dB and adjust low frequencies (±3 dB from 100 Hz down) and high frequencies (± 3 dB on all frequencies above 2.6 kHz). Making frequency adjustments requires a small screwdriver (a plastic tool is included with the system), and the process is less than pleasing ergonomically. In addition, it's very difficult to visually confirm what you've tweaked. The enclosures are shielded so you can place them near computer monitors; this also minimizes the chance of erasing the DAT tapes that some misguided recordists insist on "storing" atop their monitor speakers (tsk, tsk).

The Genelec 1029A gets my vote for the "Most Robust" award because both drivers are protected by aluminum mesh; only the Mackie high-frequency driver is similarly protected. The small, tiki-like cabinets are constructed of cast aluminum and are available in black or titanium gray. A wave guide around the high-frequency driver is designed to improve treble dispersion and minimize cabinet reflections.

The 1029A's handy, front-panel volume and power controls are extremely convenient, but the four recessed tone-control switches (Treble, Bass, and two bass rolloff controls to be used in conjunction with the optional 1091A subwoofer) on the back of each enclosure are rather clumsy. They are difficult to reach and hard to see—and, once again, you'll need a jeweler's miniscrewdriver to make your tweaks. Each cabinet is fully shielded.

The JBL 6208 employs the potbellied design of the company's popular 4206 and 4208 passive monitors. But don't send these babies to the gym—the sloping midsection is actually an example of form and function peacefully coexisting. Called a "Multi-Radial baffle," the patented design delivers precise acoustic alignment and frequency dispersion. In other words, the "belly" ensures that all frequencies arrive at the listening position simultaneously. The handsome, black, oak cabinets are fully shielded and offer but a single control: the power switch.

The Mackie HR824 is the only system that doesn't require the user to fumble around with tiny tools in order to make adjustments. A rear-panel control section offers Phillips screwdriver adjustment of input sensitivity along with switches to enable a 3 dB cut at 80 Hz and a 2 dB cut or boost at 10 kHz. You can also tailor the system's low-frequency response to suit your listening environment by selecting Quarter Space (speakers placed in corners), Half Space (speakers placed against a wall), or Whole Space (speakers placed near the middle of a room, with open space in front of and behind the monitors). If this "room tuning" sounds somewhat arcane, diagrams screened on the HR824's rear panel make the process extremely easy to grasp.

Finally, you can enable a handy Auto Power mode that automatically turns on the system when it senses an input signal and puts the system into standby status if no signal is present for several minutes. Unfortunately, all of these control switches are black-on-black, and they're hard to see in low-light situations.

Like the Genelec 1029A, the HR824 employs a wave guide to deliver excellent treble dispersion. The HR824 is the only system of the four tested that doesn't use a port to enhance bass response. (Reference monitors typically augment low-frequency output by putting the woofer's back wave 180 degrees out of phase with the front wave.) Instead, Mackie coupled the woofer to a passive, aluminum driver that fires from the rear of the cabinet. This design allows the HR824 to move a large volume of air with minimal low-frequency distortion and power compression. The enclosures—dressed in conventional yet classy black—are shielded.

Genelec 1029A

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POWER MIXING

I used each pair of monitors to mix three different source materials: an R&B tune, a synth-heavy track, and an acoustic rock song. I mixed the projects in my home studio through a Seck Model 1882 Mark II console. Here are my perceptions of each system.

Event 20/20bas

The bass was robust and present—so robust, in fact, that I was afraid I was hearing too much low end and would cut mixes that were light on bass. However, a reference check of the mixes on my home and car stereo proved that my fears were unfounded. The mixes translated to the other listening mediums just fine. Stereo imaging was excellent. I could discern subtle panning details on the 20/20bas better than on the Mackie HR824 or the Genelec 1029A. Another great feature of the 20/20bas system is that you don't have to stick yourself in the speaker's sweet spot for critical listening. You can listen off-axis—while making tweaks at an effects rack mounted near a side wall, for example—and still get excellent audio resolution.

Genelec 1029A

Acoustic guitars sounded nice and present with plenty of high-end and midrange punch. On low frequencies, the 1029A reproduced bass guitar amazingly well, showing off the instrument's growl and warmth. In fact, I was amazed at how much bass response I was getting from a 5-inch driver. The monitors also delivered strong imaging, which made it easy to critically position sounds in the stereo field. Overall, I enjoyed mixing on the 1029As quite a bit.

JBL 6208

When cranked up, the 6208s delivered a nice, vibrating experience from low-frequency signals such as the kick drum, but the midrange was a little shrill, and the lead vocals seemed to pop out of the mix too much. Treble dispersion was not quite as good as the HR824s. However, even though I enjoyed mixing on the 6208s the least, I found that my 6208 mixes translated to different listening systems better than the mixes made on the other speakers.

Mackie Designs HR824

I immediately heard more high-end detail (including some subtle audible hiss on a comped vocal track that I hadn't noticed before) than was apparent on the 1029As, although I wouldn't say the HR824s were brighter sounding. The low end was robust and present, and the electric bass and kick drum thumped into my chest the way those huge UREI monitors used to back in the old days. The imaging and high-frequency dispersion is brilliant: I was amazed at how far off-axis I could scoot my chair and still clearly hear what was going on in both channels.

ACTIVE LISTENING

To supplement my personal mixing impressions, I recruited some experienced ears for a listening test. Bill Scheniman is chair of the department of music production and engineering (MP&E) at the Berklee College of Music in Boston. Formerly an engineer at New York's Power Station, his clients have included Bruce Springsteen, Mick Jagger, Diana Ross, and NRBQ. Don Puluse is dean of music technology at Berklee and for two decades was a recording engineer for CBS Records in New York, recording such artists as Chicago, Sly and the Family Stone, Miles Davis, and John McLaughlin. Rob Jaczko is assistant chair of MP&E and, as a staff engineer at A&M Studios in Hollywood, has engineered sessions for Don Henley, Sheryl Crow, Bruce Springsteen, and Barbra Streisand. David Moulton is the author of the *Golden Ears* ear-training course on CD and is the former chair of MP&E.

The listening tests took place in various studio control rooms at Berklee. All of the speakers were set to their flat EQ response and placed atop each mixing console. (Genelec suggests, in most console-mounting situations, lowering the 1029A's bass tilt by 2 dB to 4 dB to compensate for low-frequency build-up across the console surface.) The reviewers were seated one meter from the speakers within an equilateral triangle—which is the conventional sweet spot for close-field monitoring.

The panelists brought reference materials they had recorded themselves or CDs that they were especially familiar with. Each panelist did his listening tests individually so as not be influenced by the opinions of the others.

The purpose of these listening tests was to provide real-world insights and evaluations from professional engineers listening in their element: the pro-studio control room. Because these were subjective tests, of course, opinions were varied. Therefore, to offer a more

JBL 6208

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Stephen Hunter Flick is a communicator. As the two-time Academy Award-winning sound effects specialist whose work includes films like *Speed*, *Apollo 13*, and *Twister*, Stephen works with major studios (20th Century Fox, Universal, Sony Pictures to name a few) creating sounds that aren't just heard, but felt. From compiling over 2,000 sound files to create a massive tornado to transporting or even cutting straight to digital picture, Stephen's work takes space. Big space. Space like the 1 gigabyte capacity of the Jaz® drive. Incredibly, he used 41 Jaz drives at once on *Twister*, demonstrating its usefulness as an industry standard.

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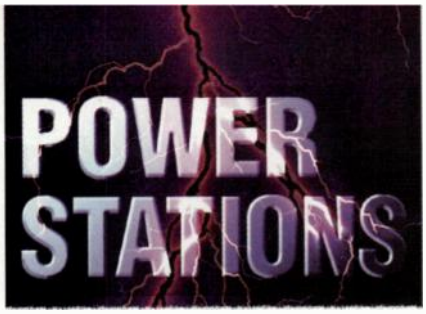

objective view, I also conducted real-time, audio-analysis tests at Dave Moulton Professional Services using a Crown Techron TEF (Time Energy Frequency) Acoustical Analysis System and a Brüel and Kjaer 4007 omnidirectional test microphone.

The TEF tests were a "free field" analysis, with each monitor placed on a stand in the middle of Moulton's studio. The test mic was positioned directly in front of each speaker at a distance of one meter. Here's what the panel—and the TEF analysis—discovered about each active monitor system.

Event 20/20bas

Jaczko: The bottom end was clear, especially in the 250 Hz to 800 Hz range. But the mids were much more pronounced and tended to make vocals sound sibilant. The very high frequencies were fine, however, and allowed me to hear things such as reverb details quite nicely. Aside from a little bump in the midrange, the sound seemed well balanced.

Moulton: The bottom end on the 20/20bas was solid and punchy. The mids and highs were fairly neutral and natural sounding, except for a little bit of edginess in the ninth octave. The stereo imaging seemed decent, and I discerned a reasonable amount of depth in the sound stage.

Puluse: The low end sounded great, but the midrange seemed artificial.

Scheniman: The low-frequency response was very good, and although the mids and highs were a tad bright, I could hear all sorts of detail in the reverb trails and percussion parts. The stereo imaging was the best of the bunch—I was able to clearly hear the two- and three-o'clock pans and the eight- and nine-o'clock pans, and these are often the hardest positions to discern in a mix. I could probably mix at 95 dB for eight to ten hours on these, and although it sounds like I'm talking about comfortable shoes, that level of comfort is really important when you're mixing records.

TEF analysis. The claimed low-frequency spec of 45 Hz was supported by our analysis, and bass response was very smooth. On the high end, the analysis showed a slight spike between 10 kHz and 15 kHz.

Genelec 1029A

Jaczko: The 1029A's midrange sounded smooth, but the overall soundscape was a bit disproportionate because the low end seemed accentuated. Consequently, the mid and high frequencies didn't sound as bright in comparison to the bass frequencies. The stereo imaging was pretty good, but the 1029As did not have the sense of "openness" that, to me, makes listening fun.

Moulton: The speakers seemed to drop off very rapidly below 100 Hz. However, the high-frequency response was really good. It was far easier to hear how the recordings were made, as the sonic differences between tracks were apparent. The imaging on these was so excellent that I could actually hear the difference between a mono track washed in a [stereo] reverb and a true stereo track. From an analytical standpoint, that is an advantage. But from a musical standpoint, you can see

Event 20/20bas

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the smoke and mirrors a little bit easier, which somewhat ruins the illusion.

Puluse: The Genelecs had a big, deep bottom. They were not very bright sounding; I didn't hear any unnaturalness, either. I would probably prefer mixing on the Genelec 1029As because they invite you to get down and listen very critically.

Scheniman: I was amazed at the low-end response. I didn't get the warmth and physical sensation of bass in the control room, but I didn't feel like much was lacking down there. However, I found the top end to be a little bit spitty and harsh. The stereo imaging was really good, but these speakers sounded a little too clinical for me.

TEF analysis. Genelec claims a free-field frequency response down to 70 Hz (±2.5 dB), and our analysis supported that spec. In addition, the test showed a pretty stellar, flat frequency response out to 20 kHz.

JBL 6208

Jaczko: The JBL 6208s were a little lumpy and cloudy down in the low frequencies. The top end, however, sounded pretty smooth and open to me. It didn't seem like the spectrum was superextended up there, but that was okay with me because the high frequencies didn't seem overly hyped, either. The midrange is pretty good—not nearly as pronounced as it is on Yamaha NS-10M monitors. Stereo imaging was also very good. I think that the 6208s would be comfortable to listen to for long periods, provided you could somehow get the low end to sit right.

Moulton: The bottom end was kind of strange. It was light on the fundamentals below 100 Hz, and there was a lack of sustain. I also felt that the high and mid response was a little rough—the detail wasn't quite there. And I heard some roughness and distortion on signal peaks, which was a little bit unpleasant. These aren't bad speakers, but they sounded a lot more like passive loudspeakers. For example, there was a really nice moment when I was using the Mackie HR824s where it almost felt like there were some acoustic guitars in the room with me. But on the 6208s, it was very clear that I was listening to a loudspeaker playing back a recording of acoustic guitars.

Puluse: Compared to the 1029As, the bottom end on the 6208s was a bit loose and the mix didn't sound as tight. However, the high-end and midrange response made voices appear stronger and more in perspective. I also liked the stereo imaging of drums on the 6208s. It's difficult to say which speakers I would prefer to mix on because one cut sounds best on the 6208s, and another cut sounds best on a different speaker.

Scheniman: The bottom was a little cloudy. The presence was there, but I had a hard time differentiating timbres between instruments in that range: electric bass, kick drum, floor toms, and so on. But I do like that old, warm bottom, and the 6208s are not hard on the ears. They reminded me of my old Advents and Century 100s. The top end was very smooth, but I couldn't hear enough articulation in the 1.2 kHz to 3.2 kHz range. Actually, I wasn't really aware of any presence in the midrange until I heard a nasty little spike at around 6 kHz. I also found the stereo image a little narrow.

TEF analysis. The analysis showed a 4 dB to 5 dB dip between 2 kHz and 3 kHz.

Mackie Designs HR824

Mackie Designs HR824

Jaczko: The low, low bottom wasn't too far out of proportion, but there was a little 250 Hz thing going on that seemed kind of funny. There didn't seem to be a big, open space from top to bottom—the sound is sort of clustered in the upper mids. In general, the HR824 didn't feel like a very open-sounding speaker. Even at a moderate volume, it didn't feel all that comfortable to listen to.

Moulton: I found that the bottom two octaves were a little lighter than I expected. It didn't feel like there was quite as much level there, and that's not a criticism as much as an observation. There was a bit of an edginess in the low-frequency response, but the mids and highs were both extremely smooth. Stereo imaging and depth were fabulous.

Puluse: The bottom was really good, especially when I was listening to an

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upright bass. I could really feel where things belonged in the mix, but the midrange frequencies seemed to jump out a little bit. Something in the midrange response seemed to separate the vocal a little too much from the backing tracks—and it also sounded like there was less reverb on the snare and the vocalists. I'd have a tough time choosing a winner, here, but the trophy race would probably be between the HR824s and the 6208s.

Scheniman: The bass response was very controlled and accurate. Overall, the response was so smooth that I wasn't even aware of a crossover point. I heard the stereo image extend about two feet beyond the actual placement of the speakers in a natural way with no hollow center. Also, I'm used to hearing very subtle details in instrument placement and reverb trails—and even the timbral differences of small percussion instruments—and those details were reproduced accurately on these speakers. In fact, all the sonic details that I can usually discern on a $45,000 reference system were very well reproduced, although not identically, on the HR824s. That was impressive.

TEF analysis. The analysis showed low-frequency extension down to around 37 Hz, with a 4 dB peak at approximately 48 Hz. Overall frequency response was so flat that it was almost hard to believe. There was good high-frequency extension all the way out to 22 kHz.

WHY GET ACTIVE?

Should you trade in your passive monitors and get active? Well, the perception of sound is a rather subjective experience, so active monitors may not be everyone's cup of tea. After all, many accomplished engineers are extremely comfortable mixing on Yahama NS-10Ms, whereas others cannot abide that monitor's accentuated midrange. Consequently, you may be in a blissful relationship with a favored passive monitor, but here's what you'll gain if you decide to "plug in."

One advantage of a good active system is unity of design. Subtleties of cabinet design, crossover frequency, equalization, and literally every other factor known to science can be taken into account during the design phase of the system, and components can be selected that complement each other. For example, power amps can be exactly calibrated to specific drivers and onboard equalization can be applied to flatten out and extend the system's frequency response. In a passive system, your power amp may not be a good "match" for your speakers, but an active system ensures absolute harmony between the amps and drivers.

In addition, most active monitors let you contour the speaker to your listening environment. Onboard frequency controls let you "goose" the high end or roll off the bass to match the idiosyncracies of your room. Or, if you travel from place to place, you can tune the system to any number of different listening environments. All of this precise control over system design and electronics can often translate into a superb, "matched" reference system that delivers exquisite frequency response, low distortion, and articulate stereo imaging.

PICKING A PARTNER

Each of these active systems would be a marvelous choice as a critical reference tool, but ultimately, it should be *your* needs and desires that lead you to a specific model. After all, it's a lot easier to craft a sonic masterpiece when you love your speakers! In addition, as shown by our listening test, even experienced professionals can disagree on sonic details. So, put some trust in your ears and seek out a system that works for you. Here's how I rated each system for *my* needs.

Close to home. The best mix I did was produced on the JBL 6208s. Perhaps they sound closer to the passive reference monitors I've been using, and of course, the comfort zone of a familiar reference monitor is often critical when mixing. If I had to start

ACTIVE SPECS

Manufacturer/ Model	Woofer Size	Tweeter Size	Crossover Frequency	Power Output (woofer/tweeter)	Frequency Response	Enclosure Type	Input Type	Dimensions (HxWxD)	Weight (lbs.)	System Price
Event 20/20bas	8"	1"	2.6 kHz	130W/70W	38 Hz–20 kHz (±2 dB)	ported	Neutrik	15" x 10" x 12"	32	$999
Genelec 1029A	5"	0.75"	3.3 kHz	40W/40W	68 Hz–18 kHz (±2.5 dB)	ported	Neutrik	10" x 6" x 7"	12.5	$1,070
JBL 6208	8"	1"	2.8 kHz	50W/50W	60 Hz–20 kHz (±2 dB)	vented bass reflex	Neutrik	18" x 11" x 12.5"	30	$998
Mackie Designs HR824	8.75"	1"	2 kHz	150W/100W	39 Hz–22 kHz (±1.5 dB)	sealed	Neutrik	16" x 10" x 12"	32	$1,498

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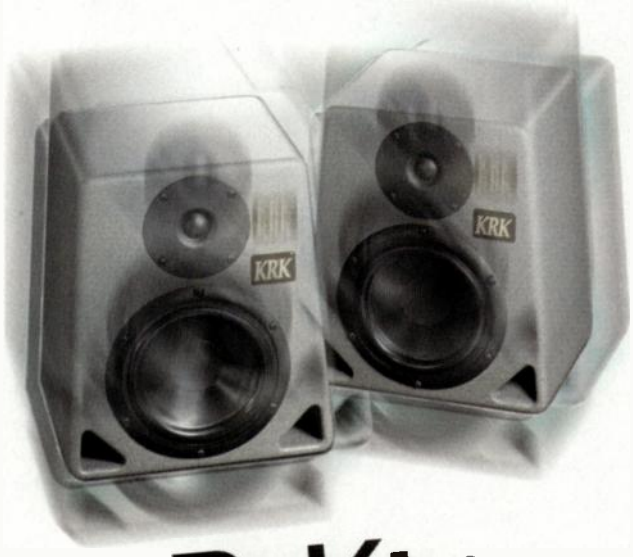

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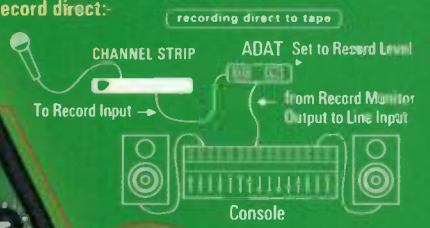

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POWER STATIONS

mixing a record tonight, I would chose the 6208s. However, I enjoyed mixing on the 6208s the *least* of all the systems. So if I had some time to prepare for a mix, I would try hard to get used to the other systems as they are certainly more fun to listen to than the 6208s.

Fun, fun, fun. Speaking of pure monitoring enjoyment, I often found that I had the most fun listening to the Event 20/20bas system. There's just something about the robustness of the bass and the superb imaging of the 20/20bas that is simply a lot of, well, *fun*. (Okay, I admit it, I like to have fun when I mix.) In addition, at under $1,000, the price of the 20/20bas is extremely attractive. If I was planning to buy a new system, my personal choice would be the Event 20/20bas.

Precision tool. The HR824 is the most expensive system of the models tested, but it also offers the most accurate reproduction—a fact that was supported by both the TEF analysis and the subjective listening tests. The precise resolution is a major boon for finicky sound sculptors. I'm still amazed at how the HR824s maintained coherence during off-axis listening. That's a great advantage when you're mixing with assistants, and everyone needs to hear a clear representation of the mix, even if they're sitting out of the speaker's sweet spot.

Portable perfection. If you do a lot of location recording or like to schlep your own monitors to each studio you work in, the Genelec 1029A system is the obvious choice. The 1029As sound great, have a small footprint (they could fit into a small suitcase and still leave room for a portable DAT deck and a couple of mics), and weigh just twelve pounds. But even if you don't move around, the 1029As can deliver big studio sound in cramped corners. That's great news for recordists who must limit their studio space to the corner of a bedroom or an apartment alcove.

Stephen Webber *is an Emmy-winning composer and associate professor of music production and engineering at the Berklee College of Music.*

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Wendy Grossman

Loop it Good

Build relentless songs with audio loops.

By Todd Souvignier

Sound stands before you. Naked. Frozen in time. Invisible sound waves that propagate in three dimensions have been captured by a digital audio workstation and flattened into visual waveforms that flow downscreen like fish on a conveyor belt. The DAW is the control freak's ultimate weapon; it can be used to force audio to submit to your every whim, inspiring vast schemes of sonic domination.

In the cut/copy/paste environment of the DAW, audio production becomes a graphic exercise, which encourages the use of short, repeated segments (aka *loops*) as compositional elements. Why use a DAW simply as a tape recorder when you can build songs, dance tracks, and other musical pieces by assembling and manipulating audio loops? Embracing the manipulative powers of a DAW can lead you to new, inspired compositional methods, unexplored song forms, shocking musical patterns, and "brilliant" accidents.

SYNC IT UP

The biggest problem you'll encounter when you construct songs from loops is making sure that your edited tracks stay in sync with the rest of the song (and even within the track itself). When you really get into flying stuff around a workstation, tracks become rather slippery. It can be tough to spot the correct locations for segments that you're copying and pasting from other parts of the song. It's easy to nudge a track out of whack with the rest of the piece or mismatch loop sizes. Spending hours doing microtweaking to correct nearly subliminal timing variations is simply a drag.

The solution is to adopt an assembly-line approach to track production and make your audio "building blocks" conform to a uniform size. That way, you have a consistent point of reference. Once you've established a guide segment with a known length, you can edit subsequent tracks very quickly, with little or no worry about keeping the tracks in sync with each other.

Using this building-block, or "cookie cutter," approach, you can reduce your tracking, editing, and mixing time dramatically. Another advantage to breaking your songs into component parts is that you can exercise stringent quality control. And by building songs out of many copies of these parts, you can take full advantage of the brainwashing power that derives from mind-numbing repetition.

DELIBERATE DRUM LOOPING

One approach to creating a tune is to assemble the drum tracks first and build everything else on top of them. If you're actually a drummer and you have plenty of playback tracks, you might want to record and subsequently loop each drum separately. This certainly gives you maximum flexibility during mixdown, but it can also chew up disk space and throughput capacity. For the sake of simplicity, I'll assume you're working with premixed stereo drum tracks such as you'd record from a drum machine or find in a sample library.

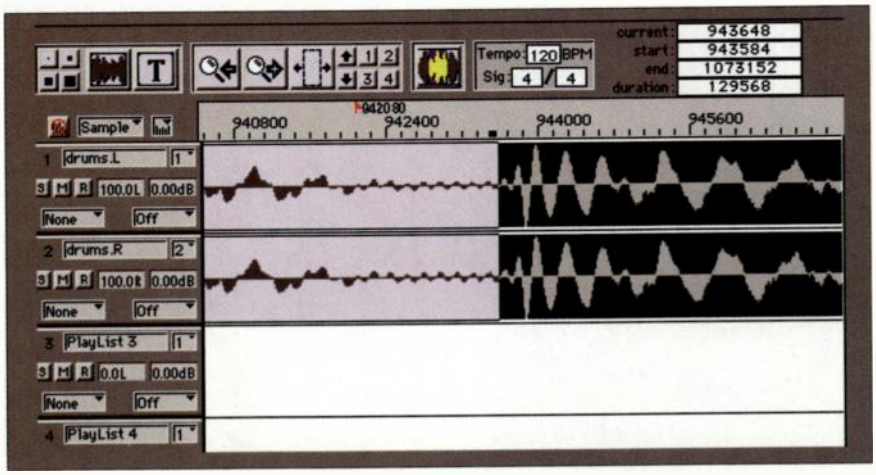

FIG. 2: Set the region's start point at the first cycle of beat one.

You'll be creating a lot of tracks and audio regions, so it's good to be organized. Make a habit of giving clear, unique names to each file and region you create. This speeds up the production process in many ways and is well worth the initial effort. And while we're putting on the lab coat, set your track-display units to "samples" so you're looking at the most accurate reading; the SMPTE and bar/beat readings aren't as precise.

When you're establishing a region to use as a loop, there are always a few measures that you'll actually use and some excess material at the start and end, which you'll omit. The fastest way to separate the wheat from the chaff is to listen to the part and drop markers at the start and end of the desired region. Markers typically appear as flags along the top of the track display, and they can be used as navigation aids to help you hone in and start editing.

Enter the mode that lets you select segments of an audio file, and highlight the area delineated by the markers you just placed (see **Fig. 1**). For now, set the zoom level so you can see the entire selection. Audition the selection to see if you're close to a smooth loop.

This might sound nutty, but I find it easier to judge loops when I'm standing up and rocking out than when I'm sitting down. Feeling the rhythm through your entire body simply works better than mildly tapping your feet or clapping your hands.

In order to minimize guesswork, try to establish a consistent methodology. I suggest placing the start and end points right before the corresponding downbeats (beat one) whenever possible. Naturally, you can put the start point anywhere you want, but I find it easier to keep track of the groove when the loops always begin on the downbeat.

Once you've made a rough selection, zoom in to the highest screen resolution and fine-tune the start and end points. First, look at the start of the region. In **Figure 2**, for example, the downbeat is a kick drum. Note the characteristic attack envelope at the beginning part of the sound; this is your visual guide.

Next, look at the end of the region (see **Fig. 3**), and note the similar attack of the first kick after the end point. Adjust your selection area so the region begins and ends on the first cycle of those kick attacks. And remember the first rule of digital editing: Always cut on a zero crossing so you don't get a click (see **Fig. 4**).

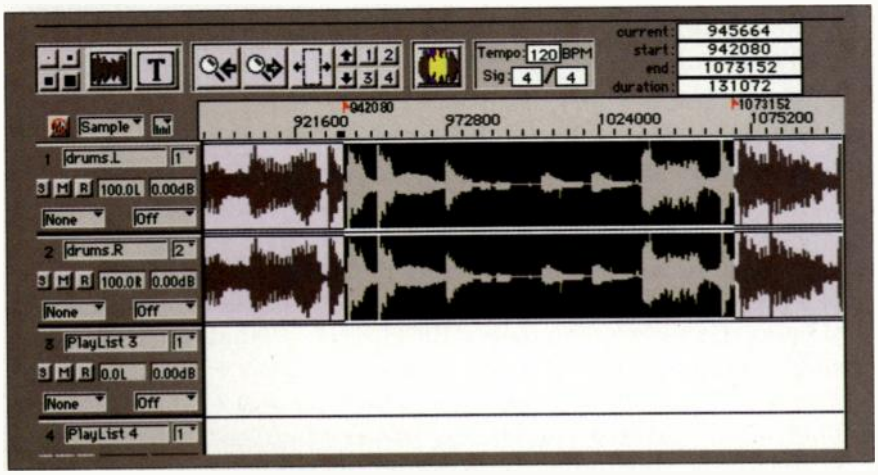

FIG. 1: Use markers to stake out the region you want to use as a guide; then make a rough selection at a low-resolution zoom setting. This illustration shows a drum track in Macromedia's *Deck II*.

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The actual method for adjusting a region is determined by your DAW; in some systems, you grab the ends of the current selection and simply resize the region. In other systems, you type in a start and end point and then cut the region. Regardless of your particular system, the point is to use markers and a medium view to establish a fast, rough selection and then to navigate between the markers at maximum zoom to accurately adjust the start and end points, thereby eliminating all guesswork. When you're editing at the see-every-sample magnification and you're consistent about cutting right on the first cycle of the downbeat, you know that your regions are dead-on.

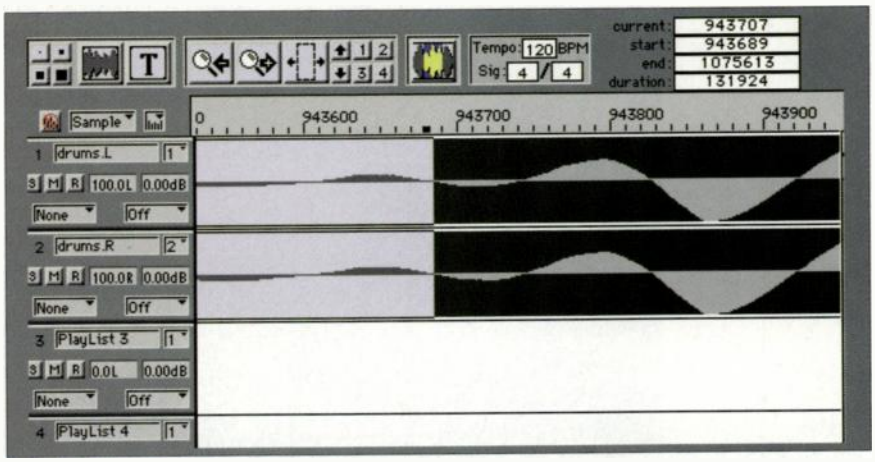


FIG. 4: Check your zero crossings at the highest possible zoom setting.

STEAL THE FEEL

Several platforms provide tools to analyze the "feel" or timing characteristics of audio files and apply these characteristics to MIDI or audio data. This is a killer technology that lets you extract a groove and apply it to a completely different set of sounds.

If you don't have these tools, however, there's a brute-force workaround: do it by hand. First, select and cut the guide region on which you're going to base the piece, and paste it into an empty section of another track. This guide region can be the most degraded source material, such as adversely time-stretched percussion loops or drumming on your lap recorded through the Apple microphone.

Next, select sounds for your new drum kit: perhaps a basketball bounce for a kick drum and a bottle smash for a snare. Then, look at your guide track and paste these sounds into a neighboring track (bounces aligned with every kick-drum hit, smashes with each snare). Increase the screen detail by a few resolution levels and fine-tune the placement of the new sounds in relation to the guide track.

Sometimes, it can be difficult to judge the best placement, so just take your best shot and try to be consistent when positioning the new sounds. Use the track display as a visual reference, and line up the beginnings of the amplitude envelopes. If you're consistent with the initial placement, fine-tuning is easy. Just select all instances of a certain sound, such as all the "kicks," and nudge them earlier or later as a group.

Once you've started replacing sounds, the next logical step is layering to create complex, multisound percussion loops. Add a door slam to that basketball and mix a bone snap with the bottle smash. Once you've got some layers built up, copy and paste the guide track and new layers a few times, and start creating some variations of the new loop.

Typically, you'll want to copy and paste the new layers without the guide track to assemble the entire rhythm part. However, you can run into trouble here; you must make sure the new regions are the same size as the guide region. To simplify matters, mix the new layers into a stereo file, being sure that the selection area is identical to the length of the guide region.

In some systems, you simply click on the guide region to select it and then extend the selection area across the tracks you want to mix using the mouse or arrow keys. Otherwise, you might have to note the start and end sample numbers of your guide region and type those start and end points when defining the region to be mixed.

Regardless of the procedure, you must somehow reference the correct selection area from your guide region in order to maintain a uniform loop size and eliminate the guesswork. The selected sounds can then be mixed to files that are guaranteed to be the exact same number of samples as the guide track.

Using this "replacement" technique, you can digitize great drum patterns from wherever you can find them and use them as guide tracks for pasting your own high-octane samples. In addition, the guide region is your selection-area reference, so you're sure to mix the new tracks to files that are

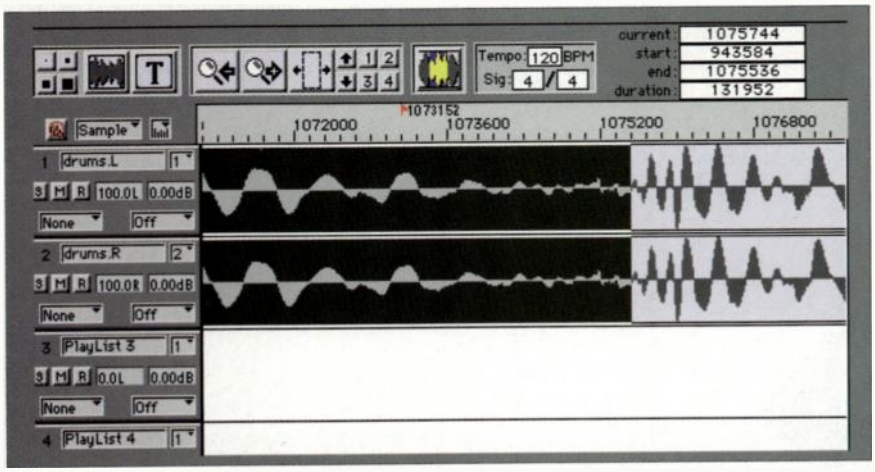
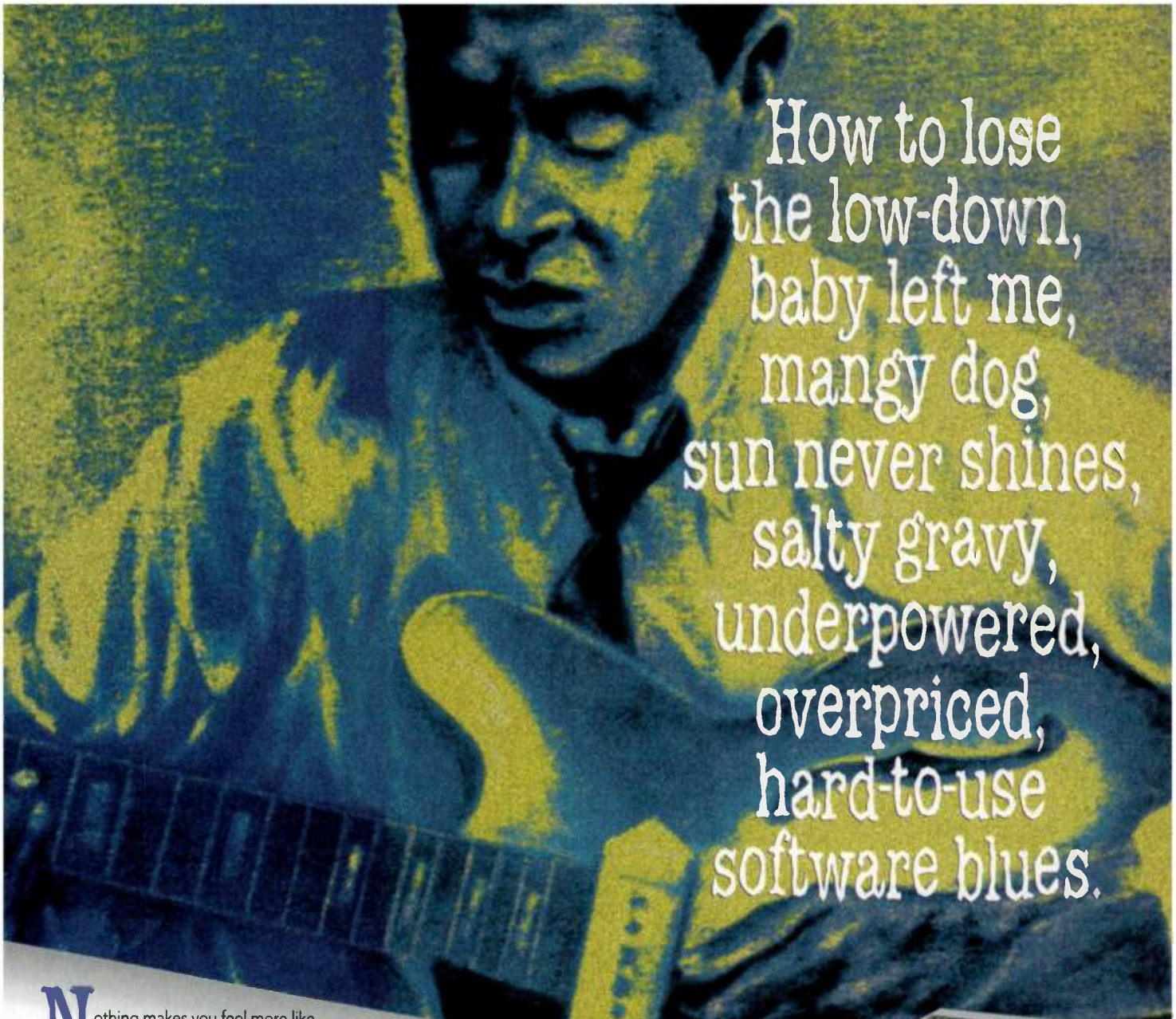


FIG. 3: Set the end point at the first cycle of beat one in the measure following the loop region.



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uniform in size and start and end at the right points.

COOKIE-CUTTER EDITING

Now that you have some drum building blocks, you can assemble the final percussion track. If you need drum passages that are of different durations (e.g., a 4-measure verse pattern and an 8-measure chorus pattern), make sure the region lengths stay in proportion (e.g., exactly twice as many samples in the 8-measure chunk as there are in the 4-measure chunk). This ensures that the tempo is consistent between parts and makes subsequent assembly easy.

Copy the new drum loops and butt splice them together into an entire track, and then overdub some bass on a neighboring track. Once you've recorded a usable take, jump in and cut some loops. To speed the process of auditioning, cutting, and pasting bass loops, use the same sizes as the drum building blocks. First, select one of the drum regions, and then extend the selection to the neighboring bass track (see **Fig. 5**). Audition the selection to see whether it locks nicely.

Naturally, you'll want to check out some of the other passes, so move your selection range to the next block. You might be able to simply click on the next percussion-track block and reextend the selection to the corresponding part of the bass track, or you might need to input the new start/end points, depending on your system.

If your DAW lets you move the selection area by a distance equal to the selection range (as *Deck II* does with the Option-arrow command), you can quickly walk through the song a block at a time, auditioning parts and cutting loops in assembly-line fashion. You'll fall into a quick, efficient pattern, auditioning the current drum/bass selection and then moving the selection to the next block. As mentioned earlier, leave your track display on the "samples" setting so you can check that you're maintaining the block lengths precisely.

When you've found a bass passage that you want to loop, cut the region and move on to the next block. This is the beauty of the cookie-cutter approach: all edits are based on the length of the guide blocks, so you never have to tweak the start and end points of any regions after that.

MEAT PACKING

When you assemble all the bass loops and subsequent parts from blocks of uniform size, compositing and arranging parts becomes a lighting-fast process. Copy the desired bass loops, set a paste point in an empty track using the beginning of one of the drum loops as a guide, and assemble your bass track from there. If a part's not working or the feel's not right, just paste in another take; they're all the same size.

If the playing is so pathetic that you can't get even one decent iteration of a certain riff, you might be able to salvage things by grafting together the usable sections of two or three less-than-perfect iterations. Here again, consistent block size helps a lot. Line up the donor riffs on neighboring tracks so they all start at the same time, and then select and delete the lame parts. Move what's left to a single track or mix the segments together into a new file; make sure you maintain the original start and end points of the area being mixed so the new composite loop is the right length.

This is the meat-packing approach to making music: grind it up, scoop out the rotten parts, and shove what's left into a uniform-sized can that stacks and transports easily. While we're at it, let's tear the song to shreds and demolish the old-fashioned concept of playing compositions through from start to finish. Because you're using a workstation, you can jam on sections over and over and then use the best pieces.

Select some drum and bass loops from a verse or chorus section, and copy them to the clipboard. Then go to an unused part of the track display and paste a gazillion iterations of the section. Now fire up that crusty guitar and tube amp, and drill on that part until you've got some ultimate takes. This "work track" approach really comes in handy when you're trying to nail difficult passages. Then, simply cut the usable riffs from your new guitar track and slot them into the main arrangement.

If you've recorded a long, spicy rhythm part or an extended solo that stretches across several iterations of the loop, you can cut and use the whole thing. In **Figure 6**, I want to use a 4-measure solo, so I set the start and end points using the beginning of the first drum loop and the end of the fourth loop as my guide. The new region is exactly four times as long as the basic block unit, so it conforms perfectly to my building specifications.

Of course, you don't always have to run the same loops over and over. Once you get going with this mass-production recording method, you'll soon have lots of perfect versions of your parts, each with unique variations,

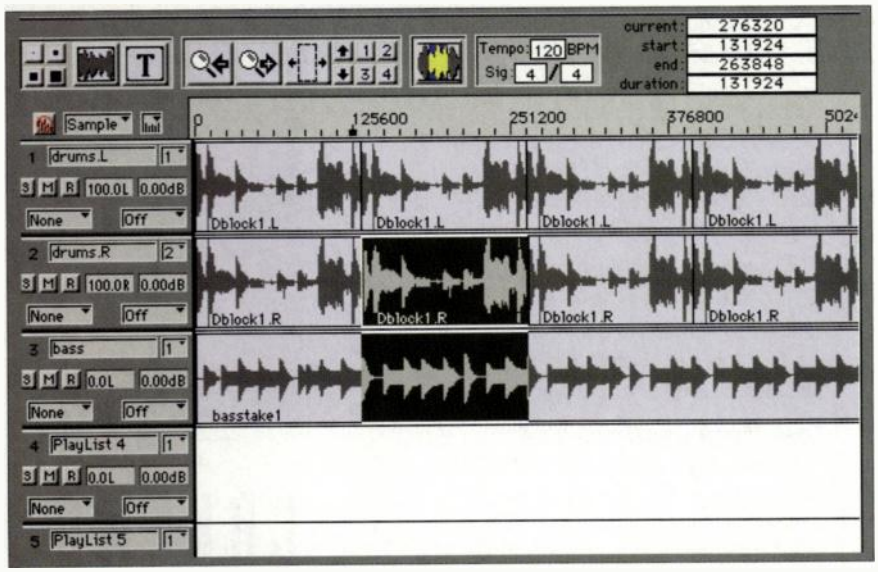

FIG. 5: After playing bass parts along with the finished percussion track, select an iteration of the drum loop that corresponds to a good bass riff and extend the selection to the bass track.

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so use many of them. Indeed, because you're enforcing uniform loop sizes, you can quickly rearrange passages to experiment with different combinations, confident that they'll all fit.

WRING THE NOISE

Guitars are wonderful sources of sound, with lots of squeals, hums, and other wiry noises. I say let 'em run on; always include some iterations that are just feedback, and listen closely to all the little accidents. These sorts of sonic events (e.g., finger squeaks) add a lot of character to recordings, so grab them and use them to spice up the tracks.

Sometimes, you'll even find mistakes and misfirings that work on their own terms and lead to new parts. Stitch a couple of screw-ups together, and use them as a grating counterpoint or as the launching point for even further sonic abuse.

Explore all the sound-shaping features in your DAW, such as the Reverse command, and any built-in effects, such as EQ. Some of them sound pretty good, and with the right help, they can sound positively horrible. Make sure you're familiar with the plug-in effects that your particular workstation software supports and try them out; many are available in save-disabled versions on the Web.

While we're on the subject of processing, one of the hidden advantages of loop-based composition is that it takes very little time to apply destructive effects, a process generically called *rendering*, to short audio files. In addition, you can render a loop just once and use it over and over in a song.

Normalization is a common and useful feature in workstations, but I use it only when necessary. If you're a fanatic about your sound, you probably want to pass the signal through as few signal-processing steps as possible to preserve the original essence. Moreover, once you start normalizing, it's hard to quit; you end up normalizing everything in sight when you probably had fairly good volume levels to begin with.

Crossfading is another useful process that can easily become an addiction. I only apply it when there's a problematic click in a track, and judicious editing usually eliminates these clicks before resorting to crossfading.

If you're doing music with lyrics, compositing the vocal tracks is the way to go. You can perform automated punch-ins and loop punch-ins on a single track with nearly any DAW. But it's much faster to let the singer wail, get a number of vocal tracks, and then Frankenstein the best parts together. Moving the selection area around the tracks for auditioning and editing can speed the vocal assembly, just as with the drum, bass, and other tracks.

Because of the fluid nature of vocals (e.g., long lines, lots of pauses, lead-ins, and trail-offs), slicing up vocal tracks into the smallest cookie-cutter blocks might not be desirable or necessary. I usually depart from the strict building-block policy with vocals, which is okay because the foundation is already constructed from predictable, interchangeable units.

There are a couple of new software packages that further expand your DAW's vocal-production possibilities, and I'd be remiss if I didn't mention them. *AutoTune* by AnTares actually corrects the pitch—you read that right—of any melodic line. *VocAlign* from Synchro Arts, Ltd. does sophisticated pattern matching, comparing and moving words and phrases so the processed track is dead on with the guide track. In addition, *VocAlign* is a big help during automatic drum replacement.

As far as tracking keyboards is concerned, keep the keyboard parts in MIDI whenever possible. Don't chew up valuable SCSI bandwidth by recording and playing instruments that can be driven by MIDI.

SONIC PERCEPTION

DAWs let you examine audio at a highly magnified level. You can achieve industrial-strength quality control and experience actual changes in your own aural perception as you listen intensely to all these little phrases. However, proceed with caution; you may start to hear tiny things, subtle differences in playing, minute variations in timing. It's mind expanding.

As you spend time culling beefy licks from weak takes, you'll eventually begin to visually recognize the sure signs of hot playing: strong level, good peaks but no clips, signals that line up with the other tracks, well-defined envelopes. Audio production is now a graphic exercise. In fact, it's really just another way of reading and writing music.

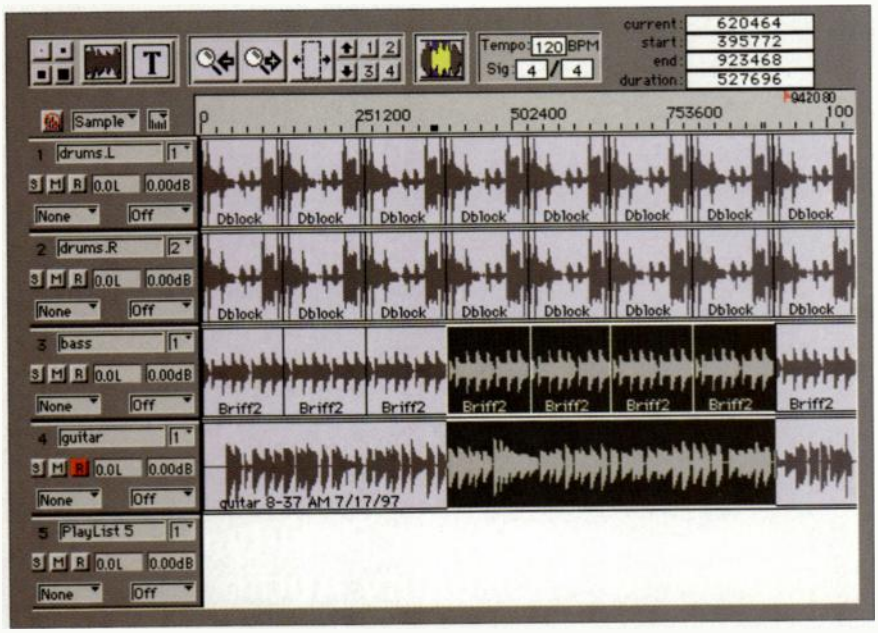

FIG. 6: If you have a cool guitar riff that extends over several building blocks, select it all, making sure the length is an exact multiple of the building-block length.

Todd Souvignier *is a San Francisco–based writer and musician with a background in the audio-software industry.* *Thanks to Thomas V. King of San Francisco for his patient tutoring in the cookie-cutter method.*

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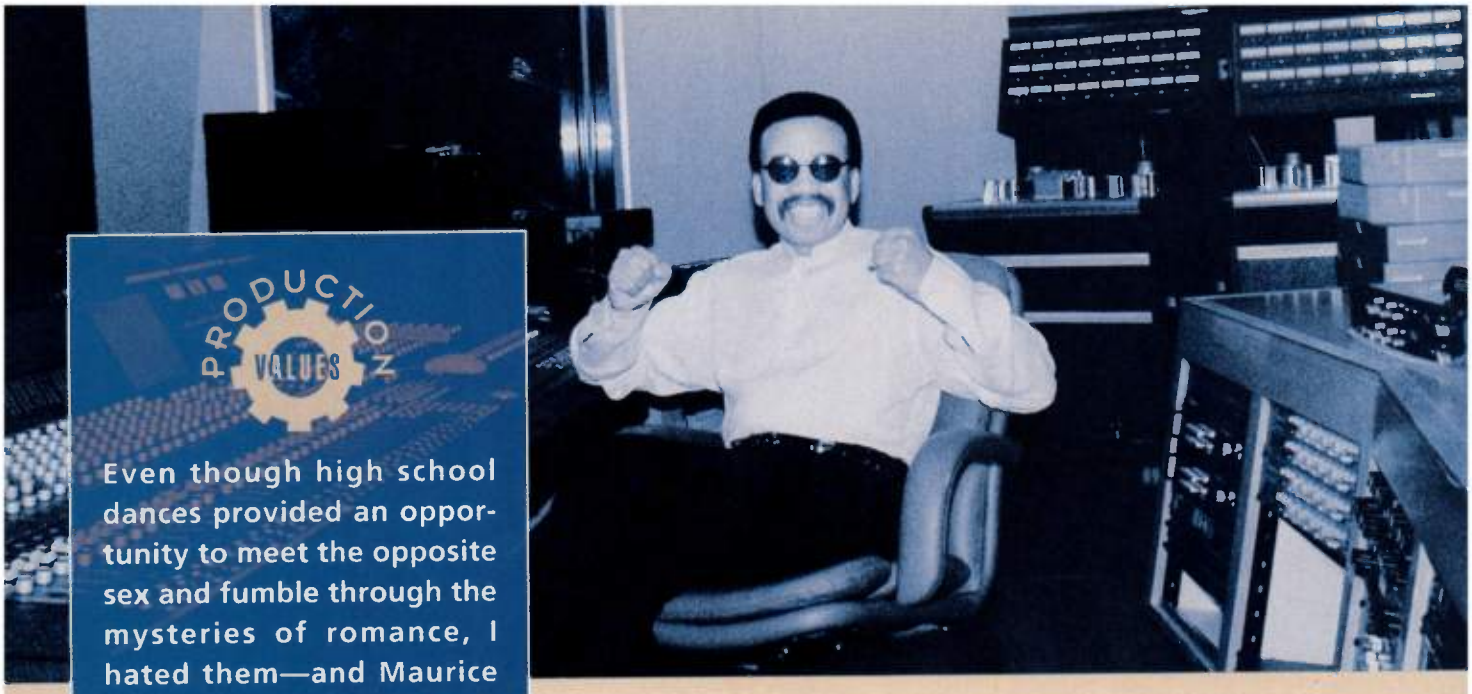


PRODUCTION VALUES

Even though high school dances provided an opportunity to meet the opposite sex and fumble through the mysteries of romance, I hated them—and Maurice White was partly to blame for my angst. Thanks to the Earth, Wind & Fire mastermind, my backside seldom left the comforting anchor

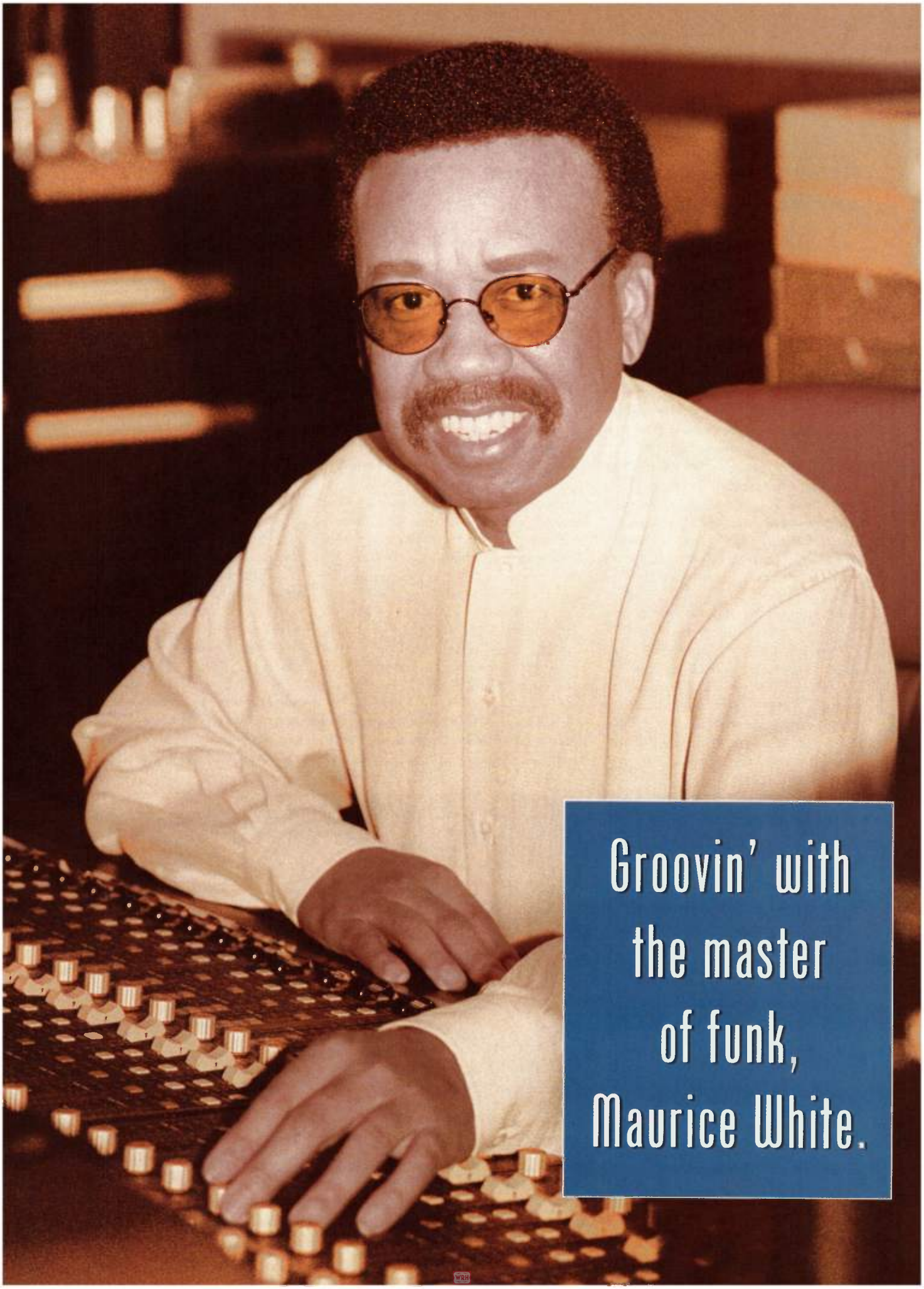
SHINING STAR

of the gymnasium wall. You see, I could never reconcile the fact that the body that worked just fine on the football field was a tragic mess at negotiating the slick funk of Earth, Wind & Fire. And, back in the 1970s, if you couldn't get down, your social life was dead. My romantic career didn't recover until my college poetry classes.

In the "party hardy" era, the music of EW&F was an essential component of every dance party, road trip, and clandestine rendezvous. Songs such as "Boogie Wonderland," "Shining Star," and "Sing A Song" became party classics, and it's not hard to see why: energized by White's studio wizardry, EW&F simply produced some of the hippest, hottest, good-vibe music on the planet.

BY MICHAEL MOLENDA

PHOTOS: MARK C. DAVIS


Groovin' with
the master
of funk,
Maurice White.

SHINING STAR

And those good vibes never stopped coming. Today, after nearly 30 years of making joyful noises, EW&F has amassed more than 50 gold and platinum albums, six Grammy Awards, four American Music Awards, and enough hits to make that cat in the weird clothes and other-worldly makeup look downright silly for ordaining himself the "King of Pop." Even better, EW&F is not a nostalgia act whose past glories are represented by some trinket on the wall of the Hard Rock Cafe. The band recently released its 22nd album, *In the Name of Love,* and is on the road bringing its joyful, funky party to the people. White, however, is staying home. The band's producer and leader retired from performing in 1994 to concentrate on forming a record label, expanding his production credits, and building a state-of-the-art studio facility.

Happily, success has graced all three endeavors. The first act White signed to his Kalimba Records was keyboardist Freddie Ravel, whose contemporary jazz album ascended to the Top 20. On the production side, White charted the top-selling jazz record of 1996 with GRP Records' *Urban Nights,* and he is now working on the followup, *Urban Nights II.*

The final stage of White's "stay at home" plan—the recording studio—should be fully operational by press time. In addition, he has housed the studio, the production company (Kalimba International), and the record company under the umbrella of Magnet Vision, a music complex based in Santa Monica, California.

Although journalists should use the term "legendary" with extreme caution, White has certainly earned the right to place that word to the left of his name. As one of the pioneer funk masters, he helped forge a vibrant musical style that still moves bodies today. But his own take on dance music wasn't limited to fat, sweaty beats and endlessly repeating hooks. White managed to "class up" the joint by fusing the harmonic sophistication of jazz with a dead-on pop sensibility. He also incorporated ethnic and folk instruments into pop songs long before world beat became a musical fashion statement. And above all, his productions have always been thick with spirit and soul. Dedicated students of music production can learn volumes about melody, groove, and song arrangement by simply checking out White's massive discography.

Luckily, we were able to get the incredibly busy producer and music exec to share his production concepts with **EM** readers. Sitting in his new studio—with equipment boxes still littering the main tracking room—the 30-year veteran spoke with all of the enthusiasm of a brand new artist. It was obvious why his music is filled with joy.

Are you primarily concerned with technology or vibe when making records?

I'm interested in both. I'm very interested in technology because that is what enables us to expand our vocabulary. We have these wonderful tools available that allow us to manipulate sound and experiment with sound. Experimentation is crucial to creativity, and now we have the opportunity to try things without hesitation. If something doesn't fit, you can always change it. That level of control is very difficult when you have a studio full of musicians.

I guess you can't just push a button and have everyone simultaneously "edit" their parts to suit your vision.

No, you can't! But I do like to use technology in conjunction with live musicians. I'll utilize both styles—the live energy and the precision of technology—to produce a complete sound. I come from an acoustic background, so I'm primarily reaching for natural sounds when I write and produce songs, but, at the same time, I look for ways to blend performance and programming.

May I assume, then, that MIDI programming and music technology are the foundations of your productions?

Oh yeah, I use a lot of machines to demo the songs. All the drum machines and sound modules are running. But when we start recording for real, I'll bring in the musicians to cut live tracks. For example, I'll ask the drummer to play to a click so I can combine his tracks with the machine tracks. Although the groove may be programmed on the machines, I give the drummer a lot of freedom because a brother playing drums is going to create more excitement than a drum machine. To really generate some excitement, you need to capture the feeling that's translated from one musician to another. With a machine, there's no spirit attached.

Are the sequences pretty much set in stone, or do you let the musicians battle it out with the machines and then choose the best parts for the final arrangements?

Earth, Wind & Fire, circa 1997. Don't look for Maurice on the current concert tour, however. "I decided to stop performing live in 1994," he says. "Thirty years living out of a suitcase was enough."

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SHINING STAR

Well, I always keep an open mind. Sometimes when the musicians start playing with the sequences we'll see that we have to slow down or speed up a track to make it work. And then there are things that we always have to discard—parts that we thought were going to be helpful but that only cluttered things up when mixed in with the live tracks. Of course, every once in a while, we'll end up adding some things to augment the live performances.

But how do you determine when something is working as programmed, or when a new direction is warranted?

The song is the most important thing, and the song should always dictate what works and what doesn't. So the first thing I try to do is create a great song. I usually start writing with just piano and voice. When I think I've created a good song, I'll start working with the musical arrangement—writing, sequencing, and recording parts—and then the process will come back to the vocal. The vocals are the last thing I do.

Do you always keep the vocals in mind while you're adding parts?

Pretty much. I'm always singing along with the tracks when I'm visualizing parts. It's always a balancing act. For example, if the horns are saying something, the vocals are not. Likewise, if the voice is saying something, then the horns don't say anything.

That's an interesting point. Inexperienced producers always seem to want everything "talking" at once.

I think what happens is that it's so easy to program certain things, that some people just want to hear every single one of their great ideas. But my thing is all about trying to craft records for the listener. I want to create something that will be appealing to people's ears. That's the reason I like to balance everything out. Conflicts can confuse the listener. This is why the mix is very important, too. You can certainly record parts that counteract the vocal lines—and those parts can actually help by giving the track more energy—but you need to keep them back in the mix to ensure the vocals can be clearly heard. Sometimes a little EQ tweak or a level adjustment will separate other parts from the main line you want the listener to hear. The parts are still there, but they're perceived on a more subliminal level.

How many parts do you typically develop for a song?

Oh, I like a million tracks—just like everybody else! I lock up two 24-track machines, and I also have a lot of virtual tracks going.

How do you decide which parts stay, which parts go, and which parts are placed subliminally? Do you employ any conceptual methodologies to ensure that all the material you record actually works?

No. To be honest with you, I kind of leave those decisions to my engineer. I want to be totally free to create in the studio. I like to be able to grab things out of the air. I put so much stuff on tracks, man, because I never know when I'm going to need a part.

It's important to have options in case I change an arrangement or something and, because of that change, a part doesn't work anymore. With all these "back up" parts recorded, I can usually find something else that works. But for the most part, I let the engineer make the initial editing decisions.

So you're still constructing some aspects of the song arrangement at the mixing stage?

Yeah. I move stuff around a lot. I'm always flying stuff from one place to the next. Sometimes we use a sampler and sometimes we use [Digidesign's] Pro Tools. We actually use Pro Tools a lot, but not as a multitrack recorder; we use it to comp tracks.

How do you track the live musicians?

The drummer plays to the MIDI tracks, and I usually record three to four guys at one time. The reason I do that is because I like the energy to flow between the musicians. I find you get better performances that way than if you overdub the drums and bass and other rhythm instruments separately. On the other hand, I don't want a lot of musicians in there playing together because I need them to focus on their parts and

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really interact with the other players. It can be rough when you're listening to the MIDI stuff and too many live players on headphones because there's just so much sound. It's difficult to concentrate.

So how do you usually track your horn section? Do you overdub an entire section at once?

I do the section all at once, and I always double or triple my horns. I've been doing that for years. I think that's why we get such a tremendous horn sound. Of course, it's important for the horns to be in a room that has the right atmosphere.

What type of room usually works best for recording horns?

It's kind of a catch as catch can because you never know until you try. Every room has its own characteristics, but I usually look for a live room. I'm a horn freak, so the studio I'm building now is very, very live. The room isn't that big, actually, but I think it will be a good environment for recording horns and drums.

What about the actual horn arrangements? How do you develop those?

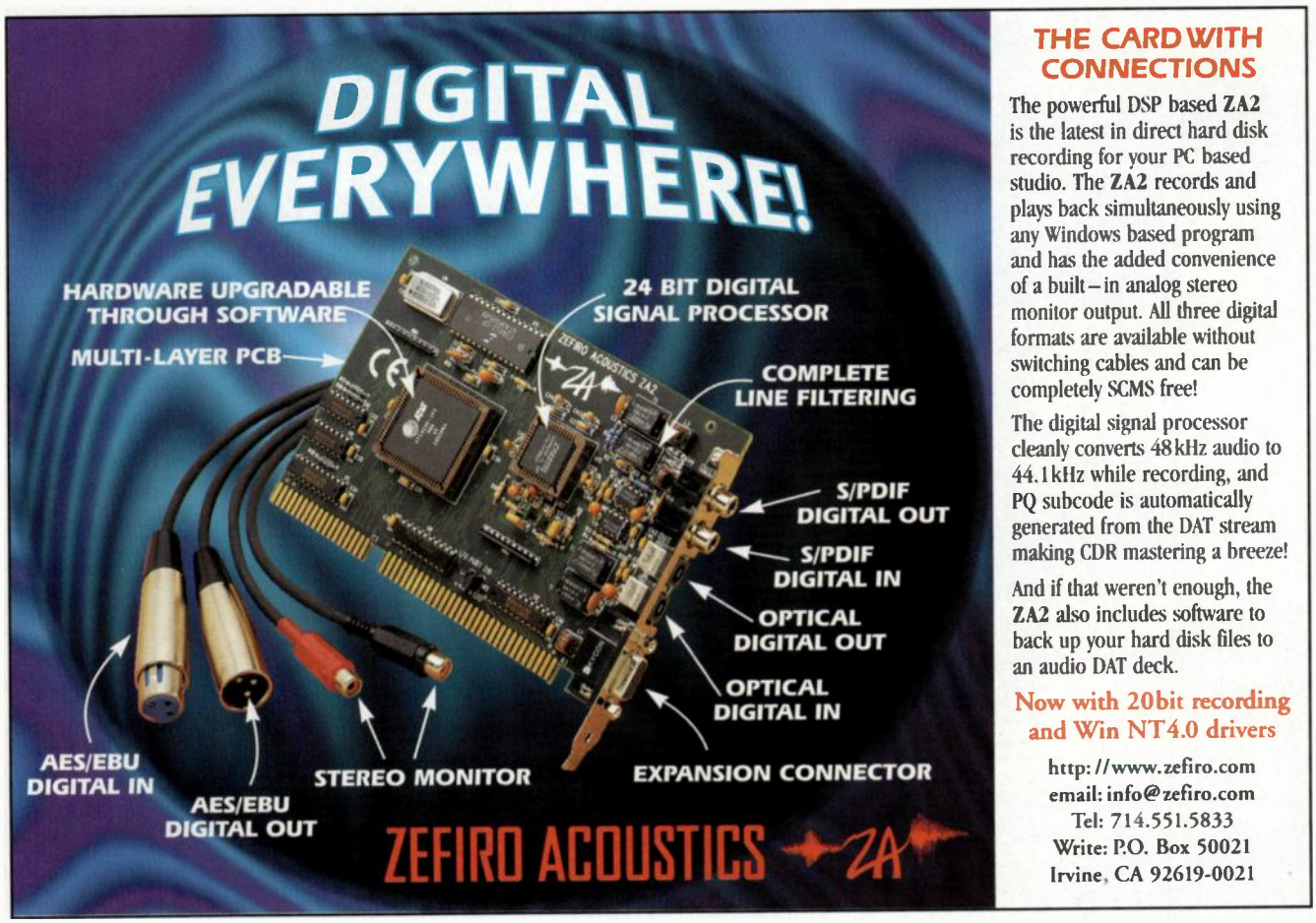
I write out charts, but, normally, they're lines that I've already tried using sequenced simulations. Sometimes, I'll just sing the parts against the track and see how the horn parts work with the vocals. Then I'll write the horn parts around the vocal. Often, I'll be faced with the problem of having too many parts. For example, I may have to eliminate the horns during the verse and not use them until the chorus. It all depends on the feeling of the song.

Given the evolution of dance music into subgenres such as jungle, drums and bass, and techno, do you approach the funk idiom differently than you did in Earth, Wind & Fire's classic years?

As far as a groove is concerned, I think that a lot of things have remained the same. You still have to get guys to play together, and you still have to program something that moves. The only difference nowadays is, for tracking drums and bass live, we have the opportunity to simulate the groove before it's recorded. You can spend fifteen minutes programming something, and then you can see what the groove will sound like when you do it with a studio full of musicians.

Are you a stickler for absolutely locked-down grooves, or do you let things get loose?

I allow a little bit of space because I want that human element. You don't want things to be perfect! You can hear it when someone is trying too hard to be precise—I certainly hear that on a lot of songs these days. I'll think, "Oh, he's just trying too hard." Sometimes, I'll purposely leave a mistake on a record because it's a human thing. Obviously, the "mistake" has to be cool, or at least presentable, but I don't automatically erase errors.



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You've worked with some amazing vocalists. Do you give them much leeway?
I see where the vocalist is coming from with the song. If I think where they're coming from is good, we'll go in that direction. If not, I'll take hold of the reins and kind of steer them in the right direction. I've found it's usually rewarding to let the vocalist create as he or she works through the song. We'll have a certain motif or melody, and I'll let the vocalist take that melody and experiment with it. But I'll typically impose some boundaries regarding the phrasing and how far the vocalist can stray from the original melody. Often, the melody will change because the vocalist has the chops to let us experiment with dynamics, and he or she will show us a different side of the song. There have been many times where I've come in with a basic melodic idea, listened to the vocalist sing the song, and then changed the whole thing around the vocalist's performance. You can discover new things about the work based on the interpretations of the musicians, but to get there you have to allow creative freedom.

A fair amount of producers like the vocalist to sing the melody as written or to stick to the demo version.
You can do that. I think that probably works with artists who are inexperienced. But I've been fortunate enough to work with a lot of experienced, talented artists. I trust where they're going. If they go off-key or miss the direction, I'll bring them back to where I want them to be. But I definitely feel that it's important to give the vocalist the freedom to experiment.

Where do you stand on technique versus passion?
I'm kind of fifty-fifty on that one. I like emotional involvement, but I still want the song represented in a technically high form.

The hype floating around the world-beat scene must be somewhat amusing to you, especially because you were juggling ethnic styles twenty years ago. Some of today's musicians—who tend to integrate the styles badly—consider themselves pioneers of the genre.
Well, there were a lot of people who did it badly twenty years ago, too! I use world instruments as colors, as a way to expose people to different sides of the music. I don't think you can just sit down and decide to play those things. Integrating styles is usually something that happens spontaneously.

Obviously, if you have broad life and musical experiences, those influences will creep into your compositions.
And I also think you have to be *open* to all types of music. I listen to a lot of jazz, but I also listen to classical music. I listen to a lot of roots music—a lot of the old blues and folk recordings, the *real* old stuff. I listen to all different types of music because when you experience different sounds, you add tonal colors to your ears. Then when you're in the studio creating something, your subconscious calls on a lot of this stuff. It's easy to access different styles and colors when you've got them in your heart.

Do you feel chained to the musical heritage of Earth, Wind & Fire? What I mean is, do you feel like you must always be true to the style of your biggest hits?
No. I only feel freedom, and I always approach the music that way. I don't

MARK C. DAVIS

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feel like I have to rewrite our hits because I think in terms of "that was then, and this is now." We [Earth, Wind & Fire] can be our toughest competition, and each one of us is out there experiencing new music and new things. When you allow yourself the freedom to approach music without limitations, everything you experience can be channelled through your songs. You just have to try to stay in a place where all those experiences help you produce good music.

But, even if the band is listening to different records, I doubt that it would be stylistically appropriate for Earth, Wind & Fire to produce an ambient dance track.

Probably not. I hear a lot of weird tracks, and some stuff is just so unmusical. Some records are all about sound; they have no spirit. For example, some of the kids today can't write a song, so they wind up sampling somebody else's.

Well, classic songwriting does seem to be in a slump. Also, I don't hear a lot of current artists putting their mark on past song forms and carrying music forward a step. In the early 1960s, for example, British kids heard the blues and translated it into something else.

It's the training! What's happening with me and a lot of other people who made good records is that we understand composition. We know how to construct a song. And we had an appreciation for the music we were influenced by, but at the same time, we were able to put our own identification on it. You must always try to give the music *your* identity. In other words, if I copy a line from a Muddy Waters song, even though the line was inspired by him, my version of it will probably not sound anything like his original.

What do you consider as your fundamental approach to record production?

Well, my production style definitely comes from being a drummer. You see, the drummer knows what all the musicians are playing because he or she must accentuate all the instruments and play the groove, too. Coming from that space, you have an opportunity to expand the music into any direction you want because you already know what everybody is playing. For example, you can suggest a line for the bass player that will fit with what the guitar player is playing. In fact, I would say that all my productions are not very far removed from the drummer's role. The sounds in the mix fit in rhythmically and sonically—just like a drummer playing the bass drum, the snare, the hi-hat, the toms, and the cymbals. So you've got the lows, you've got the highs, and all the parts fit together as a whole. Believe me, you have to have big ears to be a drummer!

Michael Molenda *is editor in chief of* **EM.** *He recently won a 1997 Music Journalism Award for his September 1996* **EM** *feature on the godfather of space-age lounge music, Juan Garcia Esquivel.*

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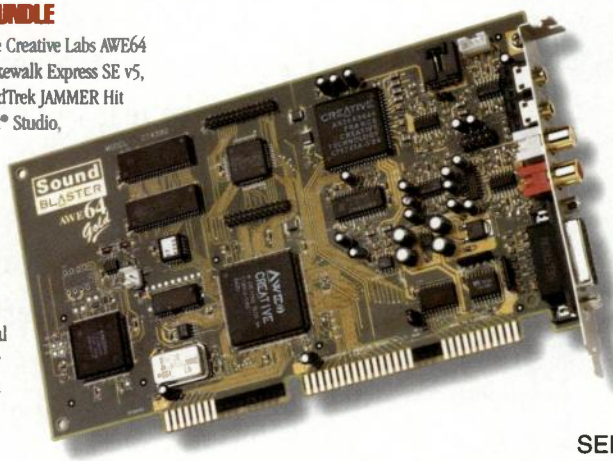

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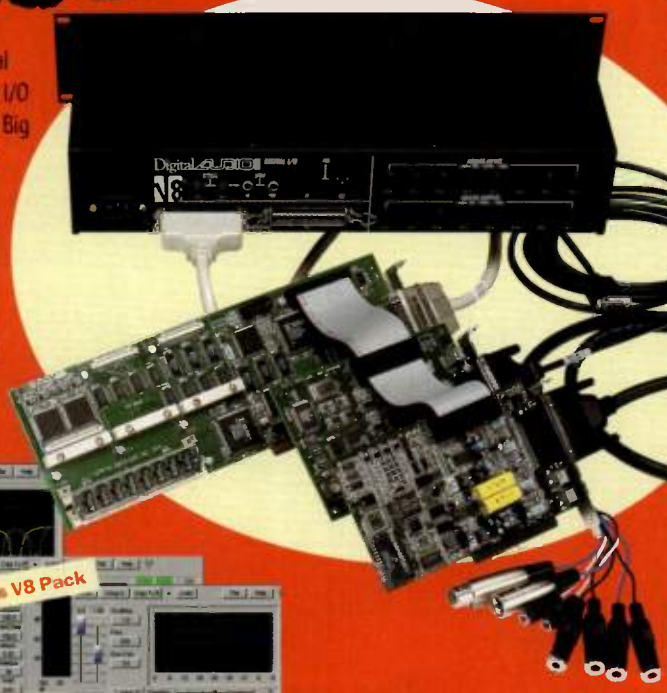

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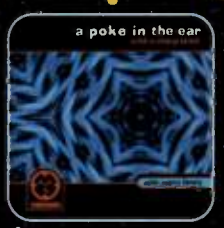

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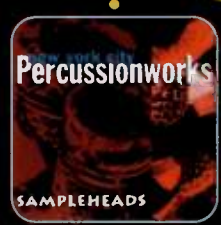

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Microsoft Windows NT 4.0

Does the other Windows OS mean business in the studio?

By Steve Cunningham

Originally positioned as the operating system for mission-critical business applications, Microsoft Windows NT 4.0 is slowly finding its way into the studio. With promises of greater stability and functionality than Windows 95, NT should be a godsend for musicians and audio editors. But is Microsoft's flagship OS appropriate for audio and MIDI work? And is the music business ready for NT? That seems to depend on whom you ask.

In the late 1980s, Microsoft created Windows as an interface that would run on top of the single-user MS-DOS operating system, but the company saw the shortcomings of DOS and Windows for business use. Customers demanded an industrial-strength, multi-user operating system to manage important data. Shortly thereafter, Microsoft and IBM joined forces to create a new operating system that would replace DOS in the business world. Microsoft assembled a team to design the New Technology Operating System, which was also known as OS/2 NT.

By the early 1990s, Microsoft had released Windows version 3.0, and sales of the software soared. At the same time, Microsoft and IBM came to loggerheads regarding the future of OS/2 NT. IBM viewed Windows as a stepping stone to the superior OS/2, but Microsoft wanted to expand Windows to compete with OS/2 and to compete on computer platforms other than Intel. Ultimately, the two companies went their separate ways; IBM kept OS/2, and Microsoft changed OS/2 NT to Windows NT.

The first release of Microsoft's Windows NT version 3.1 shipped in 1993 and had the same graphical user interface as Windows 3.1. Unlike Windows, however, NT was a pure 32-bit operating system with the client/server features that business required, and it had the ability to run older DOS and Windows applications.

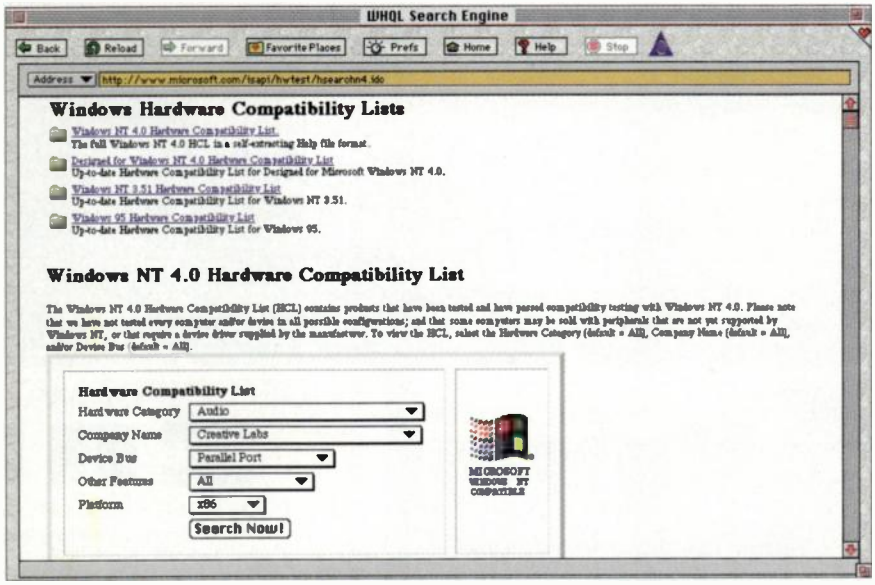

FIG. 1: The Hardware Compatibility List at Microsoft's Web site enables you to check devices by category to see whether they're Windows NT–compatible.

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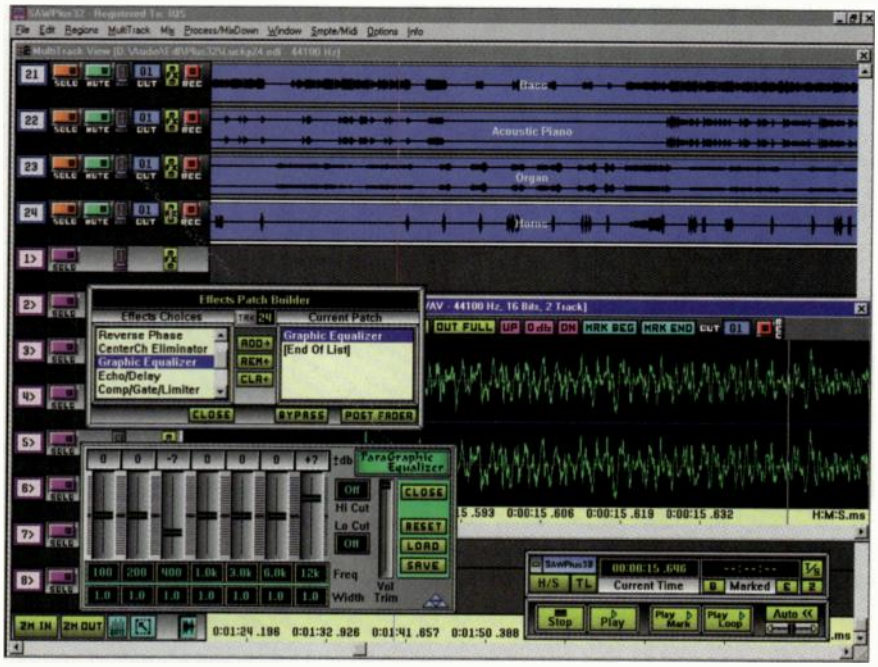

FIG. 2: *SAW Plus 32* from Innovative Quality Software takes full advantage of the improved performance of Windows NT.

PC-based computer graphics professionals were the first artists to get into NT because its multitasking capabilities allowed them to render one image while working on another. Moreover, these artists could now run their high-end graphics and animation programs on an inexpensive Intel PC rather than on a pricey UNIX system. Soon desktop video jockeys and their composer friends began to ask for professional music software to run under NT. And music-software vendors have heard the requests.

WHAT DOES IT DO?

Unlike other versions of Windows (such as Windows 3.1 and Windows 95), NT is a complete operating system and not an addition to MS-DOS. NT 4.0 supports several CPUs, including Intel 80×86, DEC Alpha, MIPS, and the IBM PowerPC, although MIPS and PowerPC support will reportedly be discontinued in NT 5.0.

Windows NT actually consists of two products: NT Workstation (the client part) and NT Server (the server part). Windows NT, including both Workstation and Server, is a true 32-bit operating system. It implements preemptive multitasking, which means that the operating system controls the allocation of CPU time for each loaded application, thereby preventing any one application from hogging the CPU and potentially hanging the operating system. Each 32-bit application operates within its own virtual memory address space, which can be up to 4 GB. This ensures that one application cannot interfere with another's memory space and, theoretically, prevents the crash of one application from bringing down the entire computer. NT's other advantage is its security, which relies on a special NT file system that allows permissions to be set on a file and directory basis.

NT supports multiple CPUs and uses symmetrical multiprocessing in which the processors share all tasks, as opposed to asymmetrical multiprocessing, where the operating system uses one CPU and the applications use another. If an application is multithreaded, a 2-processor system running NT can provide twice the horsepower of a single processor.

NT REQUIREMENTS

All of this power does not come cheaply. To begin with, there is the issue of hardware. NT 4.0 does not work on 80386 machines, period. And although Microsoft claims that NT can run on a 80486/25 processor, a fast Pentium or Pentium Pro is required for reasonable real-world performance.

RAM requirements are equally weighty. Microsoft claims that 32 MB of RAM is just fine, but you'll quickly discover that you need at least 64 MB to take advantage of NT's multitasking abilities. This is especially true if you intend to load multiple applications and switch between them.

Buying the Windows NT 4.0 system can be costly, as well. Users of Windows 95 may be disappointed that there is no software upgrade path to NT 4.0. NT Workstation single units are $299.95, and upgrades from earlier versions of NT are $139. A 5-user NT server software license is $649.95, and a 20-user license is $1,599.95.

The cost for a typical NT upgrade, therefore, might include $300 for the NT software, $200 for more memory, and $350 for a bigger hard disk. And that doesn't include the cost of replacing boards or input devices that may not be NT-compliant—not exactly painless. But that's not all. You still have to install the software.

INSTALLATION WOES

The upgrade path to Windows NT can be steep and frustrating at times, depending on your system's configuration, but it's not impossible. It seems that there are some fundamental incompatibilities in the system registries for Windows 95 and NT. The situation is compounded by Windows 95's anything-goes support for oddball hardware and virtual device drivers (VxDs). NT has no way to detect installed devices, doesn't recognize VxDs, uses incompatible hardware drivers, and may not recognize the file system in use. In other words, NT is definitely not a plug-and-play operating system.

To upgrade from Win 95 to NT, you should first check your system inventory against the official Microsoft NT Hardware Compatibility List (located at www.microsoft.com/hwtest) to see whether your sound card, video card, mouse, and other devices will work with NT (see **Fig. 1**). Then make sure your main hard drive is formatted using the FAT (file allocation table) file system. If it is not, you will have to back up the drive's contents to another hard drive and reformat.

Keep in mind that there are two types of FATs: one is FAT 16, which is perfectly compatible with NT; the other is FAT 32, which is the file system that is used by the newest version of Windows 95, commonly known as OSR2. (OSR2 is not available as a stand-alone product from retail sources; it is only available

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on new systems from computer manufacturers, although you can pick up most of the important components from the Microsoft Web site.) If you have purchased a system recently that has drives formatted with OSR2 (i.e., FAT 32), then NT will not recognize those drives. You can use separate drives that are formatted with NT's file system, NTFS, but that's not a particularly elegant solution.

Next, install Windows NT into its own directory. Finally, you'll need to reinstall some of the applications that you intend to use under NT. Older applications that don't write to the Windows registry will most likely work fine regardless of which operating system is running. On the other hand, most newer programs do write information to the registry, and in these cases you will have to reinstall the programs so that their setup information is added to the NT registry. When in doubt, simply try to run each application and see what happens.

Even if you're exceptionally well organized, the upgrade will take some time to finish, and further hardware and software conflicts may arise before you finish the installation. NT 4.0 requires manual resolution of conflicts between hardware components. Therefore, before beginning the installation, you would be wise to write down all of the I/O and IRQ settings for each board in your computer and keep the list handy. As *Byte* magazine declared in a recent article, "Interrupt-request (IRQ) and I/O-address conflicts between hardware components that Win 95 resolved...stopped [an NT] installation in its tracks."

One out of three 80×86 systems that work with Windows 95 sputters and dies when faced with NT. If you have an older audio adapter or network card, you'll probably need to replace it before you upgrade your operating system. NT experts won't even think of purchasing hardware without checking the Hardware Compatibility List. Microsoft's *Migration Market Bulletin* sheepishly acknowledges the problem and offers this promise: "Microsoft is completely committed to fixing this issue in the next major release of Windows

ALL DRESSED UP...

Life is not always easy for a Windows developer, especially if the product you're developing is a MIDI sequencer. Winjammer Software President Dan McKee knows this as well as anyone can; his *WinJammer Pro* sequencer (see **Fig. A**) is the first—and currently the only—sequencer that runs natively under Windows NT 4.0. But because there are no commercially available multiport MIDI drivers for NT, his customers cannot take full advantage of NT's benefits.

One of the biggest benefits comes in the form of a plug-in for Innovative Quality Software's *SAW Plus 32* recording system, which also supports NT 4.0. This plug-in creates a link between *SAW Plus 32* and *WinJammer* so that a Go To command executed in either program causes the other to locate instantly to the same point. "It turns *SAW Plus 32* and *WinJammer* into a really powerful music production system," according to Bob Lentini of Innovative Quality Software. "The timing link between the two programs is rock solid, and they're both screaming fast. The MIDI driver situation with NT is just really sad."

"*WinJammer* has supported NT for nearly two years now," according to McKee. "The testing was completed using a beta version of an NT MIDI driver that never made it to market. And please don't ask me, because I'm not sure why it didn't come to market or where the driver is today."

WinJammer Pro began life in 1991 as a shareware sequencer called *MIDI Edit*, which used the ubiquitous MPU-401 MIDI driver. It became *WinJammer* in early 1993 with the advent of Windows 3.0 and evolved into *WinJammer Pro* about six months later. *WinJammer Pro* for Windows 95 was released in early 1996, and today *WinJammer Pro* 5.04 includes versions for Windows 3.1, Windows 95, and (you guessed it) Windows NT.

"I'd guess that 75 percent of our customers use *WinJammer Pro* under Windows 95," McKee explains, "and another 20 percent use Windows 3.1. Only about 5 percent of our customers run NT, but that percentage is increasing. Frankly, the multitasking timing of NT is much better than that of Windows 95 or 3.1, but until MIDI drivers become available for multiport interfaces, advanced users can't take advantage of NT."

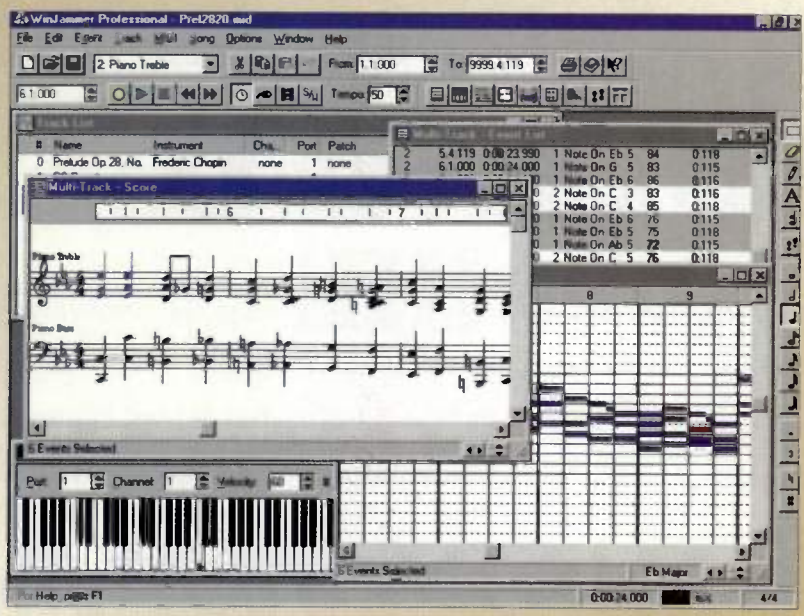

FIG. A: *Winjammer Pro* was the first native Windows NT sequencer and has supported NT for almost two years. It's still waiting for a pro-level MIDI driver.

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NT Workstation." Fortunately, several manufacturers now offer NT drivers on their Web sites (mostly for newer hardware), so more options are becoming available all the time.

NOT-SO-HARD DISK RECORDING

If you want to run a hard-disk recorder or sample editor using Windows NT, the news is pretty good and getting better. Several companies have already released NT-compliant versions of their recording software, and others will release new versions in the near future. Furthermore, many programs are already compatible with both NT and 95, so you may not actually need a separate stand-alone version of the software. In fact, a number of professional audio and video applications currently work under both systems right out of the box.

Sonic Foundry was one of the first companies to support Windows NT (as early as version 3.0) with its *Sound Forge* digital audio recording/editing application. According to Sonic Foundry's Monty Schmidt, "Our chief technology officer is a former Microsoft employee. He saw Windows NT as the OS of the future and insisted early on that we support it across our entire product line. Besides, we think NT is cool." Today *Sound Forge* 4.0 and *CD Architect* run fully native under NT for the DEC Alpha processor as well as for the Intel and Cyrix chip sets. As Schmidt points out, "The older version 3 of *Sound Forge* ran native on Intel, Cyrix, DEC Alpha, MIPS, and PowerPC. We only discontinued support for MIPS and PowerPC because Microsoft announced it would discontinue support for those chips."

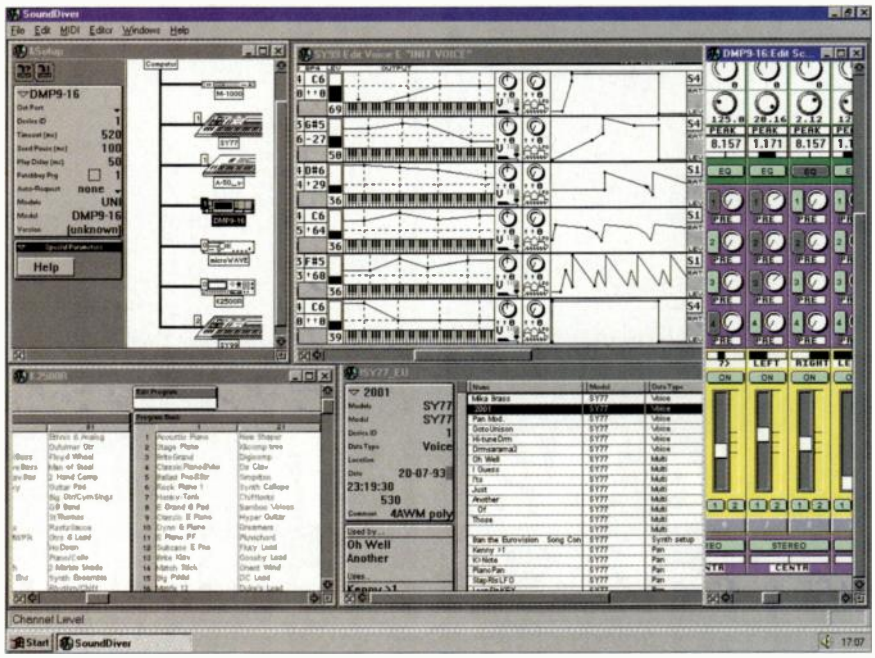

FIG. 4: Emagic's *Sound Diver* is the only editor/librarian that currently runs under Windows NT.

Innovative Quality Software's new *SAW Plus 32* (see **Fig. 2**) is another product that takes advantage of NT. "*SAW Plus 32* is a flat-out 32-bit NT-savvy product, and it takes full advantage of NT's performance," according to IQS' Bob Lentini. "Running the *SAW Plus* 16-bit program on a 166 MHz Pentium machine, we can get seven or eight stereo tracks under Windows 3.1 and ten or eleven stereo tracks under Windows 95. Running *SAW Plus 32* on the same computer under NT, we can get close to 24 stereo tracks of audio. It really screams."

Version 1.8 should be on store shelves by the time you read this. Lentini repeats the caveat regarding RAM, noting that 64 MB is necessary for doing any serious work under Windows NT.

According to Digidesign Product Manager Robert Campbell, "Audiomedia III delivers 24-bit audio performance under NT 4.0. We're actively developing on NT, especially since announcing the strategic partnership between our parent company, Avid, and Intel, which now owns 7 percent of Avid." Session 8, however, is still strictly a Windows 95 and Windows 3.1 product, and there are no plans for Session 8 to support NT.

Digital Audio Labs supports Windows NT across its entire product line, including CardD Plus and V8. NT drivers for these have been available for several months and ship as standard equipment. Minnetonka Software, creator of *Fast EdDIT* and *MxTrax* (see **Fig. 3**), is also committed to NT. According to David Hussman at Minnetonka, "*MxTrax* runs just fine under NT 4.0, as does *Fast EdDIT*." The company is working on a 32-bit version of *Fast EdDIT* that it hopes to deliver in the fourth quarter of 1997.

Yamaha is another company clearly committed to NT. According to Mike D'Amore, "We're currently in beta on our new *SY-XG-50* software synth. It's a Win 3.1, Win 95, and NT-compliant software replacement for Blaster-type cards. We've been getting requests from our customers since the introduction of NT 4.0, and we expect to release the NT version of *SY-XG-50* some time in the fourth quarter of this year." Yamaha's older DB50-XG daughterboard for the Sound Blaster and its SW60-XG EISA-bus wavetable upgrade card support NT via the NT MPU-401 driver.

YOU WANT MIDI WITH THAT?

If you hope to connect your 6- or 8-port MIDI interface to your PC running Windows NT, you're in for a shock: you can't. Well, technically you

FIG. 3: Minnetonka Software's *MxTrax* digital audio editor runs fine under Windows NT 4.0.

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can, but it won't work. As of this writing, there are no drivers to support any of the high-powered, multiport MIDI interfaces that work just fine under Windows 95. There seem to be three reasons for this condition.

The chicken-and-egg effect. There are currently no Windows NT multiport MIDI drivers, so sequencer manufacturers are in no hurry to spend precious R&D dollars developing NT versions of their software. And because there are few 32-bit sequencers, interface manufacturers are loathe to spend money writing drivers for NT.

Lack of an official MIDI driver spec. Microsoft was engaged in discussions with several companies regarding its MIDI strategy for NT 4.0. Then, for reasons not well understood outside of Microsoft headquarters, it changed its corporate mind and decided to release its own spec for the upcoming release of NT 5.0, leaving NT 4.0 in MIDI limbo.

Technical issues. Suffice it to say that, due in part to NT's multitasking capabilities, latency issues are a major concern to potential driver programmers. Although these issues are not insurmountable, they have thus far discouraged many companies from writing MIDI drivers for NT. Does the term "thunked code" mean anything to you? Me neither.

The bottom line is that interface manufacturers, including Mark of the Unicorn and Opcode Systems, have not written NT drivers for their better interfaces. And that presents some unique problems for sequencers under NT (see sidebar, "All Dressed Up..."). Following is the current situation among MIDI software companies.

Steinberg's *Cubase* series, including *Cubase Audio*, does not run on NT. However, the company is looking into support for NT.

Coda's *Finale* version 3.72 also does not yet support NT. According to Chris Anderson, product manager at Coda Software, "We know of some folks who run *Finale* under NT 4.0, but there are problems with MIDI. We don't recommend running *Finale* on NT, and we can't support it." As a matter of policy, Coda does not comment on products under development, but Anderson notes, "We're certainly aware of customers that want to use NT."

Emagic's *Logic Audio* and Audiowerk8 card do not yet support Windows NT. However, the company's *Sound Diver* editor/librarian program (see **Fig. 4**) does support NT 4.0. Emagic is another company that does not comment on products under development, so stay tuned.

Mark of the Unicorn's MIDI software for Windows, including its *FreeStyle* sequencer and *Unisyn* editor/librarian, support only Win 95 and 3.1 at this time. The company declined to comment about future developments.

Cakewalk Music Software's *Cakewalk* 5.0 does not "officially" run under Windows NT, but several users have had success using the program with NT. As of this writing, the company's current 32-bit release, *Cakewalk Pro* 6.0, does not run under NT, but by the time you read this, an upgrade should be available that makes the program NT-compatible. Unfortunately, there is no pro-level MIDI driver for it.

A fast Pentium or Pentium Pro is required for reasonable performance.

Opcode Systems currently has two Windows programs: *Musicshop* for Windows and *Vision* for Windows. Both are 16-bit programs that will not run under NT, but Opcode's Paul de Benedictis says that the company plans for both programs to run under NT at some point in the future.

IS THE UPGRADE WORTHWHILE?

This is a tough one. Opinions regarding NT vary, as the following quotes from the Windows NT newsgroup on the Internet attest.

"I run Win NT, Win 95, and OS/2 Warp on the same machine. My favorite is OS/2 Warp 4.0, the most stable is Win NT, and Win 95 has the most support."

"NT is far more stable than Windows 95. NT is much less prone to having its registry hosed."

But all is clearly not beer and skittles with the newsgroup folks.

"I have never called [the Microsoft NT support line] before, but that doesn't matter, because you do not get any technical support for free when

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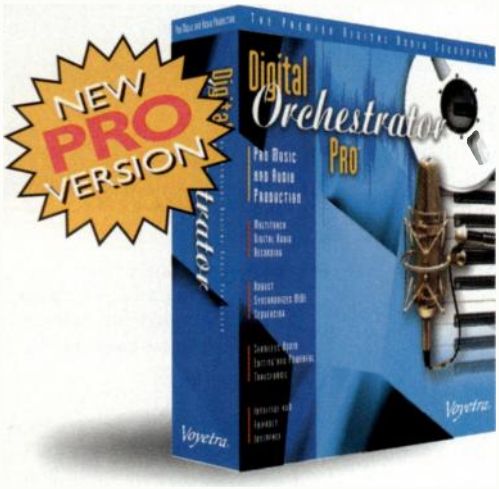

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you buy Microsoft NT Server. None, zero, nada, zip. The charge to have *any* questions answered by Microsoft is $195 per incident. No exceptions. If you find that hard to believe, please call the [support line] and check it out for yourself."

In the end, the answer to the question of whether you should upgrade depends on the nature of your work. If you're just recording and editing audio on hard disk, the new crop of NT-compliant digital audio editors appears to offer much better performance. If you run a video capture board and graphics software, the upgrade may prove useful as long as you don't need MIDI. And the consensus is that Windows NT is definitely more robust than Windows 95. If your MIDI needs are modest, you might even get by with the built-in MIDI interfaces that come on some sound cards. There are basic 1-In/1-Out NT drivers for cards from Creative Labs, for example.

On the other hand, if you need professional-level MIDI capability for serious music production, you're out of luck. Despite NT 4.0's stability and multitasking capabilities, it's not as well supported by MIDI software companies as is Windows 95, and there are no drivers to support multiport MIDI interfaces. Windows NT was designed primarily for business use, and Microsoft's investment in development is funded by sales in the business world.

In the end, you might be better off waiting for NT 5.0, which should appear some time in 1998. According to Microsoft, NT 5.0 will support full plug-and-play capabilities for the first time and will support a new audio driver model that will provide 32-bit binary-compatible drivers for Windows 98 and NT 5.0. The software giant claims it is making a concerted effort to work closely with the professional audio industry during the development of these and other new releases. So it appears there's hope for the future. But for the moment, Windows NT remains a product better suited to the boardroom than to the personal studio.

Steve Cunningham *has been messing with computers since CP/M and was working in pro audio when Bill Gates was selling BASIC interpreters for Altairs. He can be reached on the Internet at synthman@loop.com.* *Special thanks to Dennis Miller for his help in preparing this article.*

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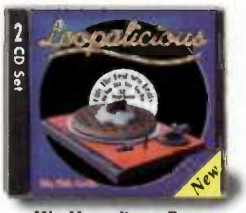

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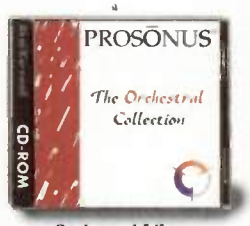

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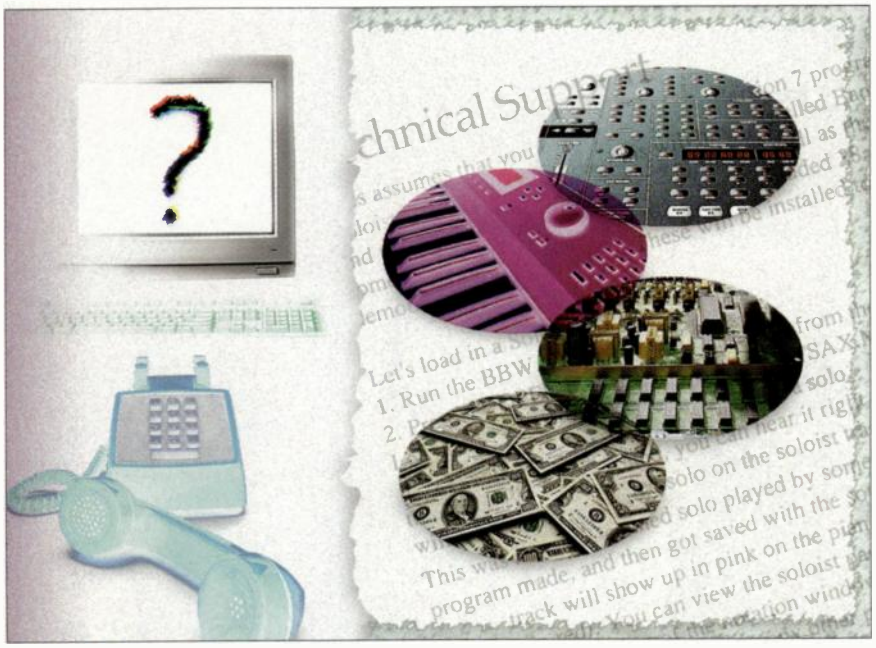
Visible Means of Support

Get maximum benefits from your tech-support calls.

By Steve Oppenheimer

Most musicians roll their eyes and make disparaging remarks when one raises the subject of technical support. One **EM** author told me he had nothing to say about tech support because there was no such thing. Readers call to complain that their e-mail is not answered and the support phones are so busy they can never get through. Others complained about support staffers who didn't know their own products, were unwilling to admit their product might be faulty, or treated callers like children. Although I have had similar experiences, I have also had the opposite experience: earnest, knowledgeable support techs (who did *not* know I was an **EM** editor) who listened carefully and helped me solve the problem.



DMITRY PANICH & TAMI NEEDHAM

I get a lot of calls, e-mail, and snail mail from readers who think that **EM**'s editors constitute a tech-support staff. I always ask what the manufacturer's tech-support staff advised. Most of the time, the caller responds, "Oh, I haven't contacted them." A surprising number of these requests for help display basic misunderstandings about the features and intent of the products. Others are well reasoned and raise real questions, but they are nevertheless misdirected. We editors cannot provide tech support for a host of readers and a multitude of products.

If the appeals we receive are any indication, the manufacturers' tech-support staffs have their hands full. It is apparent that many musicians simply do not know how to get the best out of tech-support specialists. Fortunately, this is a situation where an editor *can* provide support. I e-mailed more than a dozen companies and started collecting their tech-support staffs' stories and advice on how to make the best use of their services.

THE DARK SIDE

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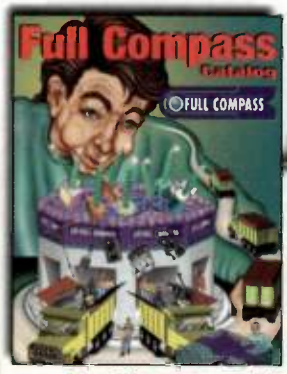

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enthusiastic, and a few were even prompt. Then I got a reminder that there is indeed a dark side to tech support. I e-mailed a marketing manager at a major software developer that prides itself on its tech support. The next day, I received e-mail from the company's tech-support "automated reply service" telling me I would receive a response to my tech-support inquiry in two to four days! I e-mailed back, "No, no, you don't understand. I don't want tech support; I am writing an *article* about tech support." The next day, I received an identical automated reply. Argggh!

Six weeks later, I had received no further contact from this company. When I brought this to the attention of the company's CEO, I was told that the automated reply service should never have asked me to wait even two days; something was amiss. As of this writing, it has been ten days since that discussion, and I have heard nothing more. If I were a paying customer seeking tech support, I would be outraged.

Yet had I phoned for tech support and actually gotten through, I would not be surprised if the support staff turned out to be cooperative and helpful. I got stuck in the dark side of the system and never actually reached the right folks. Avoiding getting stuck is one of the keys to getting good tech support.

DO YOUR HOMEWORK

The tech-support staff is there to help you solve problems you cannot solve on your own. You bear the primary responsibility for using the information that is available to learn how your gear works. Not to dwell on the obvious, but every company I contacted began their comments with "read the friendly manual," or something to that effect. Although some manuals are hardly friendly, if you work with them, you might be able to extract the information you need. Software developers also often include online help and Read Me files. Use them.

Opcode Manager of Quality Assurance and former tech-support staffer Mike Rodgers warns, "Customers should not expect to be given a lot of time with basic questions that are answered in the manual. These customers clog the tech lines, and customers with real problems have a hard time getting through the busy signal."

In addition to supplying manuals, many manufacturers provide troubleshooting tips, FAQ sheets, specs, software updates, user lists, discussion forums, and other resources on their Web sites. Also, look for user-sponsored Web pages, which often discuss workarounds, tips, and undocumented features. You can often find these via an Internet search engine (e.g., Alta Vista or Lycos).

You should also take advantage of Internet mailing lists. (For more information, see the table "A Community Effort"). Some mailing lists are specific to a single manufacturer, and some are for a specific platform. Usenet newsgroups are also valuable online resources because they enable you to share tips and information with other users. And don't forget the online forums on the Microsoft Network, CompuServe, and America Online.

For those who don't have Web access, some companies (e.g., Roland, Korg, and TASCAM) offer technical information by automated faxback, which is an excellent service. Manufacturer-supplied instructional videos from companies such as Roland and Opcode are also well worth checking out, especially if the problem appears to be feature related. Of course, third-party books and videos are also available from libraries, bookstores, and catalogs such as Mix Bookshelf (tel. 800/233-9604 or 908/417-9575; fax 908/225-1562; e-mail info@mixbookshelf.com; Web www.mixbookshelf.com).

DOCUMENT YOUR SYSTEM

Before proceeding, make sure you have registered your purchase by sending in the warranty card. Many companies require this before providing support. For example, if you call Alesis for support and have not registered your unit, you will be asked to fax a copy of your sales receipt. It's also important to prepare a detailed inventory of your system (at least all relevant parts) *before* making the call.

For hardware products, note the model, the operating system version (if possible), and the serial number. It helps to list the date of purchase and the name of the dealer from whom you bought the product. This can be useful, for example, if the tech-support staff knows that a particular shipment with problems went to that dealer around that date.

Lexicon's Brian Wood suggests you provide detailed information at a pace the support tech can handle rather than flooding the tech with information at high speed.

Computer products have the most variables, so keeping accurate records of what you use is critical. For software support, you'll need to know the computer make and model, OS version, and amount of RAM as well as the software title, version, and serial number. You also should list other applications you may be using concurrently and all loaded system extensions and control panels. Note the memory control-panel settings, disk-cache size, and the status (on/off) of virtual memory and 32-bit addressing. Include the type of MIDI interface you have and which serial port it uses.

An important but sometimes less obvious point is to document the make, model, and version of *all* cards (such as ISA, PCI, NuBus, and PC cards) in the computer, not just audio cards. For example, an **EM** reviewer recently found that his unusual, high-end graphics card caused strange problems with his Windows software synthesizer. It took quite a while for the tech to isolate this problem because it occurred to neither party that the graphics card could be the cause. Windows users should beware of address conflicts between their MIDI interface and computer cards, especially sound cards.

Consider creating a flowchart for MIDI and audio connections in your

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system. This makes it easier to double-check all connections. Although I don't have a flowchart, I keep complete documentation on every MIDI, audio, control, SCSI, serial, sync, and power connection—including all patch-bay points and mixer connections—in the form of word-processor tables. I update these whenever I make a change in the studio wiring. It has been well worth the trouble.

Korg USA Product Support Manager Rich Koestner recommends that, while you're in list-making mode, you should make a list of the goals you wish to attain when you call. "Chants of 'Ummmm, ummmm, ummm' do not relax the user or the product specialist," Koestner remarks.

DIY TROUBLESHOOTING

Once your system is documented, do as much preliminary troubleshooting as possible before calling tech support. It's especially useful to conduct experiments that would be too time-consuming to do over the phone.

If you aren't sure which program, device, or combination of components is causing the problem, strip your system down to its basic components and isolate the problem by testing each piece of hardware and software separately to the extent possible. Then start adding pieces back in until the problem reappears. Suspect all cables until they are proven innocent. For computer problems, run a hardware diagnostics program, virus checker, and hard-drive utility to identify hidden problems. I discussed troubleshooting tactics in more detail in my August "Gear" column on the **EM** Web site (www.emusician.com).

As soon as you encounter problems, carefully review everything you have done to the system recently, and keep a written record of the symptoms and your troubleshooting efforts. For example, write down any error codes that pop up when a program or operating system crashes. (Certain hardware, such as MDM decks, also displays error codes.) "If you have a strange or intermittent problem, keep track of the things you tried and the changes that resulted," advises BIAS tech-support guru Earl Vickers. "If something used to work, what did you change just before it stopped working?"

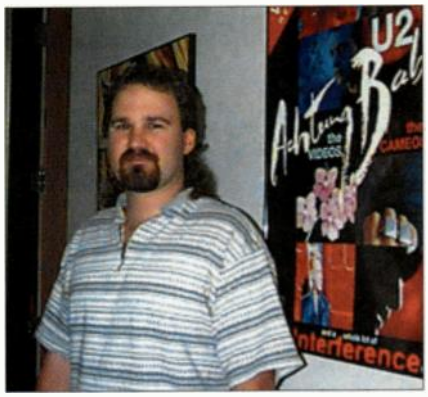
The main point is to do as much as possible to solve the problem yourself. Be persistent, and above all, don't panic. "Once you have run through your arsenal of tricks for fixing the unit, walk away and relax for a minute," advises E-mu tech-support ace Dan Becker. "Come back later and try again. You would be surprised at how many things you overlook when you are stressed."

OPTIONS

You have several methods for getting tech support, so the next step is to decide which to use. Phone calls are the quickest way for the support staff to collect the critical information they need to assist you. This is the best way to solve really thorny problems. Also, if you are in midsession and genuinely need an answer right away, the telephone is best.

A lot of people think they need immediate answers when they really could wait for an e-mail response. For software problems in particular, you might be wiser to initiate the support process via e-mail. This way you can give the support staff a written, detailed list of symptoms, exact information on your system, and an account of the troubleshooting steps already taken. You might still end up on the phone with the support staff, but you won't have to go through an elaborate explanation on your dime. E-mail is only effective if your message is clearly thought out and presented, so it's a better option for the experienced user of the product than for the novice.

To cut down on wait time and to route callers to the appropriate specialist, Roland Corporation U.S. divided its tech-support staff into five product-specific groups. Here, T. J. Hudson of Roland's Hard Disk & Sampling group gets down to business.



Opcode Manager of Quality Assurance and former tech-support staffer Mike Rodgers suggests you pay careful attention to the concepts the tech discusses so that you can avoid repeating the problem.

By the way, most companies prefer to receive suggestions for future versions of the product via e-mail, which is easily forwarded to the appropriate engineers and other decision makers. Usually, the tech-support staff doesn't make upgrade decisions anyway.

Avoid faxing requests for technical support. Some companies offer support by fax, but unless the question is specific and the information you need is already archived in written form, the support folks have to type in your question along with their response. That slows things down considerably. If you want to write for tech support, use e-mail.

Don't forget about the dealer who sold you the product. It's sad but true that many regular music-store personnel are undertrained and unmotivated, but some dealers, especially those who cater to professionals, will work hard to keep you satisfied. The best of the bunch, such as Sweetwater Sound, offer a very high level of technical support. All the guidelines for getting manufacturer support also hold true when seeking tech support from dealers.

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your system with your equipment up and running. Often a tech needs to have you try some experiments before they can help determine what isn't working. Without exception, every tech-support staffer considers it essential that you be at your rig when you call. Keep your owner's manual handy in case the tech needs to refer you to a specific section.

"I know that it's hard to call during working hours," says Becker, "but to find a solution, we need the immediate feedback of 'Try this. Now what happens?' It's mutually frustrating when the tech has to say, 'Try this and call me back tomorrow,' especially when we both know the phone lines are always busy."

KEEPING COOL

Other than "read the manual" and "call while at your system," the most-repeated advice I heard from virtually every tech-support person I contacted was that you must be calm and patient. Get your emotions under control and resolve to stay cool.

"It doesn't help matters to yell at the tech-support staff," explains Becker. "They don't design this stuff, and they want to help you, even if sometimes it seems that they are helpless to do so. These folks are, well, just folks like you. How eager would you be to help someone who is abusing you and your employer right out of the gate, before you even have a chance to solve the problem?"

"One of the biggest factors to bear in mind with regard to technical support is that the support personnel are usually under a good deal of stress all day," adds Lexicon's Chris Theodore. "All they ever see are problems—that is their job, of course—often the same ones over and over. Usually the customers are a bit frazzled, too, and they sometimes project this frustration onto the support rep, which exacerbates the situation. Your best bet is to always keep a cool head, be businesslike, and keep in mind that the person on the other end is a human, just like you."

I am acquainted with one particularly abusive musician who offended so many software companies that one returned his money and told him they didn't want him as a customer. Another company initiated the official policy that he or anyone who even mentioned his name was referred to a corporate vice president (who did not supply tech support, of course). Nobody will go out of the way to help this person anymore. Too bad. He is a bright, knowledgeable producer who sometimes found real problems in the products he complained about, but nobody wants to deal with his attitude.

WAITING FOR GODOT

Okay, you're ready to call. You are sitting at your rig, which is turned on. You've taken time to chill out and are resolved to be positive and constructive in the conversation that is soon to begin. Ah, but how soon will it begin? The difficulty of actually getting through to tech support is one of the

Korg USA Product Support Manager Rich Koestner says you should make a list of the goals you wish to achieve when you call.

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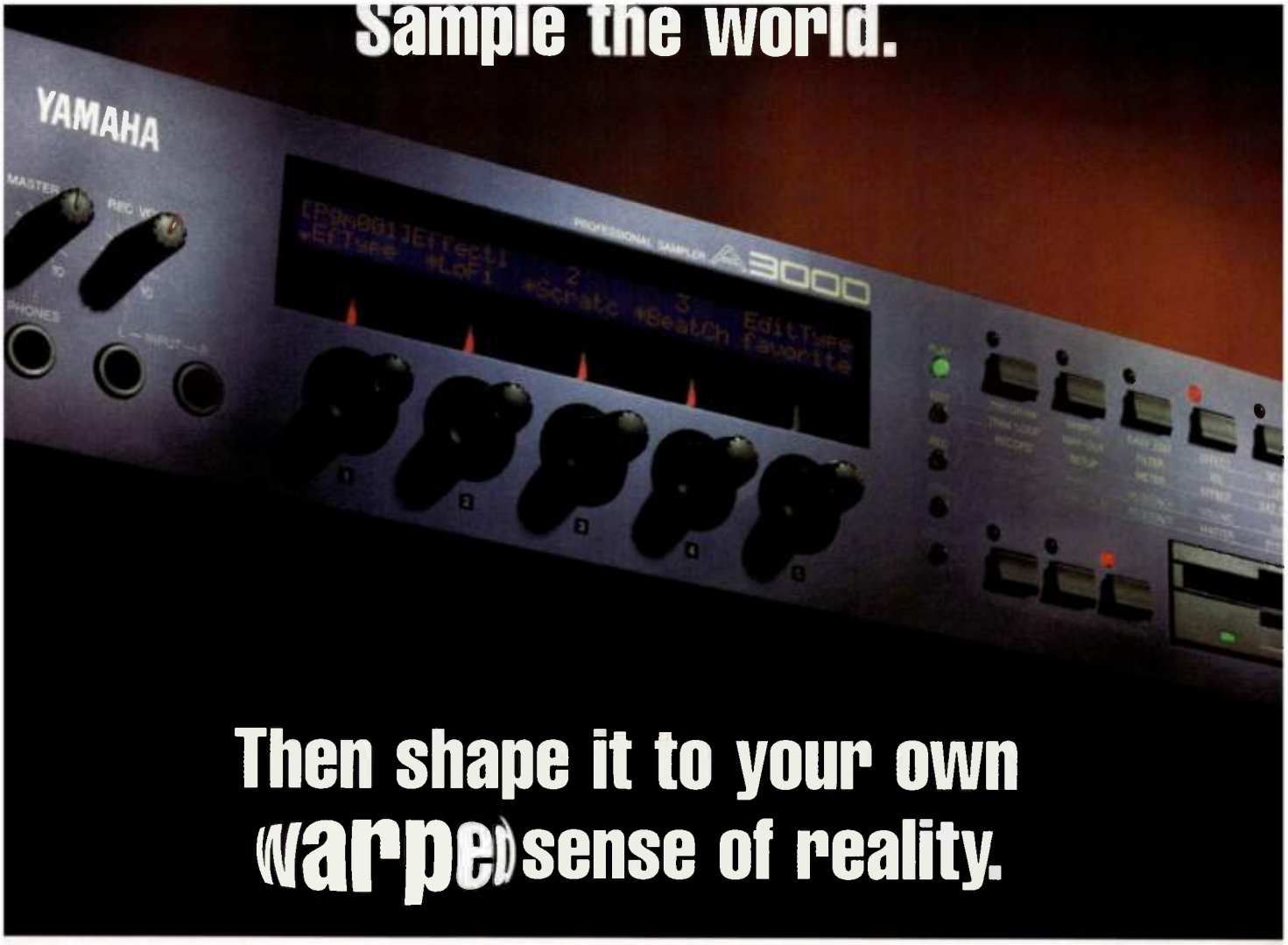

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top complaints I hear from **EM** readers. Several companies boasted rapid answering times, but we users may be forgiven for being skeptical. Our experience has been a cruel teacher.

There's no doubt some companies simply do not invest enough in tech-support staff and phone lines to properly support their products, which makes getting through to the techs especially difficult. (Some company representatives argue that tech support is not a profit center; although strictly speaking this is true, the alternative could be to lose profits to competitors who offer better service.) On the other hand, if a company hires more support staff and installs more lines, the cost of doing business rises considerably. Therefore, the price of the product goes up, and because musicians are notoriously price sensitive, that leaves the manufacturers and the end-users in a bit of a quandary.

How long is it fair to be kept on hold? "Waiting on average from two to four minutes is common, and I consider that fair and necessary," states Koestner. "Many callers get through immediately, in two or three rings, but waiting for more than ten minutes is a possibility." You might be given the option of leaving voice mail when the phone lines are backed up. If so, accept the offer and let the tech call you back. That way, you won't be stuck on seemingly perpetual hold due to some inconsiderate caller ahead of you who didn't read this article and did everything wrong.

RIGHT PLACE, WRONG TIME?

Although there is no magic formula, you can increase your chances of getting through in a reasonable amount of

A Community Effort

Internet mailing lists are an excellent source of technical information and discussions. Lists of mailing lists can be found at www.electronicmusic.com/datafiles/mailinglists, www.bakalite.com/Pages/Daw-Mac.html, and www.liszt.com. I especially recommend you check out some of the following ones. For information, send an e-mail to the address given below, and place the command given below in the *body* of your message.

—Earl Vickers, Berkley Integrated Audio Systems

List Name	Subject Matter	Address	Command
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Daw-mac	Mac digital audio workstations, including Digidesign Pro Tools and SampleCell, Opcode *Studio Vision Pro*, Macromedia *Deck II*, Steinberg *Cubase Audio*, and MOTU *Digital Performer*	daw-mac-request@lists.best.com	info end
ddesign	Digidesign products	majordomo@lists.uoregon.edu	info ddesign end
deckusers	Macromedia's *Deck II* (not run by Macromedia)	deckusers-request@lists.best.com	info end
dp4	Ensoniq DP/4	dp4-request@oak.oakland.edu	info
Electronica	Advanced and creative sound manipulation, from resynthesis to surround-sound processing to computer-based synthesis to vintage analog and digital equipment	majordomo@maths.exeter.ac.uk	info electronica
EMUSIC-L	Electronic music composition, criticism, technology, and technique	listserv@american.edu	info emusic-l
eps	Ensoniq EPS and ASR samplers	eps-request@oak.oakland.edu	info
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opcode-users	Opcode products and their uses (unmoderated)	majordomo@opcode.com	info opcode-users
Prophet SCI Sampler	Sequential Prophet 3000 and Prophet 2000 samplers	listproc@u.washington.edu	info prophet
SYNTH-L	A "gearhead" list discussing the availability and capabilities of music software and hardware	listserv@american.edu	info synth-l

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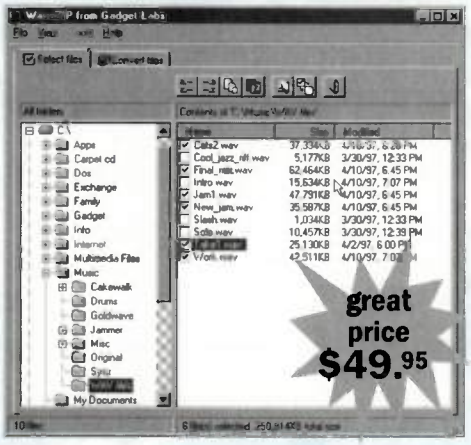

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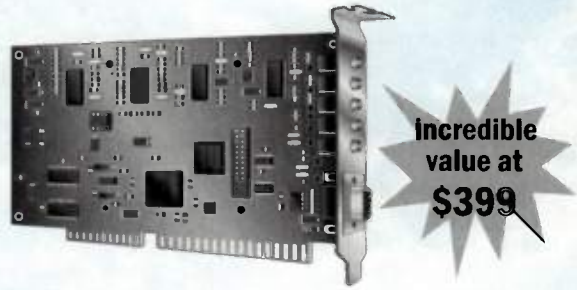

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time. First of all, make sure you are calling the right number. "Some companies, such as Korg, have a direct phone number for product support," notes Koestner. "Calling any other company number may result in multiple messages or transfers, which frustrates callers and extends their time on the phone." Usually, the support number is supplied in the manual or other printed literature that came with your product, and it is sometimes provided on the company Web site.

A common customer charge is that some large companies have support techs who don't know the entire product line. In response, some companies have taken proactive steps to help customers reach the right support person more quickly. About a year ago, Roland's product-support staff was divided by product type into five specialty groups. When you contact Roland's technical support, you are presented with a menu that allows you to choose the appropriate specialty group. Arrangements of this sort are intended to help you get to the right support person quickly. This doesn't guarantee superior support, but it is a big step in the right direction.

Keep in mind that, as in music, timing is critical when calling for tech support. At peak hours, calls start to back up. In general, the volume of calls is highest on Monday mornings, when people want answers for problems arising at the gig over the weekend. The calls also come hot and heavy on Thursday and especially Friday because people are preparing for weekend gigs. At many companies, the phones are busiest for the first hour of each day, although Becker notes, "Most musicians don't like to get up early, so you can beat the crowd if you find out the tech-support service's time zone and try calling right when they start their business day."

One particularly bad time to call is during lunch hours (generally between 11 A.M. and 2 P.M.). Musicians with day jobs often use their lunch breaks to make personal calls, and full-time musicians are up and stirring around midday. Compounding the lunch-time crunch is the fact that fewer technicians are available, even if they stagger their lunch breaks so that someone is always available (as they do at Korg and Voyetra, for example). Some tech-support lines (e.g., Alesis) close down at lunch time, which means that the lines are jammed during the hours right before and after lunch.

E-mu tech-support staffer Dan Becker reminds you to take stress-relieving breaks when troubleshooting and, above all, not to panic.

Ideally, then, you should try calling on Tuesday or Wednesday afternoons or possibly the first thing in the morning.

CONTACT!

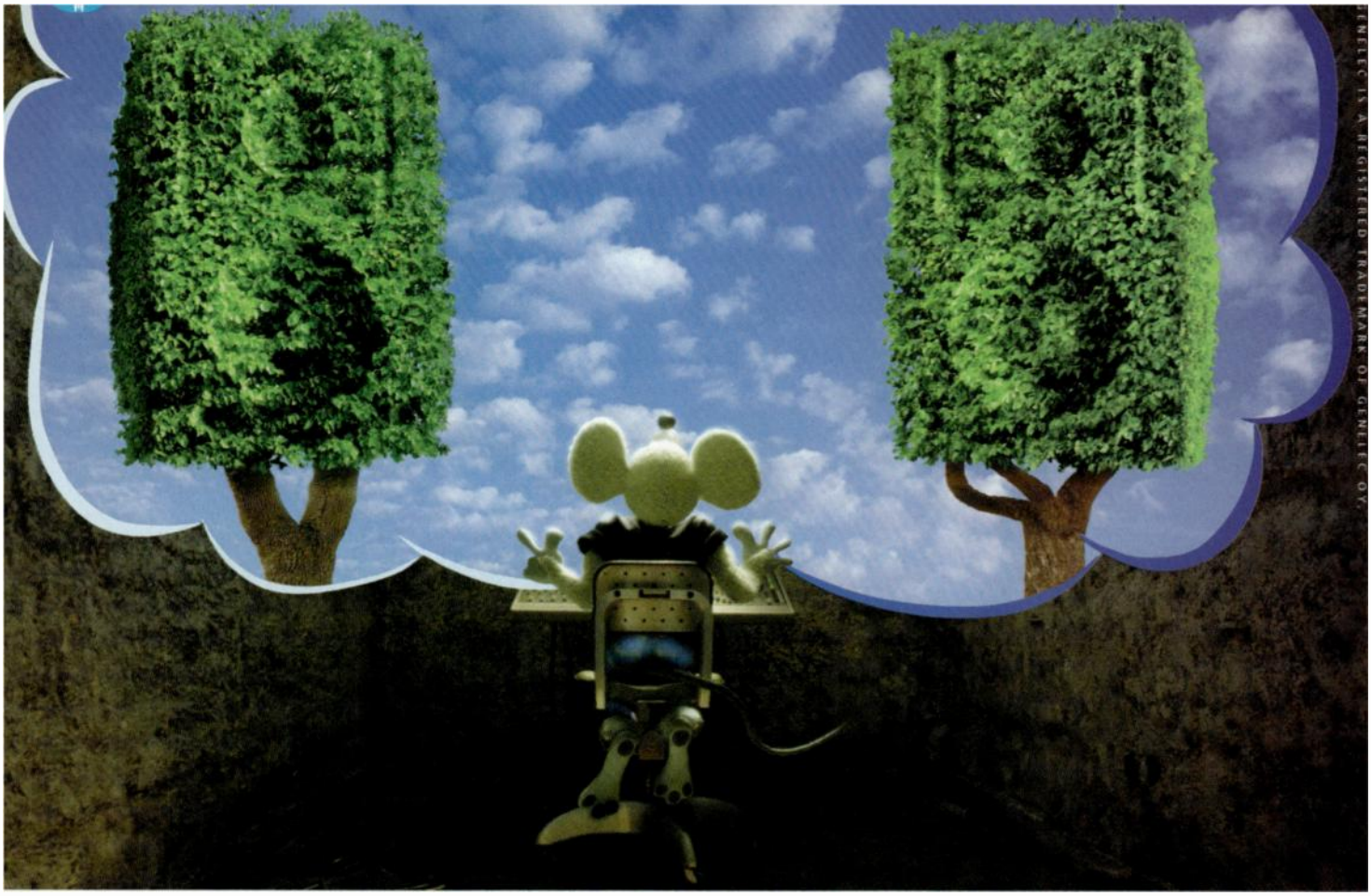
At last, you're on the phone with the product-support specialist. How do you use the time effectively? Well, to start with, let your support person know if the problem is urgent. Don't be shy about telling the tech that you're in the middle of a paying recording session and the clock is running. But don't cry "wolf" if the need isn't truly urgent.

When answering a call, the tech first qualifies the person to determine the customer's technical expertise. "This is usually done by listening to the way the customer explains the problem," says Opcode's Mike Rodgers. "For example, if you call up and say your program is not working, the tech does not have much to go on and will begin asking basic questions on the assumption that you don't have the technical savvy to explain the problem. The way these questions are answered helps the tech understand how basic the directions should be, so it is important that you take the time to answer the questions accurately and completely. This can also make the difference between the tech giving you a list of things to try when you get off the phone or walking you through a host of troubleshooting techniques. And that makes a difference in your phone bill."

Although detailed information is generally welcomed, you would be wise to prioritize things and make it clear which problems are of the most concern. If you e-mail tech support a list of every odd thing you've ever encountered, the support staff may overlook your main question. Too little information, on the other hand, may result in a misunderstanding of the problem. It also helps to use the terminology that is in the owner's manual and on the product's display or the computer program's screen. "Initially, give a brief description of the problem," suggests Lexicon's Brian Wood. "Although we want and need detailed information, don't give us a massive brain dump the minute we pick up the phone. Give us time to log your information so we can deal with the problem efficiently."

Be prepared to give your name and address and a telephone number where you can be reached so the tech specialists can track your problems and requests and follow up, if needed. Ask for a call-tracking number if the tech does not give one.

"Work closely with the specialist," advises Rodgers. "You are that person's eyes, ears, and fingers. Follow every step offered, and interrupt the specialist if you do not understand something or press the wrong button by mistake. Do not jump ahead, thinking you know where they are going; take nothing for granted. Be prepared to understand the concepts involved; each function is part of a bigger picture. Learn from the phone call. You do not



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want to call back the next day with a similar problem."

Sometimes customers are not willing to try recommended solutions to a problem. "If you don't think a suggestion offered by a tech will help you," says Rodgers, "I recommend doing it anyway. Often customers are surprised that a problem is resolved by a technique they were not originally willing to try."

Many problems are diagnosed or solved by the customers. A wise company listens to its customers and learns from them. If the tech-support folks show an interest in the problem, e-mail them to let them know how things turned out. If you let the support people know the resolution to the problem, they can also help others who encounter the same situation. And if you like the product even though you needed to solve a problem, mention that, as well.

MAKE THE RIGHT CALL

The manufacturer's tech-support staff gets paid to support that company's products. Yet support techs from several companies reported receiving calls from customers with questions about other companies' products. "I had a call from a user who was getting nasty distortion from his audio system,"

▼

It's okay to say you are angry, but stay cool so you can focus on the solutions.

Emagic's Jeff Bohnhoff relates. "It turned out that it behaved exactly the same with a competitor's software, but when I suggested that the problem appeared to be with the audio hardware and that he should call that manufacturer, his response was that they were too hard to reach, so he called us." Sadly, Bohnhoff's experience was not unusual.

An especially tough challenge is presented when customers call with questions involving the interaction of various pieces of gear designed by different manufacturers. In many cases, the customer doesn't know which product (or products) is causing the problem. Clearly, a product specialist cannot be familiar with every product on the market. That's why it is so important that you practice do-it-yourself troubleshooting and try to isolate the problem before calling.

Address the probable cause first. Alesis' Mike Nicoletti points out that although many of today's keyboards and sound modules have a serial port that interfaces directly to a Mac or PC, interfacing problems often have little to do with the instrument. "Please remember that we work for Alesis, not Microsoft," Nicoletti says. "If we determine that your keyboard is set up properly and your computer is still not responding, it is probably time to call the software company." On the other hand, if a company makes a keyboard with a computer interface, like it or not they are in the business of making computer peripherals and need to understand drivers.

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To test mix amp headroom, load every channel of a mixer with HOT inputs. If you hear distortion, the mix amplifier is overloading. The CR1604-VLZ uses a special negative-gain mix amp architecture to add 6dB more headroom than the competition.

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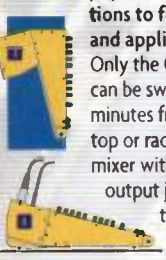
One mixer. Five physical configurations to fit your space and applications. Only the CR1604-VLZ can be switched in minutes from a table-top or rack-mount mixer with input/output jacks on the top (1 & 2) to a space-conserving 8-rack space mixer with jacks to back (3) — rack rails are included. Add our optional RotoPod-VLZ bracket and rotate the input/output pod to the same plane as the mixer's controls (5 & 6) for patching-intensive applications.



Get the whole story. Call toll-free for an incredibly-detailed, mixer tabloid complete with applications hook-ups...or visit our new Web site at http://www.mackie.com

Solid steel main chassis. Not aluminum. Not plastic.

More aux send gain. All six CR1604-VLZ sends on each channel have 15dB more gain after Unity. This lets you boost weak effects or create a "super-wet" sound.

Musical, natural EQ with sweepable midrange. Others have copied our frequency points, but nobody can equal our sound.

Plus every channel has a true 18dB/oct. **low cut filter** that lets you use LF EQ on vocals without boosting mic thumps, infra-sonics and room rumble.

Hyper-sensitive Signal Present LED on every channel.

Very Low Impedance(VLZ) circuitry uses high current and low resistor values to dramatically reduce thermal noise and crosstalk. A Mackie Designs exclusive with very audible benefits.

Feature for feature, the most versatile, flexible, CREATIVE master section of any compact mixer.

The definitive, big-console-quality mic preamps with all discrete (no hybrid) circuitry, astonishing headroom, and a real, verifiable E.I.N. (noise) spec of –129.5 dBm. When you compare mixers, bring a familiar condenser microphone and prove to yourself just how much better our mic preamps sound.

If imitation is the sincerest form of flattery, we have a lot to be flattered about. But now that some competitors are even borrowing our ad copy, we figured it was time to come up with a devastatingly nasty come-back.

Greg Mackie put a quick stop to that idea. He pointed out that the REAL test of a mixer is how it sounds. And the more you listen, the more our CR1604-VLZ's low noise, high headroom, pristine mic preamps and natural EQ put it ahead of the pack.

Musician Magazine thinks the original is clearly the best.

Sound quality, Greg pointed out, is why the CR1604-VLZ has a longer roster of famous users than any other 16-channel compact mixer...major groups & artists, Emmy-winning TV composers, Academy Award-winning sound engineers, network news & sports departments. So why dis the competion?

Call us for complete info and that long list of famous users. Then make your final mixer buying decision with your ears. Anyone can write an ad. Only Greg can make a mixer as good as the CR1604-VLZ.

Below: a few of the 400+ folks who work at Mackie Designs in Woodinville, WA. 20 miles northeast of Seattle.

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Some support staffs are willing to contact the support staff at another company whose product is involved. If you have done all your homework and DIY troubleshooting with no results, and the support staffers you are dealing with at each company are clearly baffled, it's fair to urge a cooperative effort. (On the other hand, if one person you talked to was exceptionally uninformed or unhelpful, try contacting someone else in the support department.)

I find it easy to sympathize with the tech-support staffs, but the truth is that some companies simply don't provide the support they claim to provide. If you have been burned, you have every right to complain, to spread the word, and to buy elsewhere the next time. But you still need to solve your immediate technical problem. If all you get is finger pointing, with each company claiming it's the other company's problem, try e-mailing an appeal to the techs (or the tech-support managers) at both companies.

Always document your past attempts at getting support, and make it clear that you expect a cooperative effort to solve this problem and that you will follow up with phone calls to both support techs on such-and-such a date, allowing the staffs a few days to put their heads together. Make sure to include the names of the techs with whom you have been dealing at both companies, and provide their contact information (phone and e-mail) so there is no doubt of their ability to reach each other.

As always, keep it businesslike. If you are angry, it's okay to say you are angry and to explain why, but keep your arguments logical, stay cool, and focus on finding solutions.

When tech support is unable to solve a hardware problem and you have to return a unit for service, be sure to pack it in the original packaging or in reasonably equivalent packaging to avoid shipping damage. "We've received Matica 900 amplifiers wrapped in newspaper and ADAT XTs shipped in a suitcase and wrapped in dirty clothes," reveals Alesis' Mike Nicoletti. "We were tempted to go for tetanus shots after that last one!"

FEEDBACK!

There's no doubt that tech support is the thorniest part of the relationship between manufacturers and customers. Some companies do a lousy job of delivering support and do not provide their techs with the resources and training they need. But in my experience, the vast majority of support techs genuinely want to help. "Between the sheer volume of calls and the fact that most calls are from frustrated users who are having problems, it's no wonder that tech support tends to be a high-burnout occupation," concludes Vickers.

The other side of the story is that far too many customers do a lousy job of seeking tech support. You can do it right by being prepared. Do your homework, practice DIY troubleshooting, and make your call from the right place and at the right time. The tech-support people can more easily help those who help themselves.

EM *Senior Editor* **Steve O.** *thanks the technical support staffs of Alesis, BIAS, E-mu, Emagic, Korg, Lexicon, MOTU, Opcode, Roland, and Voyetra for their enthusiastic cooperation.*

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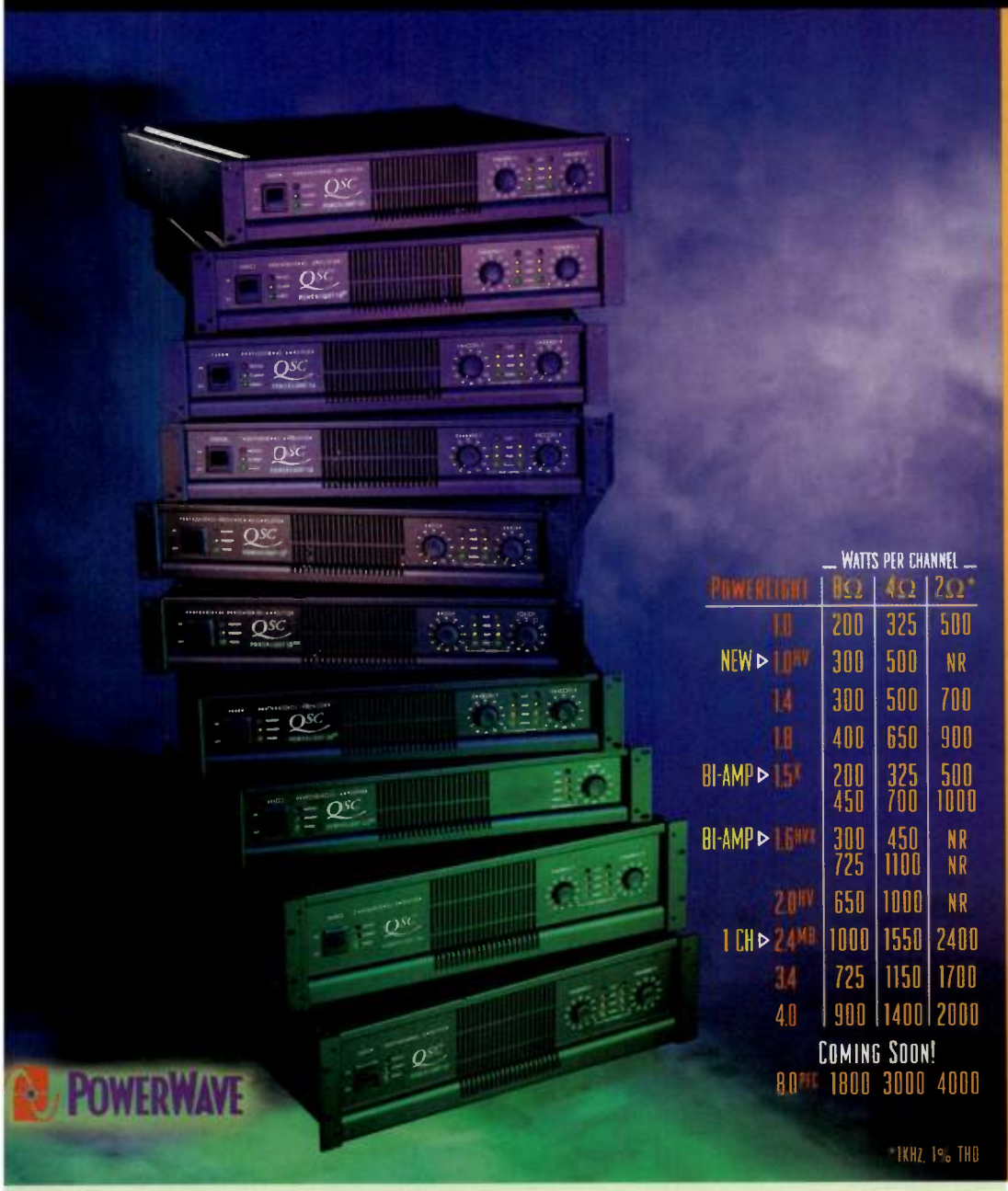
10 POWERPOINTS, 1 COLOR.



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BI-AMP ▷ 1.6HVX	300 725	450 1100	NR NR
2.0HV	650	1000	NR
1 CH ▷ 2.4MB	1000	1550	2400
3.4	725	1150	1700
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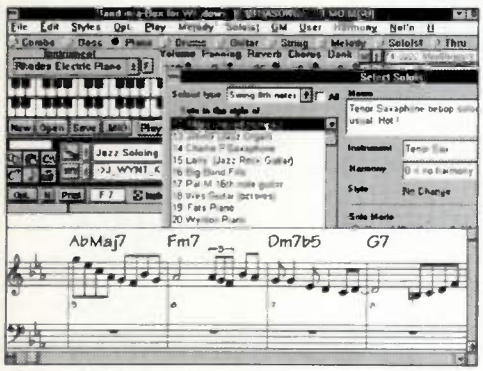
VERSION 7.0 FOR WINDOWS & MACINTOSH

Intelligent software for IBM (Windows/DOS) & Macintosh*

(NOTE: ATARI Band in a Box available only in Ver 5)*

Version 7 for Windows & Macintosh is here. Automatic Accompaniment has arrived!

Type in the chords to any song, using standard chord symbols like C or Fm7b5, choose the style you'd like and Band-in-a-Box does the rest... Automatically generating professional quality five instrument accompaniment of bass, drums, piano, guitar & strings in a wide variety of styles.



Windows version shown above

100 STYLES INCLUDED WITH PRO VERSION. *Jazz Swing • Bossa • Country • Ethnic • Blues Shuffle Blues Straight • Waltz • Pop Ballad • Reggae • Shuffle Rock • Light Rock • Medium Rock Heavy Rock • Miami Sound • Milly Pop • Funk • Jazz Waltz • Rhumba • Cha Cha • Bouncy 12/8 Irish • Pop Ballad 12/8 • Country (triplet) • and 75 more!*

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SUPPORT FOR OVER 70 SYNTHS BUILT-IN. *Drum & patch maps included for over 70 popular synths. General MIDI, Roland GS & SoundBlaster soundcard support included.*

STANDARD MUSIC NOTATION *and leadsheet printout of chords, melody and lyrics. Enter your songs in standard notation & print out a standard lead sheet of chords, melody and lyrics.*

AUTOMATIC HARMONIZATION. *You can select from over 100 harmonies to harmonize the melody track, or harmonize what you play along in real time. Play along in "SuperSax" harmony, or harmonize the melody with "Shearing Quintet". Create your own harmonies or edit our harmonies.*

NEW! Additional features in Version 7.0

Band-in-a-Box 7.0 for Windows & Macintosh breaks new ground with over 60 new features!

Band-in-a-Box 7.0 is here! This major upgrade includes over 60 new features. We've added a an amazing new feature called "Automatic Soloing". Choose the type of soloist you'd like (from 100 available) and the program creates and plays a solo in that style, along to any song! Or create your own soloists. This is hot! These solos are of the highest professional quality, rivaling solos played by great musicians! And there's lots more in 7.0 – improved notation, step time/notation edit of StyleMaker patterns, scroll ahead option for notation, improved synth support, over 60 new features in all!

OUR CUSTOMERS LOVE VERSION 7.0! ***"Wow! The soloing sounds amazing... how can it do that?" "I love the notation improvements." "Another winner – thanks!" "You guys have added everything I wanted."***

NEW! Add-ons for Band-in-a-Box Version 7.0! Jazz, Rock & Bluegrass Soloist Disk Sets

- **Soloist Disk Set #2: "Killer" Jazz Swing Soloing $29**
- **Soloist Disk Set #3: Specialty Jazz Soloing $29**
- **Soloist Disk Set #4: Rock Soloing $29**
- **Soloist Disk Set #5: Bluegrass Soloing $29**
- **Bluegrass MIDI-FakeBook (50 songs) $29**

An exciting aspect of the Soloist feature in Band-in-a-Box Ver. 7 is that the program is able to increase its musical intelligence by analyzing new solos it is exposed to. It learns by "ear" and constantly gets better and better! Then the Soloist can incorporate the soloing we expose it to into its own playing. We've now created brand new soloist KnowledgeBases with dramatically enhanced results. We've created stunning new soloists in the jazz, rock and Bluegrass styles, and are offering them as new Soloist Disk Sets for Band-in-a-Box 7. The packages include **bonus styles** (some also include demo songs) to augment your BB with your favorite types of music.

SOLOIST PAK - ALL 4 Soloist Disks + Bluegrass MIDI-FakeBook on disks or CD-ROM $99

Bluegrass MIDI-FakeBook 50 Bluegrass standards with chords & melodies performed on MIDI guitar by Bluegrass virtuoso **Marty Cutler**.

NOTE: Soloist Disk Set #1 is included with Band-in-a-Box 7.0 and upgrade, so is not offered as an add-on.

BAND-IN-A-BOX PRICES

NEW CUSTOMERS (IBM/Macintosh/Atari*)

Band-In-A-Box Pro *(first time purchase)* $88
Version 7, Styles Disks 1-3, Harmonies Disk 1 + Soloists Disk 1

ULTRAPAK *(first time purchase. Also available on CD-ROM)* $189
The UltraPAK includes Pro version 7, Styles Disks 1-8, Harmonies Disk 1 + Soloists Disk 1
(ATARI available only in Version 5)*

ADD-ONS

Styles Disk #4 ..... $29
Styles Disk #5 ..... $29
Styles Disk #6 ..... $29
Styles Disk #7 ..... $29
Styles Disk #8 *(included with Version 7 upgrade)* $29
MIDI-FakeBook *(100 songs on disk)* $29
Bluegrass MIDI-FakeBook (50 Bluegrass standards on disk $29
Soloist Disk Set #2 - "Killer" Jazz Swing Soloing $29
Soloist Disk Set #3 - Specialty Jazz Soloing $29
Soloist Disk Set #4 - Rock Soloing $29
Soloist Disk Set #5 - Bluegrass Soloing $29
Soloist Pak - All 4 Soloist Disk Sets + Bluegrass MIDI-FakeBook $99
NOTE: Soloist Pak available on disks or CD-ROM. Soloist Disk Set #1 included with Version 7 upgrade.

UPGRADES

Regular Upgrade to Version 7 *(for Windows & Macintosh)* $49
Includes Styles Disk 8 + Soloists Disk 1. Upgrade from Version 6

Complete Upgrade to ULTRAPAK *(also available on CD-ROM)* $89
Includes Styles 1-8 (these are all the Styles Disks we have made for Band-in-a-Box!)

MEMORY REQUIREMENTS: DOS (640K), Windows (8 mb), Macintosh (8 mb), Atari (1040)

HELP! *I Forgot to send in the Registration Card, but I want to upgrade now!! No problem. Since the upgrade checks for any previous version of Band-in-a-Box, you can order the upgrade even if you forgot to register! Or register & order online at http://www.pgmusic.com*

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THE PIANIST SERIES

WINDOWS • MACINTOSH
ATARI • DISKLAVIER

Each program contains piano music performed by world-class pianists, **PLUS** memos, trivia questions, biographies, Guess the Song games & more. They are ideal for learning to play piano, or for background music while you use other programs. Windows versions also display & print standard music notation & chord symbols for pieces. They are available for WINDOWS, MAC & ATARI, & are also available in Yamaha Disklavier & Roland SoundBrush format.

NEW! The Blues Pianist™ $49

Volume 1 (50 pieces - older styles) $49 • Volume 2 (50 pieces - newer styles) $49

Each volume contains over 50 great down-home blues piano stylings by top professionals! Playing in a wide variety of blues piano styles – Boogie Woogie, Slow/fast boogies, jazz blues, New Orleans style, Chicago blues & more. These are the styles made famous by Pete Johnson, Albert Ammons, Jelly Roll Morton, etc. Hours of listening pleasure! Full of info & trivia on the great masters of piano blues. Slow them down & learn the licks! The perfect gift for any blues lover.

NEW! The New Age Pianist™ $49

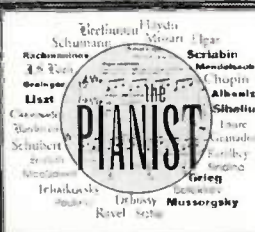
Over 70 "New Age" & "New Age-Jazz" style piano pieces, played on MIDI keyboard by top performers.

A beautiful collection of solo piano compositions which draw their inspiration from the natural world. Full range of "New Age" piano techniques are presented: "ambient" performances in the style of George Winston & "New Age-Jazz" performances in styles of Chick Corea/Keith Jarrett. Includes song memos, biographies & information on important New Age musicians. Includes photo album of stirring nature scenes & real time piano score *(notation in Windows version only)*. Over 3 hours of music!

NEW! The Children's Pianist™ $49

Over 70 of the best-loved children's songs for listening & singalong!

Lyrics to all songs displayed on screen in large type. Chords, lyrics & music notation. On-screen lessons explain the techniques of piano accompaniment. Examples of alberti bass, embellishments, syncopation, stride style & many more techniques! Over 4 hours of music! Includes words & music for 70 songs: London Bridge, Camptown Racetrack, Home



Nearly 600 of the world's most popular classical piano pieces, performed by world class concert pianists! **$49**

Moonlight Sonata, Sonata Pathétique, Minute Waltz, Claire de lune, Mephisto Waltz, Hungarian Rhapsody, Fantasie Impromptu, Military Polonaise... over 400 more!!!

PLUS... *Music Trivia Game, "Guess the Song", program notes, biographies, music dictionary (on disk) & more!*

OUR CUSTOMERS LOVE THE PIANIST...
"Incredible amazing terrific masterful... fabulous love it my favorite program!"

NEW! The Pianist Volume 3

Volume 1 (215 pieces) • Volume 2 (200 pieces) • Volume 3 (170 pieces) • Each volume $49

We've added 170 wonderful pieces to The Pianist program. This magnificent library brings to nearly 600 the repertoire of classical masterpieces available in The Pianist series! Lots of new Chopin & Brahms, plus piano arrangements of orchestral favorites by Liszt and others. **PLUS** ... New & revised program notes, biographies & dictionary (all on disk)!

The Jazz Pianist™ $49

This program makes it "too easy" to learn to be a great jazz PIANO player!

Top jazz/studio pianists play 60 jazz standards in a wide variety of styles.

Hear the music with CD-quality through your sound card or MIDI system. Most pieces have bass/drums as well as piano so you get a full sounding jazz trio for the tunes! Jazz Trivia game & Guess the Song game, program notes, biographies & music dictionary (all on disk).

The Jazz Pianist Volume 2

Volume II upgrade - $49 (requires The Jazz Pianist) • first time purchase: Volume 1 & 2 - $98

60 more fabulous jazz standards for Volume 2, complete with new program notes and biographies!

The Ragtime Pianist™ $49

Over 90 ragtime & early jazz piano standards, played on MIDI keyboard by top Ragtime Pianists and featuring world-renowned Ragtime performer JOHN ARPIN!

Hear virtuoso performances of every Joplin rag in this program, as well as many other rags, CakeWalks, waltzes & other Ragtime Era tunes by Eubie Blake, Joseph Lamb, Daniels and, of course, Scott Joplin.

The New Orleans Pianist™ $49

Over 60 "New Orleans Style" piano music standards played on MIDI keyboard by top New Orleans pianists Henry Butler, Jon Cleary, Tom McDermott, Joel Simpson & David Torkanowsky playing a wide variety of New Orleans, R & B, Blues & Ragtime piano music.

The Gospel Pianist™ $49

Over 50 Gospel style piano pieces played on MIDI keyboard by top Gospel pianists Louise Rose, Davell Crawford, Henry Butler, Sam Berfect, Derrick Bethune, Joel Simpson & Jon Cleary. The "Gospel Piano" style underlies much of the blues, jazz & popular music played today.

The Christmas Pianist™ $49

This software includes great piano performances of over 50 all-time favorite Christmas songs and carols – ideal for listening or singalong! On-screen lyrics, notation & piano keyboard, piano notation printout, background playback, Music Trivia & Guess the Song games & more!

NEW! Ver. 3.5 PowerTracks Pro ONLY $29 upgrade $15

SEQUENCER · NOTATION · PRINTING · WAVE SUPPORT FOR WINDOWS (IBM)

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

NEW FEATURES in 3.5... Enhanced notation window (32nd notes, etc.)
• Karaoke window • Notation Scroll ahead • Notation clean mode
• Align music to click track • Force all files to PPQ option
• Improved hand splitting • Intelligent enharmonics

In versions prior to 3.5, we added major features like music notation, wave files, lyrics, chord symbols & printout. Now we've added many new features. We've added a big "Karaoke" Style Window to display lyrics. The notation is enhanced with support for finer resolutions like 32nd notes. You can align a rubato piece to a click track. We've enhanced the intelligent piano hand splitting routines. The enharmonics are intelligently chosen based on the chord symbols & more! *Powertracks for DOS included FREE (NOTE: DOS version doesn't support music notation or other graphical features)*

NEW! The Bluegrass Band™ $49

Virtuoso live performances of 50 Bluegrass standards!

These MIDI files are great! As you listen to the tunes, you can single out any of the instruments using the on-screen fretboard display, tablature or notation. **PLUS**... Lots of Bluegrass pictures, bios, & trivia (all on disk) & much more. Our most "feel good all over" program so far. Includes: Wildwood Flower, Sally Goodin, Cripple Creek, Fire on the Mountain, Pigtown Fling, Red Haired Boy, Jesse James & many more!

NEW! The Jazz Soloist™ Vol. 3 $49

Vol. 1 (50 pieces) $49 • Vol. 2 (50 pieces) $49 • Vol. 3 (60 pieces) $49

THE JAZZ SOLOIST

The Jazz Soloist is a music program with professional jazz quartet arrangements. Each song features a great jazz solo played by top jazz musicians, as well as piano comping, bass & drums. Vol. 3 of the Soloist series features Latin, Blues, & Jazz Waltz stylings. Includes Jazz Soloist program with MIDI files, & also files in Band-in-a-Box format. Sight-reading was NEVER so much fun before the Jazz Soloist series! (NOTE: Mac users get on-screen-notation only when running the files in Band-in-a-Box; Volumes work together or as standalone programs.)

The Jazz Guitarist™ (Windows, Mac, Atari) $49

A music program containing a huge collection of over 60 jazz standards, played on MIDI guitar by top jazz/studio guitarist Oliver Gannon

RECORDED IN REAL-TIME ON A MIDI GUITAR!
Hear the music with CD-quality through your sound card or MIDI system. Most pieces have bass/drums as well as guitar so you get a full sounding jazz trio for the tunes!

LEARN TO BE A GREAT JAZZ GUITAR PLAYER!
On-screen fretboard shows you exactly what notes & chords are being played on the guitar. Slow down the performance or, better still, step through the music chord by chord, so you can learn every note as it's played!

PLUS MANY MORE FEATURES...

- *Jazz Trivia game & Guess that Song game, program notes, biographies (all on disk)*
- *Over 60 Top jazz standards with complete guitar arrangements*
- *Listen to the music while you work in other programs*
- *Special support for Roland GS or General MIDI modules*
- *Standard MIDI files can be used in other programs or presentations*
- *Use your existing sound card or MIDI synthesizer*

Other products...

Multi MPU401 Driver for Windows 3.1/95 $19
Windows driver that allows 10 programs to use the MPU401 at the same time.

SC-PRO Editor for Windows & Macintosh $29
mixing/editing of every feature of the Sound Canvas and other Roland GS cards/modules.

Roland Sound Canvas SC-88VL-WH sound module $499
654 GM/GS sounds, 9 drum sets & 2 FX sets, 16 part multitimbral, 64 voice polyphonic, front panel LCD screen & external controls. On-board digital reverb, delay and chorus effects & 2 band EQ. Wave sounds using immense 16 MB wave memory. Built-in standard MIDI interface.

Roland Sound Canvas SC-88ST-WH sound module $399
654 GM/GS sounds, 9 drum sets & 2 FX sets, 16 part multitimbral, 64 voice polyphonic, 32 part LEDs. On-board digital reverb, delay and chorus effects & 2 band EQ. Wave sounds using immense 16 MB wave memory. Built-in standard MIDI interface.

Roland Sound Canvas GS/GM SC-55ST-WH sound module $299
354 GM/GS sounds, 9 drum sets & one SFX sets, 16 part multitimbral and 28 voice polyphonic. On-board digital reverb, delay and chorus effects & 2 band EQ. Wave sounds using immense 16 MB wave memory. Built-in standard MIDI interface

"INSIDE BAND-IN-A-BOX" Video Instruction Tapes for Version 7
Over 3-1/2 hours of video instructions, narrated by program creator Peter Gannon. Vol. 1 Basics, creating & entering songs, solos & entering notation $29; Vol. 2 Advanced, creating harmonies, new soloists & new Styles $29; Both volumes $49. Available in VHS or PAL format. NOTE: Video tapes demonstrate Windows version of Band-in-a-Box. Macintosh version contains similar features.

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RECORDING MUSICIAN

ADAT Maintenance

Prolong the life of your ADAT with a little at-home health care.

By Brian Knave

Ever seen a tricked-out ADAT? At the Summer NAMM Show in Nashville, Alesis showed an all-chrome "Special Edition" ADAT-XT. A limited number of these shiny units are available to commemorate the company's manufacture of 100,000 ADATs to date. That number is quite a milestone for any maker of audio gear—but it's a particularly potent indicator when you consider that the ADAT is one of the tools responsible for the personal-studio revolution. To help celebrate that achievement, we're dedicating this month's Recording Musician column to a topic that is critical for ADAT owners: how to care for your ADAT.

Of course, everyone knows that one of the great *side* benefits of modular digital multitrack recorders is that they're relatively easy to maintain. Unlike analog recorders, MDMs require no demagnetization, no head alignment, and no adjustments for bias or azimuth. For the most part, you can just pop them into your rack and go—and go and go.

That does not mean, however, that ADATs are maintenance free. The movement of tape through the machine necessarily dirties and abrades the heads and other parts of the tape path, so wear and tear is only to be expected. However, with a little bit of preventative care and regular tape-path cleaning, you can minimize maintenance time to a fraction of what is required of the analog recordist, ensuring that your ADAT works darn close to trouble free for years to come.

The all-chrome, Special Edition 100,000th ADAT is even more impressive than the XTs used to record signals from planets orbiting the star Vega in the movie *Contact*.

THE OBVIOUS

For those not in the know, a few common-sense measures bear repeating. Most importantly, use only premium-grade S-VHS tape in your ADAT. Actually, regular VHS tape will work—and providing it doesn't malfunction, the sonic results are the same. However, Alesis does not recommend the use of VHS tapes in ADATs. Not only are the cassette shells, hubs, rollers, and tape guides inferior but the tape is more prone to snags and dropouts. Cheap tape will alsc shed more oxide onto the various components of the tape path,

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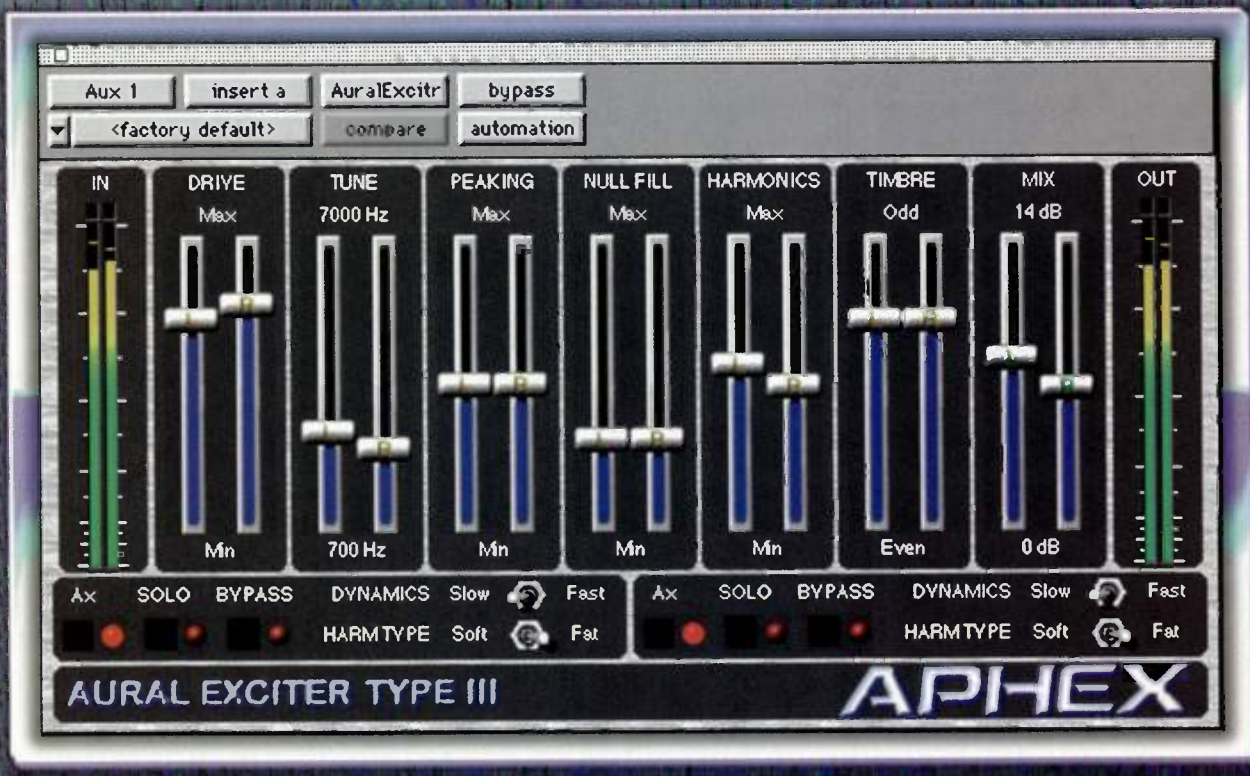

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necessitating more frequent cleanings and shortening the life of the unit.

According to Alesis, any name brand of S-VHS tape should provide excellent results, the only caveat being that some companies make both high- and low-grade varieties—and again, the low-grade stuff is quicker to shed. So definitely specify premium tape. (Usually, premium cassettes come in plastic boxes or sleeves whereas substandard ones are packaged in cellophane only.)

As for operating conditions, ADATs are happiest in cool, low-humidity, dust-free environments. (For you folks living in the deep South, climate control is highly recommended.) To minimize particle contamination, don't leave tapes inserted halfway, because this leaves the door to the transport chamber wide open. Either remove the tape completely or leave it fully inserted. At the end of each session, rewind the tape completely, remove it from the ADAT, and store it in its protective box or sleeve. If you do accidentally leave a tape inside the machine overnight, don't sweat it. Just make sure you don't turn off the power while a tape is still *threaded*, as this leaves the tape bent around the rollers and in contact with the heads. Instead, press Stop first to unthread the tape.

To clean the ADAT front panel or other exterior parts (not usually necessary but you never know), first unplug the unit, and then wipe carefully with a damp cloth. If there's heavy dirt or grime, use a nonabrasive household cleaner such as Fantastik or Formula 409. However, spray the cloth, not the front panel: spritzing the front with cleaning solution could destroy the lubricants used in the switches and controls.

Going out of town? Unplug your ADAT if you won't be using it for a while. Also, use a power conditioner or at least a spike/surge protector between your ADAT and its AC power source (this is advisable, of course, for all studio gear).

THE NOT SO OBVIOUS

If you read your manual carefully, you'll know that Alesis recommends you record a "benchmark" tape for each new ADAT you purchase. The benchmark tape should be made before using the unit for its first session. Simply record a minute or two of a test tone at a nominal level on all eight tracks in a single pass (no overdubs). Store the tape in a safe, dry location, and use it for no other purpose. Later, the benchmark tape will come in handy for determining whether the heads need to be cleaned or whether a tape is defective. (It's not a bad idea to record a new section of benchmark data after each manual head cleaning. You can use the same tape and afterwards compare the sections to see whether you did an adequate cleaning job.)

For the XT, Alesis publishes a recommended maintenance schedule that describes services to be performed after every 250, 500, 1,000, 2,000, and 3,000 "drum on" hours (the measure of time the heads are actually in contact with the tape). To order the maintenance schedule, call Alesis Corporation at (800) 5-ALESIS and ask for the ADAT-XT maintenance schedule. For new XT owners, Alesis also offers the "ADAT-XT Optional Extended Service Contract." The cost is $150 for one extra year. Ask the service department for more information.

To check the number of drum-on hours, hold the Set Locate button while pressing the Stop button. Bear in mind, though, that the 250-hour mark is an estimate only; the actual number of hours between necessary cleanings will vary from one studio to the next, depending on type of usage, tape quality, and concentration of dust in the operating environment. (I recently logged 400 hours on my XT before getting around to cleaning it and encountered no problems.)

There are visual indicators in the display window that suggest when it's time to clean your ADAT. The first line of defense is the Interpolation Indicator (also called the Advanced Information Indicator), a little eight-pointed, sporadically blinking light (green on the ADAT, red on the XT) to the right of the time counter. It's okay if it blinks occasionally, but if it starts blinking a lot or stays on continuously, it may be time to clean the heads. On the other hand, the light could also indicate a defective tape. To determine which is the case, play the benchmark tape and see whether the Interpolation Indicator lights the same. If it doesn't, then the problem is more likely with the tape, not the heads.

The error messages Er 7 and Er 8 are more serious indicators that something is amiss. Er 7 will appear during playback, and it indicates that the ADAT is losing its internal sync (part of the information recorded on the tape during formatting); Er 8 will appear during recording. Either error message may indicate that the tape path needs cleaning.

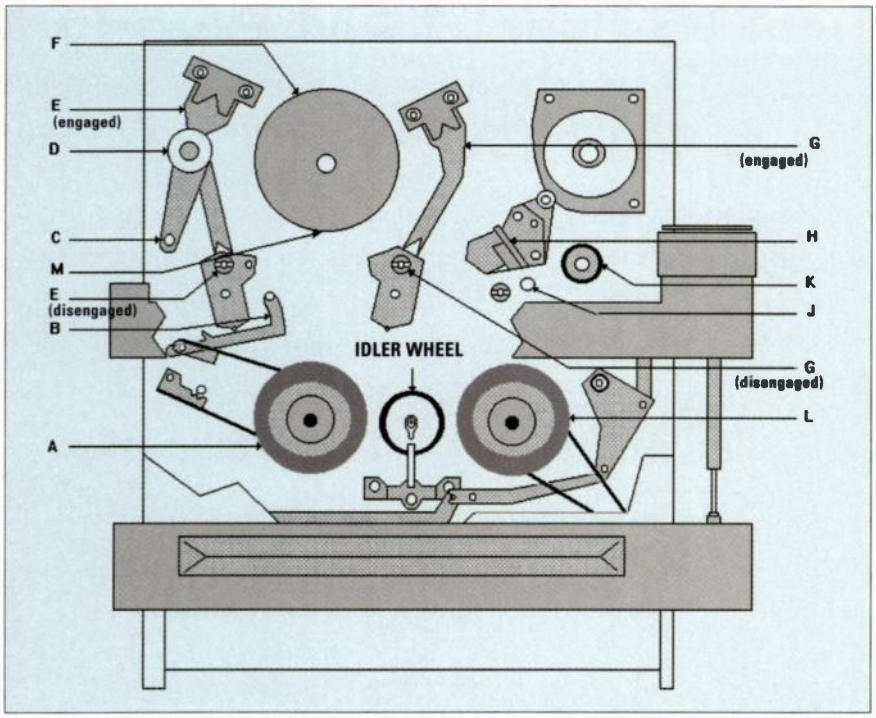

FIG. 1: This diagram shows the path the tape follows—from point A to point L—in an ADAT. (Courtesy Alesis Corporation)

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Dirty heads will not affect the quality of the audio, but they will affect the formatting of new tapes. Formatting a tape on an ADAT with dirty heads may result in a bad internal sync pulse. In time, this will degrade to an Er 7 condition.

Keep tabs on your ADAT. A maintenance log is advisable in any studio and should allow a page for each piece of gear. For each ADAT, write down the serial number, date of purchase, software version, and upgrades as well as the dates that you cleaned, repaired, and/or modified the unit. This information may come in handy if anything goes wrong with your ADAT.

TAPE-PATH CLEANING

Several surfaces come into contact with the tape, and all of them need to be cleaned. Together, these surfaces make up the tape path (these are identified individually under "Procedure"). There are two ways to clean these parts: manually and with a head-cleaning tape. Cleaning tapes, however, are not a replacement for manual cleaning and should only be used in an "emergency" (i.e., when you're in the middle of a recording session and the relevant error indicators keep lighting up). Basically, cleaning tapes only move the dirt around; they don't really remove it.

FIG. 2: The dark lines on this chamois swab show the dirt cleaned from an ADAT-XT head after 150 hours of operation.

There are two types of cleaning tapes: wet and dry. The wet-style cleaners require squirting a few drops of cleaning liquid into a videotape-sized device and then "playing" it. The dry style is easier to use: you simply insert the cassette and press Play. Alesis recommends the 3M ASD-HC Black Watch cleaning tape (available from 3M professional tape dealers for about $17.50). Whichever you use, read the instructions carefully. Generally, cleaning tapes are to be used in 30-second increments only.

The official word is that manual cleaning should be done by a qualified technician only; however, if you have a steady hand and any experience at all with VCR repair, the procedure is not hard to learn. Be forewarned, however, that improper cleaning can easily ruin your ADAT's rotary heads—and they are expensive to replace. Also, there are potentially lethal voltages inside the unit, so make sure it's unplugged before commencing to clean. Finally, for ADAT-XT users, remember that your XT comes with a 1-year warranty (or 1,500 drum-on hours, whichever comes first) and that the warranty is voided when you open the unit. It may therefore be advisable to let an authorized service center handle maintenance chores for the first year, just in case something is defective or goes awry with your XT.

One of the best ways to learn manual tape-path cleaning is by watching someone with experience perform the procedure. (You might be able to schedule a tutorial with a qualified technician locally. Try calling pro-audio or reputable video-repair shops in your area.) There is also an instructional videotape available from Alesis Product Support which demonstrates head cleaning in detail. (The videotape costs $19.95. Contact Alesis for ordering information. Ask for the parts department.) Detailed instructions are also available from the Alesis Web site at www.alesis.com. Another source of step-by-step cleaning instructions is *Modular Digital Multitracks: The Power User's Guide,* Second Edition, an excellent book by *Mix* Editor George Petersen that provides comprehensive information about every aspect of MDMs.

ADAT TAPE NO-NOS

Do not leave a tape inserted halfway in the ADAT. Instead, rewind it completely, remove it from the ADAT, and store it in its protective case in a cool, dry place.

Do not expose tapes to temperature extremes, high humidity, or dust.

Do not leave tapes near speakers, power amps, televisions, or other sources of magnetic fields.

Do not leave tapes in your car—not only because of the heat but because they might get stolen.

Do not open the cassette-box shutter, and *never* touch the tape. The oils from your fingers will damage the tape, and if the tape is then played, it will damage the heads, as well.

Do not turn off the ADAT while a tape is threaded. If you do, the tape remains bent around the rollers and head (which is not good for the tape or heads).

MATERIALS

The following materials are necessary for cleaning the tape path: a Phillips-head screwdriver; 99 percent isopropyl (denatured) alcohol or other approved video head-cleaning solution (do *not* use ordinary rubbing alcohol); lint-free clean-room rated cloth (Tech Spray Hydroentangled Cellulose/Polyester C-Fold Wipes #2350-100 or Kimberly-Clark Kimwipes) or chamois-tipped swabs (Chamois Tips by Chemtronics); cotton or foam swabs; and rubber cleaner.

Another helpful item, recommended by MDM guru George Petersen, is a dental mirror, available from any drugstore. This is useful for seeing around tight corners while inspecting the heads and tape path. (Another interesting thing I learned from Petersen is that you should recap the alcohol or cleaning fluid between douses, as it draws moisture from the air and self-contaminates.)

PROCEDURE

First, eject the tape, turn the unit off, and disconnect the power cord. Remove the rack ears and top cover or hood using the Phillips screwdriver. Next, familiarize yourself with the tape path. (If this is your first cleaning session, it may be helpful to power up at this point, insert a tape into the transport, and press Play so that you can watch the tape in motion. Just be sure not to insert your hands or anything else in the way of the tape path while the heads are spinning! Remove the tape, power down, and unplug the unit before proceeding. Also, make sure the rotating headstack has come to a complete stop before you begin the cleaning procedure.)

Refer to **Figure 1** for a detailed, directional diagram of the tape path. The tape, fed from the supply hub (point

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A), travels past a stationary tape guide, the tension arm (B), the P1 post (C), and the impedance roller (D). After passing the P2 assembly (E), it enters the rotating headstack (F), where it passes by the heads. The tape then exits the headstack and passes by the P3 assembly (G), the linear head (H), and the P4 post (J). It then passes the capstan/pinch-roller assembly (K) and, at the end of its journey, is wound onto the take-up reel (L). (Note that in the diagram, no tape is installed, so the parts designated by points B, E, and G are in a "relaxed" position. When a tape is inserted, those three parts move, causing the tape to "thread" or wrap around the rotating headstack.)

COMMON ADAT ERROR MESSAGES

All MDM designs include autodiagnostic circuits that display various error-code messages to inform the user of potential problems. Should these appear on your machine, it's best to call the manufacturer's service department and get their advice. Unfortunately, many sessions occur on weekends, late nights, holidays, and other times when such phone help is simply unavailable.

With that in mind, here is a listing of some of these messages, along with what problems they might indicate. So if an error code tells you that the carburetor in your ADAT has an improper air/fuel mixture or that one of the venturi is blocked, should you head in with a soldering gun and an air hammer? Probably not, but sometimes an error-code message may indicate something that you can fix, perhaps by replacing a defective tape or checking sync cables or I/O connections. At 3:00 A.M., it's extremely helpful to know whether an error signals a major breakdown that should stop the session or merely an inconvenience that can be worked around until morning. Here's the info:

-du-: This indicates excessive humidity or condensation in the recorder. Leave the deck powered up, and let the machine heat up gradually.

Prot: Tape is protected against erasure—its erase-protect tab is removed. Recording cannot occur unless the open erase tab hole is covered.

FULL: The serial buffer is full and has no space for additional data. As a remedy, reinitialize the ADAT and/or clean the idler wheel.

NoFo: No formatting present. This message sometimes appears when a cassette stops on the clear plastic leader at the end of a tape—there's no tape coating, so there's no formatting on the tape. In this case, rewind the tape. This may also indicate that a tape needs formatting. In this case, reformat the tape.

Er 0: The "Tape Load" switch has indicated improper loading/unloading of a cassette. Try reinserting the cassette gently and let the recorder pull it inside the deck. This error message may also indicate a tape whose adhesive label is applied outside of its designated area. Try another tape or a tape with no label.

Er 1 through Er 3: These indicate threading errors or internal switch problems, such as a bit of dust blocking the microswitch that tells the ADAT the tape is threaded properly. This may also indicate a tape that's binding. Eject tape and try a different tape. If everything's okay, retry the first tape, perhaps after fast-forwarding it all the way to the end and then rewinding it. If this doesn't cure the problem, try reinitializing the machine.

Er 4: Head drum isn't spinning when tape is threaded. If reinitialization doesn't improve the situation, then it could be a motor problem requiring expert service.

Er 5: Head drum/capstan servo problem, such as too fast or too slow head-drum speed relative to tape speed. May occur when slaving to external clock source. Check sync-cable connection; check optical I/O cables when deck is in "Digital In" mode. This error message can also indicate some physical problem that creates resistance in the tape path, which may be as simple as an unevenly wound cassette or warped/misaligned cassette shell. (Didn't your mother ever warn you about storing master tapes on your dashboard on summer days?) One solution that may work is "exercising" the tape: fast-forward and rewind the tape a couple of times, and then try playing it again.

Er 6: Problem reading information from data section of tape. This is sometimes caused by powering up the BRC before the ADAT transports in a system.

Er 7: Excessive error correction during playback. Usually preceded by a lighting of the Advanced Information Indicator. May indicate a poor-quality or defective tape (too many dropouts) or dirty tape heads. (See the section on tape-path cleaning.)

Er 8: Loss of sync during recording. Possible causes include loose or damaged sync cable, incoming time code has excessive jitter or dropouts, or dirty linear head. Error 8 may also be displayed at the end of tapes—the plastic leader at the end of the tape carries no sync data; in such cases, there is no need for concern.

Er 9: Nonfunctioning take-up reel. This can be caused by a bad or dirty idler wheel that turns the take-up, a jammed take-up reel inside the cassette shell, or a broken tape. Eject the tape and try again with unimportant tape.

If these errors occur only with a certain tape or are displayed very occasionally, there is little cause for alarm. Errors 1, 2, 3, and 9 indicate conditions that may damage a tape; the other errors won't damage the tape or the recorder.

The following errors only apply to XT-family recorders—all can be cured by reinitializing the recorder. Note: Errors 11, 12, 13, and 16 are currently not used and are saved for future use.

Er 10: Record enable lights when track isn't in record mode. Reinitialize recorder to cure problem.

Er 14: This indicates a crossfade buffer problem. Reinitialize recorder to cure problem.

Er 15: Channel error or crossfading state error. Reinitialize recorder to cure problem.

Er 17: Tape-end sensor error. Re-initialize recorder to cure problem.

—George Petersen, reprinted from Modular Digital Multitracks: The Power User's Guide, *Second Edition, available through Mix Bookshelf; tel. (800) 233-9604.*

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Each of the surfaces designated by the letters A through L should be cleaned. The logical approach is to clean them in the direction the tape moves, skipping the headstack and saving it for last.

Use only the chamois swabs or lint-free cloth for cleaning the headstack; you can, however, use cotton swabs for all the other parts. The alcohol or cleaning solution is used to clean all the surfaces (including the plastic impedance roller), except for the rubber pinch roller, which should be cleaned with rubber cleaner only.

Clean the tape guides and linear head with a side-to-side motion (the same as the movement of the tape). Also, be sure to rotate the white plastic rollers as you clean them to ensure a thorough cleaning. Do the same with the rubber pinch roller, and wipe off any excess rubber cleaner with a clean, dry cloth or fresh swab.

Now it's time for the most delicate operation: cleaning the headstack. The headstack contains four heads: two for recording and two for playback. These heads appear as tiny rectangular bits located in the top portion of the rotating headstack. It's important to follow these instructions carefully because one wrong move can easily knock the heads out of alignment and/or ruin them entirely.

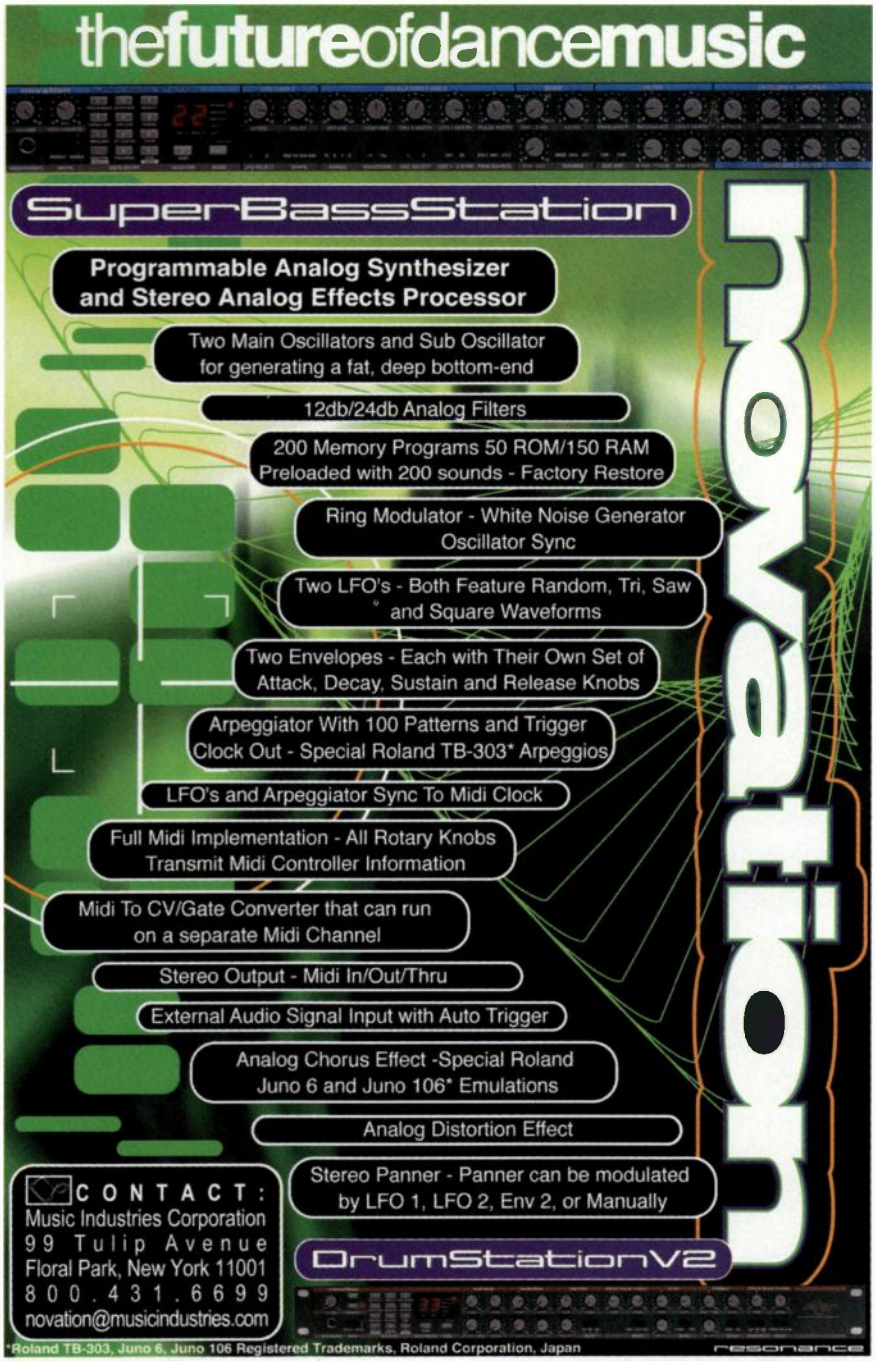
First, apply the alcohol or cleaning solution to a piece of lint-free cloth or a chamois swab. Place the cloth or swab against the rotating drum (the top half of the headstack), and gently hold it in place with your index finger (this is most easily done on the right side of the drum). While applying a very mild pressure to the drum, rotate the head counterclockwise (the direction of its normal travel) by turning the round rotor above the drum. This way, your finger will not touch the headstack. As you gently rotate the drum counterclockwise, you will feel the heads rubbing against the cloth beneath your index finger.

▼

Take care when cleaning the headstack, because one wrong move can destroy the heads.

Do *not* move the cloth or swab or your finger while the drum is turning because this will almost certainly throw the heads out of alignment and possibly damage them, as well. Also, be sure to keep the cloth or swab moist with cleaning solution. Continue cleaning the drum until the cloth or swab shows no more residue (see **Fig. 2**).

After cleaning the rotating drum, clean the helical groove located on the lower, nonmoving half of the headstack. This is an indentation (it looks like an engraved line) in the drum where the tape rests as it travels along the head. Clean this groove all the way around the lower drum, turning the top drum if necessary to ensure that you don't touch the just-cleaned heads. Take every precaution to assure that this part of the tape path is kept absolutely clean because any dirt that gets on the headstack can cause the tape to mistrack, resulting in an unplayable tape.



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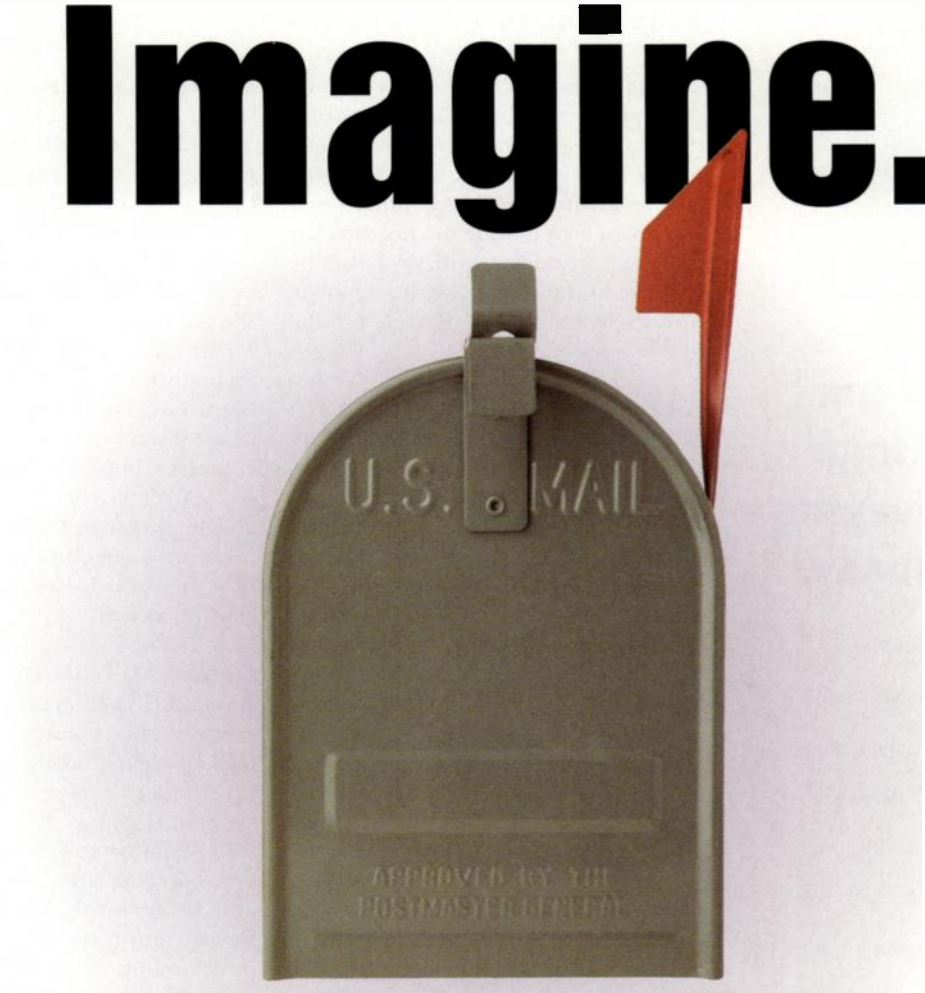

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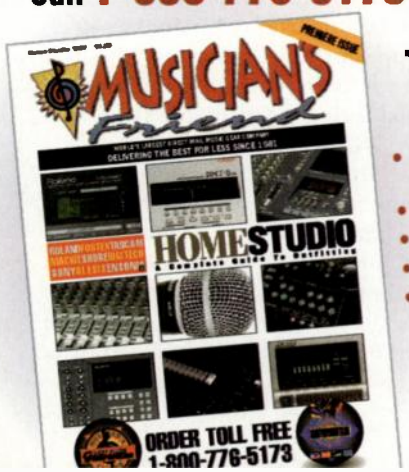

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Congratulations: you've now cleaned the tape path in your ADAT. But don't throw a tape in immediately—you need to wait a couple of minutes to allow the cleaning solution time to evaporate. If you insert a tape while the headstack is still "wet," the tape will probably be rendered unusable. Take the opportunity while the cover is off to service the idler wheel.

IDLER WHEEL

The idler wheel is the small, white plastic disk between the supply and take-up hubs (see **Fig. 1**). Its purpose is to transfer the reel motor rotation to the hubs during play, record, rewind, and fast-forward. On the original ADAT, the idler wheel has a black rubber ring around it; on the ADAT-XT, the ring is made of Santoprene, a white synthetic rubber.

After continued usage, the idler wheel's outer ring tends to get coated with tape oxide and other crud, causing it to lose traction. There are several symptoms of this problem, including sluggish rewind, dropping out of sync, and dropping out of Record. The error messages NoFo, Full, Er 7, and Er 9 may be indications of a dirty idler wheel.

You can clean the idler wheel by saturating a cotton swab with rubber cleaner and scrubbing the outer ring until its finish becomes dull. There will also be crud on the black take-up and supply hubs at the points where they contact the idler wheel, so scrub there until clean, as well. However, the idler wheel is inexpensive enough that Alesis recommends you simply replace it when necessary (expect 300 to 800 drum-on hours per idler wheel). Note that the ADAT and XT idler wheels are not interchangeable. Order part kit #8-50-0028 for original ADATs and #8-50-0053 for XTs. Cost is $5.64 for the original and $3.14 for the XT. (Call Alesis for details.)

To replace the idler wheel (the unit is already powered down, unplugged, and opened up, right?), remove the clip/spring assembly from the idler wheel's center post by gently pushing it away from the post until the post is in the wide part of the clip. Now, slowly lift the assembly upwards and remove it, being careful not to let the idler wheel spring (located *beneath* the idler wheel clamp) spring out and get lost. Next, remove the spring from the post, and remove the idler wheel by lifting it straight up.

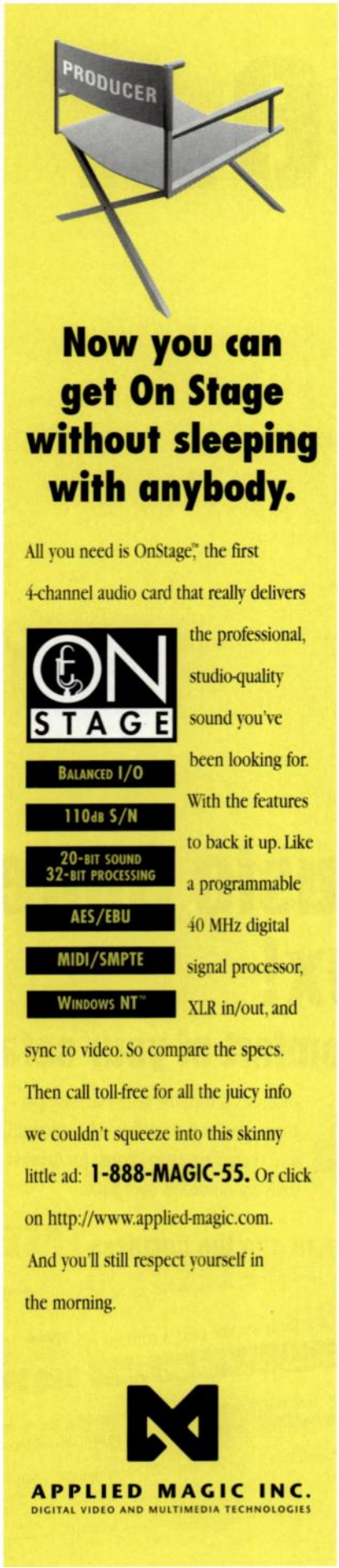
Insert the new idler wheel (the small plastic post faces upward), and place the spring on top. Now replace the clip/spring assembly onto the idler wheel post, making sure the clip is securely in place around the detent of the post (you should hear a click). Use a pair of needle-nose pliers or tweezers to pull the hook end of the assembly around the hub actuator post (i.e., where it was originally). The task is now complete; however, before reinstalling the ADAT cover, power up the machine, and insert and play a tape to make sure everything is working properly. It's best to try fast-forward and rewind, as well.

GENERAL TROUBLESHOOTING

If your ADAT freezes up or behaves erratically, always power down and power back up before taking any other action. If this doesn't solve the problem, next try reinitializing the machine. (This step is similar to rebooting a computer.) To reinitialize, first power down, and then simply hold the Play and Record buttons simultaneously while powering up. Note, however, that this procedure will reset all parameters to their default settings, meaning that you will lose any stored operational information (autolocate points, crossfade times, pitch-shift settings, etc.) from your last session.

As with digital synthesizers, MDMs store operational information in a battery-backed memory, which operates even if the unit is switched off or unplugged. These batteries are designed to last five years—so if your ADAT starts acting weird after that amount of time, the problem could be no more serious than a dead or dying battery. The battery is located on a circuit board beneath one of the small bottom panels, and it is about the size and shape of a quarter. (Remember to always power down and unplug the unit before opening any of these panels!) The batteries are available from Alesis for $7.21 each.

Note that all of the above information applies to other-brand units in the ADAT family, namely the Fostex RD-8 and CX-8 and the Panasonic MDA-1. It does not, however, apply to the new Alesis M-20 or Studer V-Eight, because these units have been redesigned from the ground up. ●



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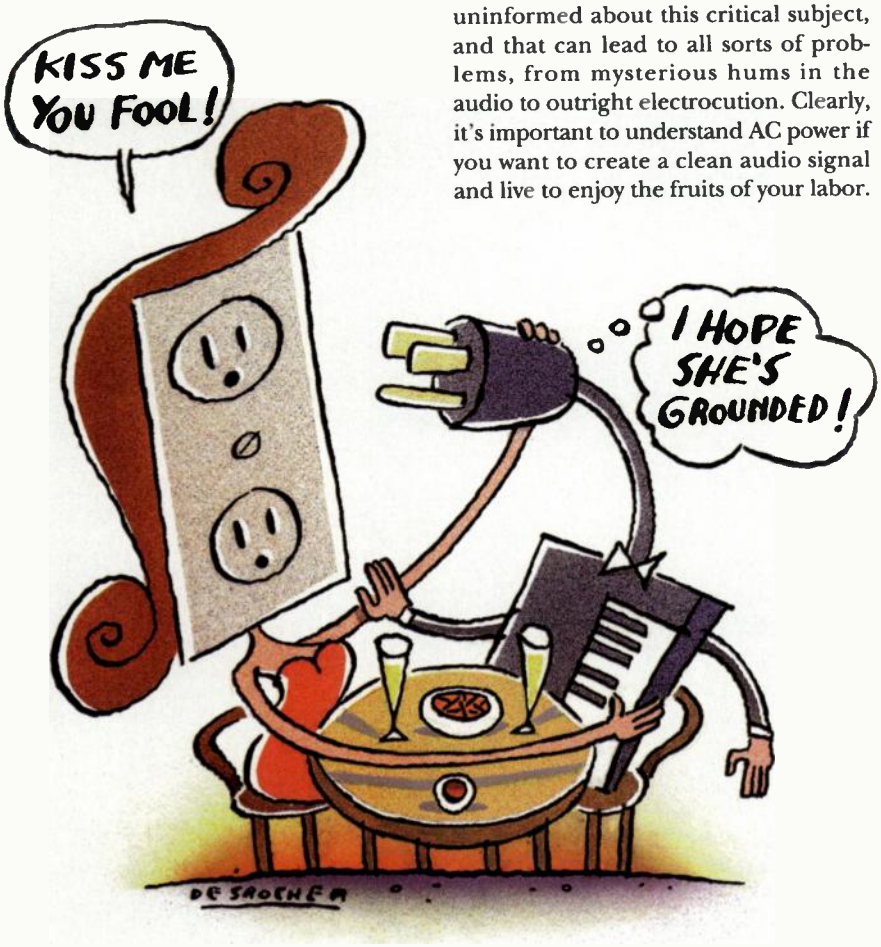
Power to the People!

Clean up your power act before it cleans your clock.

By Scott Wilkinson

Electronic musicians should be intimately familiar with AC power; after all, it is required by most of the equipment we use to make music. However, most of us are woefully uninformed about this critical subject, and that can lead to all sorts of problems, from mysterious hums in the audio to outright electrocution. Clearly, it's important to understand AC power if you want to create a clean audio signal and live to enjoy the fruits of your labor.



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The information presented here will help you understand AC power, but be forewarned: you should have a professional electrician make any significant changes in your home's electrical system. Mucking around with household current can be very dangerous, so leave it to a pro.

DOWN TO BASICS

The electrical signal that reaches your home from the power company is an alternating current (AC) with a sinusoidal waveform. In this country, the signal's frequency is 60 Hz (in Europe, it's 50 Hz), which is very tightly controlled to a tolerance of 0.01%. Many time-based devices are designed to sync to this frequency because it is so stable. However, it is also in the audible range, so it can be heard if it gets into an audio path. (On the plus side, it makes a very nice B-natural tuning reference!)

Because the signal is AC, its voltage is measured with the *root mean square* (RMS) method (see "Square One: Watts & Volts & Logs, Oh My!" in the December 1995 **EM**). The power signal arrives at your home with a voltage of 240 VRMS (which is normally called VAC). Once this signal reaches the distribution point in your home, it is divided into two signals of about 120 VAC each, which are 180 degrees out of phase with each other (see **Fig. 1**). The exact voltage of these signals is not as carefully controlled as the frequency

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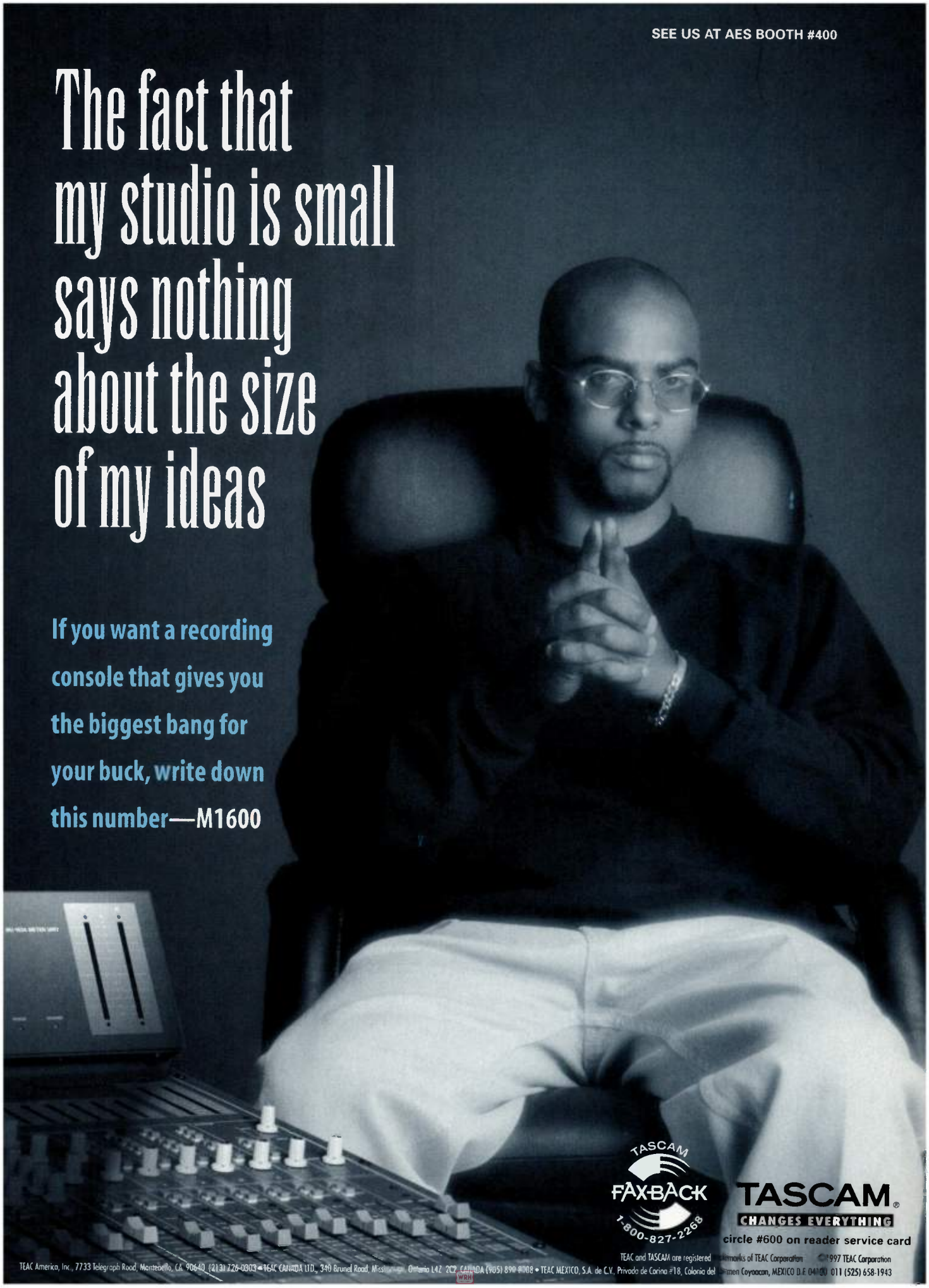

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because conditions at the power company can fluctuate as overall demand for power changes. A few heavy-duty appliances, such as electric stoves and clothes dryers, use the entire 240 VAC signal, but most powered items use one of the 120 VAC signals.

The distribution point is normally a metal box with fuses or circuit breakers arranged in two vertical rows. Each row distributes one of the two 120 VAC signals to the outlets and light fixtures in your home. Typically, each distribution point in the box sends power to several outlets and light fixtures, such as those found in one room.

In addition, each fuse or circuit breaker limits the amount of current that can be drawn from all the outlets and fixtures it feeds. This limit is typically 15 or 20 amps. If the combined current exceeds this limit, the fuse or circuit breaker "blows," disconnecting the power from all its outlets and fixtures. This prevents the wires in your walls from overheating and possibly causing a fire.

Speaking of the wires in your walls, the 120 VAC signal is sent to each outlet through a single wire called the *hot wire.* Of course, all outlets have at least two holes; newer outlets are "polarized," and the hot wire is connected to the smaller hole on the right of the outlet to make sure that the device's hot wire is connected to the correct hole.

When you plug something into an outlet, the power signal flows from the hot wire through the device and back out to the other hole (which is the larger one on the left of a polarized outlet). This other hole is connected to the *neutral wire,* which goes back to the breaker box, where it is connected to a *ground point.* Because the power signal makes a round trip from one of the distribution points and back to the ground point in the breaker box, it is said to complete a circuit. Each distribution point is often called a circuit, as well.

Ground represents 0 VAC, and it is often established by connecting the ground point in the breaker box to the cold-water plumbing in your home. Some homes use plastic plumbing, in which case one or more metal (preferably copper or copper-clad) stakes are driven into the ground on which the home is built, and the ground point is connected to it. This approach, which is often used in professional studios, is commonly referred to as a *true earth ground.* (I'll return to this point in a moment.) Basically, the ground provides an infinite sink for electrons, which always take the easiest path to ground they can find. Once the power signal leaves the device, it makes a beeline to ground via the neutral wire.

Three-prong outlets include a separate ground hole and ground wire, which is sometimes called the *safety ground* and is also connected to the ground point. The safety ground provides protection in case the hot lead is accidentally connected to the chassis of the device being powered, which is called a *short circuit.* If this happens in a device with a 2-prong plug and you are touching the chassis, you become the current's path to ground, which could give you a real jolt. With a 3-prong plug, however, the current has a much easier path to ground, which protects you from electrocution.

It is so important to keep these wires straight that a convention has been established in the electrical industry. The

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insulation of the neutral wire is white, and the ground wire in a 3-prong outlet is either green or has no insulation at all. The insulation of the hot wire is any color other than white or green, with black being the most common.

TESTING, TESTING

Appliances that include motors, such as air conditioners, dishwashers, and refrigerators, can sometimes put a momentary strain on the side of the circuit-breaker box to which they are connected when the motor turns on. It's best to make sure the outlets in your studio are connected to the other side of the box from any such appliances. Otherwise, the power might fluctuate when these appliances start their motors, which can cause problems with studio equipment (e.g., it can scramble the memory of synths and other devices).

It's relatively easy to determine which side of the box your studio outlets and other appliances are connected to. First, make sure any computers and music gear are turned off and unplugged. Next, plug in several radios or lights around your home and turn them on. Then, trip each circuit breaker in the box and see which radios and/or lights turn off. Make a note of which breakers affect which outlets.

If necessary, have an electrician reconfigure the breaker box so that heavy-duty, nonmusical appliances are on one side and the studio outlets are on the other side. However, this might not be possible because the electrical load on both sides should be relatively equal.

By the way, if you notice that the lights dim momentarily when a major appliance such as the air conditioner or refrigerator turns on, call an electrician as soon as possible. This symptom generally indicates that you have a fault in the neutral or that one of the hot legs is not properly connected.

For maximum isolation, have an electrician establish a completely separate electrical service and ground for the studio outlets. In particular, the electrician can create a true earth ground using a dedicated grounding rod. This can be expensive, but it is the only way to be completely sure that other appliances in your home won't affect the studio equipment.

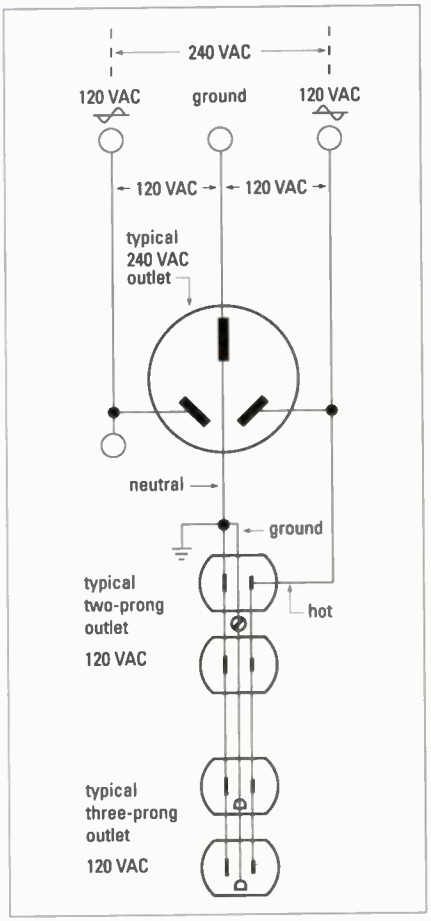

FIG. 1: Electrical power enters your home as a 240 VAC sine wave, which is divided into two 120 VAC sine waves that are 180 degrees out of phase with each other.

Another thing to consider is the total amount of power drawn by all of your equipment. You should make sure it isn't overloading the circuit to which it's connected. This is relatively easy to determine; most pieces of electronic music equipment specify the amount of power they require (in watts) on the back plate or in the technical specifications of the manual. However, the limit of most circuit breakers is specified in amps, which relates to current.

The voltage remains relatively constant at 117 to 120 VAC, so it's possible to convert watts to amps. Recall Joule's Law (see "Square One: Watts & Volts & Logs, Oh My!" in the December 1995 **EM**):

$$P = VxI$$

This law can also be stated as

$$I = {}^{P}/_{V}$$

Apply this formula to the power rating of each piece of equipment in

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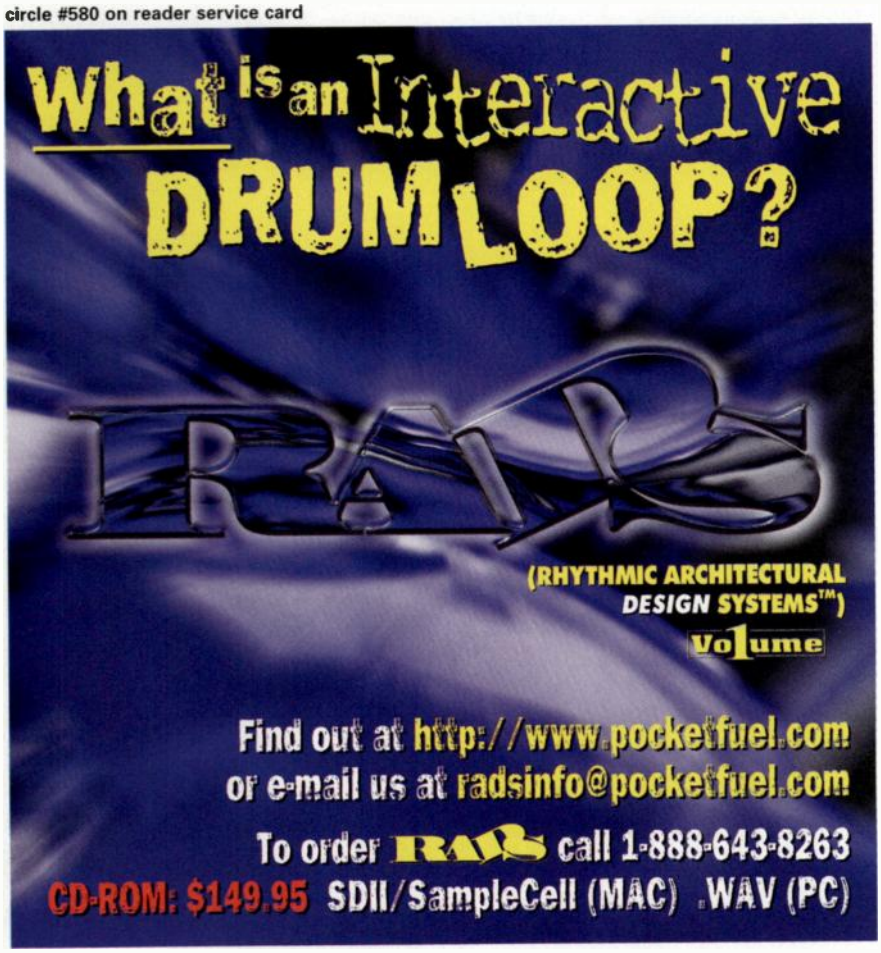

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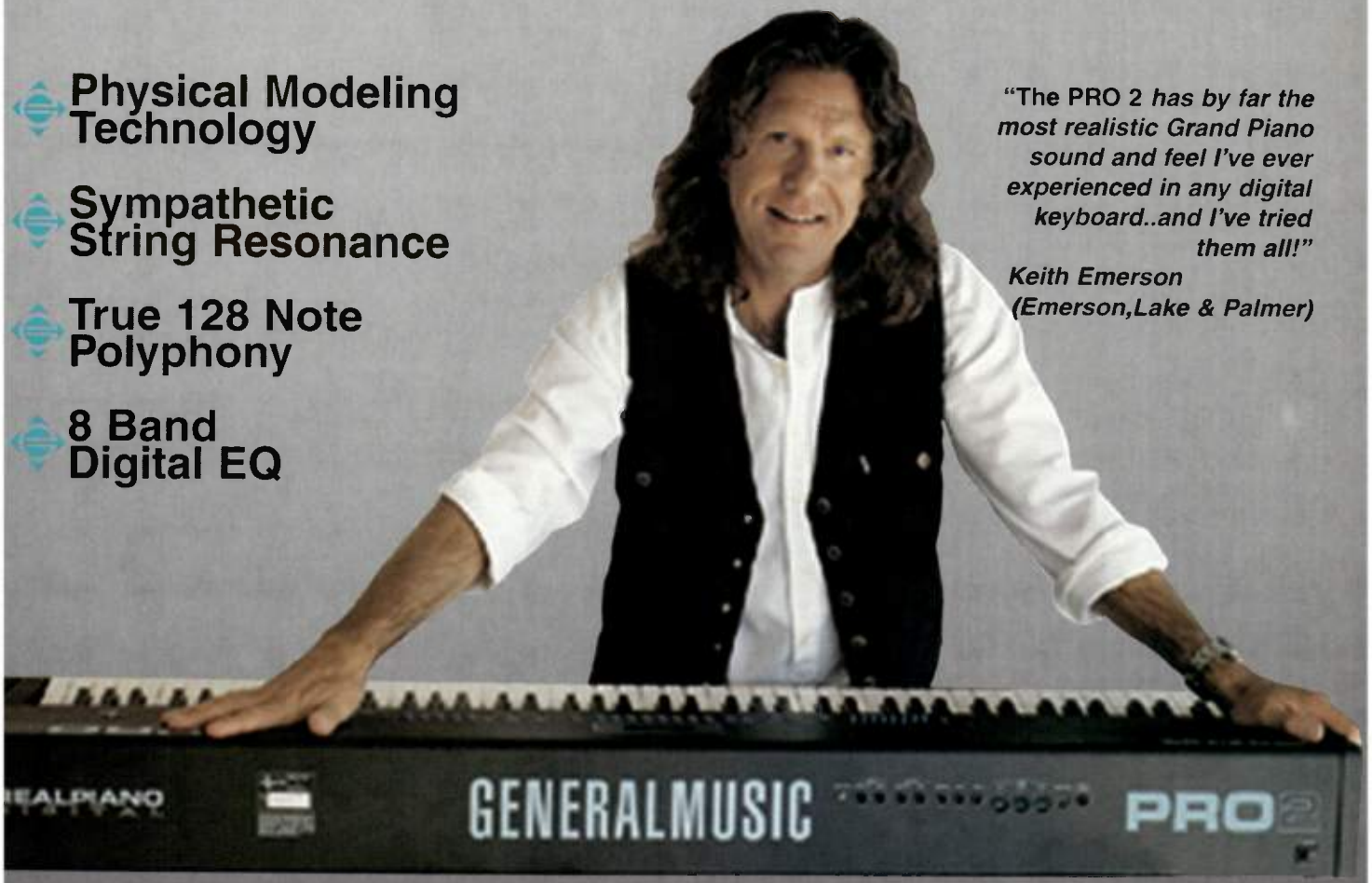

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order to determine the amount of current it draws. For example, suppose a synthesizer draws 90 watts. If the voltage is 120 VAC, then:

$$I = {}^{90}/_{120}$$

$$I = 0.75 \text{ amps}$$

Add up the current requirements for all the gear in your studio to determine whether the circuit can safely deliver the current you need to run the studio. If not, have an electrician install a higher-amp circuit for the studio. Fortunately, most electronic music equipment doesn't need much power. Tape decks, power amplifiers, and mixing consoles require the most, but even so, most home studios can easily run from one 20-amp circuit as long as there is nothing else on the same circuit. Be sure to keep studio lighting and ventilation fans on a separate circuit.

It is extremely important to test the outlets in your studio. If an outlet is a 3-prong design, use an AC outlet analyzer, which is available at RadioShack and other electronic-parts stores. This will reveal whether the hot, neutral, and ground wires are properly connected (see **Fig. 2**). In some cases, the polarity of the hot and neutral connections is reversed, which can create a shock hazard and increase noise in the audio signal. In addition, the ground hole might not be connected to anything, which creates a potential shock hazard and defeats surge and spike protection. These problems should be corrected by an electrician.

If the outlet is a 2-prong design, use a neon circuit tester (also available at RadioShack and elsewhere) to test the ground. Touch one lead of the tester to the metal screw that secures the cover plate and insert the other lead into the hot-wire slot of the socket, which is the smaller slot of a polarized outlet. (Make sure the screw isn't covered with paint.) If the tester glows, the ground is okay. Unfortunately, the cover-plate screw is often not connected to ground. In this case, do the right thing: don't even bother grounding the old outlet, but have an electrician install a properly grounded 3-prong outlet.

If you must connect a 3-prong plug to a 2-prong outlet—and the only excuse for this is that you are playing a live gig and are stuck with the venue's lame power system—make sure the cover-plate screw is connected to ground and use a 3-to-2-prong adapter that includes a ground lug on a short wire protruding from the plug (see **Fig. 3**). Connect the lug to the cover-plate screw to ensure proper grounding.

THE INSIDE STORY

Most of the problems caused by AC power in the studio arise because of improper grounding among the various pieces of equipment. Ideally, the chassis of each piece of equipment is connected to the ground of its power supply's input, which should be connected to the safety ground wire in a 3-conductor power cord. However, this connection sometimes comes loose, or the grounding for the unit may have been poorly implemented to start with.

To verify this connection, use an ohm meter to check the resistance between the ground prong of the power plug and the metal case of the equipment. (Make sure to touch an unpainted part

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of the case.) If the resistance is high, the connection between the chassis and the ground prong is broken or inadequate, in which case you should take the equipment to a repair facility and have it fixed.

AUDIO ENTERS THE PICTURE

Every piece of AC-powered equipment includes a power supply that accepts 120 VAC and converts it into a DC voltage, typically ±15 VDC. The power supply might be internal or external (e.g., wall wart or lump-in-the-line). In either case, there is a ground point at 0 VDC between +15 and -15 VDC. This is called the *signal ground*, because it is normally connected to the ground conductor of the audio cables that carry audio signals from one device to another.

Like 2-conductor power cords, unbalanced analog audio cables include two conductors: hot and shield. The shield forms a concentric tube around the central hot wire and is attached to the signal grounds of the devices it connects. Balanced audio cables include three conductors: hot, cold, and shield. The hot and cold wires both carry the audio signal 180 degrees out of phase with each other, and the shield is connected to the signal ground. In many devices, the signal ground is also connected to the chassis ground, which can cause problems (more in a moment).

Ideally, these cables carry only the audio signal. In the real world, however, extraneous signals sometimes get into them. This can occur when a current in an audio device's AC ground is generated by the device's impedance to the power signal. In this case, the signal in the power ground appears in the signal ground because they are connected through the chassis.

Another common means by which extraneous signals enter the audio path is a process called *induction*. All current produces a corresponding electromagnetic field that radiates from the conductor carrying the current. Conversely, a radiant electromagnetic field can induce current in a nearby conductor. As a result, unwanted signals can be induced into the audio cable. Balanced cables are much less susceptible to induced noise because of the 180-degree phase relationship between the two signal-carrying wires within the cable.

The main sources of this induced signal are *radio-frequency interference* (RFI) and *electromagnetic interference* (EMI). RFI is caused by radio stations, cell phones, and other sources of radio energy that is transmitted through the air. EMI is caused by any nearby current-carrying conductor, such as power cords, large transformers, or electromagnetic coils (e.g., in televisions and computer monitors). When these signals are induced into the audio cables, they can become an audible part of your audio.

THROWN FOR A LOOP

RFI and EMI are aggravated by the presence of *ground loops*, which are formed when your equipment is connected to ground through more than one path. This is especially problematic with 2-conductor power cords and audio equipment in which the signal ground is connected to the chassis ground.

For example, consider two pieces of equipment that are plugged into different wall outlets and connected together with an audio cable (see **Fig. 4**). Each device has its own ground connection through its power cord, but

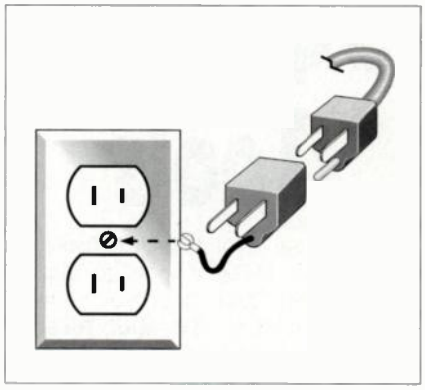

FIG. 3: Use a 3-to-2-prong adapter only if the outlet faceplate screw is connected to ground.

each unit is also connected to the other's ground through the shield of the audio cable, which is connected to the chassis of both devices. As a result, ground loops can act as antennas that pick up RFI and EMI, causing a current in the ground line that can get into the audio signal via the signal ground.

One way to reduce ground loops is to connect all equipment and outlet grounds to a single ground point, such as a grounding stake, using ground wires that are as short as possible. However, this is not always practical.

Many people are tempted to use a *ground lifter* (such as a 3-to-2 AC adapter without the ground lug) on one of the AC power cords; some people go so far as to remove the ground prong from a 3-prong plug. In this case, both devices see only one path to ground: one device is grounded through its own power cord and the other through the audio cable's shield to the first device's ground. This is very dangerous and not recommended because it eliminates the inherent shock protection offered by

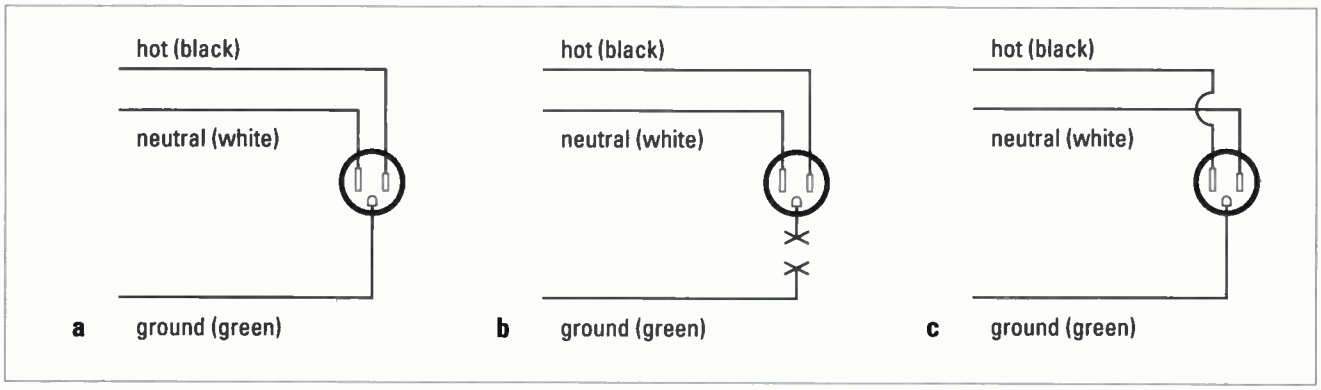

FIG. 2: In a properly wired 3-prong AC outlet (a), all three conductors are connected and color coded. In some cases, the ground is disconnected (b) and/or the hot and neutral wires are reversed (c).

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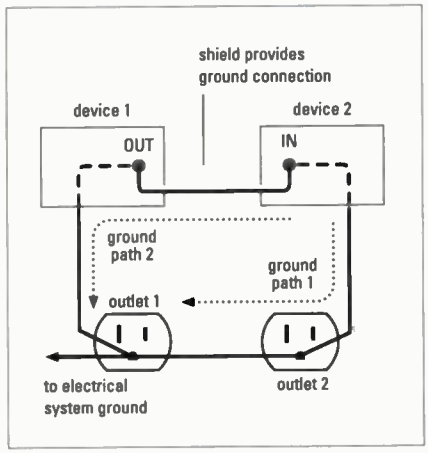

FIG. 4: When two audio devices are powered from different outlets and connected by an audio cable, they have two different paths to ground, resulting in a ground loop. Only the ground paths for device 2 are shown here; device 1 has two similar paths.

grounding. A much safer alternative is to plug two devices that might form a ground loop into the same outlet, which shortens the ground wire between them (see **Fig. 5**).

Some equipment includes a ground-lift switch, which disconnects the signal ground from the chassis ground and eliminates the path to ground through the AC power cord. This is equivalent to using a ground lifter, but it's much safer. However, using ground-lift switches is a trial-and-error process; in general, most or all of these switches should be in the lifted position, but you must determine the best configuration for your studio by trying different combinations.

Another way to eliminate ground loops is to disconnect the cable shield at one end of an audio cable. This is called a *telescoping shield*, and it only works with balanced audio cables; both conductors of an unbalanced audio cable must be connected at both ends for the signal to flow. You can buy such cables or make them yourself. In general, the shield's connection should be broken at the end that goes to an audio input.

Yet another method of breaking ground loops is to use *audio isolation transformers* (also called *iso transformers*), which are available from Furman, Jensen, Ebtech, and others. Audio iso transformers pass the audio signal from their input (called the *primary*) to their output (called the *secondary*) by induction, which requires no direct electrical connection. (See "Square One: Going Direct" in the July 1997 **EM** for more on transformers.) This effectively isolates the audio signal from the rest of the electrical system.

Iso transformers can also be used on the power line. MidiMotor makes a rack-mountable box called the Hum Buster that isolates several AC outlets using power iso transformers.

Ground loops can form when the chassis of your rack-mounted gear are electrically connected in some way. This commonly occurs in a rack when the metal faceplates of different modules come into contact. It can also occur because the metal rack ears of each device are electrically connected by the metal mounting rails of the rack itself. In these cases, each device has its own ground connection, and it's also connected to the chassis ground of the other devices.

To prevent ground loops in racks, make sure the faceplates do not touch each other and use nylon washers on the front and back of the rack ears when attaching devices to the rack with metal screws. To be extra safe, use nylon washers with a sheath that fits into the devices' mounting holes to prevent any metallic contact between the rack ears and mounting rails via the mounting screws. Some people even build their own racks with wooden mounting rails to avoid ground loops.

To reduce EMI from power cords, it's very important to keep audio cables as far away from power cords as possible. Use cable ties to bundle power cords on one side of a rack and audio cables on the other side.

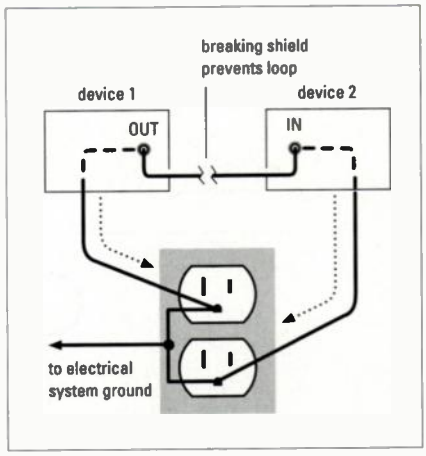

FIG. 5: Plugging both devices into the same duplex outlet helps reduce ground-loop problems. Breaking the cable shield of a balanced audio cable also helps.

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POWER MANAGEMENT

Despite all the precautions you might take to prevent grounding problems, the AC signal from the wall can fluctuate due to circumstances beyond your control. These fluctuations include *surges* (temporary increases in the voltage) and *spikes* (momentary but huge increases in the voltage) from lightning and other sources. The voltage can also drop dramatically in a *brownout* or disappear altogether in a *blackout*.

If your gear experiences these conditions, it could be damaged; at the very least, it could operate improperly and its effective lifetime could be shortened. In addition, the power signal, which should be a nice, clean sine wave, can be polluted with noise from RFI/EMI and other sources before it reaches your home, and this noise can get into the audio signal path.

Fortunately, you can protect yourself from most of these problems with various power-management devices. These devices typically include several AC outlets, which can be used to power an entire rack. More expensive units often include several types of protection and are available in rack-mount cases.

The simplest form of protection is a *surge/spike protector*. Many power strips include this type of protection, which is provided in two ways. *Transverse-mode rejection* guards against spikes between the hot and neutral lines, and *common-mode rejection* protects against spikes between the hot or neutral line and ground. Make sure the surge/spike protector you use has both types. Surges and spikes can also travel along telephone wires, and some protectors include phone jacks in addition to AC outlets.

Many power strips also include *RFI/EMI filtering*, which is also called *line conditioning*. This uses a lowpass filter with a cutoff above 60 Hz that redirects higher-frequency signals to ground before they get to your equipment. The result is a clean sine-wave power signal. However, these filters can generate extraneous currents in the ground when used with a standard 120 VAC power source.

One solution to this problem is called *balanced power*, which is used in products from Equi=Tech, Furman, MidiMotor, and others. In this scheme, the hot and neutral wires from a balanced power supply each carry a power signal of 60 VAC instead of 120 and 0 VAC, respectively, and these signals are 180 degrees out of phase with each other (see **Fig. 6**). This resembles the way 240 VAC is divided into two 120 VAC lines in your home as well as the operation of balanced audio cables. The total voltage between the "hot" and "neutral" wires is still 120 VAC, so the equipment works fine, but any current in the ground is canceled out. In addition, radiated EMI from the two conductors cancel each other out, effectively eliminating any induced EMI from the power cord.

The next step up in power management is a *voltage regulator* (also called a *line regulator* or *stabilizer*). These are available from companies such as Furman, Juice Goose, and Tripp Lite. A voltage regulator attempts to maintain a constant output voltage to each of its outlets in spite of varying input voltage from the wall. Most can provide a steady 117 or 120 VAC as long as the input voltage remains in the range of approximately 90 to 130 VAC. (Some regulators can deal with input voltages up to 300 VAC.) If the voltage rises above the unit's maximum input range, it should trip an internal circuit breaker to prevent damage.

A voltage regulator can be very helpful in the event of a short brownout (also called a *sag*), but it can't protect against a long voltage drop below the unit's minimum input or a complete blackout. In most cases, the regulator's outlets are rated for a given amount of power, so make sure you match the power requirements of each device with the appropriate outlet.

The only protection against complete blackouts is an *uninterruptable power supply* (UPS). This device has a battery that kicks in if the power drops out, preserving the data in your computer and synth/sampler RAM and giving you time to save your work and safely shut everything down. (The amount of time before failure varies depending on the UPS and the load, but usually you get at least ten minutes.) Some units, such as models from American Power Conversion (APC) and Furman, also have surge/spike protection, RFI/EMI filtering, and voltage regulation.

The most important factor is the time it takes the universal power supply to detect a power loss and switch over to the battery. The combined detection/switching time should be under 10 ms. Some systems even include software (such as APC's *PowerChute Pro*) that monitors and tests the UPS and lets you schedule computer shutdowns to conserve power.

Power management is of critical importance in any studio if you want to stop hums, buzzes, and other noise from creeping into your audio signals. Armed with a solid grounding in the principles of AC power, you can now start to clean up your audio act.

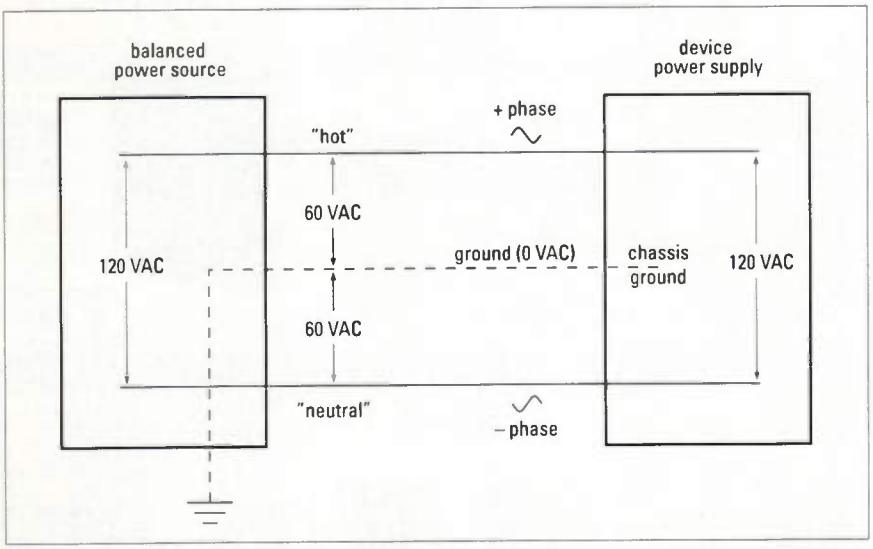
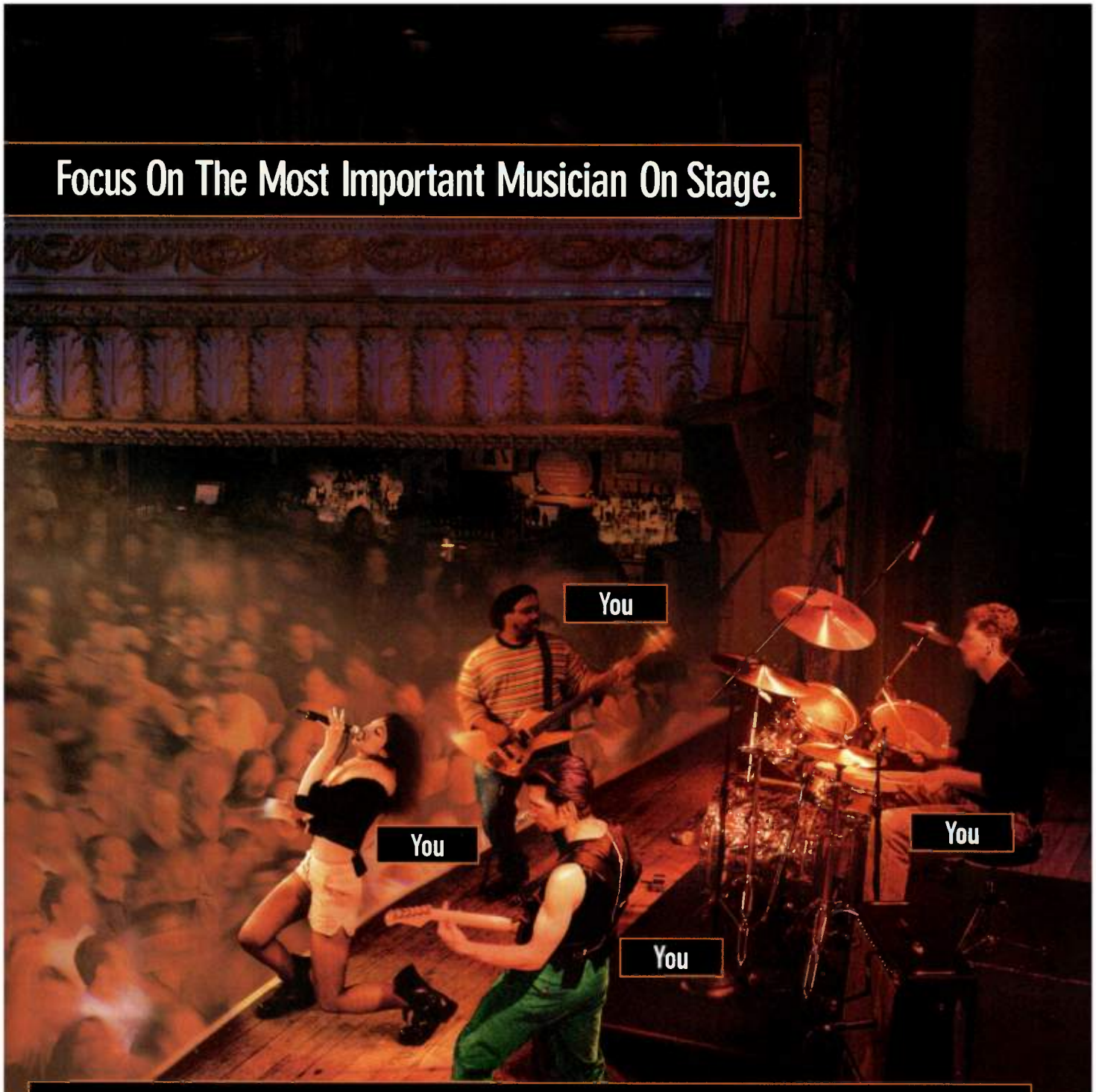


FIG. 6: A balanced-power system divides the 120 VAC from the wall into two 60 VAC sine-wave signals that are 180 degrees out of phase with each other. Any EMI from this type of power system is effectively canceled out.

EM *Technical Editor* **Scott Wilkinson** *has gotten a couple of real jolts by carelessly connecting power cords. Thanks to Jim Furman of Furman Sound for his help with this article.*

Focus On The Most Important Musician On Stage.



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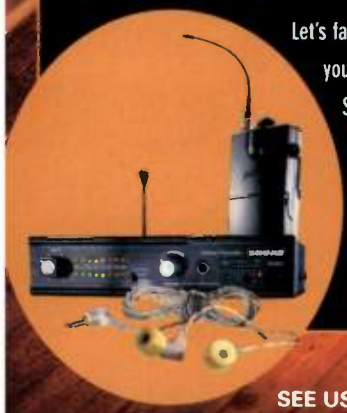

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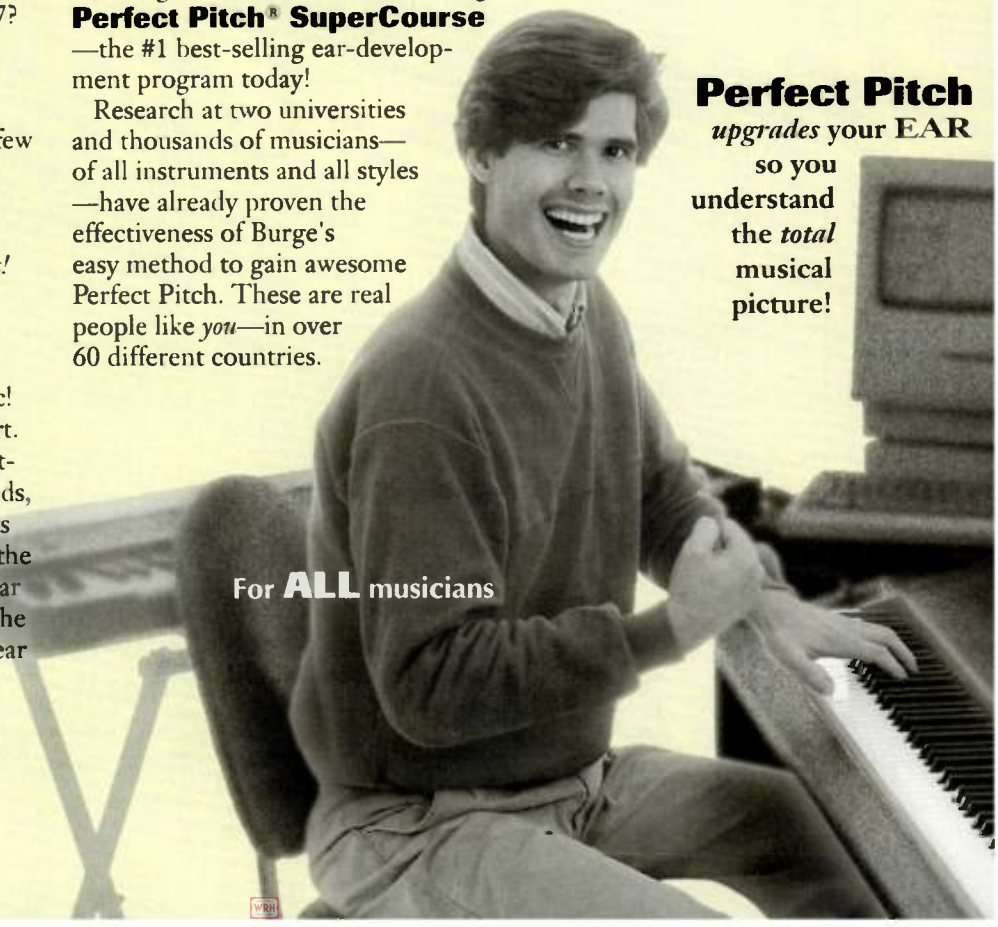

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Reviews

Hammond XM-1

By Rob Shrock

A killer drawbar organ module with loads of real-time control.

I am sure that many of us are guilty of cheating the Gods of the Drawbar at one time or another. You need a quick B-3 sound, so you dial up a stagnant organ sample on one of your MIDI modules. It probably sounds decent, it has a built-in speed control for the questionable Leslie simulator, and it works well, as long as you don't want the sound to change much while you're playing it.

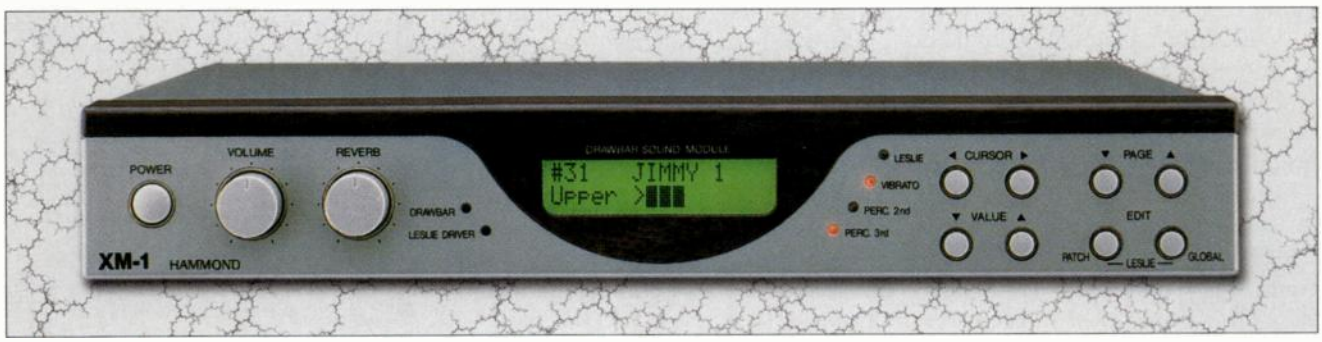
But what if you want to hold down a screaming, distorted chord and make it holler even more by yanking out a few more drawbars? What if you want to flip on the chorus, vibrato, or percussion in the middle of a phrase or just play the Leslie speed as part of the instrument and make it sound convincing? In other words, what if you really want to sound like a B-3? Samplers and synths normally can't perform the real-time changes that make an organ sound like a Hammond—at least, not to anyone who knows what a real Hammond feels like and how much that feel affects what and how you actually play.

Hammond/Suzuki has come to the rescue of those who just aren't satisfied with the present crop of mostly lifeless organ patches and modules. Now owned by a giant Japanese company, the Hammond name and product line lives on in a new form. Based on the technology of the Hammond XB-3 organ and GM-1000 sound module, the XM-1 drawbar sound module provides access to all the vital parameters of old Hammond organs that aren't typically available in sample-playback boxes. Incorporating a built-in, realistic-sounding Leslie simulator, this is the closest thing to a "Hammond-in-a-box" I've heard.

The XM-1 is designed to be used with the XMc-1 drawbar controller (see the sidebar "Real Control"), which offers nine drawbars and additional knobs and buttons and connects to the XM-1 with an included 8-pin serial cable. (Currently, Hammond/Suzuki only offers the two units as a package, but it is possible to purchase either unit individually if a replacement is needed.) Although all parameters are available from the front panel of the XM-1, using the XMc-1 for real-time control provides a much more natural Hammond playing experience.

LOOKING GOOD

The XM-1 is a tabletop unit that can also be rack-mounted with an optional kit, although it is wider than standard half-rack units. The exterior design is elegant, with a wood-grain trim and an



The Hammond XM-1 looks elegant enough for a home setting, but it has the right stuff for any studio or live gig.

overall appearance that would fit nicely in a home environment—connected to a beautiful home keyboard, for instance. But don't let the elegant look fool you; the XM-1 is sturdy and designed for the serious live gig or studio organist.

The rear panel includes a connector for the wall-wart power supply, two ¼-inch audio outputs, one ¼-inch headphone output, one ¼-inch footswitch input, and MIDI In, Out, and Thru ports. It also includes connectors for the XMc-1 and an actual Leslie speaker cabinet.

In the center of the front panel is a 16-character by 2-line LCD. To the left of the display is the power button, volume knob, and reverb-level knob. A pair of Edit buttons access the Patch, Global, and Leslie parameters. You navigate the parameters and set values using the Cursor Right/Left, Page Up/Down, and Value Increment/Decrement buttons.

Immediately adjacent to the display are six LED indicators. The two LEDs on the left indicate the presence of an XMc-1 or Leslie cabinet connected to the corresponding rear-panel jacks. The four LEDs on the right indicate the status of the internal Leslie simulator, vibrato, and second- and third-harmonic percussion effects.

Although the selection of editing parameters is remarkable, it is not a painless process to create or extensively edit a patch. It is often necessary to wade through many pages of parameters using various combinations of the six Page, Cursor, and Value buttons. Sometimes it takes as many as a dozen button pushes to make an edit!

The LCD is typical of current MIDI devices and is capable of displaying only a couple of parameters at a time. It isn't confusing so much as frustrating to scroll through so many pages hunting for the desired setting. The parameters are organized in a logical fashion, but controlling the sound from the front panel is not as spontaneous as using the XMc-1. Your edits can be stored in 128 user patch locations. However, unless and until a module for an editor/librarian becomes available, expect to spend some time pushing buttons if you want custom-tweaked organs.

With 32-voice polyphony, the XM-1 offers 3-part multitimbral operation. These parts correspond to the upper and lower manuals and pedals of an actual Hammond organ and are addressed on different, user-assignable MIDI channels.

The XM-1 includes the same 4 MB of samples found in the XB-3 organ, using a custom DSP chip to constantly recalculate the tone output based on the positions of the drawbars. I was never able to get any specific details on how this worked. However, the result of the technology is astonishing, and the bottom line is that when you move the drawbars, it sounds real.

ALL THE DETAILS

Real Hammond organs let you quickly modify the sound with a variety of features, such as key click, percussion, vibrato, chorus, and Leslie settings. When you consider physical variations, such as the type of organ and Leslie,

REAL CONTROL

The XMc-1 drawbar controller provides immediate access to many of the important performance parameters of the XM-1. An included 5-foot serial cable connects the two units, but you can use a cable up to thirteen feet long, making it possible to conveniently place the XMc-1 on top of or next to your controller. Like the XM-1, the XMc-1 is well built with a nice amount of weight; rubber feet help hold the unit in place on most surfaces.

A set of nine drawbars is used for both upper and lower manuals as well as the pedals (which use the 16' and 8' drawbars); a dedicated button selects the manual to which they apply. Rotary pots control Volume and Overdrive amount. (The Volume knob is simultaneously active along with the volume control on the XM-1 module.) Additional buttons turn the second- and third-harmonic percussion effect on and off. Holding either of these buttons while turning the Volume knob affects the Percussion level, and holding a button while turning the Overdrive knob regulates the Percussion decay.

Three buttons (labeled 1, 2, and Chorus) control the Vibrato/Chorus section, and all possible settings are available by button combinations. For example, pressing 2 alone selects Vibrato 2 (Wide), and pressing Chorus and 2 together selects Chorus 2 (Wide).

Two more buttons control the internal Leslie effect and manipulate a real Leslie when one is connected to the XM-1 module. The On button turns the effect on and off, and the Fast button toggles the speed. With the internal Leslie effect, the actual slow and fast speeds, rise and brake time, etc., are determined by each patch and programmed from the XM-1 front panel.

Five presets are instantly available from the XMc-1, although you can't store edited patches except from the XM-1 module itself. Although the printing on the control panel is small and not the easiest to read (especially on a dark stage), all buttons on the XMc-1 have corresponding LEDs to indicate when they're on, which makes it easier to know the settings at a glance.

The XMc-1 lets you manipulate the tone with drawbars and control other parameters in real time, just like the genuine article.

Any adjustments on the XMc-1 can be recorded via MIDI in real time, which greatly adds to the flexibility of the organ module. All in all, the XMc-1 is a powerful and effective controller for the XM-1 module, bringing an immediacy to playing the organ that rivals the old days—without the back pain.

microphone placement, Leslie speed and brake time, and overdrive amount, it's no wonder that most static organ samples are unsatisfying after only minutes of playing. There are just too many variables in real Hammonds, and having instantaneous control over them is half of what organ playing is about.

Different models of Hammond organs and Leslies provide different sets of parameters and limitations, which result in identifiable sonic signatures. With a knowledge of certain models, you can create authentic reproductions of specific setups with the XM-1. In addition to various drawbar combinations (see the sidebar "Tone Wheels and Drawbars"), the XM-1 gives you programmable control of all these features and more.

With 128 patch locations, you can instantly switch from, say, an overdriven B-3 with a Leslie 147 cabinet to a Hammond Concorde with a Leslie 825, each with completely different key-click, percussion, vibrato/chorus, and drawbar settings. Of course, you can also modify each patch from the XMc-1 Drawbar Controller in real time.

Each modulation feature provides control over the associated parameters. Drawbar Attack (key-click volume) for each manual provides five choices: Slow, No Click, Soft, Normal, and Max. Drawbar Sustain can be Off, Short, Mid, or Long. You can also specify the Drawbar Voice Mode: B-3, Mellow, or Brite.

A Drawbar Foldback parameter lets you accurately re-create the tonal shift that occurs at the extreme ends of a real B-3 keyboard. On an actual B-3, the subfundamental drawbar (16') only goes down to C2 before it "folds back," repeating the pitches C2 to B3 in the lowest octave of the keyboard. Also, the eighth-harmonic drawbar (1') tops out at F#4 and folds back for the uppermost octave on the keyboard. Other models do not have this feature; the 16' and 1' drawbars cover the entire range. The XM-1's Drawbar Foldback parameter lets you choose between B-3 mode or normal operation.

The XM-1 also replicates the second- and third-harmonic percussion of the

TONE WHEELS AND DRAWBARS

Each drawbar on a real Hammond organ uses a spinning tone wheel (or, in more recent models, an electronic equivalent) to produce a sine wave at a certain pitch relative to the other drawbars. The volume of each sine wave is determined by how far the drawbar is pulled out; pushing a drawbar all the way in means no sound is produced, and pulling the drawbar out provides eight steps of level adjustment.

The combination of drawbar settings determines the timbre of the sound. In fact, this is one of the earliest forms of additive synthesis. The pitches of the drawbars are derived from the harmonic overtone series, and when these pitches are added together in different amounts, many different complex waveforms can be created.

The drawbars are arranged in three color groups that help identify each drawbar's contribution to the overall sound (see **Fig. A**). The four white drawbars (8', 4', 2', 1') are "consonant," adding different octaves of the fundamental pitch. The three black drawbars (2⅔', 1⅗', 1⅓') are "dissonant," adding upper harmonics. The two brown drawbars (16', 5⅓') are "suboctaves," producing one octave below the 8' fundamental and 2⅔' third-harmonic pitches.

Organ timbres are typically categorized into four families. Flute tones consist primarily of fundamental (white) drawbars, with little or no harmonics added from the dissonant drawbars. Reed sounds contain a lot of the first black drawbar (second harmonic). Diapason tones emphasize a stronger fundamental, a little weaker second harmonic, and a weak upper harmonic content compared to reeds. String sounds consist of strong upper harmonics, essentially the opposite of flute tones.

Each family offers a multitude of variations, and the nine drawbars offer millions of tonal possibilities. With so many drawbar combinations, the organ still sounds fresh after all these years; it's possible to carve out a "signature" sound without reverting to such clichés as the Jimmy Smith/Keith Emerson 88 8000 000 setting.

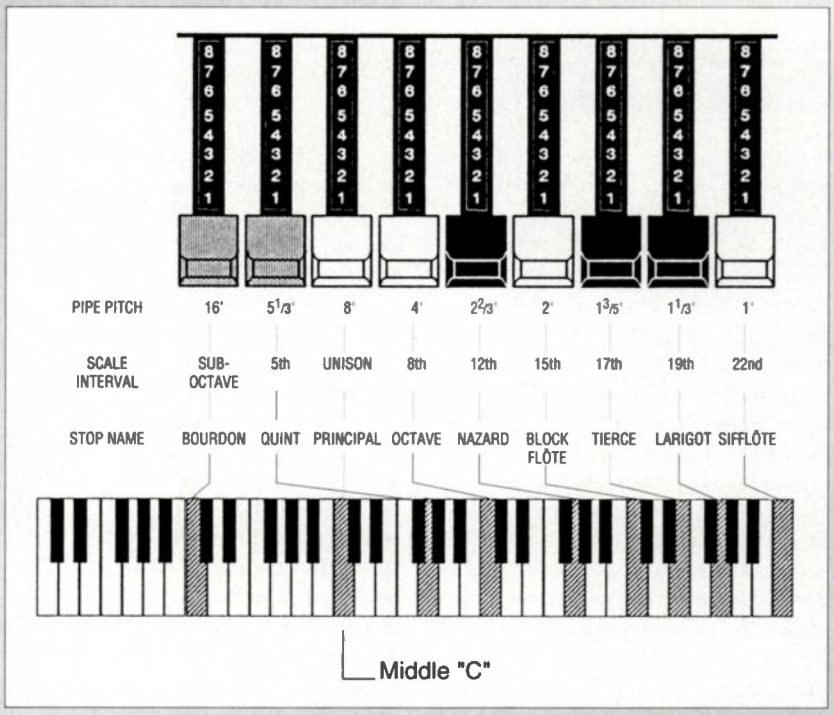
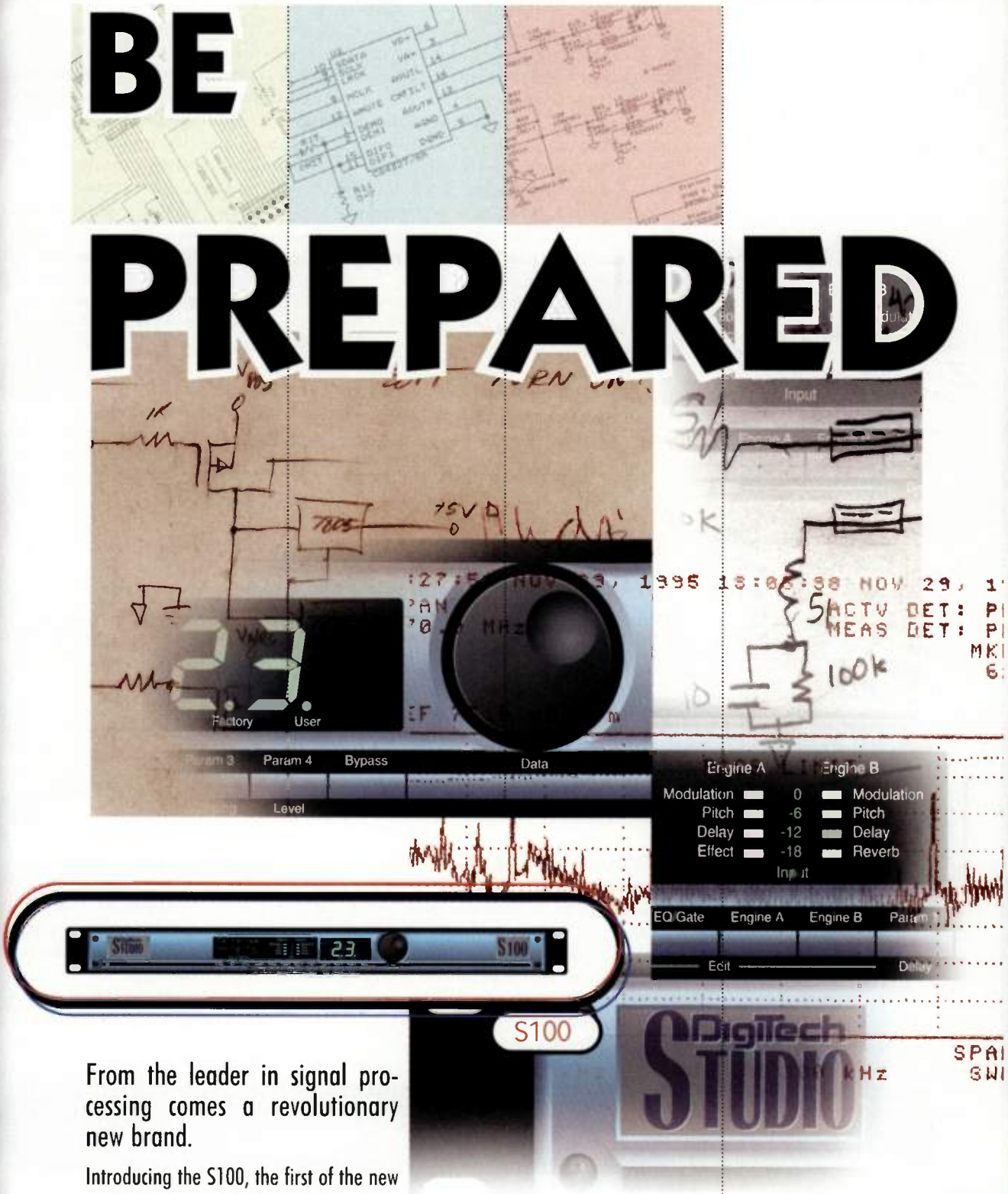


FIG. A: The nine drawbars control the amount of different harmonic overtones in the final timbre. Their relationship to middle C is illustrated here. (Courtesy Hammond Suzuki)

BE PREPARED



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"3" series (B-3, C-3, M-3, and RT-3) and A-100 and D-100 models. You have control over percussion decay, volume, and touch. (On certain models, such as the B-3 and C-3, the percussion sounds only in response to one key at a time.) The XM-1 also lets you control the volume of the percussion with Velocity, a feature not available in tone-wheel organs. The level of the drawbar itself drops a bit when you activate percussion, just as it does in the original models.

A Percussion Drawbar Cancel parameter lets you toggle between deactivating the 1' drawbar while percussion is engaged (as on certain original models) or allowing the drawbar to remain active (which is possible on a real organ with certain modifications). The percussion can also be set to taper off at higher frequencies as it does on real Hammond organs.

The Vibrato/Chorus section accurately replicates the V1, V2, V3 vibrato and C1, C2, and C3 chorus from the original Hammond organs. Five levels of vibrato and chorus speed are available: Slow, Mid, Normal, Midfast, and Fast.

The MIDI implementation is thorough, with a multitude of modulation capabilities. A detailed MIDI implementation section is included in the reference guide, so suffice it to say that MIDI-heads won't be disappointed if they need to know the hex codes of the NRPN data.

STIMULATING SIMULATORS

Ten different Leslie simulators are available for use with any patch. Five of these simulators are designed after the 122, 147, 710, 760, and 825 models, and five more user-definable simulations based on the first five can be stored in memory.

After selecting a Leslie type, you have full control over all parameters. You can edit the slow and fast speeds as well as rise and fall times independently for the horn and bass rotors. Each rotor also has an independent brake time (the time it takes the rotor to come to a complete stop). The volume of the rotors can be balanced, and two parameters affect the "miking" of the Leslie: Angle and Distance. The Angle setting determines the simulated position of two microphones, from 0 to 180 degrees, with 0 degrees being mono. Distance can be set from 0.3 to 2.7 meters.

As mentioned earlier, a special connector on the back panel of the XM-1 lets you connect a real Leslie, although you must purchase an adapter kit for your specific Leslie model. You can turn the real Leslie on and off and control its speed from the XM-1 or XMc-1, which is very slick.

THE REAL DEAL

The XM-1 can't replace the aesthetic experience of playing a real B-3—no other keyboard manual in the world feels the same—but it sounds practically identical to a miked Leslie when played through studio monitors. I did not get to play the XM-1 through a real Leslie, but I'm sure that would make the live experience as close as you could get to the real deal without lugging around a real Hammond/Leslie setup.

On practically all counts, the XM-1 is authentic in its sonic reproduction. The tones are clear and strong yet beefy. The percussion, chorus, and vibrato effects sound just like real Hammonds. The Leslie simulator is very good, although I wish there were a few more mic-placement options and types of mics. One nice touch is the apparent directional position of the horn when you turn off the Leslie simulator; if you

XM-1 Specifications

Synthesis Type	VASE II (sample-based)
Polyphony (voices)	32
Multitimbral Parts	3 (Upper, Lower, Pedals)
Patches (RAM/ROM)	128/0
Stereo Effects Processors	2 (Leslie, Reverb)
Effects types	5 (Leslie), 4 (Reverb)
Audio Outputs	2 ¼" unbalanced (L/R)
Dimensions	12" (W) x 9.5" (D) x 1.75" (H)
Weight	4 lbs. 3 oz.

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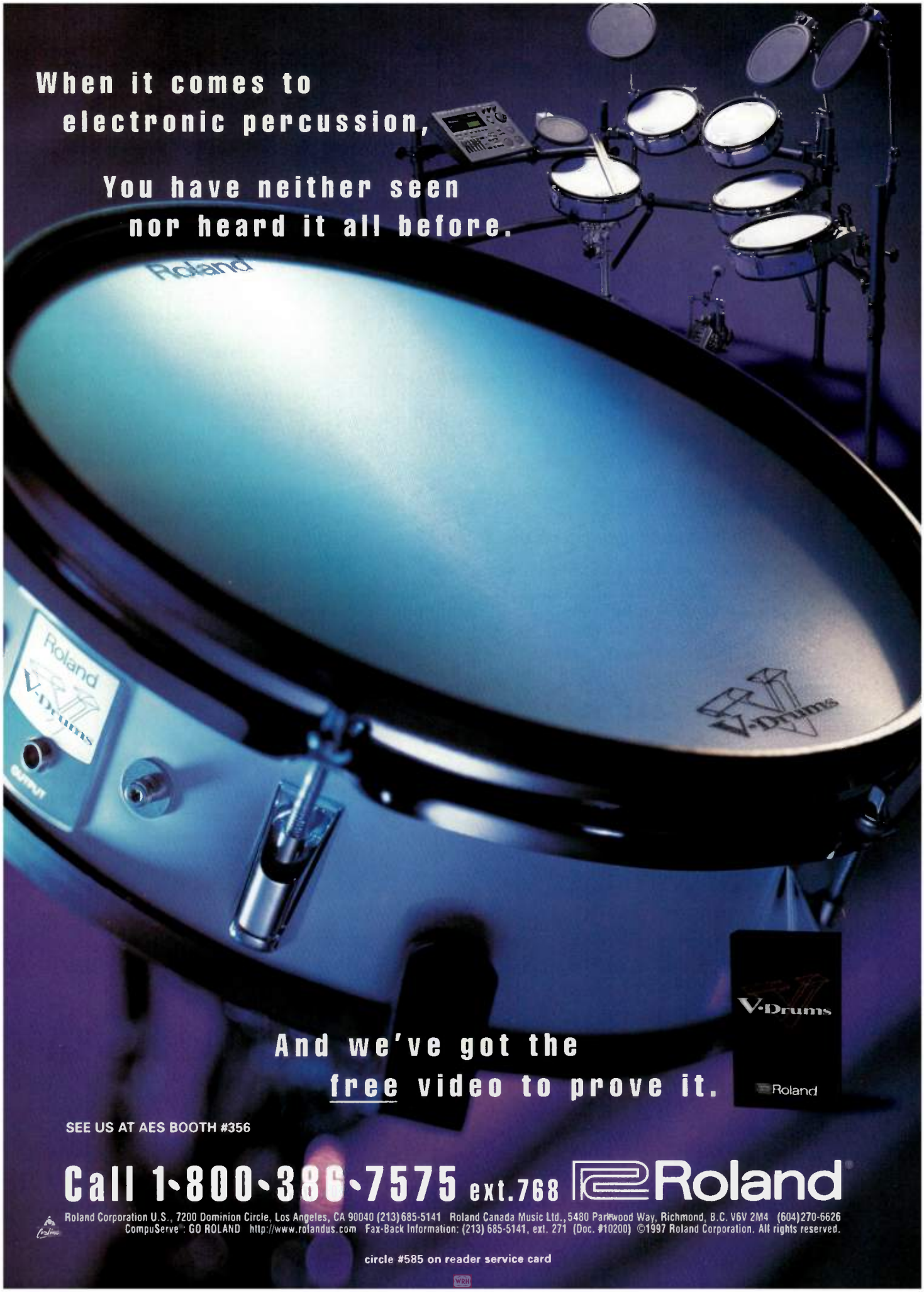
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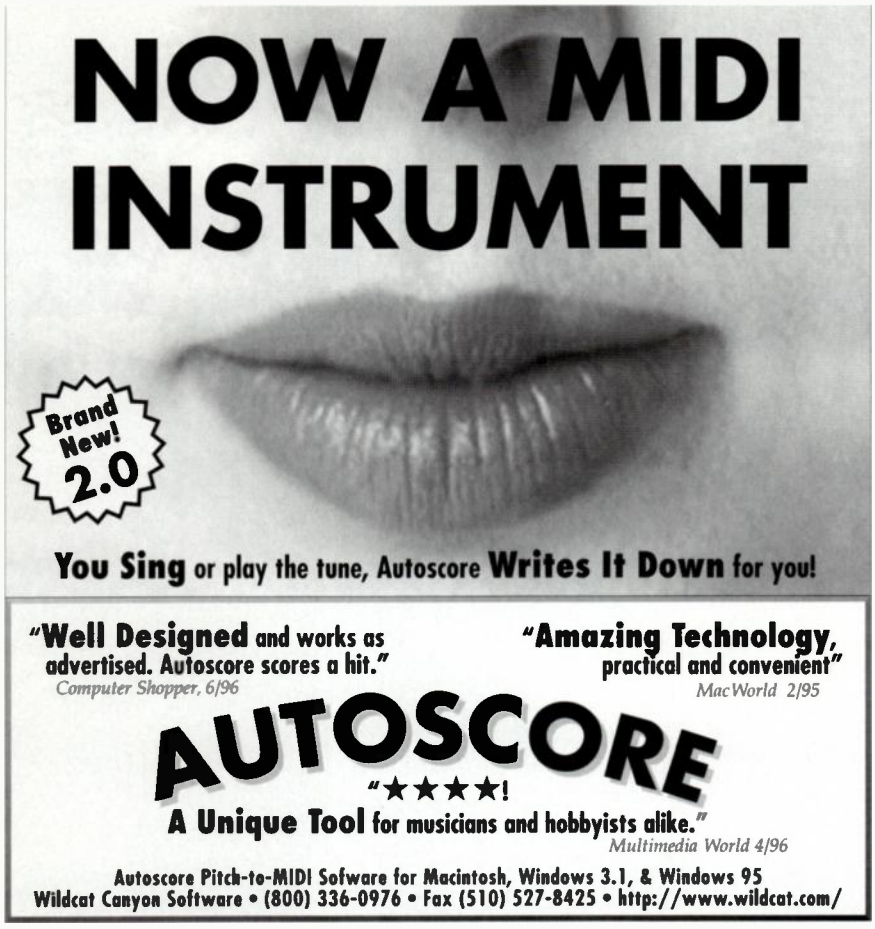

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turn it on and off again, the rotor winds down to a new, arbitrary position.

When auditioned alongside other organ sounds from various sample libraries and MIDI modules, the XM-1 wins hands down. After hearing the XM-1 step up to the plate against everything else I threw its way during the evaluation period, my mantra was, "Oh, yeah—*that's* what an organ really sounds like." Even when a particular organ sample was initially intriguing to my ear, the lack of performance control made me quickly tire of playing it. Not so with the XM-1. There is just too much immediate variety and control to this box. Mmmm, good.

IT'S ALIVE!

Trying to re-create a B-3 setup (two manuals) with MIDI controllers is not so easy. I eventually created a Frankenstein-like rig with an old Roland JX-8P and a Yamaha DX7IIFD stitched together with a couple of stands and a MIDI merger for the MIDI Outs of the two keyboards. Removing the PG-800 from the JX-8P left an adequate place for the XMc-1 drawbar controller to sit, although I would have preferred it to rest on the left side for easier control.

It didn't take long before I was shouting, "It's alive!" The setup wasn't the prettiest, but it worked. The XM-1 lets you specify different MIDI channels and parameters for the upper and lower "manuals" as well as the "pedals," so I was able to get a dual-manual feel going with my setup. And it was fun to play! If someone is serious about recreating a complete organ setup, a MIDI pedalboard is a must.

It is much easier to play the two

Product Summary

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"manuals" from a single, split keyboard, especially if you have an unweighted controller. Creating a split worked fine with my Fatar Studio 900 88-key, weighted controller, but the feel was completely blown with weighted keys.

One sorely missing feature in the XM-1 is the ability to transpose one of the "manuals" when using a split keyboard. (The company is working on a software update that will include transposition.) If your controller cannot transpose the zones independently, you cannot send the same note numbers on separate MIDI channels to the two "manuals," which is a major bummer. If you frequently want to re-create the dual-manual style of playing, you need two separate keyboards or a single, splittable controller that has enough keys and can transpose the MIDI output from each zone separately. Most MIDI master controllers can do this but not all. In addition, you need a handy place for the XMc-1 to rest.

SWEET FINAL NOTE

The XM-1/XMc-1 combo is hard to beat if you're really looking for a "Hammond-in-a-box" and are particular about organ tone. The available parameters are complete and thoroughly realistic sounding. Great attention to Hammond detail is reflected throughout the XM-1, and it is possible to create some stunning organ sounds.

Programming a patch is somewhat clumsy because a lot of the deeper parameters (Leslie parameters, organ type, etc.) are accessed by poking through pages and pages in the front-panel LCD. But once you've done it, the XMc-1 gives you all the immediate performance control you need, and you don't have to touch the front panel again. In addition, the XM-1 comes loaded with 100 rewriteable presets that are outstanding and give you a great launch pad.

The XM-1 is a real winner, although expensive. However, if you're serious about organ sounds, it's worth the price. Only the snobbiest of Hammond purists will find faults. If you're willing to create your own physical playing setup, the XM-1 will give you the rest so you can be your own God of the Drawbar.

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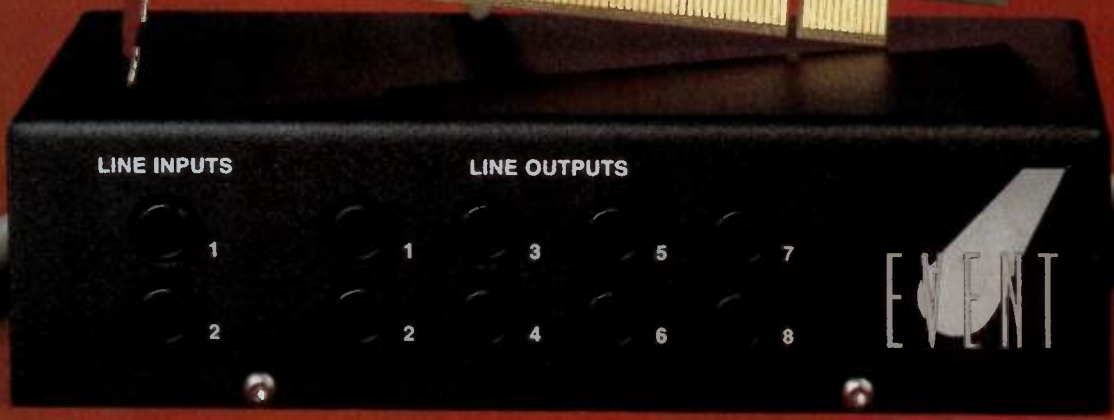

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Seer Systems Reality 1.0 (Win)

By Dennis Miller

Turn your PC into a synthesizing dynamo.

Several years ago, there was a move by computer-chip developers to have computer CPUs perform many of the functions that had formerly been handled by dedicated external hardware. This concept, called Native Signal Processing, encompassed various tasks, such as faxing, telephony, and sound synthesis. Although it was a great concept, the technique never took hold, mainly because the CPUs in those days weren't able to efficiently handle those chores in addition to their basic functions. With today's ultrafast Pentium and Pentium Pro processors, however, the situation has changed. And the recent release of Seer Systems' *Reality* software synthesizer has proven that, for musicians especially, you really can have it all on your desktop.

Reality is a 64-note polyphonic, 16-part multitimbral synthesizer that runs entirely in software on a Windows computer. The system is highly intuitive, with an interface that resembles a patch editor/librarian. And with a Pentium 133 or faster computer, it feels and plays like a musical instrument, displaying practically no lag time or "latency" between when the program receives a Note On message and when you hear the sound.

There are numerous advantages to using a software-based synthesis system. For starters, the software is easily upgradeable. By downloading a patch from the Internet, you can have a whole new interface, a new set of commands, or a thousand new presets. And unlike all but the most recent synthesizers, *Reality* allows you to use any combination of the available synthesis methods simultaneously.

INSTANT GRATIFICATION

After having experimented with a number of real-time software synthesizers—most of which were, admittedly, on the low end of the spectrum—I was amazed at how responsive *Reality* was to real-time input. I first tested the software by using my sequencer to play a number of the included presets and found that *Reality*'s timing was impeccable. Then I created several patches that combined huge digital audio files with synthesized sounds, and the program handled them equally well. Finally, I merged live MIDI input coming from my controller with multitrack data from my sequencer, and again, *Reality* performed without a glitch. No matter how complex the mix of information coming into the program, I couldn't detect a single gap or timing problem.

Of course, the program's performance is very much affected by the complexity of the sound that you are playing and by the speed of your computer's CPU. You'll need at least a Pentium 133 with a minimum of 24 MB of RAM to run *Reality* effectively; I tested the program on a Pentium Pro 200 with 64 MB of RAM. Furthermore, the current version only works with Creative Labs Sound Blaster cards; Sound Blaster clones can't be used. That's because Seer Systems has worked closely with Creative Labs to optimize the sound card's drivers for use by the program. Other cards should be supported in the future, but for now you'll need a second sound card if you don't already have a Sound Blaster installed. For this review, I used a Sound Blaster AWE64 Gold card, which offers the additional benefits of S/PDIF digital outputs (though not inputs) and a decent-sounding onboard synth from E-mu.

Reality employs a hardware dongle for copy protection, which is unfortunate but is apparently deemed necessary by Seer to protect its investment. Though I find such keys annoying and question their necessity, I prefer them to such alternatives as limiting the installs or requiring the original installation disks to be in the drive.

TERMS AND CONDITIONS

A *Reality* Patch is a sound that uses any one of the basic synthesis algorithms the program provides. There are two basic types of Patches: those that use the various PCM/Analog settings and those that use any of the different algorithmic methods, which include physical models, waveguides, and modal synthesis options. (I'll explain these in more detail a little later.)

A Patchwork is a layer that includes up to sixteen regions, each of which can have a different Patch assigned to it. Though Patchworks can include different types of synthesis methods, a Patch is limited to one synthesis algorithm.

A Program contains either a Patch or a Patchwork. Each Program has a bank number and an ordinal number;

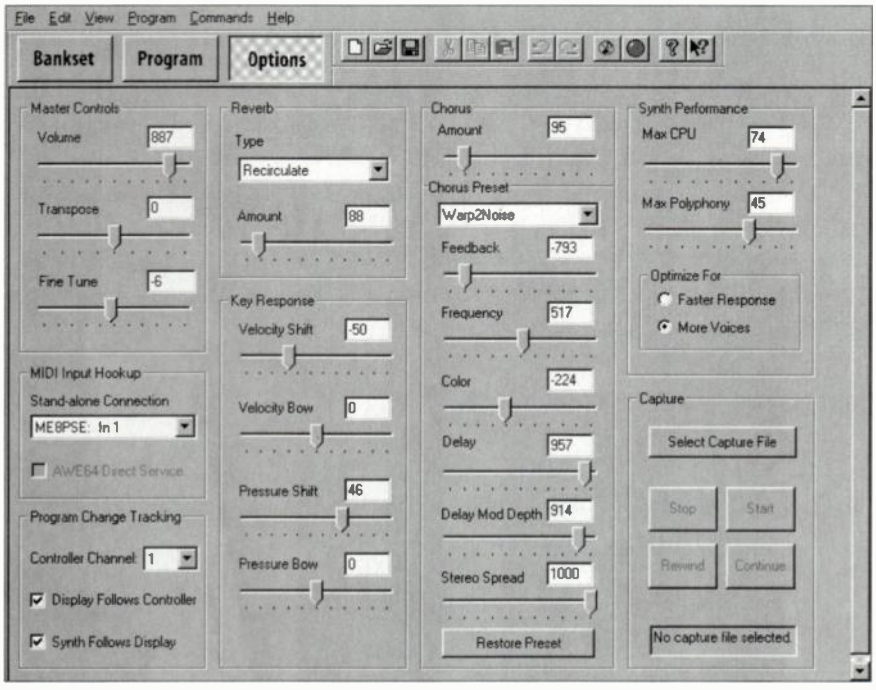

FIG. 1: *Reality*'s Option view provides settings for optimizing the program and adjusting global parameters such as volume and effects levels.

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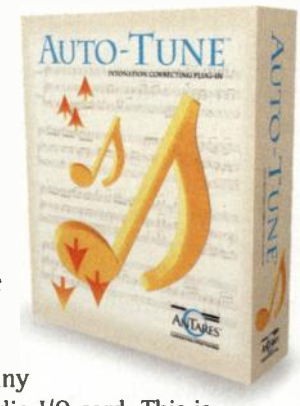
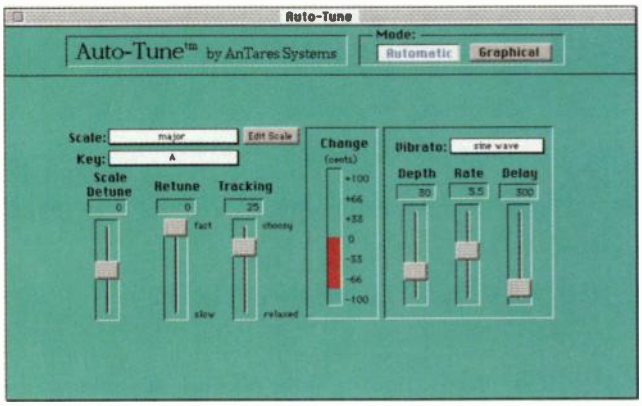


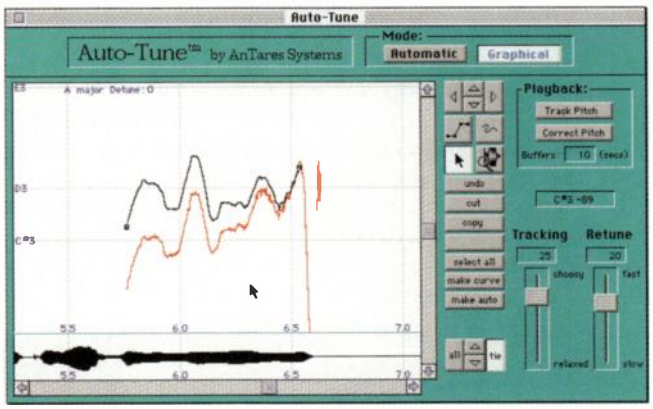
Those of you not familiar with Auto-Tune,™ prepare to be amazed. Auto-Tune is the cleanest and most controllable pitch correction tool available. Auto-Tune was previously available only for DigiDesign's ProTools and Steinberg's VST platforms. The new stand-alone version will run on any Macintosh or PowerMacintosh computer, and will work with any Sound Manager-compatible audio I/O card. This is made possible by AnTares™ AudioStream,™ a stand-alone application which interfaces with Sound Manager.

In Automatic mode, Auto-Tune will read an audio file, correct the pitch, and write the corrected track directly back to your hard disk. Really, it's that simple. You first set a few general parameters, and then the software takes over. What goes in are your problem vocal and instrumental tracks, and what comes out is perfectly in tune. Auto-Tune doesn't "shift" the pitch like other correction devices, it actually rebuilds your original audio information at a corrected frequency. This method produces absolutely no artifacts or aliasing in the final output.



Although these controls are extremely simple to use, there is a solution to almost every pitch problem. The reference scales include not only major and minor scales, but also modes and a variety of ethnic and microtonal scales. Customizeable pitch settings will allow for slides, vibrato, and other stylistic variations. The retune slider can allow a fast pitch change, like vibrato, to go unmodified, while centering the overall pitch! There is even a special Vibrato function, which allows you to add a vibrato with controllable delay, rate, and depth.

For those of you who need complete control over your tracks, Auto-Tune's Graphical mode allows you to literally draw in the desired pitch of your audio over time. This interface features three line graphs: input pitch, corrected pitch, and a sound envelope display. You can draw in a target pitch, or you can copy and paste selections from other sections of your track. The zoom tool changes the amount of data in the window at once, and the vertical and horizontal axis markings update automatically when you change the scale of your workspace.



Combining amazing ease of use with incredible functionality, the stand-alone version of Auto-Tune may change the way you think about pitch correction. In fact, you may not have to think about it at all.

For more information on Auto-Tune or any AnTares products, contact Cameo International, Inc., or circle number 502 on the reader service card.

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for example, Program 1-003 refers to the third slot in bank 1 and can be accessed via a MIDI Bank Select and Program Change command. (CC 0 is used as the bank switcher.)

The Bankset is at the highest level of the program's architecture. Banksets contain up to 1,336 individual Programs that are arranged in banks of 128.

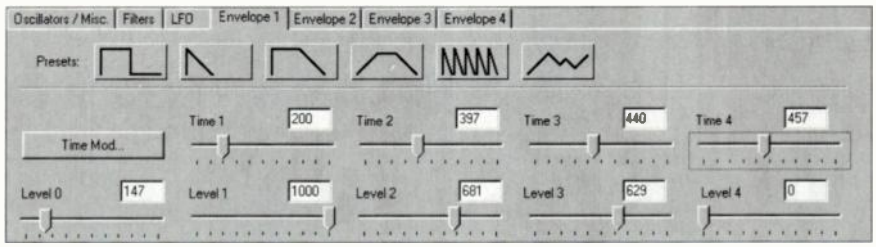

FIG. 3: Six preset shapes can be used as starting points for each of the software synth's four envelopes.

GET REAL

Reality's opening screen provides access to the three main work areas of the program. These are the Bankset view, where you select Programs and set various WAV file parameters; the Program view, where the editable controls of a sound are located; and the Options view, where you set up a number of global parameters, such as volume and reverb level. The Options view is also used to specify how much of your CPU's resources you want devoted to synthesizing sound (see **Fig. 1**).

Because Seer didn't envision *Reality* as a waveform editor, the program is not overly graphic in its interface design. There are no graphic envelopes or waveform views, for example, which makes it less user-friendly than I would have liked. This is especially troublesome when setting the start and end points of a sample loop. These points must be set by hand: you type in the actual sample numbers that define the loop range or use the up and down arrow keys to increment the values.

Because Windows does not allow sliders to have a range of values wide enough to cover all the possible values that the loop dialogs would need, it would be handy to see a waveform of your sample and be able to define the range visually. A workaround is to use an external editor, such as Sonic Foundry's *Sound Forge* or Steinberg's *WaveLab*, and save loop points in the WAV file; *Reality* will read those points with no problem.

Nevertheless, the sliders and drop-down lists that are provided for most of the program's settings work well enough, and it doesn't take long to start designing interesting sounds. Despite the number of synthesis parameters available and the vast range of matrix-modulation options, *Reality* is easy to navigate, and its layout is clear and understandable.

WORKING WITH MIDI

Once you install the program and work through the various configuration options, playing the synthesizer is simple. You can load any of the 100 or so Programs that are installed with the system (a few hundred more are included on the CD-ROM) and trigger a sound with your MIDI controller or sequencer. If you're using an external controller, you set *Reality*'s MIDI input option in the program's Options page (see **Fig. 1**), which provides a list of all the MIDI drivers configured for your system. To use a sequencer and a controller simultaneously, you disable external input, select *Reality* as the output of your sequencer, and then enable the Thru option in your sequencer to get the data from your keyboard into *Reality*.

Working with Program Changes is a bit problematic. There is no single screen where you assign Programs to MIDI channels, so you have to pick channels one at a time from a drop-down list and then jump to another screen to pick the Program for that channel. The main problem is that you can't tell what's assigned to any channel other than the one the current Program is on. If you're using your sequencer to send Program Changes whenever a sequence starts, you can keep track of your sounds from the sequencer. Nevertheless, it feels awkward not to have a list showing what's on each channel from directly within the program.

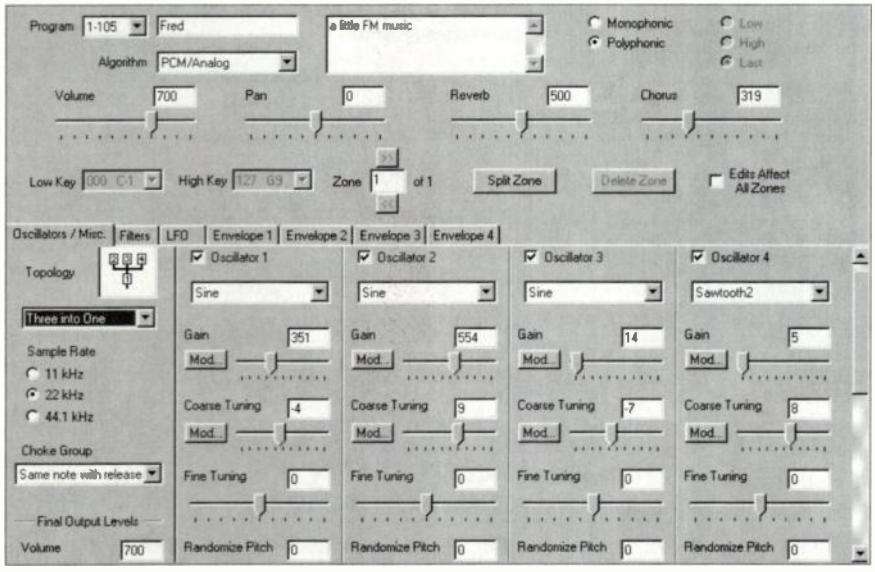

FIG. 2: Most sound design is done in the Program view, where Program level settings are displayed at the top of the screen, and individual Patch parameters appear in the bottom of the window.

SOUND BY DESIGN

Because of *Reality*'s extreme flexibility, designing sounds with the program is far easier than with any external hardware device that I've ever used. The program provides several major categories of sound design. The first category involves PCM/Analog algorithms, which include traditional analog, frequency modulation (FM), and sample-playback synthesis methods. *Reality* offers a huge range of analog synthesizer controls, which is not surprising given that one of its key developers, Dave Smith, was also the designer of many legendary Sequential Circuits analog synthesizers.

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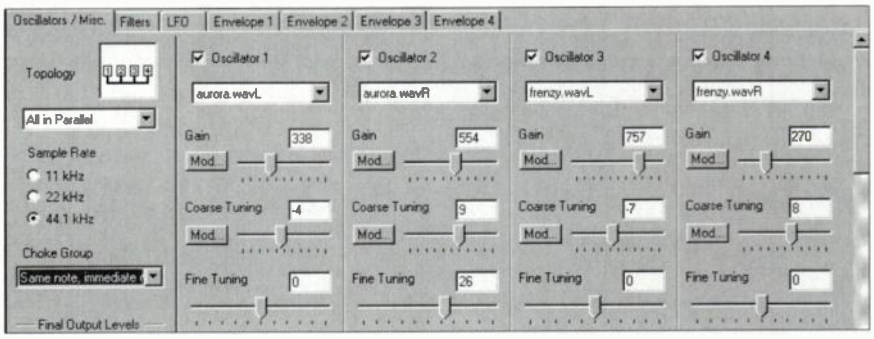

FIG. 4: *Reality* can be used as a disk-based sampler by setting any of the four oscillators to read samples from disk.

Selecting a PCM/Analog sound from the current Bankset or choosing New/Analog Patch from the Program menu brings up a screen full of editable parameters (see **Fig. 2**). At the top of the screen are the Program-level options, which include Volume, Pan, Reverb, Chorus, and Key Range. As with nearly every parameter in the program, changes to these controls take effect in real time. You don't have to wait for the settings to update; as you move a slider or mute an oscillator, you hear the change, even while a note is playing.

Reality can automatically split Patches into as many as 128 zones, and once the zones are created, you can change the range manually or split the zones even further (unless you've reached the maximum). You can also select whether edits made to one zone, such as altering a filter's cutoff frequency, will affect the settings in all zones or only the one you are editing.

The four oscillators available for each Patch can be configured in numerous ways using the Topology setting on the left side of the screen (see **Fig. 2**). Here you select whether the oscillators will run in parallel or whether they will serve as carriers and modulators in an FM design. Because the oscillators can read samples from disk, it's possible to use your own audio files to modulate an internal waveform, such as a sine wave. You can create interesting Patches using this method—just be sure to keep the sample's gain very low—though I think using a waveform to modulate a sample would be even more useful.

Tabs along the bottom of the Program window provide access to the waveshapes, filters, LFOs, and envelopes associated with each oscillator, and you'll also find settings for the internal sampling rate used by each sound. Though *Reality*'s 4-segment envelopes are not graphic, there are six preset shapes provided as starting points (see **Fig. 3**). Unfortunately, when you click on the icon for one of the preset shapes, it doesn't highlight, so you can't see which of the six shapes you have chosen. This is especially annoying if you load a preset Patch from disk that employs one of the six shapes, and you want to know which envelope is being used. It would be handy if the selected envelope's icon would stay

FIG. 5: Patchworks contain up to sixteen Patches in assignable regions. Any mix of synthesis methods can be used in the Patches.

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highlighted until you altered some of the settings for that shape.

Both the envelopes and LFOs can be modulated by a wide range of control sources, and each of the LFOs can be activated using a different trigger mode. The LFO shapes include the familiar triangle, sawtooth, and white noise (for random modulation), but curiously, there's no sine wave in the Shapes list. You have to start with a triangle waveform and smooth it using the Color parameter, which is a rather awkward workaround. The four filters can be run in series or in parallel, and you can easily modulate the frequency, resonance, and gain of each. Overall, the analog arsenal is massive and should keep even the most hyperactive sound designer busy for some time.

BUT WAIT, IT'S A SAMPLER!

I've been after a disk-based sampler for many years, and with the exception of Symbolic Sound's Kyma System (a high-end hardware/software hybrid), *Reality* is the first program that has everything I want. It provides two ways to play back WAV files from disk under MIDI control. First, you can build a single Patch that includes up to four mono or two stereo audio files by assigning each of the files to one of the Patch's four oscillators (see **Fig. 4**). Though there's no separate pan control when using this method, there are numerous other settings that you can adjust for each sample, such as pitch, gain, and Velocity response. There are also controls for each sample's fine and coarse tuning as well as a pitch-randomization option.

Creating a separate Patch for every sound file that you want to use and combining the Patches into a Patchwork provides even more options. Simply design up to sixteen Patches containing your samples, and then create a new Patchwork and assign each Patch to a different key range (see **Fig. 5**). You'll have solo and mute controls for each Patch, along with coarse-tuning and fine-tuning. A time-offset feature to delay the start of each Patch would be a useful option for this screen.

MODEL THE PHYSICAL

Reality incorporates a number of different physical modeling techniques, some of which are based on research done at the CCRMA research institute at Stanford University. Though most of the algorithms don't provide the number of editable parameters that are available on the Yamaha VL-series synthesizers, *Reality* does offer numerous user settings, and the program far exceeds the Yamaha synths in its polyphonic capabilities. Furthermore, in *Reality* you can simultaneously mix various modeling algorithms with other forms of synthesis.

Reality's modeling options include modal synthesis (explained shortly), waveguides (a method that uses recirculating delay lines to construct physical models), and a number of acoustic instrument models. As in other areas of the program, there are a variety of modulation options for the models'

MAKING THE MOST OF REALITY

Windows 95 provides several utilities that can make working with *Reality* and other audio applications more efficient. They are System Monitor, Resource Meter, Volume Control, and Sound Recorder. These utilities, which are not generally installed with a standard Windows installation, can serve as useful accessories for your multimedia work.

As its name implies, System Monitor enables you to monitor various components of your system's performance. *Reality* and *WaveSynth* (the software synthesizer included with Creative Labs' AWE64 sound cards) both publish statistics that can be viewed in System Monitor, including the amount of the CPU the synthesizer is currently using, the number of voices that are playing, and the amount of clipping (if any) that is occurring when your audio output is converted from floating point format to whole numbers in order to output the signal.

Resource Meter enables you to view system resource levels. There are three different ways that Windows can run out of resources (memory is only one of them), and each is displayed by a separate bar graph. If any of these are getting dangerously low, you should close one or more programs. Sometimes you'll need to close all programs, or even restart Windows, to reclaim all unused system resources.

Volume Control is a graphic mixer that queries each sound card's driver to find out which volume controls are available. Volume, Balance, and Mute can be set for each input or output channel on the sound card. The name of the sound card, and sometimes the hardware port address, are displayed in the lower left corner of the mixer. The *WaveSynth* mixer channel adjusts *Reality*'s levels. Some inputs, such as Microphone or Line In, can introduce noise, so when they're not in use, mute them. Configure the mixer by choosing Properties from the Options menu.

Sound Recorder is a utility to record and play WAV audio using a sound card. It doesn't take up much space and can be very useful. Double-click on a WAV file in Windows Explorer, and the file will play. Right-click on a WAV file in an Open File dialog and the menu that appears includes a Play command. This is a great way to audition WAVs before loading them in *Reality* and other Windows 95 audio applications. If the Play command does not appear, Sound Recorder isn't installed.

To install these utilities, run the Add/Remove Programs Control Panel and access the Windows Setup page. Choose Accessories and click Details to select System Monitor and Resource Meter for installation. The Windows 95 CD may be needed to complete the installation. (If you installed Windows 95 from floppy disks, download the necessary files from www.microsoft.com/windows/software/accessories.htm.) Volume Control and Sound Recorder are available under the Multimedia option. (For floppy disk users, these files are available at www.microsoft.com/windows/software/multimedia.htm.)

Use the Multimedia Control Panel to set the default devices for these utilities once they're installed. This Control Panel also provides a shortcut to the Volume Control. When "Show volume control on the taskbar" is checked on the Audio Properties page, a small, yellow speaker icon appears in the Windows taskbar next to the clock. Double-click the icon to run Volume Control.

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parameters. Wind players, in particular, will find it easy to work with breath control as a modulation source. The acoustic models are incredibly realistic; for example, the nylon guitar is about the best I've heard, and the bells and percussion are also excellent. Though they only have a limited number of parameters, I find the clarinet and flute to be particularly lifelike.

Among the other models, I especially like the realism of the bowed bass; the Bow Length, Attack, and Position settings produce believable results. I also love the effect offered by the Stretch Source parameter in the "Tibet Bells" model, which stretches odd and even partials in opposite directions. Using a slow-moving LFO for both the Stretch and Impulse source, I produced some very eerie effects that I captured to disk and transferred to my K2000 for additional processing.

A LA MODE

Reality also includes modal synthesis in its arsenal. Modal synthesis is based on the idea that a musical instrument can be represented as the sum of all its interacting, vibrating parts. Each of these parts manifests a different pattern, or mode, of vibration, and modeling the frequency and shape of these vibrations is an efficient way to produce highly realistic instrumental sounds.

Reality's implementation of this technique includes controls for up to eight frequencies, with which you can build an endless number of variations on the basic designs. By default, several of the models use a different table of frequencies for each note. That avoids many of the problems in sampling, such as having to stretch a sample too far if you don't have enough multisamples. The selected frequencies are derived from the analysis of actual instruments, which probably explains why they sound so good.

HAVE AN EFFECT

Unlike many pro synthesizers on the market today, *Reality* offers only a small number of built-in effects. The chorus and delay are the best of the bunch; twelve presets with a wide range of editable settings are included with the program (see **Fig. 1**). Unlike other controls, the effects' settings cannot be varied over time or modulated in any way. Nonetheless, the range of possibilities

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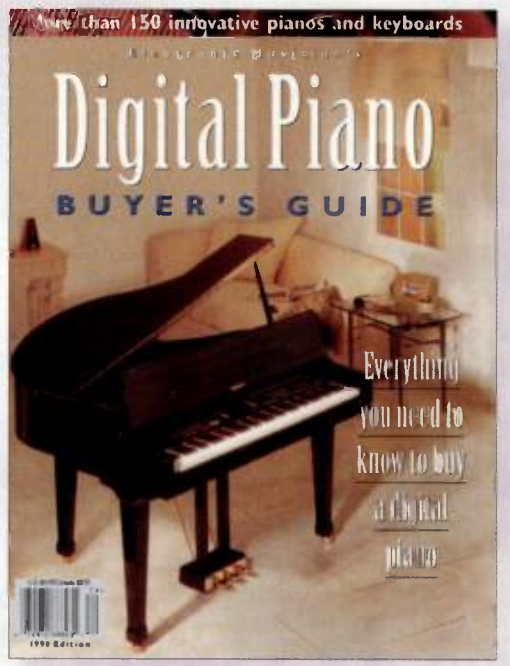

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offered with the fixed controls is quite broad.

The reverb section is more limited, with only eight noneditable presets. Fortunately, they cover a wide range of spatial imaging, from the slowly decaying "Recirculate" to the more quickly fading "Room." Both the reverb and chorus amounts can be controlled from the Global page, the Program level, or even at the Patch stage. You can choose Off as one of the reverb presets, but you must reduce the chorus setting to zero to kill it completely.

FILE MANAGEMENT

As expected, *Reality* allows you to save any Programs you've edited or created, but the file-management functions aren't as flexible as they might be. Unlike most hardware synthesizers, where you work on a copy of a sound in a RAM buffer, *Reality* actually changes the original version of a Program when you tweak it. There's no Save As option that lets you simply assign a new name and location to the edited sound while still retaining the original. Instead, you must "duplicate" the edited Patch, which assigns it to the next available Program location in the bank. Then you must return to the original Program and select Undo. Of course, it would be better to duplicate an existing Patch before you make any changes if you know in advance that you'll be tweaking the Patch.

You won't have any problem if you build a sound from scratch; once you select New Patch from the Program menu, *Reality* creates a blank, unnamed template in the next available location. Unfortunately, there's no option to save a single Program, but there is a Save Selected As feature that saves one or more programs, along with any dependent waveforms or Patches, to a new Bankset. In addition, Banksets can be combined to form new Banksets. Though it's easy to merge Banksets once they're saved, *Reality* would do well to follow the model of the K2000 series, where a single Program, or even an object within a Program, can be saved independently.

Reality offers one unique option that I haven't seen before: you can undo a change even after you've saved a Bankset to disk. As long as you don't load a new Bankset, you can reload a Program and choose Undo All, and the version of the Program that existed when you started your work session will reappear.

DOSE OF REALITY

I can imagine *Reality* becoming the centerpiece of many home studios. Coupled with a powerful laptop computer, it might even appear in live settings. Though it has a few rough edges, especially in its lack of graphics and its file management, *Reality*'s features are enormously powerful and intuitive.

The large number of presets provided with the program are useful starting points for your own experiments, and when you start to mix synthesis methods and add MIDI controllers, there's no limit to the sounds that you can design. For the adventurous, modal synthesis and the other physical models provide vast new areas to explore.

I suggest that you do a reality check and write a check for *Reality*. You'll be getting one of the hottest, most exciting new programs to appear on the PC in some time.

Dennis Miller *is a composer living in the suburbs of Boston.*

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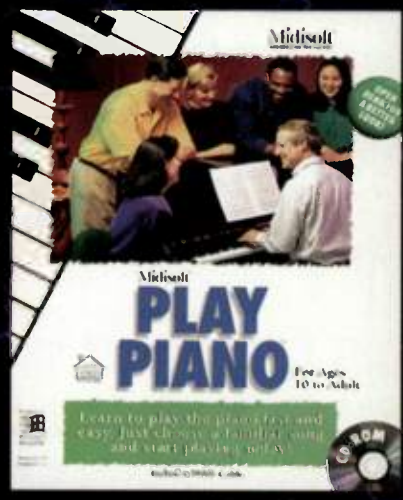

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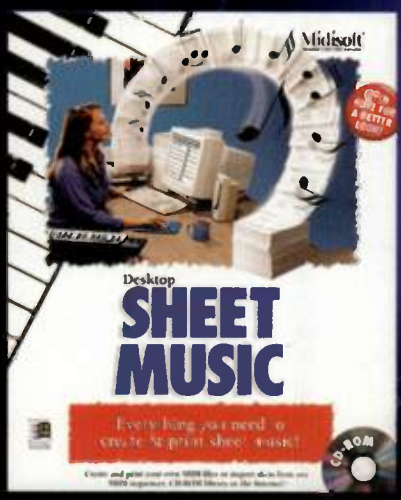

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Blue Chip Axon NGC 77

By Erik Hawkins

This guitar-to-MIDI converter has some nerve.

I love playing with new toys, especially ones that make noise. My *modus operandi* is to rip any new gizmo from its warm little box, power it up, and start using it with hardly a sideways glance at the manual. However, not all new toys should be handled this way; some require greater attention to detail and setup than others.

A good case in point is Blue Chip's new guitar-to-MIDI converter, the Axon NGC 77. My zeal to try this unit left me with a poor first impression. I hasten to point out that this was not because it's a poor product; on the contrary, it's a very cool product. After I read the entire manual and configured it to my playing style, I was very impressed.

The Axon NGC 77 uses neural-network technology—a series of processors that "learns" from example—to improve the tracking abilities of its MIDI conversion. In traditional pitch-to-MIDI conversion, which is notoriously slow in most devices, the unit determines the pitch by counting waveform cycles, introducing an unavoidable delay between the moment you play a note and the moment a MIDI note message is generated.

By contrast, the Axon learns to recognize the transient characteristics of your playing style, which is why the configuration and setup phase is so important. The Axon includes two 32-bit, 66 MHz "transputer" processors that have been "taught" the initial attacks of all the notes that a guitar or bass can output. The processors then compare the input from your guitar with their library of attack transients, which enables the unit to recognize the pitch much more quickly than normal pitch-to-MIDI converters.

FRONT AND REAR

There's a lot of technology packed into this half-rack unit; so much, in fact, that its power supply is a very large lump-in-the-line type. (It's almost half the size of the Axon itself!) Also included with the unit is a normally-open footswitch and a 5-foot MIDI cable.

Optional accessories include a 23-foot, 13-pin DIN cable ($89) that connects your guitar's Roland GK-2 or compatible pickup to the Axon; the Yamaha DB50XG multitimbral synth daughterboard ($295), which adds onboard sounds to the Axon; and a rack-mount adapter called the 1HE Rack Carrier ($36.95). From the look of the screw holes on the bottom of the unit, it appears that any universal rack shelf will work (e.g., a Quik-Lok RS660 or a Mid-Atlantic US-1).

The front panel is thoughtfully laid out and easy to get around. A large power switch on the right is mirrored by a big knob for adjusting the auxiliary input level on the left. (In addition to being a guitar-to-MIDI converter, the Axon can be used to convert mic and line-level signals into MIDI messages; more about this in a moment.) A 2-line × 16-character, backlit LCD displays parameter pages that are selected with a pair of +/- Parameter buttons. Parameter values are adjusted with a pair of +/- Value buttons. A Store and an OK button are also found in this section of the front panel.

The unit's four main mode buttons are labeled Global, Arrange, Chain, and Scratch. As you might imagine, the Global mode provides access to the Axon's global parameters, and the Chain mode lets you arrange stored programs in any order for live performance. I'll explain the Arrange and Scratch modes in more detail shortly. Each of these buttons includes an associated LED that glows red to indicate which mode is active.

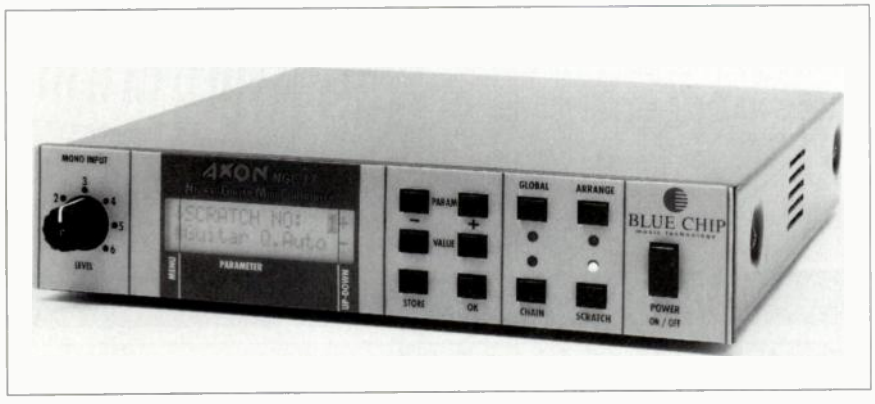
All connections are on the rear panel, even the 13-pin DIN jack. This is pretty inconvenient if your Axon is rack-mounted and you connect and disconnect your guitar a lot. It would be much better if this jack were located on the front panel, as it is on most other such products.

Also on the rear panel are MIDI In, Out, and Thru jacks. If the DB50XG sound card is installed, the MIDI Thru jack functions as the synth's stereo audio output. An adapter is provided with the sound card to convert the MIDI Thru jack into two unbalanced ¼-inch audio jacks; this is a bit odd, but it works. Two footswitch jacks are used in conjunction with the Axon's Hold and Chain functions, which I'll discuss shortly.

Rounding out the back panel are a microphone input, a direct guitar output, a power-supply receptacle, and a switch for selecting the type of guitar you intend to use (4-string bass or regular 6-string). Like the 13-pin DIN connector, the mic input should be on the front panel, but this real estate is at a premium because of the unit's small size.

GIVE ME A PICKUP

The Axon can be used with any guitar equipped with a Roland GK-2 or GK-2A hex pickup. Blue Chip also makes its own pickup, the AIX-101 ($249), which is basically a GK-2A with a redesigned control box. It has the same controls as a GK-2A: volume knob, increment/decrement buttons, and a switch for selecting sound sources (just synth, synth and guitar, or just guitar). It also includes a 13-pin DIN jack and a ⅛-inch jack for the guitar's signal. I think the AIX-101 looks slicker than the GK-2A; it's a nice charcoal gray color, and it has nice curves.



The half-rack Blue Chip Axon NGC 77 uses neural-network technology to reduce tracking delays when converting notes played on a guitar into MIDI information.

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• AXON NGC 77

Blue Chip claims that the NGC 77 is fast enough to track bass as well as it tracks guitar. I was not able to try this, but given the tracking response I experienced with the low E string on my guitar, I am confident it is so. In fact, Blue Chip also offers a bass pickup, the AIX-102 ($349), which is fatter in width and shorter in length than the AIX-101 to accommodate four bass strings instead of six guitar strings.

Both models come with a plethora of options for affixing the pickup and its control box to your axe. For the pickup itself, you can use screws, double-sided tape, or reusable, double-sided adhesive pads. The reusable pads are made of a new, space-age material that can be washed with soap and water to revive its stickiness.

The control box can be mounted with screws, double-sided tape, Velcro, reusable adhesive pads, suction cups, or an L-bracket that uses the same screw hole as the strap peg. The control box can then be attached with screws or Velcro to the L-bracket instead of your instrument. The suction cups attach to three small holes on the bottom of the control box, and they work amazingly well, assuming your axe has a nice, clean, smooth surface they can stick to.

A variety of plastic spacers are also provided, which are used to set the height of the hex pickup and get the control box to sit flat if you're mounting it on a curved surface. An included right-angle tool is used for finding the proper gap between your instrument's strings and the hex pickup.

Piezo pickups are available for $139 from Godin Guitar for use with nylon-string guitars. Attaching one of these to a GK-2–type control box gives you a crystal-based guitar interface that works with nylon strings. (Normal GK-2–type pickups are magnetic and only work with steel strings.) Blue Chip is planning to release its own piezo pickup system before the end of the year.

PROGRAMS AND HOLDS

The Axon offers two types of programs: Scratch and Arrange. The only difference between them is that Arrange programs can split the strings, frets, and picking areas into separate zones that can be programmed independently, which I'll discuss in the next section. Up to 128 Scratch programs and 64 Arrange programs can be stored in user

RAM; there is no preset ROM, although the unit is shipped with factory programs that can be bulk dumped and loaded via SysEx.

Both types of programs offer a Hold function that lets you play a separate sustained or arpeggiated sound simply by stepping on a hold pedal. This temporarily redirects the strings to a different channel and sends a different, user-specified Bank Select and Program Change message as well as any user-specified Control Change message. You can play a sustaining or arpeggiated sound while the pedal is depressed and then return to the "normal" sounds while the Hold sound continues until you press the pedal again.

Arpeggiation options include up, down, up and down, and random. You can even sequence up to 32 notes in Hold mode that are repeated as you played them when you release the pedal, which is great for melodic lines and drum beats. I had hours of fun experimenting with this feature.

Each program is divided into several sections of parameters. The General section includes the String mode parameters (e.g., all strings on one channel or each on a different channel), basic Hold-function parameters (sustained or arpeggiated, arpeggiation type, CC message, etc.), and split points in an Arrange program.

The remaining parameters are found in sections called Segments. Each Scratch program includes two Segments (one for the strings and one for the remaining Hold parameters) whereas the Arrange programs include thirteen Segments (one for each of twelve split zones and one for the remaining Hold parameters).

Interestingly, all Segments specify the same set of parameters for different parts of the guitar. Some of these parameters are pretty much self-explanatory, such as Program Change, Bank Select MSB and LSB, Volume (CC 7), Transpose (±36 semitones), Pitch Quantize, Pan Position (CC 10), Reverb Level (CC 91 value), and Velocity Sensitivity.

Most of the remaining Segment parameters are easily explained. Velocity Offset adds a bias to Velocity values to adjust for your touch. Pan Spread adds a specified offset amount to the Pan Position value for each string, creating a stereo spread across the strings. Trigger Level is the threshold for detecting notes. Finger Pick On/Off allows you to disengage the neural network so that the Axon reverts to counting waveform cycles to determine pitch. The Segment parameters also include the pick split points and a definable Control Change message associated with the picking zones, both of which I'll discuss in the next section.

SPLITS

The Axon provides three different types of splits: string, fret, and pick. All types of splits are available simultaneously, and they work with the internal sounds or external sound modules. You can define up to two string zones, two fret zones, and three pick zones (see **Fig. 1**).

The fret split divides the neck of the guitar into two separate zones, each with its own timbre. The ability to play two different timbres from one string that sends on one MIDI channel is quite ingenious: each time you change zones (i.e., you've been playing notes in one zone and you move to the other

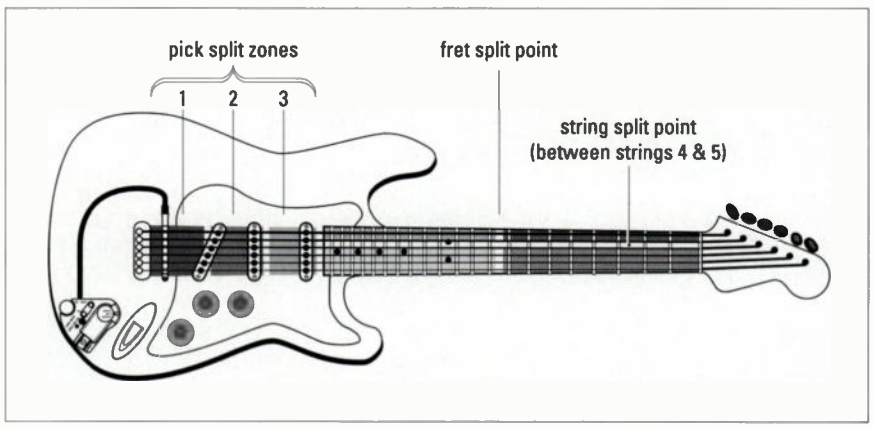
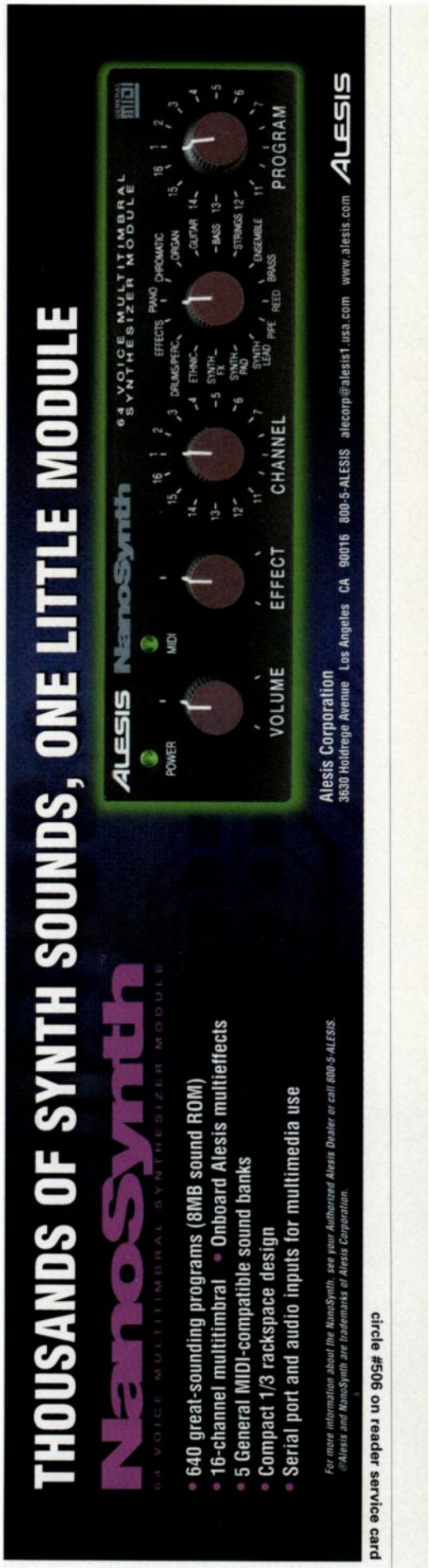


FIG. 1: The guitar can be divided into two string-split zones, two fret-split zones, and three pick-split zones, each of which can play a different timbre on the connected sound module.



zone), the first note you play in the new zone is preceded by a Bank Select and Program Change that are specified in that zone's Segment. This means your synth is changing programs each time you change fret zones.

Likewise, string splits divide the six strings of a guitar (or four strings of a bass) into two groups, and each group can control a separate timbre. In this case, the strings in each group send the same Bank Select and Program Change on different channels.

Pick splits divide the picking area between the bridge and fretboard into three parts, each controlling its own timbre. Again, the Axon sends a user-specified Bank Select and Program Change on the same MIDI channel each time you move to a different pick zone. This is possible thanks to the neural-network technology that identifies the transients generated in different picking areas.

In addition, for each Segment, you can define one Control Change message that is sent when you pick. You assign two values for this CC message, one value for each pick zone. For example, the area nearest the fretboard might apply an LFO to the sound by sending a user-specified CC 1 (Modulation) value to the synth whereas the area near the bridge could be a straight sound (i.e., it sends CC 1 with a value of zero).

Combining the multitimbral capabilities of an external sound module with the split capabilities of the Axon can yield an amazing variety of simultaneously available sounds on your axe. This is great for live performances and production gigs that require a whole stack of keyboard sounds.

The fret and string splits worked wonderfully, but I had less luck with the pick splits. Maybe it was my guitar, but I often triggered the sound assigned to a different pick-split area than the one in which I was playing. According to Blue Chip, using all three pick-split zones means that each zone is very small, and it's relatively easy to pick in an unintended zone. One representative of Music Industries Corp. (Blue Chip's U.S. distributor) normally uses two pick-split zones, which is easier to control. Nevertheless, having so many timbres available on the guitar simultaneously is truly inspirational.

TIPS FOR A SMOOTH FLIGHT

In order to optimize the Axon, you should tweak a few parameters before playing anything. Two of the most important parameters are Pitch Quantize and String Sensitivity.

Pitch Quantize determines how the Axon converts pitches into MIDI notes. There are four Pitch Quantize settings: Off, On, Auto, and Trig. In the Off setting, all pitch information generated by different playing techniques (e.g., pitch bends from string bends and slides) are converted as precisely as possible. In the On setting, all pitch information is quantized to the nearest half step.

In the Auto setting, notes and chords are quantized to the nearest half step unless they are bent, in which case the quantization is turned off until all bending is finished. In the Trig setting, which is optimized for hammer-ons and pull-offs, a new note is retriggered whenever a hammer-on or pull-off is executed. (With Quantize set to Off,

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too many sequential hammer-ons or pull-offs results in missed notes as the sound fades out. Retriggering solves this problem.)

I found the Auto setting to be amusing, but I'm a pretty expressive player; I like to slide chords, slur notes, and generally play around with the guitar's ability to generate microtones, so setting Pitch Quantize to Off was the most *simpatico* with my playing style. However, if you are a more precise or literal player, you'll probably like the Auto and On settings. The Trig setting also works great; I found it very useful for fast lead lines.

String Sensitivity controls how the Axon interprets the dynamics of your individual picking style on a particular guitar. This is a crucial parameter; if you ignore it (as I did when I first turned the unit on), the Axon will not track your playing properly.

Although this is an extremely sophisticated parameter, the designers at Blue Chip made it easy to use and fun to program. One of the Global pages shows each of your strings (E6, A5, D4, etc.). Playing normally while this page is displayed allows the Axon to learn the picking dynamics that you use. It looks for the highest and lowest dynamics used on each string as you play and stores this information in memory. When the string name fades out in the display, it means the Axon has stored the dynamics for that string. This method of sensitivity adjustment works well and is far superior to simply assigning each string an arbitrary sensitivity value as in traditional guitar-to-MIDI converters.

When you play with the Axon, make sure your guitar is properly tuned. If it is out of tune and you mix the synth and guitar signals together with Quantize set to On, you'll end up with some pretty nasty dissonances. Luckily, the Axon includes a handy internal tuner that is quite easy to use. It's laid out like most hardware tuners, with a tuning line (calibrated in cents) and a center arrow that reveals when your instrument is in tune.

In addition, the Axon can perform relative tuning, which is called Tune Base in this case. For example, if you're playing along with a piano that is a little flat, it's easier to tune your axe to the piano rather than the other way around. Tuning your guitar's A string to the A of the piano provides a tuning base that can be used to reprogram the Axon's tuner. If this newly tuned A on your guitar is five cents flat, the Axon can adjust its tuner so that all incoming notes will be tuned five cents flat, even though the tuner reads 0 cents. If you check the Tune Base parameter, you'll see it is set to -5 cents. Putting the Tune Base parameter back to 0 normalizes the tuner.

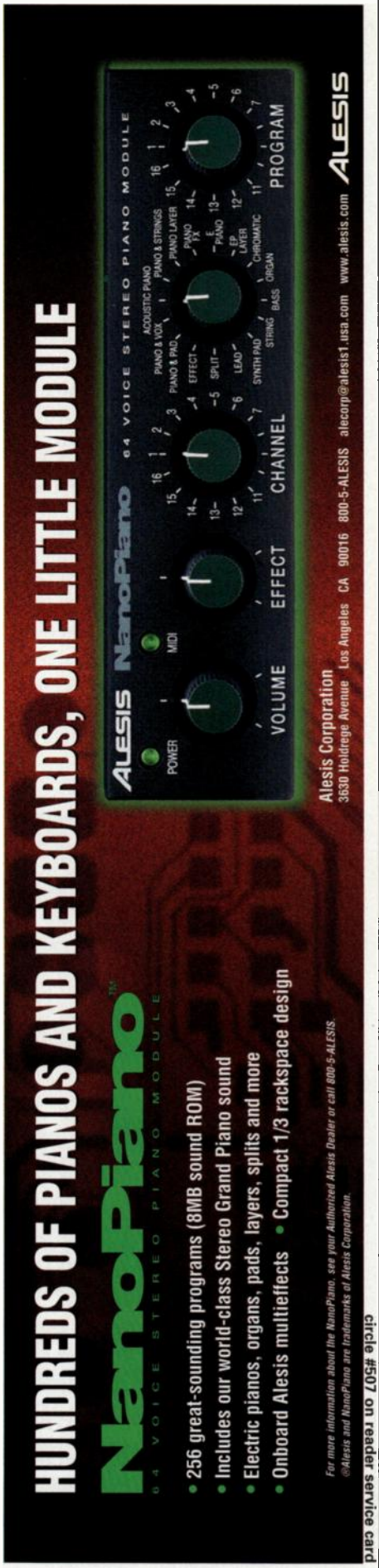
POWER STEERING

The Axon's user interface includes some very nice features that make driving this unit a real joy. For example, the Preferences can store the String Sensitivity settings for up to four different guitars, and each Preference can have its own name. I have several axes I like to play, so I created a Preference for each one. Now I'm ready to grab any axe and play without any tweaking. Preferences can also be used to optimize the Axon for different playing styles on the same guitar. This is great for live performances and a real pleasure in high-pressure studio situations.

Another little amenity is an LCD level meter for each string. These ladder-type meters, which are oriented horizontally, appear in the display whenever a string is played. The top meter represents the high E string and the bottom meter represents the low E string, which seems backward; intuitively, the top meter should be the low E string to correspond with the orientation of the strings on the guitar.

Nevertheless, I like the string meters; if I'm having problems getting sound out of my MIDI rig, I can see that signal is getting from my guitar into the Axon by checking the meter. They also let me know if there are any problems with the hex pickup. However, I recommend turning the meters off when you are trying to program a patch because they can be pretty distracting if you accidentally bump the guitar in the middle of changing a parameter.

The Chain function lets you customize the order of programs as they are recalled with the corresponding footswitch. Both Scratch and Arrange patches can be assembled into a chain, and you can create up to 64 different chains with up to 32 steps in each one. The increment/decrement buttons on the pickup's control box select the chain you want to use, and the footswitch steps through the programs in the selected chain. A single tap on the



footswitch moves you forward, and two quick taps move you backward.

The Chain function is invaluable in live-performance situations because it lets you arrange your sounds according to the order of the songs in your set. This frees you up to concentrate on playing instead of looking for a sound you're supposed to use in a particular song.

MR. MICROPHONE

As mentioned earlier, the Axon can accept microphone and even line-level signals, in addition to signals from a hex pickup, and convert them into MIDI messages. This function actually works, unlike most pitch-to-MIDI converters. The input is labeled Mono, which is fitting considering that it produces a monophonic signal no matter what kind of polyphonic signal you feed it. If you have a hex pickup plugged into the Axon and you plug something into the Mono In, the latter is given precedence over the hex-pickup input.

The high-impedance Mono In circuit accepts just about any signal you throw at it, from mic to line level. You simply route a signal into it and adjust the input-level knob on the unit's face. I tried connecting the audio output of my guitar directly to this input and found it worked wonderfully for monophonic lead lines. However, playing a chord resulted in a cacophony of monophonic MIDI notes.

I had several hours of fun singing into the Mono In through a Shure Beta 58. I recorded my lines in a software sequencer, and I was impressed by the unit's ability to track my nuances, from vibratos to pitch bends. I even tried miking a marimba, and I was impressed by the Axon's ability to track pitches quickly and accurately. Overall, this is the best pitch-to-MIDI converter I've ever used with a microphone.

INTERNAL VIBRATIONS

Although the Axon can be purchased without internal sounds, I highly recommend the Yamaha DB50XG internal sound-board option. Its sounds are not spectacular and are only partially editable via System Exclusive, but they are solid and quite usable. I particularly like the basses and pads. They work well with the Axon, and they sound good in the mix.

I recommend the DB50XG not just for the sounds themselves but for the convenience of having sounds right in the Axon. This makes the unit completely self-contained and much easier to use. Not having to connect it to an external sound source and fiddle with MIDI configurations makes for a more accessible instrument that helps to fuel the creative juices.

The DB50XG was designed as a sound-expansion daughterboard for the Creative Labs Sound Blaster and compatible sound cards. (In fact, you can use any Sound Blaster–compatible synth daughterboard—such as those from E-mu, Korg, and Roland—in the Axon.) The DB50XG is General MIDI Level 1–compatible with 32-voice polyphony and 16-part multitimbral capabilities. In XG mode (Yamaha's superset of GM, and the mode used by the Axon), there are 676 patches and eleven drum kits. There are also eleven reverbs, eleven choruses, and 42 "variation" effects (e.g., Auto Wah, 3-Band EQ, Amp Simulator, Echo, and Delay).

Navigating the 128 basic patches is no problem, but getting to the rest of the sounds and effects is a complete pain in the butt. Looking through lengthy lists to program the MSB (most significant byte) and LSB (least significant byte) values to access different sounds and effects is not what I call intuitive.

Fortunately, any XG synth-editing program can be used with the DB50XG. I highly recommend that you check out the Yamaha XG Home Page Web site (www.yamaha.co.uk), which contains a wealth of detailed information on XG synths in general and the DB50XG in particular. The site includes an impressive variety of downloadable XG editing and utility software for Mac and Windows, including Sound Solutions' *XG Edit* shareware editor for Mac and Windows 3.1/95.

WHERE'S THE BEEF?

I rarely criticize a manual unless it is really bad. The Axon's manual is *really* bad. For one thing, it is poorly translated, making it difficult to understand even the gist of what is being said. For example, here is a short excerpt: "According to the setting of the preset parameter, further reliefs are the result. At previous devices, Pitch Bend data load the interface device strongly." Note to Blue Chip: please hire a professional manual writer and a better translator. The Axon deserves better.

Although the DB50XG manual is reasonably well translated, it primarily covers the sound board's use with a computer. It would be nice to have a section of the Axon manual that specifically addresses the use of the DB50XG with the Axon, such as how to select the DB50XG's sounds and effects from the front panel. Although there are tables of MSB and LSB values in the DB50XG's manual, there is only one paragraph about it in the Axon's manual. And there is no mention of the Yamaha Web site or other sources of DB50XG information.

THE NERVE OF IT

Apparently, there is something special about neural-network technology (at least Blue Chip's implementation of it), because the Axon NGC 77 is by far the fastest guitar-to-MIDI converter I've ever used. In addition to the DB50XG internal sound module, I used the Axon with a Korg 01/WR sound module and Ensoniq ASR-10 sampler, both of which worked extremely well.

In addition, the Axon's splits and hold-pedal options are nothing less than stunning. Up until now, I've been content just to have a different sound on each string but not anymore; the Axon has spoiled me. The availability of so many different timbres simultaneously is spectacular.

With the Axon, I really enjoy playing MIDI guitar because I can get so many different sounds going at once: sustaining a chord, playing a bass line with my thumb, and playing a lead line all at once. I can have a live jam session with myself with no help from a sequencer. It's scary to think what a really good player could do with the Axon in a live performance.

Although the Axon costs a little more than Roland's guitar-to-MIDI converters, the extra money is well worth it. If you are in the market for a guitar-to-MIDI converter, I highly recommend Blue Chip's Axon NGC 77. But don't make the mistake I made when I first checked this unit out; this puppy needs some serious setting up before it will shine. If you go into a retail store to try it out, and it seems glitchy or unresponsive, it probably hasn't been set up properly. Once that's done, however, you're in for a real treat.

Product Summary

PRODUCT:
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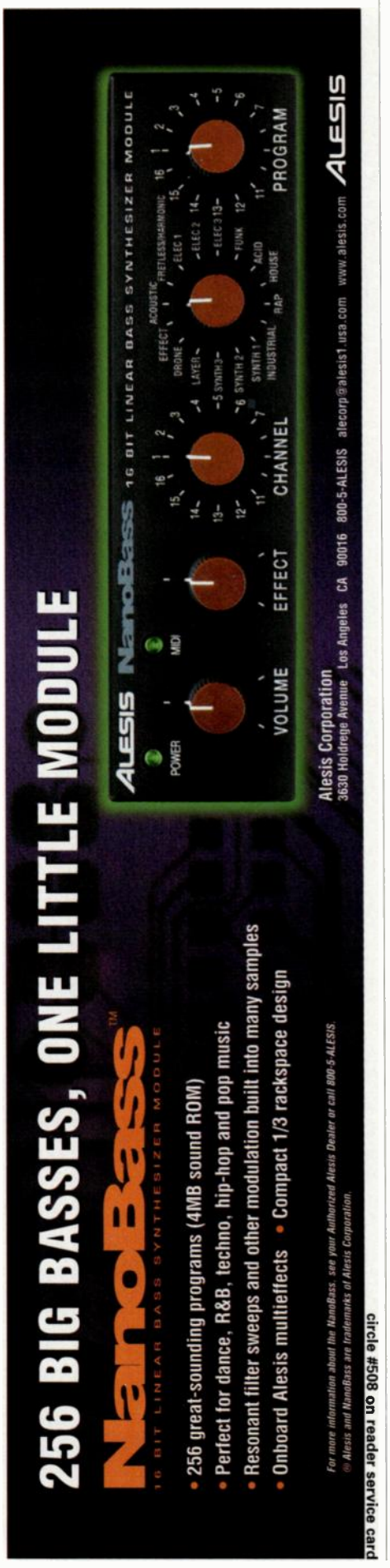
Erik Hawkins *is an independent producer, engineer, and session musician in the San Francisco Bay Area. In his spare time, he hangs out with Pinky and the Brain and tries to take over the world.*



Retrospec Squeeze Box

By Rob Shrock

Stomp your instrument with a quality tube processor.

The demands on a session musician are great. In addition to showing up on time with a pleasant demeanor, you are expected to read well, quickly conceptualize a great part, cop a deep groove, have a versatile and efficient rig, and deliver a refined audio signal to the engineer that immediately works in the track. Gone are the days when a roomful of hired guns would sit around telling dirty jokes while the guitarist and engineer struggled to get a decent rhythm tone. If you don't walk in with a happening sound from the get-go, there probably will not be many sessions in your future.

Retrospec designed its Squeeze Box for musicians who want an easy-to-use stomp box that gives them refined control over their sound. The compressor/limiter delivers the warmth and tone of tube circuitry coupled with electro-optical compression and a single EQ control for broad tonal shaping. (Retrospec also makes an all-tube, transformerless DI box; see the sidebar, "Retrospec Juice Box.")

Intended primarily for guitarists and bass players, the Squeeze Box can be used to process any mono instrument signal that comes in at -10 dBm or lower. (I used the Squeeze Box primarily to record guitar and bass and to process prerecorded vocals at my project studio.) According to the manufacturer, the box is fashioned after classic tube limiters such as the venerable Teletronix LA-2A.

STAND ON IT

The Squeeze Box is well built, with a steel housing and four tough, solidly attached plastic knobs. I imagine you could stomp on this box a lot without causing damage. The unit has an attached power cord and internal power supply, so you need not worry about accidentally kicking out the power cord or displacing a wall wart.

The four knobs give you control of the output level, EQ amount (discussed shortly), compression ratio, and threshold. Two small switches activate power to the unit and engage the EQ. In the newest units, Retrospec has added a Lo/Medium/Hi input-level switch; this is an important addition because the unit lacks a variable input pot. (The review unit had a Lo/Hi switch.) A blue LED glows when the unit is on, a yellow LED lights when the Squeeze Box is activated via the footswitch, and a green LED indicates the input signal is above the compressor threshold.

You get one ¼-inch line-level input and both ¼-inch line-level and XLR mic-level outputs. The jacks are on top rather than on the sides or back panel—the back is vented for heat dispersion—and are mounted almost flush with the casing. Although the top-mounted jacks are not a big problem, they push the cables up in the air, which creates a greater possibility of getting your feet tied up in a cable. Using cables with right-angle connectors would help reduce the clutter.

TONE UP

When the compressor is not active (accomplished by setting both knobs all the way counterclockwise so that the ratio is 1:1 and the threshold is infinity), the Squeeze Box acts as an instrument tube preamp with an active EQ, similar to a Tube Works Real Tube pedal but without the distortion.

The unit delivers up to 20 dB of gain and is quieter than most tube devices; it only exhibits a low 60 Hz hum when cranked to very loud levels. The overall noise level is on a par with that of most vintage devices, which is fine for most studio applications. The input impedance is 2 MΩ, so you shouldn't have any problems with loading the output of your source.

When the EQ is engaged, a single knob controls a fixed-frequency (2 kHz) broadband filter. It sounds like the Q is set to approximately two octaves. This is great for adding a little top back to an electric-guitar signal or bringing out the spank in a slap bass. A small amount of noise is added to the signal when the EQ is engaged, but it is minor. (Remember, this is an all-analog throwback.)

A lot of guitarists use a tube pedal in their signal chain for tonal color and fatness, and the Squeeze Box is an excellent choice for this. Applied strictly as a tube coloration/EQ box, without using the compressor features, the Squeeze Box performed wonderfully, adding body, tone, and presence to guitar and bass signals. There is a lot of headroom, so you can crank up the signal and send it straight to a console's

Retrospec's Squeeze Box combines a tube preamp, EQ, and compressor. Designed primarily for use with instruments, it especially shines on bass. However, the compressor section has a small usable threshold range and exhibits excessive pumping when it is hit hard.

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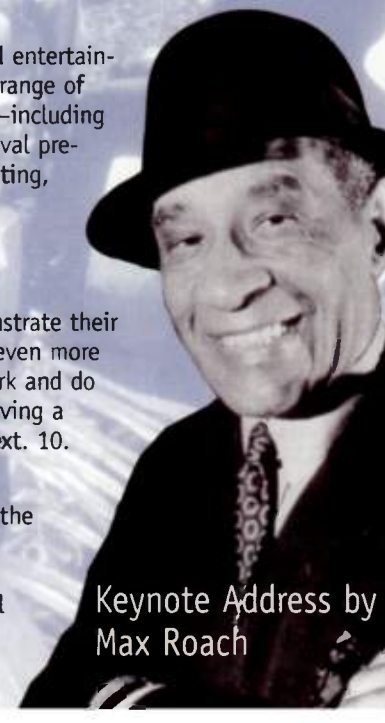

Keynote Address by Max Roach

-10 dB insert point or to a -10 dB input on, say, an MDM or modular hard-disk recorder. This makes the Squeeze Box an excellent direct box, especially for recording bass.

COMPRESSOR WITHOUT PITY

The compressor has two major weaknesses: the usable threshold range is too small, making it difficult to set the compressor to a musical response, and the compressor thumps and pumps when it is nailed with a loud signal. As a result, I had performance problems with the compressor for most applications except bass guitar.

I recorded several different electric guitars played through the Squeeze Box in a variety of ways: directly to tape, intermixed with a chain of effects pedals into a vintage Deluxe Reverb and miked, and finally, in line with a Roland GT-5 guitar processor. In all cases, the musically useful range was always around the -5 dB setting on the threshold knob, which is barely on. Although the threshold goes down to -40 dB, anything much past -10 dB greatly overcompressed the signal, even at mild ratios of 2:1 or 3:1. To a lesser extent, I had the same experience when using the compressor with bass.

Running prerecorded vocals into the unit straight from the -10 dB outputs of an ADAT yielded the same touchy threshold settings. Any low threshold caused the compressor to pump too much for my taste.

Retrospec has attempted to address this issue by adding the Lo/Medium/Hi input-sensitivity switch in newer

Squeeze Box Specifications

Input	¼" unbalanced (≤-10 dBm)
Outputs	XLR balanced (-25 dBm) and ¼" unbalanced (-10 dBm)
EQ Type	1-band; level control only; fixed 2-octave width; fixed 2 kHz center frequency
Attack Time/Release Time (compressor)	50 ms (fixed)/500 ms (fixed)
Power Consumption	40 watts
Tubes	(2) 12AU7
Frequency Response	10 Hz–40 kHz (±2 dB)
THD	0.5% (-20 dBm in)
Dynamic Range	70 dB
Input Sensitivity (Hi/Medium/Lo)	-30 dB/-20 dB/-10 dB
Weight	5 lbs.
Dimensions	4" (H) x 8" (W) x 6" (D)

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units. According to the manufacturer, without this switch, certain acoustic instruments with low levels were not crossing the threshold properly, so the Hi setting should be used in this application. However, I found that the threshold was easily crossed, even at the Lo setting, and the compression quickly became audibly apparent.

This is a true electro-optical compressor, so the attack and release envelopes are determined by the circuitry. The attack time is preset at around 50 ms and the release at approximately 0.5 seconds. Variable release and attack times are integral to getting a proper compressor sound, especially in critical recording. Because the settings are fixed, it is difficult to minimize the pumping artifacts when overcompression occurs.

When the unit is hit too hard, it thumps in the low frequencies as it pumps. This was especially apparent when attempting to get a funk electric rhythm-guitar sound. Really chunking the guitar caused the compressor to momentarily make a lower-midrange "thonking" sound as the compressor tried to squash the signal. Backing off the threshold setting failed to properly contain the peaks and even out the level. Dialing in different ratio amounts didn't really solve the threshold problem, although I'm not convinced that the numbers accurately reflect ratio values. This is more of a "turn the knobs until it sounds right" kind of box, anyway.

An extremely dynamic vocal performance caused the same "thud" sound when the compressor was hit hard. Unfortunately, Retrospec's compressor is not as forgiving as an LA-2A, Joemeek, or other more expensive electro-optical compressor/limiters. That's too bad; one of the outstanding characteristics of the electro-optical limiters that the Squeeze Box is patterned after is their ability to handle just about anything thrown at them with grace. When used judiciously, the Squeeze Box can be

RETROSPEC JUICE BOX

Also available from Retrospec is an all-tube direct-injection (DI) box. The Juice Box ($595) allows you to directly record or sample any instrument-level sound source without having to run the audio path through transistors, while also imparting tube coloration to the signal. The DI box is transformerless, which minimizes phase shift, transient overshoot, ring, and other nasty sonic artifacts commonly caused by transformers.

Like the Squeeze Box, the 6-pound Juice Box has a ¼-inch input and both ¼-inch and XLR outputs. A 3-position gain switch allows you to choose between -20 dB, 0 dB, or +20 dB levels, and a Vari knob offers continuous gain adjustment. The unit is powered by an internal, high-voltage power supply. Its frequency response is rated at an impressive 10 kHz to 100 kHz, signal-to-noise at greater than 90 dB, and distortion at 0.05%.

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useful as a mild compressor, but I did not like the way it handled more drastic compression and would not use it in this application or as a limiter.

BASS ACE

On the other hand, the Squeeze Box fared well when recording bass guitar. It drastically improved the direct bass signal with tube coloration and EQ tonal shaping, and its attack and release responses seem well suited to the dynamics of typical bass playing. When applied mildly to bass played with fingered technique, the compressor was very good at smoothing out level inconsistencies from string imbalance or imperfect technique.

The unit was less forgiving when mixing low thresholds with slap technique (more pumping), but overall, it is capable of delivering a wonderful bass tone straight to an engineer's hands, even in critical studio situations. This is where the Squeeze Box really shines.

THE SHORT AND THE SWEET

Compared to the average guitar or bass pedal, the Squeeze Box isn't a budget buy; there are less expensive tube-preamp pedals if that is all you need. On the other hand, Retrospec's box is more versatile than a lot of tube pedals, due to its EQ and compressor.

However, the Squeeze Box's compressor falls short in many applications. It's overly sensitive, and I found it difficult to dial in a good balance between too much and not enough gain reduction. The unit pumps drastically when nailed with hot signals, and there's no control of the attack and release times. When used mildly, it performs all right, but there is not much margin for error.

On the other hand, as a tube front end for guitars and basses, the Squeeze Box is a definite winner. It delivers a thick, full tone, and the EQ can give you the added presence boost to make a signal cut through in the studio or on stage. It adds a "tubey" vintage sound to any mono instrument. It would be great in a solid-state guitar rig.

Bass players in particular should check this unit out. It's an easy-to-carry package that lets session players and home recordists conveniently control their bass tones, and its compressor can be used to advantage in this application. The Squeeze Box lifts the bass out of that anemic, direct-injection sound and brings it into the land of fat, present tube tones without resorting to an amp or cabinet simulator. I would definitely use it to record bass on any session. ●

Product Summary

PRODUCT:
Squeeze Box tube compressor/limiter
PRICE:
$495
MANUFACTURER:
Retrospec
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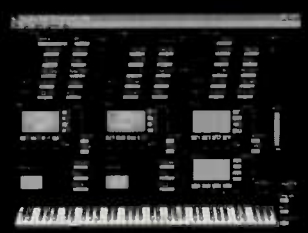

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Kurzweil Take 6

By Jeff Obee

Bring platinum-quality vocals to your studio with this CD-ROM.

There is nothing quite like a vocal sample. The aural texture of choir sounds played a big part in selling the first samplers; that expansive, rich sound was the last straw that convinced many of us to plunk down our cash and buy into the world of sampling. I've always loved soundscapes created with vocal samples, from low, sustained drones with that enticing breathiness to otherworldly atmospheric backdrops.

Of course, the better the samples, the better the results. Most of you are probably familiar with the platinum-selling, Grammy Award–winning, contemporary R&B vocal group Take 6. The silken sheen of their harmonies and their funky rhythmic stylings have graced the airwaves for a few years now, and they have a number of chart-topping hits to their credit. Now you can invite them into your own studio with the *Take 6 Vocal Sample Library*, developed by Kurzweil for their K2000/K2500-series synthesizers. This unique CD-ROM features 652 MB of sustains, accents, bass vocals, brass emulations, vocal percussion, rhythm loops, and much more. No ordinary batch of choir samples or vocal hits, this collection has a definite identity and takes vocal samples to the next plateau.

Showcasing the vocal talents of Grammy Award–winning R&B group Take 6, Kurzweil's *Take 6 Vocal Sample Library* includes both realistic and heavily processed samples.

THE LOWDOWN

You will need 16 MB sample RAM and OS version 3.16 or later to use this CD-ROM, and you really need to have the PRAM expansion and considerably more sample RAM to get full mileage. At least 40 MB RAM is needed for most of the Macros here. For those to whom memory is no object, there are Macros that use full-bandwidth, chromatic samples and require 110 MB RAM.

To ease the memory demands, Kurzweil made the samples available in both mono and stereo, and you can choose from three sampling rates: 24, 32, and 44.1 kHz. According to Kurzweil, there is generally very little energy in the human voice above 10 to 12 kHz, so the downsampled files reduce memory requirements without sacrificing too much sound quality. Nonetheless, a turbocharged instrument is highly recommended; the 44.1 kHz stereo samples are stunning, and the way this CD-ROM is organized, it really helps to be able to load in a lot of data at once.

The samples were recorded in Nashville by Tony Sheppard using his standard configuration for Take 6. (They usually record while standing in a circle with a circumference of approximately twenty feet.) Vintage mics, including a Neumann U 47 and U 49, AKG C 12, and Telefunken 251, were plugged directly into Neve mic pre-amps, then into Tube Tech CL-1B equalizers, and from there into an Otari DTR-900 MkII multitrack. The project was mixed on a Neve V-series console with Flying Faders.

All of the documentation is contained in the CD jacket, a thick booklet (23 pages) that's difficult to get in and out of the CD case. Even with 23 pages, the information is packed in pretty densely. All the necessary stuff is here; Kurzweil gives the user a comprehensive tour through the CD in a fairly easy-to-understand, step-by-step fashion. The booklet explains the use of Macros in great detail, listing all the Programs and doing a good job of anticipating potential questions. However, I would have preferred a separate booklet for the documentation that was less cramped and also contained a history and overview of the group Take 6.

FIRST TAKE

There are five types of files on the CD-ROM: text, demos, samples, Programs, and Macros. The text files can't be read by the K2000/K2500-series synths; they contain an electronic version of the documentation and are provided for users who have their CD-ROM in a chain with their computer.

The four sequenced demos were excellent; they showed off the sounds fabulously and really gave a positive impression of how this collection can be used. Three of the demos are audio CD tracks that are playable on a CD player. There are also some smaller demo files you can play from the keyboard. These were written and performed by Jeff Williams (who also headed the programming team), Chris Stevens, and the members of Take 6.

The sample files are divided into five categories: Accents, Sustains, Bassvox, VoxBrass, and VoxPerc. These categories are further broken down into subdirectories. For instance, the Accents directory opens to a list consisting of Bee, Bop, Doop, Dot, Dow, and Shoop. If you open the Bee subdirectory, you then choose from BeeMono or BeeStereo, and from there you select the desired file. Each sample file contains some basic Programs, but the more elaborate programming is contained in the Macro files. I liked this setup; I could use those rudimentary Programs as launching pads for my own sounds without having to take the time to load in the larger files.

The Program section loads the Program data only, not the samples, which was a tad puzzling at first. It turns out that the Program section merely stores the information for the Macros to access. I would like to be able to load

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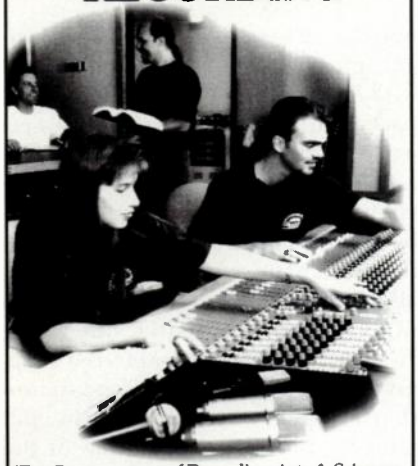

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these Programs and their dependent objects one at a time, but that ability would have required Kurzweil to provide a separate Macro for each Program or to duplicate the samples with each one.

MACRO MAGIC

With 652 MB of data on this disc, the folks at Kurzweil wisely used the K2000/K2500's Macro feature to organize it all. Macros store the file names of samples, keymaps, and Programs; when you select a Macro, it loads these objects for you. The Macro files on this disc are divided into six main directories: Drums, Loops, Control, Real, Synth, and Techno. These in turn open to subdirectories arranged by memory requirement.

Brass emulations are a specialty of Take 6.

For example, under the Real directory, I opened the MB40 subdirectory, which contains Macros that require 40 MB of RAM. There I found files with names that indicate style, sample rate, mono or stereo, and keymap. I chose REAL32LC.MAC, a Macro that uses 32 kHz samples in left-channel mono with a chromatic keymap. The stereo or mono aspect of the name refers to the way the original sample was recorded, not what you hear when you play it. Some of the mono files play in "faux stereo"; a stereo field was created with the effects processor or by duplicating and panning the mono sample.

It takes a while for the Macro to load all the corresponding files—more than three minutes for REAL32LC.MAC. For each of the Real Macros, the same 80 Programs load in, each needing the proper (fairly large) samples. The documentation explains how to take certain shortcuts and how to take advantage of the Check feature to load some Macros without deleting the previously loaded samples.

Although the Macro system greatly simplifies the task of bringing all the elements of the programming together and assembling the sounds, it has its limitations. I have 40 MB of RAM in my machine, and when I wanted to load 44.1 kHz files, I found that the Macros in the 32 MB bank had only mono samples in 44.1 kHz. You need to go to the 44 MB bank to get high-resolution stereo samples, and I didn't have enough memory to do so. You may need to create custom Macros once you get a clear idea of what you want from the disc.

VAST POTENTIAL

The programming makes good use of the range of parameters that Kurzweil's VAST synthesis offers. I dug into many of the patches to see how they were created and learned a lot about my K2000 that way.

More than 400 Programs are included on this CD-ROM, ranging from drum kits based on Take 6 percussion emulations to solid, basic vocal sounds to processed Synth and Techno patches. All of the effects were custom programmed and tweaked specifically for the sounds on the disc, and they work very well with the patches.

I didn't get a feeling of "cookie cutter" programming; each patch was tweaked to sound its best. The controllers are often routed to the effects and are used very creatively. Some sounds make nice use of panning, which gave an alluring sense of movement and space.

GET REAL

In the Real Programs, the first thing that I noticed was the use of Velocity to trigger different samples from within one Program. For example, in a Program aptly named "ShooBeeDoo," low Velocities trigger the accent "doo," medium Velocities trigger "bee," and high Velocities trigger "shoop." I loved the Programs in which high Velocities triggered the "dow" accent, which is a brass section–style falloff. This makes for very expressive Programs, especially with Take 6's stylized vocal samples. If you've ever wanted to sequence a jazz choir, this is the way to do it.

Brass emulations are a specialty of Take 6, and I absolutely loved the ones offered here. These rich, full brass patches sound better to my ear than just about any synthesized or sampled brass sound I've heard. Also in this category, I liked the way new accents were created from two separate samples. The Program "Shee" was created by taking the "shoop" and "bee" samples and tweaking the envelopes to cut off the

"oop" and "b." So you hear the "sh" and then the "ee." Clever! A cappella vocal stylings are easy to create with these sounds. They really convey the Take 6 style and sound very natural, and their range of expression gives them an extraordinary amount of realism.

The Control section gives you 32 Programs in which a breath controller or foot controller can be used to crossfade between vocal accents, e.g., from "ooh" to "aah." I don't have a breath controller, but I used my A.R.T. X-15 foot controller to play with these Programs. I like the change in texture when crossfading between two sounds. Some of these sounds provided a nice surprise: when I sustained a chord with the pedal up and then moved the pedal down, the first sound continued to sustain as the second sound played.

TAKE 6 GOES TECHNO

The Synth Macro loads 154 Programs that cover a wide range of tonal ground. Shimmering and resonant vocal pads, phased and plucked comping sounds, varied basses and leads, and some unusual brass emulations give you a lot of sonic material to work with. Likewise, the Techno Macro loads 87 Programs that give the user a palette of contemporary sounds, including some very hip, off-kilter, "edgy" analog emulations.

In fact, almost all of the patches in the Synth and Techno categories are very "synthy" sounding and depart drastically from the straightforward Real vocal Programs. Some are quite experimental and "nasty" sounding and would work well in industrial music. It's hard to believe that some of these Programs are built on the Take 6 samples; they really stretched the sonic fabric and did some fascinating things. Some are so far out that they are barely useable, but others work well.

For example, a Synth Program called "Metal Loops + Hits" takes the "goong" loop and turns it into a metallic, phased loop while other keys play some grungy hits and effects, making for great fun. One sound, called "Hammer6 Daa," is a gritty, solo, hammer-on guitar-style patch built on the "daa" accent; you hear very little of the original vocal sound except at the lowest velocities.

Other Programs, such as "BrassWash" and "Panneereal," are entrancing, "liquid" sounds. "RobotJox" sounds like a power plant with sizzling electrical noise, and "Pad Thai 6" sounds like an electronic jungle. "Showstopper" is a 6-layer Program that starts with a stuttering vocal and quickly fades into a rolling hi-hat loop from which a descending analog sawtooth sound and some electronic grunts and chirps emerge. I could go on for quite a while; suffice it to say there is some unique programming to be found here.

VOCAL PERCUSSION

The outstanding Programs in the Drum Kits section were created from vocal samples. Take 6 does some really fabulous drum-kit emulations, and the programming team assembled a nice array of kits. A few of the kits have a General MIDI layout, and the rest share the same key assignments, making them interchangeable, which is nice.

These kits, along with the PercSeq files, provided some unique and very usable drum sounds that I really enjoyed playing with. They have an organic yet electronic quality that makes them stand out from the rest. Their basic crispness and punch means

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they can work in a lot of styles, yet there is an undeniable originality to their sound.

All the loops are fun. There are two Loops sections that give the user a smattering of very creative and cool percussive vocal loops created by one or more of the members of Take 6. There are also 34 Real vocal loops and 53 Synth loops. The Synth loops are terrific, and some of the loops in the Techno category are mind-bending. I had a blast playing trippy little mini compositions, although they always felt like someone else's composition.

Something about the raw percussive vocal sounds, either natural or processed, piqued my ear. I would have liked to hear a wider variety of them, especially in the Real loops. One Real loop, called "12/8," made me feel like the guys were standing next to me singing: I could clearly hear every little detail down to the lip smacks. I loved the feel of the hip-hop grooves; they were laid back with a slightly jazzy feel to them.

I wrote two different pieces of music using only the sounds on the CD. One was a jazz/fusion piece in 3/4 time with a lot of sus4 chords using the Real and Drum Kit Programs that was just a blast; having different accents play at different Velocities gave the piece a sense of realism that was almost frightening. The other was an Arabic techno rave using the more industrial sounds and a processed drum kit that really kicked. There are so many Programs here to choose from; you won't find yourself wanting for colors.

TAKE IT FROM ME

According to Kurzweil, one of this collection's goals was to provide sounds and techniques that would be uniquely characteristic of Take 6. It is largely successful: the Take 6 stamp is apparent in all of the Real Programs, loops, and natural Drum Kits and some of the Synth Programs.

Another goal for the disc was to showcase what the VAST architecture can do with vocal samples. Although the Synth and Techno sections demonstrate some intriguing possibilities, the results here were more mixed. There were many sounds that intrigued me, and I found myself saying "Oooo" quite often. But I got a "flavor of the month" vibe from some of these programs, and some of the sounds are overspecialized. These experimental programs were fun to play with but I wonder how long some of these sounds will be in vogue. In all honesty, my favorite part of the disc was the Sample section, which gave me just the basics to work with. I could create my own sounds from there very easily.

The quality of the sounds in this library is excellent; all of the sample recording, editing, and looping is done to perfection, and a lot of thought, imagination, and teamwork went into the production of this ambitious project. But with a list price of $399, this is no cheap disc. It is beautifully produced and gives you a lot of material with which to work, but I couldn't shake the feeling that it is essentially a specialized, niche product. Many personal-studio owners would certainly gain from having these sounds available (depending on the genres of music they produce), but this type of CD-ROM wouldn't be a priority for the studio owner on a budget.

If you have been looking for some great vocal sounds, they are here in abundance, and you get much more besides. I wholeheartedly recommend that you check out this disc; it's an excellent piece of work that will definitely stoke some creative fires as you explore and play with it. There's no question that the *Take 6 Vocal Sample Library* is tremendous fun!

Product Summary

PRODUCT:
Take 6 sample CD-ROM for K2000/K2500
PRICE:
$399
MANUFACTURER:
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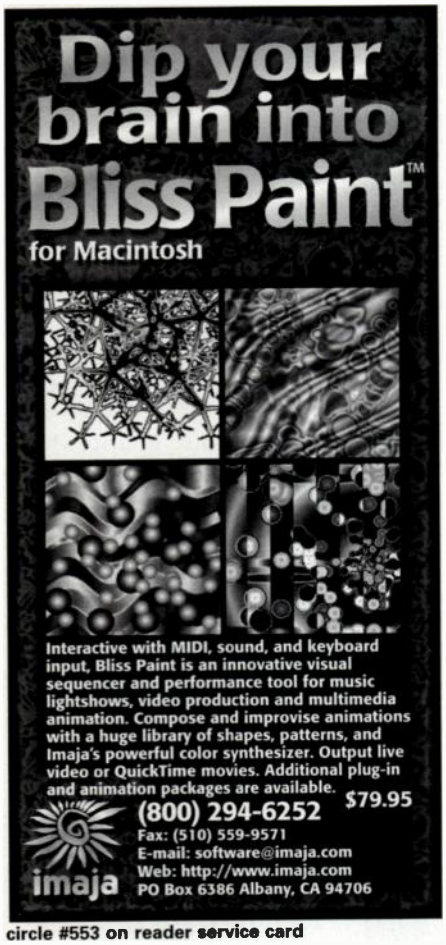
PROGRAMMING	● ● ●
QUALITY OF SOUNDS	● ● ● ● ●
DOCUMENTATION	● ● ● ●
VALUE	● ● ● ◖

Jeff Obee is a 6-string fretless bassist, synthesist, and composer from Oakland, California, who lays an awe-inspiring groove in bands like Haunted by Waters and Sculpting the Muse.



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dissidents Sample Wrench 4.0 (Win)

By Allan Metts

A favorite Amiga sample editor moves to Windows.

Okay, I'll admit it. Deep down, I'm a techno-weenie. No matter how elegant and user friendly software becomes, there's a part of me that always wants to play with the bits and bytes.

Dissidents' *Sample Wrench* is a pro-level, RAM-based sample editor that keeps my nerdiness alive. This powerful yet easy-to-use program offers a kit bag full of tools for sonic exploration, and some of them aren't even musically useful! Moreover, for the truly nerdy, *Sample Wrench* allows you to write code. With its full-featured scripting language, you can automate repetitive or complex tasks with reckless abandon.

Sample Wrench installed without a problem. When I ran it for the first time, the program presented me with little more than a background work area (the main window) and a few menus. Most of the program's functionality doesn't appear until you open an Editor (editing window). I later learned that you can have the program start up any way you like by writing a special script.

WRENCH'S WINDOWS

In *Sample Wrench*, all audio manipulations occur in one or more Editors (see **Fig. 1**). You can have up to 99 of these windows open simultaneously. When you open an audio file, a temporary copy of the file is loaded into RAM and appears in an Editor. That means you can always revert to the original file if you mess things up. But there's a down side to this arrangement: if you open the same file in two or more windows, changes made in one window aren't reflected in the others. I soon discovered that it was easy to make different changes in different windows, but only the changes made in the window last saved were actually put into effect.

The layout of the editing windows is straightforward. Across the top of the window, speed buttons control file loading and saving, horizontal and vertical zooming, communications with a sampler, and playback. There is an Undo tool, a Selection tool, a Zoom Box tool (for zooming into a highlighted range), a Freehand Drawing tool, and a Scrub tool.

In addition to the main waveform display, the editing windows provide an Overview display. The Overview always shows the entire audio file, regardless of the current zoom setting. I like that feature because it lets me know what portion of the total waveform is visible in the main display by highlighting the corresponding area in the Overview. What's more, the Zoom Box and Scrub tools work in both the main and the Overview displays.

The editing window is highly customizable. You can specify many different horizontal (time) units, such as elapsed time, sample numbers, SMPTE time code, and measures/beats. A dialog box lets you specify any SMPTE offset, beats-per-measure value, and beats-per-minute value. This same dialog box acts as a SMPTE/tempo calculator by allowing you to see the effects of a tempo change on the SMPTE time (and vice versa).

You can also choose the units of the editing window's vertical (amplitude) axis, including percent of maximum, dB, dB RMS, and sample value. Oddly, the vertical axis labels appear on only the left or right channel waveform display (not both). Also, there's no provision for horizontal or vertical grid lines on the display.

Sample Wrench can show you exactly where the sample points are in a waveform by plotting the points in a different color than the waveform. This Color Points feature isn't of much use until you zoom into the waveform quite a bit. Then you will see that what you thought was a continuous wave is actually a connect-the-dots drawing; your waveform is created by drawing lines between each Color Point. And speaking of color, *Sample Wrench* gives you complete control over the color of every element in the editing windows.

The Editors also include indicators that show the current *x-y* cursor position and the editing Affect range (described shortly). I especially like the program's ability to memorize up to ten waveform locations and zoom ranges for each editing window. These Views come in handy when you're bouncing around a large audio file and you want an easy way to move from place to place. For example, you can store one View where the singer hit a sour note and another where she nailed it in the second verse. Once you've set the Views, you can move back and forth between them with only two keystrokes.

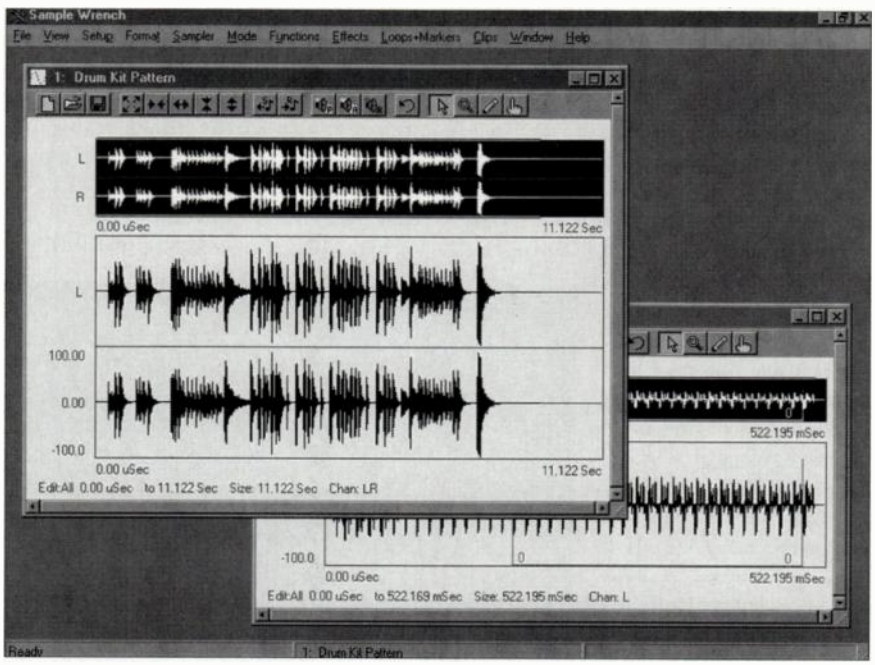

FIG. 1: *Sample Wrench*'s editing window is where most of the action occurs. You can have up to 99 windows open for editing.

BRING IT IN

There are five ways to get a sample into *Sample Wrench*. You can load existing samples from disk, import them from a sampler, or paste them from the Windows clipboard. You can also record from an external source or generate new samples with the program. *Sample Wrench* supports fifteen audio-file formats, including: WAV, VOC, AIFF, Sound Designer, RealAudio, and several variations of Raw files. You can easily convert between formats or convert between the 16-bit and 8-bit versions of the same format.

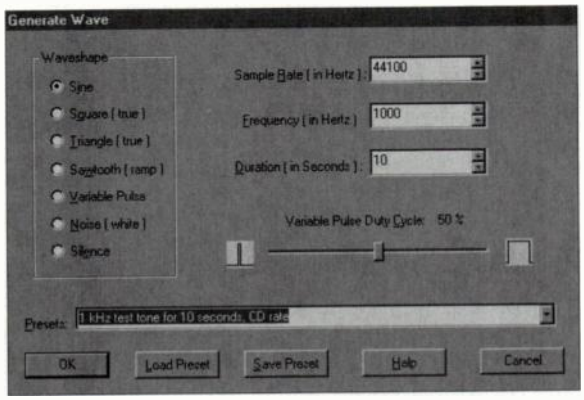

FIG. 2: *Sample Wrench*'s Generate Wave dialog enables you to mathematically generate basic waveforms for use in your sounds.

Working with an external sampler is as easy as loading files from disk. *Sample Wrench* has drivers for MIDI Sample Dump Standard (both 12-bit and 16-bit) and SMDI as well as dedicated drivers for the Prophet 2000, Akai S612, Korg DSS1, and all Ensoniq EPS and ASR samplers. Once you choose a driver, you simply press the Send or Receive button, respond to a dialog box, and hit the OK button to transfer the sample.

To record a sample, you first establish your recording preferences (mono/stereo, sample rate, and input source) and then open the Record dialog box. When recording, *Sample Wrench* provides both level and peak monitors for the input source. The peak monitors work fine, but I'd prefer something a little more obnoxious to warn me when I exceed 0 dB during recording.

The Generate Wave dialog box is really neat (see **Fig. 2**). It allows you to mathematically create sounds of any frequency and duration. In addition to white noise and silence, you can choose from a list of waveform shapes, including sine, square, triangle, sawtooth, and variable pulse.

SAMPLE AFFECTION

Most of *Sample Wrench*'s editing operations use what dissidents calls the Affect area. The Affect menu offers four options for determining how areas are selected for editing. You can have editing operations affect the entire wave or only what you see in the editing window (especially useful when you're zoomed in on a region). The program can also apply edits only to the region between marker numbers 0 and 1. Finally, you can highlight an Affect area by dragging with the mouse, which makes the program behave like most other audio editors.

At first, I didn't see the need for multiple Affect area choices. I was content selecting my Affect areas with the mouse. But the options really can come in handy. If you know you're going to manipulate an entire audio file several times over, for example, you don't have to highlight the waveform each time with the mouse. Instead, just change the Affect setting to Affect All. It will stay that way until you change it again.

When it comes to editing samples with the mouse, a few things I want are missing. You can highlight and drag a portion of a waveform, but you can't drag it to another Editor or Control-Drag to copy it. Furthermore, when I accidentally dragged a section in a really large file, it took several minutes to complete the operation, and I had no means of aborting the process.

As with other audio editors, *Sample Wrench* allows you to cut, copy, and paste using the Windows clipboard. But *Sample Wrench* also provides a second clipboard for use within the program. This other clipboard can contain multiple audio Clips, which can be given descriptive names. I like using Clips because they allow me to define multiple regions in a waveform and deal with them by name thereafter. You can save Clips to disk (using any of *Sample Wrench*'s supported formats) or load any sound file into the Clips list. Unfortunately, I could not find a way to name Clips that I loaded from disk. It's also not possible to set the Affect area to a named Clip for later processing.

Clips can be powerful, but they can also be confusing. To save memory and processing time, they aren't automatically saved to the clipboard. Instead, you must save each Clip to the clipboard using a separate menu selection. And you can only save a Clip to the clipboard when you're using the Editor where the Clip originated. Furthermore, each Editor's Clip list has its own Active Clip (the one that will be used in a paste or replace operation). Until I understood the Zen of Clips, I often pasted the wrong Clip into my files. And I was frustrated by menu options that weren't enabled when I thought they should be.

Sample Wrench allows you to specify up to 255 loops and 255 markers in each waveform. You can give markers any name, and you can tell *Sample Wrench* which of your loops are the "official" sustain and release loops. The ability to specify so many loops can come in handy: you can have several working versions of your loops and then use the best version in your sampler.

You can also specify complex criteria for loop-point or marker placement, and an Auto Locate feature will "snap" your selection to the next sample that meets those criteria. For instance, you can tell *Sample Wrench* to choose only loop points that are more than 2,000 samples from the beginning of the sound (to avoid the attack transient) and occur at a zero crossing with a positive slope. You can also center the display on a marker or loop, create linear or logarithmic crossfade loops, and use

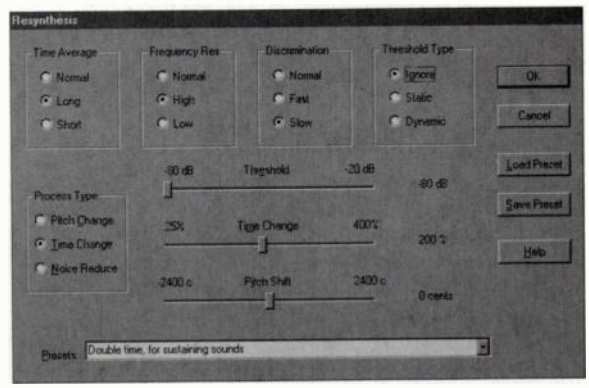

FIG. 3: The Resynthesis feature provides sophisticated time-stretching, pitch-shifting, and noise-reduction capabilities.

a special Loop window (which shows the end of your loop next to its start point) to fine-tune your loops.

USE THE RIGHT WRENCH

Sample Wrench offers a host of functions to help you edit sound files. You can mute or delete the current Affect area, or you can delete everything *but* the current Affect area. You can also replicate the Affect area any number of times or to fill any amount of time. You can clone, mix, invert, and reverse waveforms and convert between mono and stereo files in four different ways: use left channel, use right channel, sum the two channels, or subtract the right channel from the left. You can set or remove a DC offset, scale (normalize) waveforms to 0 dB, and increase or decrease gain by up to 30 dB. Unfortunately, you can't normalize to a value other than 0 dB in a single operation. Also missing is equal-power normalization, which helps to keep perceived volume levels consistent between songs or samples.

▼

There are tons of tools for twisting and contorting audio.

When changing sample rates, *Sample Wrench* allows you to choose how the operation is performed. The program can use linear interpolation, resampling (for better results), or a simple rate change (which doesn't alter the sample data). The online help does a good job of clarifying the speed-versus-quality issue for each approach.

When it comes to pitch shifting and time stretching, *Sample Wrench* again provides several useful options. You can specify a Quick Pitch change in cents, and the program will change the sample rate accordingly. For modest changes, there's a Pitch Shift feature that can shift the pitch by up to 400 cents. *Sample Wrench*'s Time Stretch feature can shorten or lengthen a selection by up to 25 percent of its original length.

For more extreme changes in time or pitch, you'll want to use the program's Resynthesis feature (see **Fig. 3**). Compared to the operations mentioned earlier, *Sample Wrench*'s Resynthesis operation typically produces higher-quality results but at the expense of greater processing time. You can also use the Resynthesis feature to reduce noise in a sample.

EFFECTIVE EFFECTS

Sample Wrench includes a long list of familiar effects, including echo, reverb, chorus, flange, amplitude modulation (tremolo), and frequency modulation (vibrato). I achieved good results with each of these. Moreover, you can tweak the AM and FM parameters until they actually alter the *timbre* of the sound. That offers great potential for sonic exploration. Some effects also have a Preview function that lets you hear the results of parameter changes in real time.

Sample Wrench provides a capable compressor with settings for threshold, detection (the amount of signal scanned), ratio, attack time, and release time. The compressor works as advertised, but I've been spoiled by other programs that let you see a graphic representation of the compression function. Unfortunately, *Sample Wrench* has no such display.

To alter dynamics over time, you can use *Sample Wrench*'s onboard Envelope Generator (see **Fig. 4**). It lets you draw your own envelope curves or load previously defined Presets (described shortly). I found this useful for fade outs. Furthermore, you can "trace" the envelope of one sound and apply it to another. Now you can give your Hammond organ sample the attack of a snare drum!

Sample Wrench offers three kinds of equalization. First, there's a shelving-type equalizer that can boost bass or treble frequencies by up to 20 dB. (You can choose the shelving frequencies.) There are also lowpass and highpass filters, which can operate in -6, -12, and -30 dB/octave modes. Finally, there's a 2-band parametric equalizer. Unfortunately, *Sample Wrench* has no multiband graphic equalizer similar to the ones found in many editing programs.

To display frequency content over time, *Sample Wrench* provides an FFT window. I find this display to be less capable and harder to use than similar displays in other programs. The window makes little use of color and cannot be resized. You have to enter

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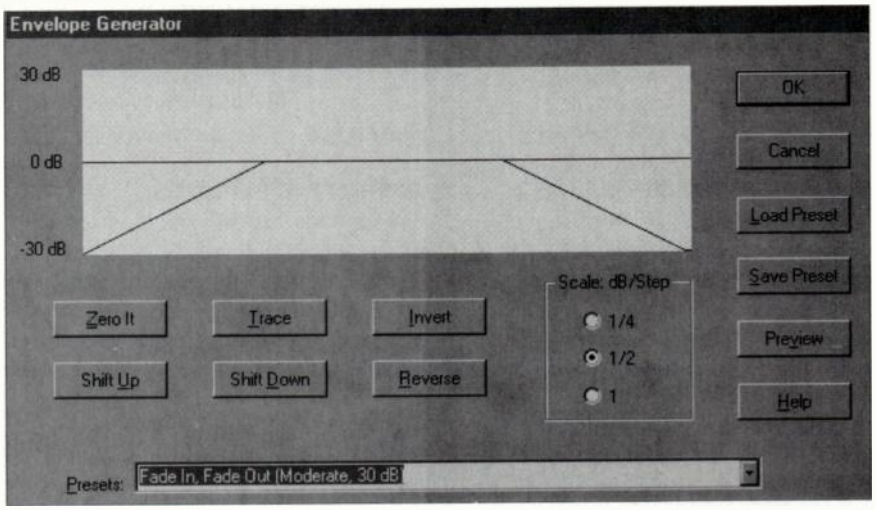

FIG. 4: *Sample Wrench*'s Envelope Generator allows you to draw your own curves or use the program's Presets. With the Trace feature, you can trace an envelope and use it with a different waveform.

the content to be analyzed in terms of sample numbers and record sizes instead of simply highlighting a waveform area with the mouse. And if you don't like your settings, you have to close the FFT window before you can change them.

Rounding out *Sample Wrench*'s list of features are several tools not commonly found in a typical studio. The Cross Multiply function multiplies the data in one waveform by that of another to create a new sonic result with attributes of both parent waveforms. The Differentiate and Integrate functions create new waveforms through the application of calculus. And Rectify removes (or inverts) everything below the horizontal axis.

The program also enables you to plot a transfer function on a graph. When you run your audio through this transfer function, the frequency content is altered according to the graph.

Finally, *Sample Wrench* includes a Spectral Warp effect. This effect takes lots of processing time, but it's fun to experiment with. Basically, Spectral Warp sweeps the pitch and timbre content of your sounds based on settings (from sliders) that control how much and how fast the pitch and timbre sweeps occur. This is a great tool for creating really wild special effects.

Each of these unusual tools is interesting to play with, but I had trouble getting predictable, musical results from them. Some of the effects (Integrate, for example) can completely alter the character of a sound. Nonetheless, if you like to create sounds that are totally "out there," these tools may be just for you.

Sample Wrench ships with a fully functional scripting language that is similar to Microsoft's Visual Basic. Many of the scripting functions allow you to manipulate sample data, which opens the door for highly complex batch processing. You can apply effects, change file

Product Summary

PRODUCT:
Sample Wrench 4.0 sample-editing software
PRICE:
$299 (w/printed manual)
$259 (electronic manual only)
SYSTEM REQUIREMENTS:
80486/50 MHz or faster PC; 8 MB RAM; 3 MB hard-disk space; Windows 95 or Windows NT; Windows-compatible sound card or MIDI interface
MANUFACTURER:
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EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	●●●◖
EASE OF USE	●●●
DOCUMENTATION	●●●●
VALUE	●●●◖

formats, combine files, or do just about anything else that *Sample Wrench* can do. Unfortunately, you don't get much control over sample playback with the scripting functions. So you can't, for instance, write yourself a WAV-file jukebox.

EASY GOING

Dissidents has gone a long way toward making its program easy to use. The more complex features are accompanied by a Presets menu, which lets you completely configure an effect or process by choosing a descriptive name from a drop-down list. I found descriptions such as "Send it through a fan" and "Cheap 1950s B-movie ray gun–izer" were right on the mark. And they made it easy to try out the more arcane features. Once you understand the program better, you can create your own Presets and save them to disk.

The online help system is excellent. Almost every dialog box has a Help button, which takes you to a description of each field in the box. At the bottom of the description, there's a link that takes you to a more detailed description of the effect in question. If nothing else, *Sample Wrench* is worth the price just for its educational value. The manual contains virtually the same text as the online help, but it's poorly organized and tough to read from front to back. So you're better off sticking with the Help system.

In spite of an overall good design, *Sample Wrench* can still use a few improvements. Most of the menus are long and unorganized, and the program makes no use of tabbed dialog boxes. Nor does it use right-mouse-button pop-up menus, which are becoming the standard these days. Even so, the program is not hard to use.

So is *Sample Wrench* for you? When you compare its features to those of other audio editors, the price is fair. But when working with large CD-quality files, *Sample Wrench* is a bit slower and more prone to audio glitches than other editors I've worked with.

If you develop sounds for samplers, I highly recommend *Sample Wrench*, especially if you want to create strange and unusual sounds. There's much to explore here; the program provides a generous collection of unique tools for twisting and contorting audio material.

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

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Edirol Sound Canvas SC-88 Pro

By Julian Colbeck

The latest Sound Canvas paints a pretty picture.

First things first. Who the heck is Edirol, and what does this name have to do with a Roland product? Music educators might know because Edirol is a subsidiary of Roland Japan that was created to promote, sell, and support Roland computer products directly to the education and computer markets in North America. The four latest Sound Canvas modules have been released in the USA under the Edirol name.

If the name Sound Canvas needs much explanation, you're probably an active member of the Anti–General MIDI League, or you might just have an overall aversion to MIDI. The Sound Canvas is the most widely recognized instrument that supports General MIDI, a set of carefully coordinated sounds designed for, but by no means limited to, instant playback of GM Standard MIDI Files.

Since the first Sound Canvas (SC-55) made its debut in 1991, Roland has produced more than a dozen Sound Canvas models. As you move up the line, each model includes an increasing number of sounds and editing features. In addition, the company has inserted the Sound Canvas engine into keyboards, sound cards, and software plug-ins. For industries as varied as multimedia, education, games, and commercial Standard MIDI Files, the Sound Canvas is the de facto standard sound module.

The SC-88 Pro is a tabletop module containing 1,117 Tones (instruments) that can be addressed via two MIDI Ins (A and B) and a built-in serial interface that can be connected directly to a PC or Macintosh. This provides 32-part multitimbral operation and 64-voice polyphony. The Tones are based on PCM samples and can be edited to a degree. There are no fewer than 64 types of digital effects, from reverbs and choruses to EQ, distortion, pitch shifting, and wah, all of which can be edited substantially.

ON THE SURFACE

If you're one of the hundreds of thousands of people who have already dipped into their pockets for an earlier model, you will quickly discover that the SC-88 Pro looks and feels familiar. The front panel on this half-rack module is dominated by a large, backlit, orange LCD that displays all the instrument's primary parameter values and shows real-time activity via level meters. This system is tried, tested, simple, and most welcome.

Buttons and controls to the far right of the LCD include increment/decrement buttons for the SC-88 Pro's main parameters (Part Select, Level, Reverb Depth, Key Shift, Delay, Pan Position, Chorus Depth, and MIDI Channel). Also on the front panel is a volume control, headphone output (⅛-inch minijack), and a MIDI In port that merges with one of the MIDI Ins on the back.

A group of buttons immediately to the LCD's right can mute a Part and reconfigure the instrument to the sound maps found in two earlier Sound Canvas models, the SC-55 and SC-88. Another group of controls is located along the bottom of the unit (in the separated panel that makes the instrument taller than 1U), which are used for Tone and effects editing.

At the rear are the two MIDI In ports (A and B), a switchable Out/Thru port, and the serial interface (see **Fig. 1**). The main, stereo audio outputs are joined by two auxiliary audio outputs that can be configured as stereo or two mono outs, and two audio inputs include a level control. All audio connections are RCA jacks.

PARTS IS PARTS

Like its predecessors, the SC-88 Pro is based on Parts that are initially assigned to the corresponding MIDI channels (Part 1 defaults to MIDI channel 1, etc.). Any Tone can be assigned to a Part, which has independent volume, pan position, reverb, chorus, and transposition settings that can be assigned on the front panel and displayed in the LCD's main page.

More detailed editing of performance parameters (Velocity sensitivity, Pitch Bend range, etc.) and sound parameters (filter, envelope, etc.) is also performed at the Part level. As in previous models, these edits remain associated with each Part until you change them. In addition, you can save these edits as new Tones in 256 RAM locations and use them in Parts in the same way you use the 1,117 ROM Tones.

With two MIDI Ins and associated Parts, you can coordinate up to 32 independent sounds simultaneously. Happily, the SC-88 Pro doesn't hardwire you into this arrangement. You can assign more than one Part to a particular MIDI channel for those times when you want to leave the safe confines of GM and produce bigger, multitextural sounds.

If you want to go even farther beyond GM, you can layer sounds, apply highly sophisticated effects settings (using the SC-88 Pro's Insertion Effects), and store the results in Patches (discussed later). There are 128 of these turbocharged Patches in ROM and 16 user Patch locations in RAM for storing your own creations.

Edirol's Sound Canvas SC-88 Pro offers loads of great GM/GS sounds and killer effects. Edirol is a subsidiary of Roland Japan.

The SC-88 Pro might not be a hands-on, knobs-and-switches kind of synthesizer, but this all-around flexibility within a General MIDI environment makes it stand out from the pack.

STRETCHED CANVAS

General MIDI is a great labor-saving approach, but many of us are getting a bit cheesed off with that cozy GM "sound." Like previous Sound Canvas models, the SC-88 Pro uses Roland's GS (General Standard), which is a superset of GM that offers additional sounds, effects, and control features. GS starts with the Capital Tones, which include the 128 basic GM instruments. In addition, it offers many Variation Tones, which include variations of the Capital Tones and completely new Tones.

Despite Sound Canvas' position in the market, many people still find its sounds quite ordinary, even dull, when played in isolation. Fair enough, but the whole purpose of GM is to make sounds that work well together in a song or backing track. And although other GM modules might offer a better "Soft Sax," funkier-sounding "Pick Bass," or generally beefier drums, a Sound Canvas will make your song gel, make it sound like a real mix.

Roland seems to have taken some of the criticism of its individual sounds to heart, and the SC-88 Pro has made significant improvements in a number of areas. For example, the drums are really quite superb. There are no fewer than 26 kits, which draw upon more than 400 individual drum/percussion sounds. In addition to three standard (acoustic) kits, there are kits for hip-hop, jungle, techno, brush, and ethnic styles as well as kits from different historical sound modules, such as the CR-78, TR-606, TR-707, TR-808, and TR-909. In the second standard kit, the toms are truly comparable to top-flight studio recordings on tape. Seriously, they're that good.

On the piano front, there are now six "Piano 1" sounds, with tones ranging from a standard, mellow, classical piano to a couple of new, harder pianos well suited to rock vamping, plus a European piano (a little thick with some interesting room ambience) and that old favorite, "Piano+Strings."

In the guitar department, a pedal-steel sound has finally made it onto the starting blocks as a Variation of "Jazz Guitar," and there are new steel-string acoustic and electric guitars, as well. While playing back some SMF songs that had been recorded on an older SC-55, I noticed that the "Muted Guitar" had been changed on the SC-88 Pro. The new Tone has more harmonics and simply didn't fit with my track. What to do?

The quick solution is simply to hit the SC-55 Map button on the front panel, and presto! The original "Muted Guitar" is back. Alternatively, I could have changed the Program Change assignment in the sequence. Either way, I really appreciate that Roland designers accommodate the vast number of SMFs based on earlier Sound Canvas models without sacrificing the chance to experiment with new sounds.

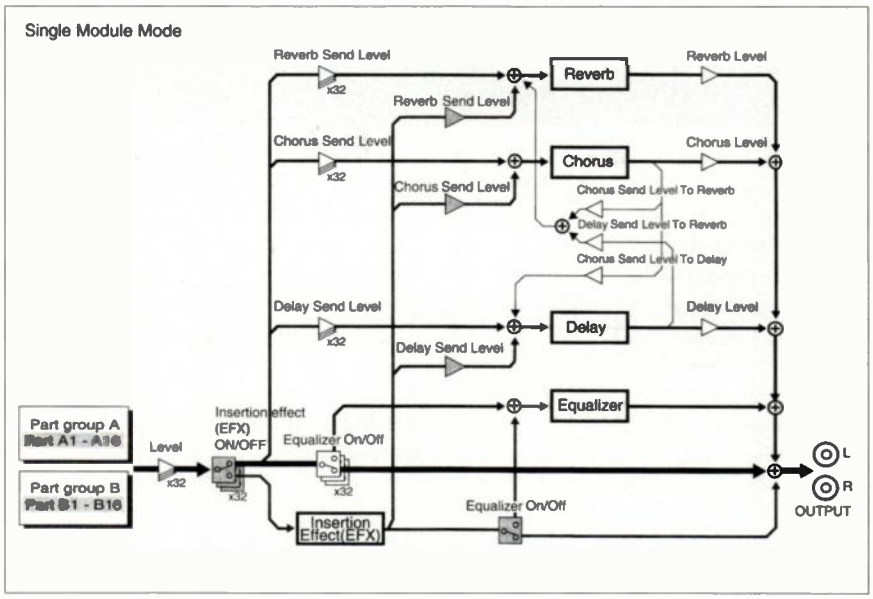

FIG. 2: The System and Insertion Effects can be configured in one of two modes. Shown here is Single Module mode. (Courtesy Edirol)

SUBTLE SHADINGS

The SC-88 Pro provides four separate System Effects, which include eight types of reverb, eight types of chorus, ten types of delay, and a 2-band EQ. The EQ bands have selectable shelving frequencies (±12 dB at 200 or 400 Hz for the low band and 3 or 6 kHz for the high band), and the display provides a graphic representation of your tonal adjustments.

The System Effects can be configured in one of two basic ways. In Single Module mode, all 32 Parts are sent through all four effects, which are arranged in parallel (see **Fig. 2**). The reverb, chorus, and delay are applied to each Part according to its corresponding send levels, which are similar to a mixer's aux buses. You can also send the signal through these three effects in various serial combinations. (Reverb is always last in the chain.) Finally, you can select which Parts are sent

FIG. 1: Thanks to its two MIDI In ports (A and B), the SC-88 Pro can handle up to 32 independent, multitimbral parts. The auxiliary audio outputs can operate in stereo or mono.

SC-88 Pro Specs

Synthesis Type	sample-based subtractive
Polyphony	64 notes
Multitimbral Parts	32 (2 MIDI Ins)
Tones (RAM/ROM)	256/1,117
Patches (RAM/ROM)	16/128
Insertion Effects	64 (various)
System Effects	8 reverb, 8 chorus, 10 delay
Audio Outputs	4
Audio Inputs	2
Dimensions	8.625" (W) x 9.875" (D) x 2.875" (H)
Weight	5 lbs. 12 oz.

through the EQ, which is applied to the dry signal and mixed with the wet signal from the other effects.

In Double Module mode, the Parts in group A and group B are sent through separate chorus and reverb effects. There is no EQ or delay available in this mode, but you can chain the chorus and reverb in series if you wish.

In addition, there are 64 fully programmable Insertion Effects, such as EQ, distortion, auto wah, rotary speaker, flanger, multitap delays, and a number of multi-effect algorithms. The Insertion Effects are easy to apply: simply press the EFX button and use three sets of dual-function buttons (which are shared by the sound-edit parameters) to select the effects type, parameter, and parameter value.

The Insertion Effects behave like processors you connect to a mixer's insert points, except that you can select only one Insertion Effect for all Parts in the SC-88 Pro. Once you select and set the desired Insertion Effect, you can specify which Parts are routed through it before they reach the System Effects (see Fig. 2). In Dual Module mode, the Insertion Effect is available only for Parts in group A, although you can apply it to Parts from group B if their MIDI channels are set to A01 through A16.

The quality of the Insertion Effects is staggering. You can take an otherwise average guitar sound and turn it into the most rip-snorting, wah-infested piece of plank spanking you've ever heard coming out of a synth.

The "Distortion" effect is fairly typical of the available editing detail. The parameters include Amp Type (small; single unit; large, double stack; large, triple stack), Amp On/Off, Low Gain, High Gain, Pan, and Level. Some of the effects even generate natty little graphics on the display screen.

CREATING NEW COLORS

The SC-88 Pro isn't just a roll call of presets. Each Part can be tweaked in terms of vibrato (rate, depth, and delay), filter (with resonance), and envelope (attack, decay, and release), and the resulting sound can be saved in RAM. For instance, the "Mute Guitar" can be transformed into a wah synth by lowering the filter cutoff and boosting the resonance. The editing procedure is extremely straightforward using the dedicated buttons along the base of the unit, even if the physical maneuvers are a little awkward given the unit's size and shape.

With a computer and a little extra enthusiasm, you can also effect tonal changes in real time using the SC-88 Pro's Non-Registered Parameter Numbers (NRPNs). This means you can manipulate the filter, envelope, and other parameters in real time from within a sequence. The procedure is a matter of accessing the corresponding Control Change numbers (for filter cutoff, the CC numbers are 6, 98, and 99) and progressively altering their values.

This can be a little time consuming to set up, but the results are quite startling. For anyone producing techno or dance music or for people who need to produce ambient, textural sounds, real-time control of NRPNs is definitely the way to go, and it's far less memory-clogging than using SysEx. If you use Steinberg's *Cubase,* you can configure a Mixer Map to perform real-time sound changes using the NRPNs, which is simplicity itself once you have the basics set up. Similar controls are available in other sequencers, such as *Cakewalk* and *Musicator.*

PREMIXED PIGMENTS

To move well beyond GM territory without any effort at all, you can dial up the SC-88 Pro's Patches, which are complete

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MANUFACTURER:
Edirol Corporation
tel. (360) 332-4211
fax (360) 332-5505
e-mail edirol@edirol.com
Web www.edirol.com
CIRCLE #443 ON READER SERVICE CARD

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

system setups that can combine up to 32 Parts and four effects. Accessing the Patches from the front panel is a bit complicated: you must press the All and Mute buttons simultaneously and then wait for about half a second while Patch 0 loads up, after which you scroll through the Patches to find the one you want. Fortunately, you can also call up Patches via MIDI Program Change, which is much more convenient.

The guitar Patches are exceptional. The wah guitars, overdriven Strats, and warm blues guitars do not sound like they are synthesized at all, much less like they're coming from a relatively inexpensive GM tone module. In addition, there are dense Hammond

▼

Roland has taken the criticism of its individual sounds to heart.

tones, complete with swirling Leslie effects, and cool Rhodes pianos with wide chorus. And remember that these Patches are editable, with sixteen RAM locations for new sounds.

THE FINAL WORK

For anyone working in an environment that requires GM (such as multimedia presentations, games, and SMF production), the SC-88 Pro is a must-buy. Musicians who value the labor-saving aspects of GM but have hitherto felt that GM modules are too restricting and "amateurish" can be confident in this module's ability. In a number of areas, especially drums, it delivers the goods as professionally as any top-flight synth. For anyone who envies the flexibility offered by GM (the ability to easily trade files, having instant setups, etc.) but doesn't want the sonic limitations that normally go along with it, the SC-88 Pro is a superb solution.

Julian Colbeck *has recently been on tour in Japan with John Wetton, who, now suitably sequencer and sampler skilled, says he has almost ceased playing bass on record, even though he's still arguably one of rock's finest.*

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Q Up Arts Voices of Native America

By Dan Phillips

Vocals, flutes, and percussion from North America's indigenous peoples.

One of the current trends in sample collections is to spotlight exotic sounds from far-flung corners of the Earth. I think we'd all agree that the resulting multicultural cross-fertilization is a good thing. With the melodies and rhythms of Asia and Africa ringing in our ears, however, it's easy to forget that there are unique, worthwhile, and rarely heard timbres that originate from this continent, as well.

Voices of Native America, from Q Up Arts, offers percussion, flute, and vocal samples from a number of Native American cultures. The collection was produced by Douglas Morton, and the flutes, drums, and percussion were performed by Douglas Spotted Eagle. It is available in Akai S1100, E-mu ESI-32 and EIV, Kurzweil K2000/K2500, Roland S760 and S700, Digidesign SampleCell, and audio CD formats; I reviewed the Roland version.

DRUMS AND SHAKERS

The percussion patches are my favorite sounds in this collection. There are multisamples of thirteen different drums, including Deerskin, Large and Small Sharkskin, Horse Hide, Painted Drum, and more, spanning the gamut from huge and slamming to small and delicate. There are also three shakers, including a bell dress.

The emphasis in the percussion section is on single-hit multisamples, although there are also a few drum and shaker loops. All samples are offered in both stereo and mono versions. (This is true of the flutes and vocals, as well.)

Most of the drum patches comprise a large number of samples covering a wide range of different articulations and intensities, which makes for extremely satisfying, expressive playing. For instance, the Large Sharkskin patches include more than 50 samples, varying from mellow and muted timbres to ringing, timbale-like tones. A few samples use the sound of scraping across the drum, instead of hitting.

The Deerskin drum patches also offer diverse sounds, with 39 samples in all. There are half a dozen very deep rumbles which resemble a surdo (a Brazilian drum used in sambas) or certain Roland TR-808 sounds. These are suitable for layering as "boom" supplements to tamer kicks. On the other side of the spectrum are some extremely punchy, aggressive hits that remind me of some of the drums on Peter Gabriel's *Us* album and would be useful for adding a tribal-percussion element to similar productions.

The Horse Hide samples are simpler in tone, with a faster decay and less ringing of harmonics. I particularly like the first patch, MltHrsHid1SQ, whose dark, punchy hits sound almost like slightly resonant synth percussion. The Cheese Box samples include some interesting, timpani-like, hollow and ringy timbres.

The Apache shaker samples have a great, jangly sound, but I would prefer fewer rolls and a few more single hits. On the more ambient side are the Bell Dress samples, which are long and diffuse with cascades of delicate, slightly dulled jangling; these are not so much percussive as textural.

Although I really like most of the source samples, the programming in the percussion patches leaves something to be desired. For instance, the Multi patches present menus of different samples spread out across the keyboard, but the samples do not have transposition disabled, which means that all except the one mapped to middle C play at the wrong pitch. It's a simple matter to disable transposition, but it would be nice not to have to do this yourself.

In addition, a small number of the samples (four in the Deerskin Drum patches and one in the Horse Hide patch) have strange clicks, perhaps due to an error in an audio transfer process. These show up in the Akai, Roland, and the Kurzweil CD-ROMs but not in the audio-CD version. Q Up Arts says that it will release an updated version that will fix the clicks and offer Multi patches with and without transposition turned on.

**tured on Q Up Arts' *Voices of Native*
l, Roland, SampleCell, and audio-CD**

FLUTES

Six different flutes are represented, including White Cedar, Bamboo, Berlin, Chimuava, Redwood, and Fish flutes. For each flute, the disc includes both single-note multisamples and sampled phrases, and each multisample offers three performance techniques: legato with vibrato, legato without vibrato, and staccato.

The programming on this CD is fairly uniform throughout the flutes and includes Velocity switches that bring in the staccato samples at high Velocities. In general, I found the flutes to be quite playable. In all patches, Aftertouch is routed to pitch, making the characteristic, plaintive bends flow naturally from the keyboard. I enjoyed the pure, breathy Bamboo flute as well as the thick, deep, and slightly gritty Redwood flute.

The sampled phrases are plentiful and well performed, ranging from brief statements to extended rhapsodies. The plaintive, soulful Chimuava Flute performances were standouts, as were the more than 50 phrases in the White Cedar bank.

The multisample patches rather lack the breathy high end of the sampled phrases, which I found disappointing. Looking into the programming, I found that the samples had been routed through a Velocity-modulated lowpass filter so that I had to play really hard to hear the samples with their high end intact. In this case, I'd be willing to give up a little expression for timbral integrity.

For some of the instruments, there are more samples on the audio-CD version than found on the CD-ROM. For instance, the audio version of the Bamboo flute includes samples on low D4 and high F5, both of which are missing from the CD-ROM.

VOCALS

Judging from the title, you might expect *Voices of Native America* to offer a good selection of vocal samples—and you won't be disappointed. The CD includes more than 180 stereo samples of traditional Native American vocalizations organized by tribal origin, including fragments of chants and songs, yells, cries, and more. Many of the samples are of solo voices, but there are also a handful of powerful samples with male ensembles chanting in unison.

▼

Phrases range from brief statements to extended rhapsodies.

Among the Navajo samples are several cool, pitched falsetto yells, throaty "hey!" yells, and a set of softer, contemplative phrases from what sounds like an older man. The Nez Percé vocals are more rhythmic, and several of the phrases are repeated at different pitches, which should make them convenient to work with in production.

The Native Yells patch (tribe unidentified) is a little low in energy for my taste, but the outstanding Zuni samples more than make up for this with a goodly selection of extremely high-octane cries and yelps.

In contrast, the Shoshone vocals are songlike, simple, and melodic, and the Pueblo bank features a selection of solemn chants from a deep male voice. All in all, the disc supplies a very broad selection of high-quality material.

WITH GREAT RESPECT

Samples this good deserve well-done documentation, but this package rates only fair in that regard. The documentation is very friendly and conversational and includes some interesting folklore, but this unfortunately makes some of the information a little hard to find. The CD booklet is graphically attractive, with colorful photographs of various flutes, drums, and rattles; however, many of the instruments pictured are not included in this sample library but will be featured on the planned second volume.

Voices of Native America offers a unique collection of sounds. This CD-ROM should be useful to those searching for unique world-music textures as well as those who specifically need Native American material. The samples are great, and Q Up Arts has pledged to correct the few problems I found in the drum section. Furthermore, the entire project appears to have been carried out with great respect for the cultures of North America's indigenous peoples. Both the product and the respect with which it was created are praiseworthy.

Dan Phillips *is a singer-songwriter-producer, a principal in Touch Productions (music for television, film, and multimedia), and a team member at Korg R&D.*

Product Summary

PRODUCT:
Voices of Native America
sample CD
PRICE:
CD-ROM $299
Audio CD $99
MANUFACTURER:
Q Up Arts
tel. (800) 454-4563
or (801) 488-0062
fax (801) 488-0065
e-mail qup@sensemedia.net
Web www.quparts.com
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EM METERS	RATING PRODUCTS FROM 1 TO 5
QUALITY OF SOUNDS	● ● ● ● ◖
PROGRAMMING	● ●
DOCUMENTATION	● ● ◖
VALUE	● ● ●

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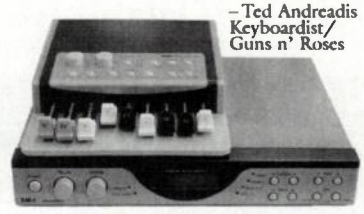

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Passport Master Tracks Pro Audio 1.0 (Win)

By Zack Price

Can an old sequencer learn new digital audio tricks?

Most people know Passport Designs as a leading developer of notation programs for a variety of needs and budgets. There was a time, however, when Passport also marketed one of the leading MIDI sequencing programs in the industry: *Master Tracks Pro.* But as the years went by, *Master Tracks Pro* gradually lost ground to more powerful sequencers.

Now, after sitting on the fence for a while, Passport has jumped into the fast-moving digital audio sequencer race with *Master Tracks Pro Audio.* The big question is: Can Passport's new product compete in the crowded field of entry-level audio sequencers from companies such as Cakewalk, Steinberg, and Voyetra? Well, it pains me to say it, but *Master Tracks Pro Audio* is not as competitive as it could be.

SPLIT PERSONALITY

Master Tracks Pro Audio is actually two separate programs bundled into one package. The MIDI sequencer is Passport's stalwart *Master Tracks Pro.* The digital audio program is Innovative Quality Software's *SAW SE (Software Audio Workshop, Special Edition),* a slightly scaled-down version of *SAW*6.0. Each of the two programs, by itself, is solid and functional.

Unlike other digital audio sequencers, however, *Master Tracks Pro Audio*'s MIDI and digital audio tracks do not exist in an integrated desktop. An environment in which both MIDI and digital audio tracks can be viewed and accessed from within a single screen is now the expected standard. An integrated desktop doesn't force you to waste time flipping back and forth between separate screens to view digital audio and MIDI tracks. In *Master Tracks Pro Audio,* the situation is even worse: you have to flip between completely different programs.

The main advantage of programs with integrated desktops is that MIDI tracks and digital audio tracks look and behave similarly, making the program's user interface more consistent. In contrast, you only need to look at the screens for the *Master Tracks Pro* sequencer (see **Fig. 1**) and the *SAW SE* digital audio program (see **Fig. 2**) to realize that the user interfaces of the two applications are entirely different. To be fair, it's not hard to learn how to use each program. In fact, taken by itself, each program is fun to work with. Unfortunately, trying to operate the two programs in tandem reveals the flaws inherent in *Master Tracks Pro Audio*'s modular approach.

Because the two types of tracks appear on separate screens, editing or aligning digital audio tracks with reference to MIDI tracks is especially difficult. Furthermore, the data in the MIDI tracks is positioned in relation to bars and beats whereas regions in the digital audio tracks are positioned in relation to elapsed time.

Moreover, the different video resolutions required by each program reveal another important problem that occurs when you try to operate both programs on the same desktop. Though *Master Tracks Pro* can work with a video resolution of 640 × 480 (pixels), *SAW SE* demands a minimum resolution of 800 × 600, and IQS recommends that you use 1,024 × 768 resolution. If you have a 14-inch monitor, all you have to do is go once to the Piano Roll Editor in *Master Tracks Pro* to see how eye-straining it can be to edit in that window at higher resolutions (see **Fig. 3**).

Although *Master Tracks Pro* lets you zoom in on the displayed data, the zoom is only horizontal: there is no vertical zoom that makes the notes thicker in appearance. Without a vertical zoom at higher video resolutions, grabbing and editing notes becomes unnecessarily difficult.

TWO SHIPS PASS IN THE NIGHT

One might argue that Passport's modular approach accentuates the strengths of the separate MIDI and digital audio programs. But *Master Tracks Pro Audio* isn't even truly modular. The sequencer and hard-disk recorder are two entirely separate programs and behave as such. They lead such separate lives that neither program has a hot link that allows one application to open the other. Instead, each program has its own application icon. Amazingly, in Windows 95, they're not even grouped together automatically within one program menu folder. Of course, this means you actually start and close each "module" separately, just as you would with any two programs. If that's Passport's definition of modular, then *all* the programs in my computer are modular extensions of *Master Tracks Pro Audio.*

Admittedly, flipping between the two programs is easy once they're both open. In Windows 95, you can simply switch between the two applications from within the taskbar. If you prefer to keep the taskbar hidden or if you're running both programs under

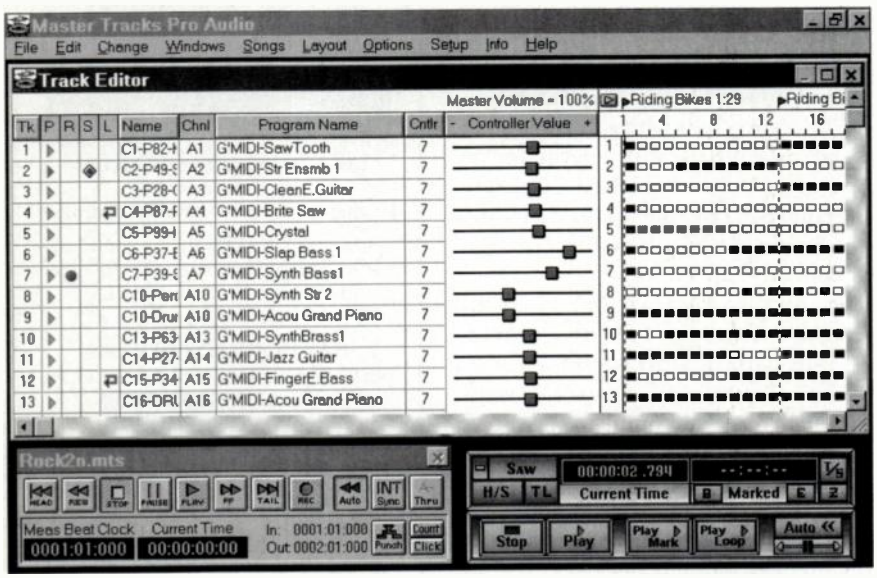

FIG. 1: *Master Tracks Pro*'s Track Editor window displays track information on the left and measures on the right. Darkened boxes indicate measures containing MIDI information. *SAW SE*'s transport bar appears in the lower right.

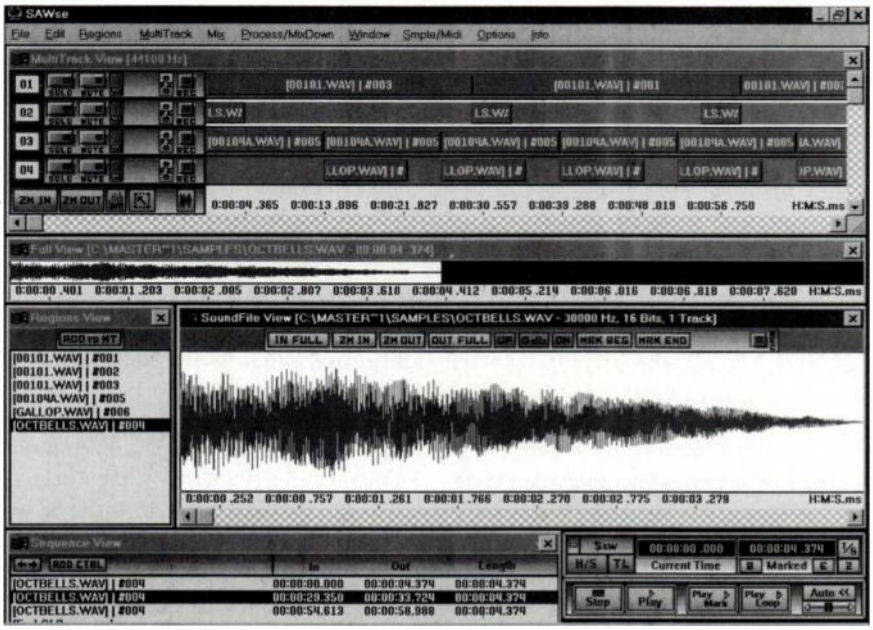

FIG. 2: *SAW SE*'s Multitrack window (at the top of the screen) shows digital audio regions arranged along a timeline.

Windows 3.1, you'll probably find it easier to use the Hide/Show (H/S) button in *SAW SE*'s transport control. The Hide/Show button toggles between the two programs, or more exactly, the button hides *SAW SE* from the user's view. However, its transport bar remains visible at all times in this mode.

Keeping *SAW SE*'s transport bar visible is especially useful when using the IQS Direct Lock as the master clock for the two programs. The IQS Direct Lock is a software SMPTE/MTC synchronizing "hook" that provides synchronization between just these two programs, and it works perfectly. All you need to do is set *SAW SE* as the master that generates SMPTE/MTC and set *Master Tracks Pro* as its slave. As with any slaved program, pressing Play or Record in *Master Tracks Pro* puts it in a wait state until the Play button is pressed in the transport of the master program *(SAW SE)*.

In case you need to record digital audio tracks while playing back MIDI tracks, *SAW SE*'s Record window also uses a transport bar that controls *Master Tracks Pro*'s transport operations. And just like *SAW SE*'s Playback transport, the Record transport can remain visible at all times.

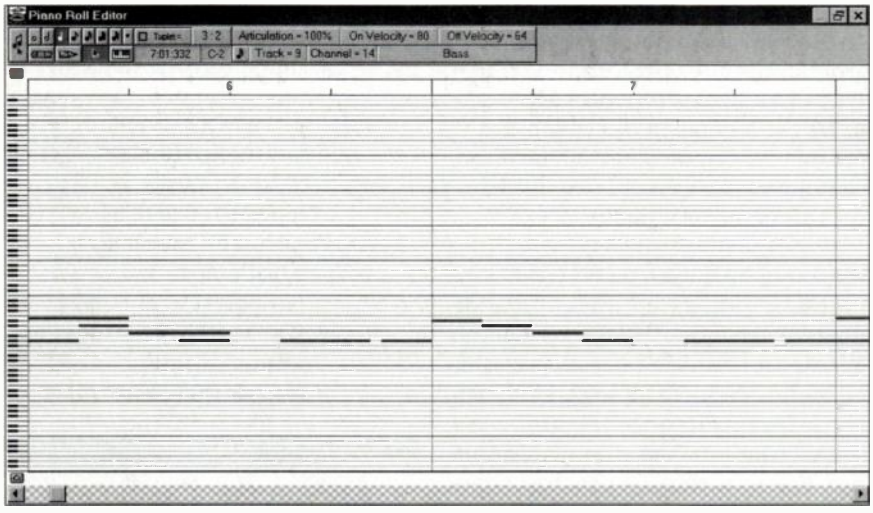

FIG. 3: Even at the maximum zoom-in setting, grabbing notes in the Piano Roll Editor window can be difficult at higher video resolutions. This shot was taken at 1,024 × 768 resolution.

MAKING TRACKS

Although it's not the most powerful sequencer in the world, *Master Tracks Pro* is nevertheless a rock-solid performer with a good assortment of MIDI event-editing functions for handling most common sequencing tasks. The program provides tools for thinning notes and controller data, quantizing, humanizing, and applying time compression and expansion. It also includes a Change Filter (see **Fig. 4**) that sets the criteria by which notes and events are selected for editing. The Change Filter in *Master Tracks Pro* may not be as powerful as the Interpolate feature in *Cakewalk Professional,* but it does provide surprisingly effective control over many editing operations.

Master Tracks Pro offers all the standard ways to view MIDI information, including a Track Editor—by default, the main screen—and a traditional Event Editor and Piano Roll View. The program also includes a basic Notation Editor, but it displays and prints only one track at a time. Moreover, all data appears only on a grand staff; you don't have a choice of seeing the information

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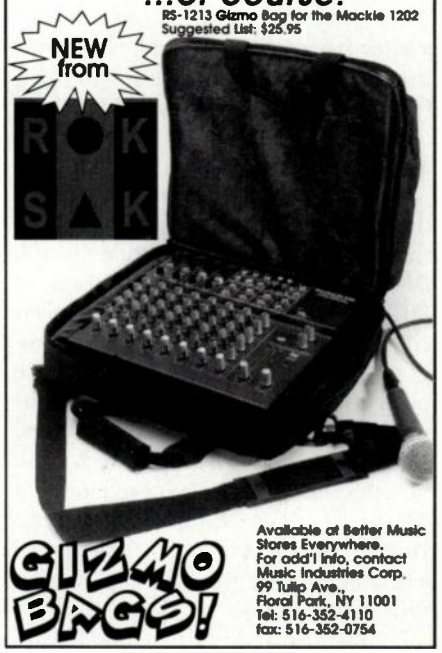
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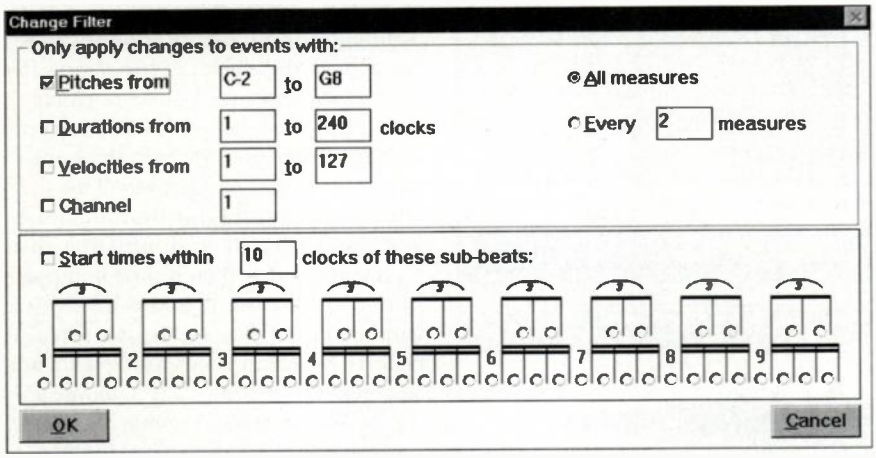


FIG. 4: The Change Filter in *Master Tracks Pro* enables you to apply various filter parameters to the transforms listed in the Change Menu.

with a single clef. The Notation Editor is really geared for quick, basic editing and printing.

Master Tracks Pro also provides graphic editing in separate windows for specific types of MIDI events. There are individual graphic editors for Pitch Bend, Modulation, Control Changes, Velocity, and Tempo. If you don't want to draw in data with these windows, you can also enter number values in the Change menu. Often, this gives you smoother, more precise control over Control Change messages than is possible with the graphic editor windows.

Despite all of its useful features, *Master Tracks Pro* is showing signs of developer neglect. For example, the software supports up to sixteen MIDI ports (for a total of 256 channels), yet there are still only 64 tracks in which to put those potential channels. Not having a separate track for each channel isn't the worst problem in the world, but I feel that if you have a 256-channel capacity, there should be a track available for each of those channels.

Another sign of inattention concerns the number and types of Device Files that are available for immediate use. A Device File contains the patch list for a MIDI device, which can be displayed conveniently in the Track Editor's Program column. Devices with multiple banks of sounds, such as the different versions of the Roland Sound Canvas, should have a Device File for each bank of sounds. Despite Passport's claim that *Master Tracks Pro* now features more Device Files than before, the list of available files, in my estimation, is woefully incomplete.

For instance, only the first nine Roland GS Variations banks (plus the Capital Tones) are included in *Master Tracks Pro*. And only one bank of Yamaha XG sounds is available as a Device File. Amazingly, none of the GS or XG drum sets are included. (According to Passport, by the time you read this, a free upgrade will be available that includes full support for Yamaha XG Devices.) Although it isn't hard to add sound banks—Device Files can be created and edited with any text editor—all the GM, Roland GS, and Yamaha XG devices, their sound banks, and their drum sets should be available for immediate use. After all, these are probably the most common MIDI devices that the typical *Master Tracks Pro* user owns. Why not save the user from having to do more setup work than is necessary?

MUSICAL SAW

Many of the features in *SAW SE* are identical to those in its parent program, *SAW Plus*. Rather than go over the same ground again, I refer you to the *SAW Plus* review in the November 1996 issue of **EM** for a detailed discussion of the program's operation. Instead, we'll concentrate on how *SAW SE* compares to the rest of the *SAW* family.

As with *SAW* 6.0, which is itself a "lite" version of *SAW Plus*, *SAW SE* can have four mono or stereo tracks. In addition, all versions of *SAW* have Output Tracks for premixing (bouncing) digital audio tracks or for creating a new track from one or more processed tracks. The number of available Output Tracks varies with each version. *SAW SE* has only one Output Track and supports only one stereo sound card at a time. *SAW* 6.0 has two Output Tracks and supports two sound cards, and *SAW Plus* has four Output Tracks and supports four sound cards.

As with the other members of the family, *SAW SE* provides real-time effects processing. The program comes with all the effects that are standard issue in *SAW* 6.0 and *SAW Plus*: ParaGraphic EQ, Compressor/Limiter/Gate, Echo/Delay, Reverse Audio, and more. But because *SAW SE* is an "extra lite" version, you can't use the additional plug-ins that are available for *SAW* 6.0 and *SAW Plus*.

If you find that you need to use those additional plug-ins, you can upgrade to *SAW* 6.0 for $199 or to *SAW Plus* for $319. You can also upgrade to the 32-bit native *SAW 32* and *SAW Plus* 32 for $239 and $399, respectively, but you won't be able to use the optional plug-ins with these versions because the plug-ins were designed for the 16-bit versions of *SAW*.

What's much more distressing is that you'll lose *SAW SE*'s IQS Direct Lock feature if you upgrade to *any* version of *SAW*. You can, however, use the SMPTE/MTC features of some Midiman and

Product Summary

PRODUCT:
Master Tracks Pro Audio 1.0 digital audio sequencer
PRICE:
$249
SYSTEM REQUIREMENTS:
66 MHz 80486 DX2 or better (Pentium 120 recommended); 16 MB RAM; 256-color monitor with 800 × 600 resolution or better; full-duplex sound card (DAL CardD recommended); Windows 3.1 or Windows 95
MANUFACTURER:
Passport Designs
tel. (415) 349-6224
fax (415) 349-8008
e-mail info@passportdesigns.com
Web www.passportdesigns.com
CIRCLE #445 ON READER SERVICE CARD

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

Music Quest MIDI interfaces to sync *SAW* and *Master Tracks Pro*. (Contact Intelligent Quality Software for the most recent list of supported MIDI interfaces; tel. 702/435-9077; fax 702/435-9106; e-mail info@iqsoft.com; Web www.iqsoft.com.)

Finally, IQS recommends using at least a Pentium 120 with 16 MB of RAM for smooth playback while processing. Using real-time effects can be CPU intensive, even for only four tracks of playback. You can use the effects on a slower machine, but the number of effects you can run in real time diminishes according to system performance. Of course, you can always process all effects offline to an Output track.

SUM OF ITS PARTS

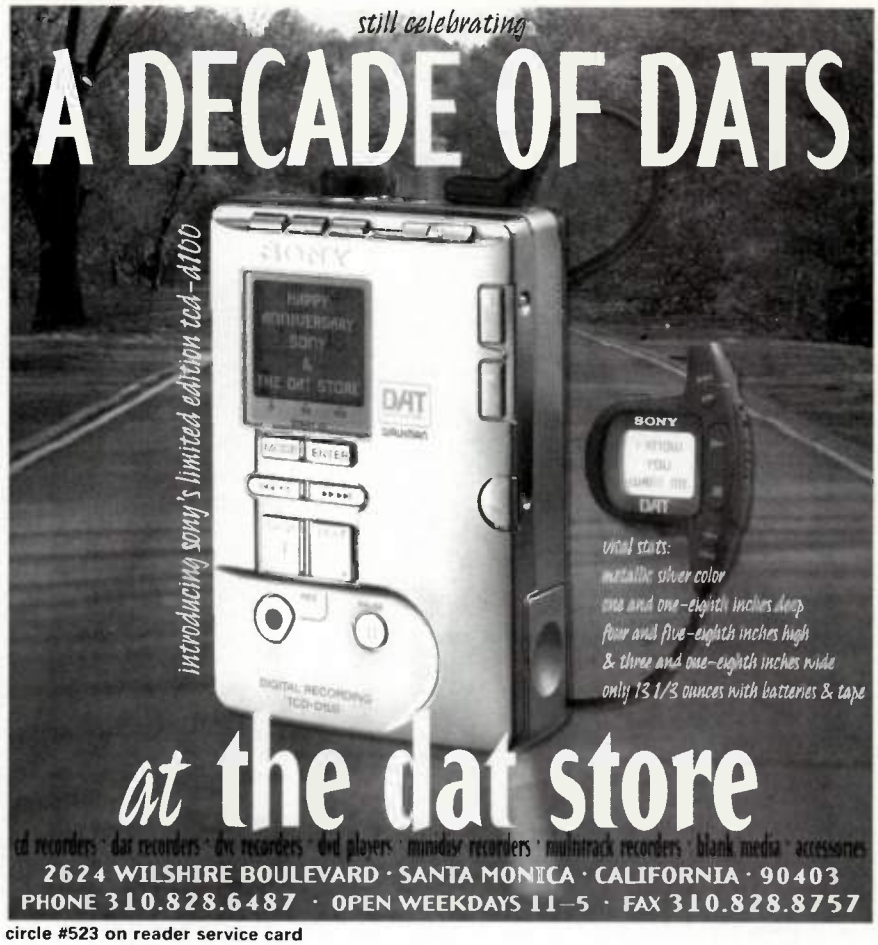
Master Tracks Pro Audio is a package in which the whole is less than the sum of its parts. As stated earlier, each program is easy to use and fun to work with by itself. Unfortunately, working with them together is not as easy as working with a digital audio sequencer that displays MIDI and audio tracks on a single screen.

Master Tracks Pro Audio does have one major advantage over other inexpensive audio sequencers for Windows: the ability to perform real-time digital audio effects processing. Although the inclusion of real-time effects plug-ins is unusual in *Master Tracks Pro Audio*'s price range, this still doesn't compensate for the program's other deficiencies.

▼ The IQS Direct Lock synchronization works perfectly.

Passport must decide whether it wants to be a serious competitor in the digital audio sequencer market. And that requires a lot more than just jury-rigging two programs to run together. To get back into the race as a winner, Passport will have to offer a more innovative and more competitive product than the current version of *Master Tracks Pro Audio*.

Zack Price *owns and operates Tin Ear Productions. Please address any inquiries to tinearpro@aol.com.*



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RATE THE ARTICLES IN THIS ISSUE!

October 1997

We want to know what you think of the articles in *Electronic Musician*! Now you can use your reader service card to give us feedback about **EM**'s editorial coverage. We have assigned a rating number to each of the main articles in this issue. Please select a rating for each article and circle the appropriate number on your reader service card:

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Earthworks TC40K

By Jim Miller

This omni condenser mic delivers stellar accuracy, imaging, and detail.

I have been a big fan of Earthworks' condenser mics ever since I reviewed the OM1 and TC30K for **EM** last year (see the November 1996 issue). I was convinced that no other mic in their price range could be as accurate. But now I have changed my mind; my new favorite mic under $1,000 is Earthworks' TC40K.

The TC40K, like the TC30K and now-discontinued OM1, is a small-diaphragm, omnidirectional condenser mic with a brushed stainless-steel body. It has an on-axis frequency response of 9 Hz to 40 kHz, which is impressive by any standard. The mic requires 48V phantom power and will tolerate sound pressure levels of 150 dB—higher than what our ears can handle. (The threshold of pain for most folks is about 130 dB. As a reference, a full symphony orchestra playing *fff* would deliver somewhere around 110 dB.)

Matched sets are available at no extra charge, and the company says matched mics typically vary by no more than 0.25 dB at any point across the 20 Hz to 20 kHz frequency range. The mics ship in an attractive, solid cherry-wood case.

The TC40K works fine with the transformer-coupled inputs found on high-end consoles from companies such as Neve, Summit, and Focusrite as well as with electronically balanced inputs such as those found on Mackie, Soundcraft, and TASCAM boards.

To audition a mic with specs like the TC40K's, I wanted a mic preamp with similar performance. So I made a few calls, did a little begging, and borrowed an Oram Microphone Workstation (MWS) mic preamp (which lists for $2,195), designed by John Oram, who is acknowledged as "the father of British EQ." The MWS has a frequency response that's down only 3 dB at 40 kHz, which assured me I'd be getting the best recordings these mics had to offer. But you don't need a high-end preamp to appreciate the sound of these exceptional performers. After grudgingly returning the MWS to its rightful owners, I did a number of additional sessions with the TC40Ks and my Mackie 1604-VLZ board. I used the Mackie's onboard solid-state preamps as well as an Aphex Model 107 Tubessence preamp, and the mics delivered consistently excellent recordings.

Earthworks' TC40K omnidirectional condenser mic produces extremely accurate, detailed recordings and is an excellent choice for close-miking instruments.

STARTING UP CLOSE

My first test was with two acoustic 12-string guitars: a relatively inexpensive Ibanez and a pricey vintage Gibson B-45-12. Starting with the Ibanez, I placed the TC40Ks about six inches away from the body, pointed at neck and bridge; slipped on a set of AKG headphones; and started to play. The sound was simply glorious, with tons of upper harmonics that gave the budget 12-string an almost otherworldly top-end sparkle but with plenty of body and richness. I spent nearly two hours sampling this guitar and ended up with a most impressive 12 MB multisample.

Wondering how the Gibson would fare if the Ibanez sounded so good, I carefully removed the guitar from its plush-lined case and started to play. Indeed the sound was absolutely wonderful, but I was surprised to discover that there wasn't as huge a sonic difference between the Gibson and the Ibanez as I expected. True, the Ibanez is an inexpensive instrument, and its construction quality and action don't compare to the Gibson. But its sound is impressive, and the TC40Ks captured it beautifully. My initial conclusion: the TC40Ks, when set up properly, deliver excellent sound with even a modestly priced instrument and accurately capture the superb sonics of a finely crafted instrument like the Gibson.

Like all omnidirectionals, the TC40Ks work best in closer proximity to the sound source than you might ordinarily place a cardioid or hypercardioid condenser. In addition, you can work just about as close as you like without any of the nasty boominess typically caused by the bass proximity effect of cardioids. This makes it particularly useful when sampling or recording relatively quiet instruments such as dulcimers, clavichords, or harpsichords.

This doesn't mean you can't move the mics a bit farther away. I tried recording some "Pinball Wizard"–style acoustic guitar to DAT with the mics placed about two feet away. As you might guess, because these are omnidirectional mics, I

got a lot of room sound. The recording sounded like a real acoustic guitar being played live in a real acoustic space: very spacious, but with a nice, tightly focused stereo image.

THE MAGIC OF HARPSICHORDS

I had been working with the TC40Ks for a few days when I had the pleasant surprise of getting access to a beautifully crafted William Dowd harpsichord, built in Boston in 1975, which now resides at Florida State University. This particular instrument is in great demand and had just been tuned, so I had no choice but to rush down to the campus with my DAT recorder, Oram MWS, and the matched set of TC40Ks.

I set the mics up just four inches above the instrument's strings, about two feet apart. Then, listening through the headphones, I adjusted them slightly until I had a well-balanced sound across the full 5-octave keyboard. Considering how close the TC40Ks were to the strings, I was surprised to hear almost no perceptible volume difference when playing notes at the far ends of the keyboard compared to those right below the mics.

Halfway through my allotted 2-hour recording session, a jazz quartet began rehearsing in the next room. The piano player was loud enough, but the drummer pounded his set unmercifully. I sensed disaster, but knowing I'd not likely get another opportunity to rerecord this instrument anytime soon, I just pressed on, stopping only when the jazz cats hit some of the bigger crescendos.

When I finished the last note on the Dowd, I rewound the DAT to see just how noticeable the sonic damage was. Despite some audible snare and kick transients in spots, I heard almost none of the ensemble on the tape, and when I did, it was always at the points where I had stopped playing anyway. Returning home, I was still concerned and ran the last half of the DAT through my studio monitors, but this only confirmed what I'd heard in the headphones: the Earthworks mics, having been placed so close to the strings and behind the harpsichord's lid, were able to adequately reject the unwanted music from my recording.

TASTE MY METAL

Heavy metal, that is. To test the TC40K's ability to stand up to ridiculous SPLs, I stuck my Peavey Classic 50 amp in a closet, turned up its volume, shoved a TC40K right up to the front of the speaker, covered the whole thing with two thick blankets, and then shut the door. I plugged in my Les Paul with Zoom Driver set to Metal mode and made all sorts of ungodly racket, running the signal directly into my Kurzweil K2500.

Nothing seemed to daunt the mic: not hammering out power fifths, not scraping my pick along the low E string, not even tapping the strings right against the pickup magnets (ouch!). All were captured cleanly—if you can use that term to describe what I was doing. Back when I test drove the OM1 and TC30K, I found them easily able to handle even the most explosive popped bass notes, and the TC40K was just as capable of ignoring such hot, spiky transients, though my amp levels were even higher this time around.

Next I hauled out an old Ludwig snare I had purchased at a garage sale, stuck the TC40K right up close to the head, and began beating the drum with superheavy sticks. Again, no distortion. Ditto on a 21-inch Zildjian crash/ride cymbal I had inherited. All of which means that these might be the perfect mics to use for that 747 takeoff recording you've always wanted to do.

I also took these mics to a recording session where I was laying down some guitar tracks. After the session was over, I set the TC40Ks up and had the drummer pound away at his set with the mics in various positions (close-in, across the room, and overhead). The best sound was with the mics just three feet away from the drum kit. More distant miking, as you might expect with omnidirectionals, picked up just a little too much room sound, giving the drums a bit less presence.

I compared the TC40K tracks with some previous recordings of a different drummer miked with TC30Ks. My impression is that the TC40Ks have a bit more punch and just a tiny bit more air at the top end. Both recordings were great, but I definitely preferred those made with the TC40Ks.

AM I BEING COHERENT?

All of the previous tests indicated that these mics were capable of delivering accurate, detailed recordings of close-miked solo instruments. Where many microphones fail, despite excellent frequency-response curves, is in time coherence. This means that many mics actually smear the time domain, with certain frequencies being transduced sooner or later than others or with some amount of ringing or resonance after the fact, resulting in a loss of much of the information that tells us exactly what kind of environment we're hearing the music in. Is it a bathroom, or a medium-sized room, or a jazz club? Essentially, time-domain accuracy equals realism, the sense of actually being there for the performance.

To test this mic, I initially was going to record a live rock band. But then a better opportunity presented itself. Some friends who play in a local Irish folk band, the Long-Forgotten String Band, invited me over to hear them practice some new tunes. They were only too happy to allow me to do a live recording of the session. The group has two guitars, a mandolin, bass, two flutes, banjo, fiddle, and pennywhistle. The complex sound of all these instruments playing together would offer the mics a nice workout.

I had the musicians form a semicircle and placed the TC40Ks about eight feet away from the back of the circle so that the closest players were only about four feet away. Despite the fact that this session took place in a medium-sized living room (about 16 by 22 feet), the

Earthworks TC40K Specs

Frequency Response (on-axis)	9 Hz–30 kHz (±1 dB); 9 Hz–40 kHz (±2 dB)
Polar Pattern	omnidirectional
Sensitivity	8 mV/PA (-42 dBV/PA)
Maximum Acoustic Input	150 dB SPL with 5 kΩ load
Self-Noise	26 dB SPL equivalent (A-weighted)
Dimensions	9" (L) x 0.87" (D)
Weight	0.5 lb.

hardwood floors and lack of heavy drapes and other sound-absorbing furniture meant I'd have a rather live recording environment. I placed the Earthworks mics about a foot apart right at the spot that my ears told me the sound was the sweetest.

The mics performed incredibly well with this material; nobody would ever guess that this session didn't take place in a studio. The sound was absolutely stunning, with every detail of every note from each instrument captured flawlessly. The left-to-right spatial imaging was amazingly realistic. Had the group been a little quieter (less coughs, foot taps, etc.) and more familiar with the material, I believe this tape would have been good enough to consider releasing commercially.

I added just a tiny bit of high-end EQ on the Oram preamp (about 4 dB) at 12 kHz, which added just the right amount of sparkle to the upper harmonics to please my ears, though there are those who would undoubtedly prefer the accuracy of the unequalized signal. In any case, the individual members of the group listened to our recording, and all agreed that it sounded great. Several even commented that the recording made them sound better than they actually do in "real life."

Creating a recording that accurately captures the energy of a live performance is no easy task, but these mics, when matched with a quality preamp, could easily make an engineer's life much simpler. Toward the end of the rehearsal, I purposely moved the mics around to different positions and still got recordings I felt were quite satisfying, though not as accurate as with the mics in their original position.

Product Summary

PRODUCT:
TC40K condenser microphone
PRICE:
$800
MANUFACTURER:
Earthworks
tel. (603) 654-6427
fax (603) 654-6107
e-mail earthwks@jlc.net
Web www.earthwks.com
CIRCLE #446 ON READER SERVICE CARD

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

THE SENSITIVE TYPE

By now, you're probably tired of hearing me praise these mics. You're wondering if there's a down side to these things. Admittedly, one area that the TC40Ks didn't knock me out in was when recording lead vocals. Aside from the fact that they just didn't quite have the sizzle I prefer on such tracks, they also captured a lot of performance noise when the singer was breathing or licking her lips, even when a windscreen was used. In addition, there was just too much ambient noise, particularly when I engaged my compressor.

When I did my review of the OM1s and TC30Ks, I noted that they were both quite sensitive to extraneous noise. The TC40K is very similar in this respect. Earthworks states that these mics are indeed about 10 dB hotter (more sensitive) than most other condensers. Because of this sensitivity, there may be a perception that the mics are inherently noisy.

Though the TC40K specs list the self-noise level as 26 dB, this is actually a bit misleading. The typical ambient sound level in a broadcast studio runs about 20 dB, while your average suburban living room would have around 45 dB of ambient noise. Only in the most highly controlled acoustic environment would the TC40Ks even begin to exhibit noise beyond that of the surrounding room. As a comparison, AKG lists the noise level of its C 414 B/ULS at 14 dB, Neumann's U 87 is also rated at 14 dB, and Audio Technica's popular AT4050/CM5 weighs in at 17 dB. (These figures are all A-weighted.)

Specs aside, the TC40K does indeed tend to pick up more ambient noise than, say, an AKG C 414 or Neumann U 87, at least partly due to its omnidirectional design. Set up a pair of TC40Ks in your studio, slip on a pair of headphones, turn up the volume on your preamp, and you'll be surprised at how noisy the room sounds. You'll hear cars driving up and down the street, jets flying overhead, and the neighbor's kids fighting. Take off the headphones, and you'll really have to listen carefully to hear all this.

This doesn't mean there's anything wrong with the design of the TC40K; it's merely that they are extremely sensitive to sounds we don't necessarily want in our recordings. But it's this same sensitivity that allows the mics to capture all the expressiveness and detail of solo or ensemble instruments. To balance this sensitivity, you can confidently use the Earthworks mics much closer to the sound source, thus creating a situation where overall volume levels on your mic preamp could be lowered. This would, in most cases, effectively offset any sensitivity issues.

Still, if you can't move in close to your source and you are recording in an environment where noise could be a problem, you might want to choose another mic. A good example would be recording a pipe organ, because you can't usually get the mics close enough to the pipes (which are typically well off the ground and spread across the entire width of a hall or church).

TO TELL THE TRUTH

Are these the best mics at this price range? Well, yes and no. If you want incredibly accurate recordings with plenty of detail and can live with the few limitations inherent when using omnidirectionals, the answer is definitely yes. If you need mics that can be placed inches from your sound source without sounding tubby, then again yes.

However, not everyone wants or needs a truly accurate mic. In truth, some of the most popular mics are not the most accurate. Modern recordings sometimes require mics with a certain high-end emphasis or glossiness (particularly on lead vocals), and that's certainly not what these mics do best. If you need a mic that can be set to a cardioid or even hypercardioid pattern, the Earthworks mics aren't what you're looking for.

But other than the TC40Ks' tendency to sometimes pick up a bit of unwanted noise, working with these mics has been a real pleasure. In my opinion, every studio owner, pro or semipro, should take a close look at these superb performers. With their 33-day money-back guarantee, you can't go wrong. But I'm willing to bet that once you plug in a pair and use them for a while, sending them back will be the furthest thing from your mind.

Jim Miller *is a freelance sound designer, sometime session guitarist, and frequent contributor to* **EM**. *Special thanks to Sweetwater Sound for use of the Oram MWS mic preamp.*

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HARD DISK RECORDING

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With Pro Tools Project you get 8 tracks of digital audio &, on some Power Mac systems, up to 16 tracks of playback & 64 virtual tracks! The Pro Tools Project system includes an audio card as well as award winning Pro Tools software. You choose either an 888 or an 882 I/O to complete the package. Project also features MIDI recording and playback as well as Quickpunch™ punch-on-the-fly & when your ready to ugrade, its ready too.

REQUIRES–
- Qualified NuBus or PCI Macintosh CPU
- Hard Drive, system software 7.1 or greater
- 24MB RAM minimum
- 14" monitor (17" recommended).

ProTools 4.0 Software
Digital Audio Software for Macintosh

Pro Tools version 4.0 software provides the next step in the evolution of Digidesign's award-winning digital audio production software for the Mac. Fully Power Mac native, 4.0 features noticable improvements in every major area. ProControl™ support, improved automation features, realtive fader groupings & group nesting, plug in MIDI personality files, multiple edit play lists, Sound Designer II™ funcionality, Finder-style searching & sorting, and I'm out of breath.

WINDOWS

Session 8™
Digital Audio Workstation for Windows

Session 8 is a professional quality digital audio recording, editing, & mixing system created specifically for personal and project recording studios. Designed to operate with Windows 95 or Windows 3.1, Session 8 offers professional recording features, powerful random access editing, automated digital mixing, & unparalleled integration with most popular MIDI sequencers.

FEATURES–
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- Random access, non-destructive editing
- Automated, intuitive digital mixing environment
- Built-in volume & pan automation
- Complete SMPTE frame rate support
- Frame accurate syncwith built in .AVI video playback window
- Digital parametric EQ
- Support for multiple hard drive partitions
- Auto sample rate convert to 44.1 or 48 kHz mono .WAV file format
- Choice of audio interface options

SOUNDSCAPE
DIGITAL TECHNOLOGY LTD.

SSHRD-1
Hard Disk Recorder/Editor

A professional Multitrack Digital Audio Workstation, the SSHDR1 combines the highest quality processing hardware with easy-to-use Windows-based software. The most complete and affordable solution for high quality digital audio on the PC, the SSHDR1 has over 50 powerful editing tools and is expandable from 8 to 128 tracks, with up to 32 inputs and 64 outputs. Ideal for a wide range of applications ranging from project studios, to multi-unit 32, 48 and 64 track systems for major TV and film studios needing audio post production linked to video.

Version 2.0

SSAC-1
Accelerator Card

The new SSAC-1 is a DSP card that can be added to any existing SSHDR-1 system for faster processing as well as an additional 8 channels of I/O in the form of a TDIF port. This card is needed by anyone who wants to upgrade an existing system to V2.0.

SS810-1
8 Channel I/O

This rack mount unit connects to the SSAC-1 card via the expansion port to give you 8 XLR ins & outs with superb A/D-D/A conversion. It also features an ADAT Optical Interface. The **SS810-D** comes without the analog converters for connecting an ADAT without additional channels.

CD & CASSETTE DUPLICATION

marantz
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Both next-generation stand-alone write-once CD recorders, the CDR615 & 620 offer built-in sample rate conversion, CD/DAT/MD/DCC subcode conversion, and adjustable dB level sensing. Additional features include adjustable fade in/fade out, record mute time, & analog level automatic track incrmenting. A 9-pin parallel (GPI) port and headphone output with level control are also included.

CDR620 Additional Features–
- SCSI-II Port • XLR (AES/EBU) Digital In/Out and Digital cascading
- 2x speed recording • Index Recording and playing*
- Defeatable copy prohibit and emphasis • 34 key, 2-way wired remote (RC620)

*Available on CDR615 w/optional Wired Remote (RC620)

Telex
ACC2000/ACC4000
Cassette Duplicators

Designed for high performance & high production, Telex duplicators offer easy maintenance and operation. The **ACC2000** is a 2-channel mono duplicator while the **ACC4000** is stereo. Each produces 3 copies from a cassette master at 16x normal speed & by linking additional copy modules, you can duplicate up to 27 copies of a 60 minute original ***in under two minutes.***

ACC2000XL/ ACC4000XL

The XL Series feature "Extended Life" cassette heads for increased performance and wear characteristics. They also offer improvements in wow and flutter, frequency response, S/N ratio & bias.

STUDIO DAT RECORDERS

SONY
PCM-R500

Incorporating Sony's legendary high-reliability 4D.D. Mechanism, the PCM-R500 sets a new standard for professional DAT recorders. The Jog/Shuttle wheel offers outstanding operational ease while extensive interface options and multiple menu modes meet a w range of application needs.

FEATURES–
- Set-up menu for preference selection. Use this mer for setting ID6, level sync threshold, date & more. Also selects error indicator.
- Includes 8-pin parallel & wireless remote controls
- SBM recording for improved S/N *(Sounds like 20b*
- Independent L/R recording levels
- Equipped with auto head cleaning for improved sou quality.

TASCAM
DA-20/DA-30mk

- Multiple sampling rates (48, 44.1, and 32kHz).
- Extended (4-hour) play at 32kHz.
- S/PDIF Digital I/O, RCA Unbalanced In/Out.
- SCMS-free recording. Full function wireless remote

DA-30MKII Additional Features–
- Variable speed shuttle wheel.
- Digital I/O featuring both AES/EBU and S/PDIF.
- XLR balanced and RCA unbalanced connections.
- SCMS-free recording with selectable ID.
- Parallel port for control I/O from external equipmer

Panasonic.
SV-3800/SV-410

The SV-3800 & SV-4100 feature highly accurate and relia transport mechanisms with search speeds of up to 400X mal. Both use 20-bit D/A converters to satisfy even the hig professional expectations. The **SV-4100** adds features such instant start, program & cue assignment, enhanced system diagnostics, multiple digital interfaces and more.

FOSTEX
D-15

The new Fostex D-15 is the least expensive timeco DAT on the market. It has a host of new features aimed at audio post production and recording studio environments.

FEATURES–
- Chase mode functions built in
- Hold the peak reading on the digital bargraphs with choice of 5 different settings
- Set cue levels and cue times
- Supports all frame rates including 30df
- Newly designed transport is faster and more efficie utilizing a 4-motor design. 120 minute tape shuttle about 60 seconds.
- Parallel interface
- Front panel trim pots in addition to the level inputs

SEVEN DAY CUSTOMER SATISFACTION GUARANTEE

VIDEO and PRO AUDIO

VISA Cards

Announcing our relocation on September 2, 1997 to a larger expanded facility at 420 Ninth Avenue (Between 33rd & 34th Streets) New York, N.Y. 10001

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MICROPHONES

AKG

JUST IN

C414B/ULS

A reputation for flawless performance & uncommon flexibility in the most demanding studio & concert sound applications.

- Dual 1" Gold-sputtered diaphrams.
- Flat on-axis response. • 126dB dynamic range.
- Switchable 10dB and 20dB pad. • 20Hz–20kHz.

CAD

E-300

Studio Condenser Microphone

A multi-patterned side address mic that combines vintage capsule design with advanced head-amp electronics, the E-300 has an unusually wide frequency response of 10Hz to 20kHz & an exceptional dynamic range of 137 dB. It also features extremely low self noise of 11dB. Ideal for even the most critical studio applications.

Shown with optional ZM-1 Shockmount

Unique powering of all Equitek Series microphones is accomplished with a pair of rechargeable nicad 9-volt batteries in combination with 48V phantom power. This overcomes inherent current limiting associated with most phantom power supplies & can supply 10x the current.

audio-technica.

AT4050/CM5

Cardioid Capacitor Microphone

The AT4050 multi-pattern condenser expands upon the AT4033 to set the standard for studio performance mics.

- 2 capacitor elements.
- Cardioid, Omnidirectional, & Figure 8 polar pattern settings.
- Vapor-deposits of pure gold on specially-contoured large diaphragms are aged through 5 steps to ensure optimum characteristics over years of use.
- Transformerless circuitry results in exceptional transient response and clean output even under extremely high SPL conditions.

AZDEN

UHF Performance Series

Breaking new ground, Azden's new UHF receiver and microphone transmitters offer superb performance and features at prices far below anything you've ever seen.

411UDR UHF Receiver

- Crystal-controlled, PLL synthesized UHF receiver with 63 user-selectable channels in the 794-806 MHz band. Up to 9 systems may be used simultaneously. Features both 1/4-inch and XLR output jacks, volume adjustment and can be rack mounted.

41HT Handheld Microphone Transmitter

- Newly-designed handheld with supercardioid uni-directional mic element and 63 user-selectable channels. Uses 2 AA alkaline batteries or Azden ni-cads with the AMC-2A Charging Station.

41BT Bodypack Transmitter

- 63 user-selectable channels, input level control, standby switch, locking mini-plug connector and metal clip. Ideal for use with lavalier and headset microphones or as an instrument transmitter.

AMC Ni-cad Battery Charging Station

- Turns the 41HT into the only rechargeable UHF microphone available. (Uses Azden AN-1A nicad batteries only). Fully charged, the 41HT will run for 4 hours. Charging time is approximately 12 hours.

SENNHEISER

ME66/K6P

Short Shotgun Microphone

This road ready mic system is perfect for camera mount and other short gun applications. It's professional sound quality and affordable price combined with the flexibility of a modular setup make it a hard choice to beat.

MIXING BOARDS

MACKIE.

SR24x4 • SR32x4

Sound Reinforcement Consoles

These consolses do for live sound what the acclaimed 8-bus series has done for studio recording. Both professional grade mixing consoles, the SR32-4 and SR24-4 were built to deliver the same kind of useful features found on "bigger boards" while standing up to 24-hr-a-day use.

- Fast, accurate, easy level setting via "solo".
- 4 submix buses.
- 3 band EQ w/ sweepable mids.
- 6 Aux sends.
- Globally switchable AFL/PFL.
- Mackies "VLZ" technology for low noise.
- Tape return to main mix, mono out w/level control.

The new MS-1202, 1402, 1604 & SR Series all include VLZ (Very Low Impedance) circuitry at critical signal path points. Developed for Mackie's acclaimed 8•Bus console series, VLZ effectively reduces thermal noise and minimizes crosstalk by raising current and decreasing resistance.

TASCAM M-1600

16 & 24 Channel 8-bus Consoles

Great for modular Digital Multitrack setups and hard disk recording, the M-1600 is part of Tascam's next generation series of recording consoles. It features multiple options for inputs and outputs and uses the same, easy to install D-sub connectors as Tascam's more expensive consoles, all in "a compact design.

- XLR Mic inputs w/phantom power on 8 channels.
- Signal present/overload indicators on each channel.
- Balanced & Unbalanced tape returns & Balanced Group/Direct outputs using D-sub connectors.
- TRS Balanced Line Inputs on all channels.
- 3-band EQ with sweepable mids.
- 5 Aux sends (1 stereo)
- 4 assingable aux returns.
- Perfect for use with DA-88 and ADAT setups.

MINIDISC MULTITRACKS

TASCAM 564 Digital Portastudio

The Tascam 564 Digital Portastudio combines the flexibility and superior sound quality of digital recording with the simplicity and verstility of a portable multitrack. Using MiniDisc technology, the 564 has many powerful recording and editing features never before found in a portable 4-track machine.

JUST IN

FEATURES–

- Self-contained digital recorder/mixer.
- Uses low-cost, removable MiniDiscs..
- 2 AUX sends / 2 Stereo returns.
- 4 XLR mic inputs.
- Channel inserts on inputs 1 & 2.
- 5 takes per track, 20 patterns, 20 indexes per song.
- Random access and Instant locate.
- Non-destructive editing features with undo capability include: bounce forward, cut, copy, move.
- Full-range EQ with mid-range sweep.
- S/PDIF digital output for archiving.
- MIDI clock and MTC.

SONY MDM-X4 MD Multi-Track Recorder

MD recorders are here! Offering up to 37 minutes of high-quality 4-track digital recording, the MDM-X4 is truely the next generation of personal multi-tracks. With a built-in mixer, exclusive Track Edit system, and a Jog/Shuttle wheel for sophisticated editing with ease, the MDM-X4 will encourage you to flex your creativity.

FEATURES–

- Records on high quality, removable MD data discs • 3.5-gen. ATRAC LSI for wide dynamic range.
- 10 Input / 4Bus mixer.
- 2 AUX sends, 3-band EQ. • 11-point locator.
- Random access memory for quick playback and record from anywhere on the disk.
- Editing features include Undo, Redo, & Section/Song editing for flying material between different tracks.

STUDIO MONITORS

ALESIS

NEW PRODUCT

Point Seven

DESIGNED FOR MULTI-MEDIA!

- Shielded reference monitor.
- Front ported venting system for great bass response.
- 50 watts RMS–100 watts peak @ 4Ω.
- 85Hz–27kHz, ±3dB.
- 2kHz crossover for accurate phase and a wide "sweet spot" for mixing.
- Accurate flat sound reproduction.
- Great for studio and multi-media applications.

TANNOY

PBM 6.5II

Studio Reference Monitors

The PBM 6.5 II is the industry standard for studio reference monitors. They provide true dynamic capability and real world accuracy.

- 6.5" lowfrequency driver and 3/4" tweeter
- Fully radiused and ported cabinet design reduces resonance and diffraction while providing deep linear extended bass.

SONY

NEW PRODUCT

SMS-1P

Powered Studio Reference Monitors

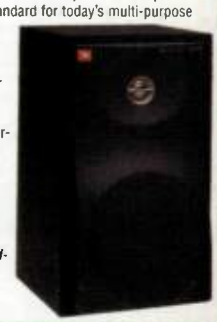
The new SMS-1P monitors are perfect for post production environments. They feature 2 types of inputs with independent volume adjustment, 15 watts of power, bass/treble control and shielding for use near computer monitors.

JBL

4206 & 4208

Studio Reference Monitors

The 4206 & 4208 studio reference monitors are 6" and 8" respectively. Both offer exceptional sonic performance, setting the standard for today's multi-purpose studio environments.



- Multi-Radial baffle ABS baffle virtually eliminates baffle distortion.
- Superb imaging & reduced phase distortion.
- Pure titanium diaphragm high frequency transducer provides smooth, extended response.
- ***Magnetically shielded for use near video monitors.***

ALL ITEMS ARE COMPLETE WITH ALL ACCESSORIES AS SUPPLIED BY MANUFACTURER

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PRO CASSETTE DECKS

TASCAM
202 MKIII / 302

These decks provide high-fidelity sound reproduction and a wide frequency response, as well as a host of fediting & play back features.

- Dual Auto Reverse, Normal and high-speed dubbing.
- "Dolby HX Pro" extends high frequency performance and minimizes distortion.
- Auto sensing for Normal, Metal & CrO2 tape.
- Intro Check, Computerized Program Search, Blank Scan and One Program quickly find the beginning of tracks.

302 *Advanced Features–*

The 302 is 2 independent decks, each with their own set of RCA connectors, transport control keys, auto-reverse, and noise reducing functions. Cascade and Control I/O let you link up to 10 additional machines for multiple dubbing or long rec & playback.

112MKII/112RMKII

A classic "no frills" production workhorse, the 112MKII is a 2-head, cost effective deck for musicians and production studios. It features a parallel port for external control and an optional balanced connector kit for integration into any production studio. The **112RMKII** features a 3-head transport with separate high performance record and playback heads as well as precision FG servo direct drive capstan motors.

SIGNAL PROCESSING

BEHRINGER
MDX 2100 Composer

- Integrated Auto/Manual Compressor, Expander & Peak Limiter.
- Interactive Gain Control (IGC) combines a clipper and peak limiter for distortion-free limitation on signal peaks.
- Servo-balanced inputs & outputs are switchable between +4dB & -10dB. ***NEW LOW PRICE!***

APHEX
107 Tubessence
2 Channel Mic Preamp

The 107 delivers outstanding sonic performance, as well as a great degree of presence, detail, & image.

- Up to 64dB of gain available
- 20dB pad with red LED indicator, 2 LED input meter
- Full 48V phantom power with red LED indicator
- Low cut filter at 80Hz, 12dB/octave
- Polarity inversion switch with LED indicator
- Switchable +4dB/-10dB output, 1/4" Balanced.

109 Tubessence
Parametric EQ

The Aphex 109 is an extremely versatile,high performance parametric vacuum tube EQ with professional flexibility and sound quality.

Great for "warming up" digital signals.

EFFECTS PROCESSING

JUST IN

Lexicon
PCM-80 & PCM-90
Digital Signal Processors

A great combination for any studio owner with an ear for the best. The **PCM-80** delivers high quality multi-effects based on the legendary PCM 70, maintaining Lexicon's high standards for sonic clarity and extrodinary processing power. The **PCM 90** is a digital reverb with its roots stemming from the studio standard 480L and 300L effects systems. Reverbs from telephone booths to the grand canyon, the PCM 90 is incredibly realistic. Together, they make an excellent addition to any rack mount arsenal.

Buy a PCM-80 and receive a FREE Pitch FX Card
offer valid thru 8-31-97

Lexicon MPX-1 Multi-Effects Processor

Lexicon's latest addition to thier Digital effects family, the MPX-1 features top-quality effects in an eay to use. 1 rack space unit. With 56 Pitch, Chorus, EQ, Modulation, Delay, and world-class reverb effects accesable from the front panel, as well as TRS and XLR balanced I/O and complete MIDI implementation, the MPX-1 creates a new standard for cost and quality in a multi-effects device.

t.c.electronics
Wizard M2000 Studio Effects Processor

The M2000 features a "Dual Engine" architecture that permits multiple effects and 6 different routing modes making it a great choice for high-end studio effects processing.

FEATURES–

- 250 factory programs including reverb, pitch delay, chorus, flange, phase, EQ, de-essing, compression, limiting, expansion, gating and stereo enhancement
- 20-bit A/D conversion, AES/EBU and S/PDIF digital I/O.
- "Wizard" help menus, 16-bit dithering tools,
- Tap and MIDI tempo modes.
- Single page parameter editing, 1 rack space.

SONY
DPS-V77 2 Ch. Master Effects Processor

Sony's latest effects processor, the DPS-V77 yields excellent sonic quality combined with realtime control, a digital I/O and many more features that will put a smile on the face of any discerning studio engineer.

FEATURES–

- 198 preset &198 user-definable programs.
- Control up to 6 parameters in realtime via MIDI information and an optional foot pedal
- Use the AES/EBU & SPDIF digital I/O to link multiple V-77s together & when working with digital mixers
- 10-key pad input
- Shuttle-ring equipped rotary encoder allows for quick patch changing.
- A noise gate circuit is provided ahead of the input for guitar players and other instrumentalists who want top quality effects without sacrificing tone.

ALESIS
QuadraVerb 2 2 Ch. Master Effects Processor

Alesis' most powerful signal processor, the Q2 offers amazing audio fidelity in a versatile multi-effects unit. Great for professional & project studio owners, its large backlit display making parameter editing intuitive and quick.

FEATURES–

- 100 preset & 200 user-editable programs.
- Octal Processing allows use of up to 8 effects simultaneously in any order.
- Choose between over 50 different effects types for each block, including reverb, delay, chorus, flange, rotary speaker, pitch shift, graphic and parametric EQ, overdriver and more.
- 5 seconds sampling, triggerd pan, and surround sound encoding are built in.
- Selectable -10 dB and +4dB levels, servo-balanced TRS inputs and outputs.
- ADAT Digital Interface allows you to work entirely in the digital between the Q2 and an ADAT XT.

PRO HEADPHONES

AKG
K240M

The first headphone of choice in the recording industry. A highly accurate dynamic transducer and an acoustically tuned venting structure produce a naturally open sound.

- Integrated semi-open air design
- Circumaural pads for long sessions.
- Steel cable, self-adjusting headband.
- 15Hz–20kHz, 600Ω

SONY
MDR 7506

The Sony **7506's** have been proven in the most trying studio situations. Their rugged, closed-ear design makes them great for keyboard players and home studio owners.

- Folding construction
- Frequency Response 10Hz to 20k Hz
- 1/4" & 1/8" Gold connectors
- Soft carrying case
- Plug directly into keyboards

beyerdynamic
DT 770 Pro

These comfortable closed headphones are designed for professionals who require full bass response to compliment accurate high and mid-range reproduction.

- Wide frequency response
- Durable lightweight construction
- Equalized to meet diffused field requirements
- Padded headband ensures long term comfort

SENNHEISER
HD 265/HD580

The **HD-265** is a closed dynamic stereo HiFi/professional headphone offering high level background noise attenuation for domestic listening and professional monitoring applications. The **HD 580** is a top class open dynamic stereo HiFi/professional headphone that can be connected directly to DAT, DCC, CD and other pro players. The advanced design of the diaphragm avoids resonant frequencies making it an ideal choice for the professional recording engineer.

CORPORATE ACCOUNTS WELCOME

VIDEO and PRO AUDIO

Cards

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PORTABLE DAT RECORDERS

TASCAM DA-P1

- Rotary 2 head design, 2 direct drive motors.
- XLR mic/ line inputs (w/phantom power)
- Analog and S/PDIF (RCA) digital I/O.
- 32/44.1/48kHz sample rates & SCMS-free recording.
- Built in MIC limiter and 20dB pad.
- TRS jack w/ level control for monitoring.
- Includes shoulder belt, AC adapter, & battery.

HHB PDR1000/PDR1000TC

- 4 head Direct Drive transport
- XLR mic & line analog ins, 2 RCA line outs. Digital I/O includes S/PDIF (RCA) and AES/EBU (XLR).
- L/R channel mic input attenuation selector(0dB/-30dB)
- 48V phantom power, limiter & internal speaker.
- Illuminated LCD display shows clock and counter, peak level metering, margin display, battery status, ID number, tape source status and machine status.
- Nickel Metal Hydride battery powers the PDR1000 for 2 hours, AC Adapter/charger included.

PDR1000TC Additional Features–

- All standard SMPTE/EBU time codes are supported, including 24, 25, 29.97, 29.97DF, & 30 fps.
- External sync to video, field sync and word sync.

- **MS1000 Master Sync module** ensures drift will be no more than 1 frame in 10 hrs.
- **HM1000 Headphone Matrix** provides a rotary switch for selection of Stereo, Mono Left, Mono Sum, & M/S (mid-side) Stereo modes.

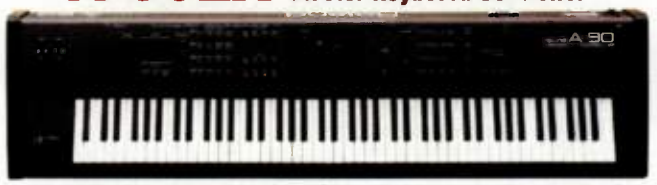
JUST IN

SONY TCD-D8

This is the least expensive portable DAT machine available. It features 48kHz, 16-bit sampling, automatic and manual recording level, a long play mode for 4 hours of recording on a 120 minute tape, & an anti-shock mechanism. It includes a carrying case, a DT-10CLA cleaning cassette and an AC-E60HG AC adaptor.

KEYBOARDS & SOUND MODULES

Roland A-90EX Master Keyboard Controller



The A-90EX is an 88-note, weighted master controller with one of the best keyboard actions currently on the market. It offers incredibly realistic piano sounds, powerful controller capabilities and 'virtual' programmable buttons which can be configured to operate your software and other devices. The A-90EX combines the majestic sound of a concert grand, the expressive action of a fine acoustic keyboard and the comprehensive MIDI functions of a master controller—all in a portable stage unit.

Roland JV-2080 64-Voice Synthesizer Module

Roland resets the standard with the incredibly expandable JV-2080 64-Voice Synthesizer Module. This amazingly powerful package offers unprecedented expandability, digital signal processing, and remarkable operational ease, all housed in a 2-unit rack-mount design.

FEATURES

- 64-Voice polyphony / 16-part multitimbral capability.
- 8 slots for SR-JV80 series expansion boards.
- 3 independant effects sets plus independant reverb/delay and chorus.
- 6 outputs, Main Stereo and 4 assingable.
- **NEW** patch finder and Phrase Preview functions for easy access to the huge selection of patches.
- Large backlit graphic display
- Compatable with the JV-1080, XP-50, and XP-80.

Roland JP-8000 Analog Modeling Synthesizer

Analog is back- FOR REAL! This synth delivers a killer array of real-time control, Roland's revolutionary new analog modeling technology, and FAT, FAT SOUNDS! The assingable ribbon controller, 4 octave keyboard, built in arpeggiator w/ external sync capability, and RPS function will make this little gem a must have for DJs and re-mixers as well as that funk musician looking for some new inspiration.

NEW PRODUCT

FEATURES–

- 8 note polyphonic, 49-key velocity sensitive keyboard.
- Newly developed DSP oscillator
- "Motion Control" recalls parameter changes in realtime
- Single, Dual, & Split mode, assingable "on-the-fly".
- 128 user/ 128 preset patches, 64 user/64 preset performances.
- Tone control, 12 chorus, & 5 delay effects. *Play of soul.*

PORTABLE HARD DISK RECORDING

Roland VS-880 V2

This new version of the popular VS880 incorporates powerful additional software functions that allow you to get the most out of this baby's incredilbe creative potential.

FEATURES–

- Auto Mixing Fuction records and plays back your mix in realtime
- Easy recording with an inserted effect in "INPUT-TRACK" mode.*
- Process the master output with a specific inserted effect such as total compression.*
- Scene change by MIDI program change message.
- Simultaneous playback of 6 tracks in MASTER MODE recording.
- Digital output with copy protection.
- 10 additional effect algorithms (30 total) including Voice Transformer, Mic Simulator, 19-band Vocoder, Hum Cancelor, Lo-Fi Sound Processor, Space Chorus, Reverb 2, 4-band Parametric EQ, 10-band Graphic EQ, and Vocal Canceller.
- 100 additional preset effects patches.
- Use MIDI program & control change messages to edit and change effects.
- In total, over 20 powerful and convenient features in editing/sync sections have been added. Some require the optional effects expansion board

FOSTEX DMT-8 VL

The latest in the Fostex HD recording family, the DMT-8 VL truely brings the familiarity of the personal multi-track to the digital domain.

FEATURES–

- 18 bit A/D, 20 bit D/A conversion.
- Built in 8 channel mixer, Ch 1&2 feature mic & line level.
- 2 band EQ and 2 AUX sends per channel
- Cut/Copy/Move/Paste within single or multiple tracks.
- Built-in MIDI Sync., 6 memory locations.
- Dual function Jog/Shuttle wheel provides digital "scrub" from tape or buffer without pitch change. 1/2X to 16X.
- Divide the drive into 5 seperate "virtual reels", each with it's own timing information.
- **NO COMPRESSION!**

NEW PRODUCT

MIDI

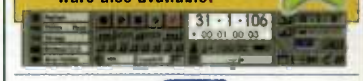
OPCODE Studio 5 LX Macintosh MIDI Interface

The Studio 5 LX is arguably the most advanced MIDI interface on the market today. It incorporates a MIDI patchbay, MIDI processor, and SMPTE synchronizer with it's interface functions, all in a 2 rack space unit.

- 15 Independant MIDI ins and outs.
- SMPTE reads and writes all formats– 24, 25/29.97/29.97DF/and 30.
- Network multple units, 240 MIDI channels each.
- 128 patches, unlimited virtual instrument controls.
- 2 assignable footswitch inputs, 1 controller input.
- 8X speed when used with OMS.
- Internal power supply.

Studio 3 & 4 MIDI interfaces, and Vision 3.5 sequncing software also available.

JUST IN



Mark of the Unicorn MIDI Time Piece AV 8x8 Mac/PC MIDI Interface

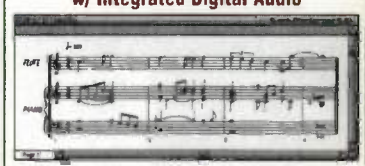
The MTP AV takes the world renowned MTP II and adds syncronization that you really need like video genlock, ADAT sync, and word clock sync, even Digidesign superclock!

- Same unit works on both Mac & PC platforms.
- 8x8 MIDI merge matrix, 128 MIDI channels.
- Fully programmable from the front panel.
- 128 scene, battery-backed memory.
- Fast 1x mode for hogh-speed MIDI data transfer.

Pocket Express Mac/PC MIDI Interface

With the pocket express you get a 2 in, 4 out, 32-channel interface that supports both Mac and PC. It also features a computer bypass button that allows you to use it ***EVEN WHEN THE COMPUTER IS TURNED OFF.***

Digital Performer Macintosh MIDI Sequencer w/ Integrated Digital Audio



Digital Performer contains all of the sequencing capabilities of Performer V.5 and adds Digital Audio to the picture. Apply effects such as Groove Quantize, shift, velocity scaling and more- ***All in REALTIME.***

- MIDI Machine Conrol, Quicktime Video playback.
- Sample rate conversion.
- Spectral effects, pitch correction.

Real-time editing and effects processing. Complete Notation.

Minimum Shipping USA (Except AK & HI) $7.00, up to 3 lbs. Add 60¢ for each additional lb. For ins. add 40¢ per $100. © 1997 B&H Photo - Video. Not responsible for typographical errors. Prices valid subject to supplier prices.

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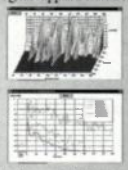
• ETFRT3.0 - Reverberation time measurement for small rooms.
• DEVICE DESIGNER - Computer design of Helmholtz Resonators and QRD Diffusers using parts readily available at building suppliers.
• MANUAL - Practical, proven techniques for improving small room acoustics.
" Nothing else is available at such a modest price which can measure the resonant behaviour of your room in such detail, and few acoustic analysis programs are anything as user friendly." Keith Howard, Grammophone Magazine, June 1997

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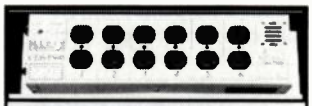

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TECH PAGE

Speakers of the House

Will conventional speakers become obsolete?

By Scott Wilkinson

Speakers haven't changed much since they were invented 70 years ago, and they're plagued with several fundamental problems. For example, they are very inefficient, typically converting only 0.25 to 0.5 percent of the energy in the input signal into acoustic sound waves. Other problems include cabinet resonances, crossover phase distortion, and directional/dispersion anomalies.

A company called American Technology Corp. (ATC; tel. 800/417-2346 or 619/679-2114; fax 619/679-0545; e-mail atc-info@atcsd.com; Web www.atcsd.com) is working on a fundamentally new approach to reproducing acoustic sound from electrical signals. This approach, called HyperSonic Sound (HSS), depends on a basic principle of acoustics investigated by Hermann von Helmholtz about 150 years ago.

Helmholtz demonstrated that when you play two notes on an organ loudly enough, two additional notes are generated. The frequencies of these two additional notes are the sum and difference of the two original notes. These sum and difference tones are not psychoacoustic mirages but actual frequencies that are literally created out of thin air.

To generate these sum and difference tones, the amplitude of the original tones must be high enough to push the air that carries them into nonlinear behavior. This is called *heterodyning*. HSS uses this principle to generate audible sound waves from the difference between signals at ultrasonic frequencies.

For example, if you play sine waves at 50 and 51 kHz with sufficient amplitude, sum and difference tones of 101 kHz and 1 kHz are generated. We can't perceive 50, 51, or 101 kHz, but we can easily perceive the 1 kHz difference tone. The amplitude of the difference tone is independent of the frequencies of the original carrier tones, but the amplitude of the sum tone falls off as the carrier frequency increases. As a result, carrier frequencies in the 50 kHz to 2 MHz range are ideal.

Of course, sine-wave difference tones aren't very useful musically. In simple terms, HSS amplitude modulates a musical signal on a single, high-frequency carrier. This creates sidebands around the carrier frequency that correspond to the musical material. These sidebands then generate difference tones with the carrier that re-create the modulated musical material as audible sound.

This modulation occurs in ATC's custom processing circuitry, which also reduces various forms of distortion. For example, when two sidebands appear on either side of the carrier frequency, they generate the same difference tone; the processor makes sure these are in phase to prevent cancellation.

Originally, ATC used off-the-shelf piezo microphone elements as drivers. These were configured in hexagonal arrays to coax as much output from them as possible (see **Fig. 1**). The microphone elements were quite delicate and couldn't take much power, but ATC discovered they could generate up to 100 dB SPL from just a few hundred milliwatts of power. There are now several companies making custom emitters. In the end, the company expects to achieve an efficiency of about ten percent, which is at least twenty times better than conventional speakers.

Because the carrier frequency is so high, the sound waves are highly directional, including the difference-tone information. You can't hear any sound unless you are directly in front of the emitter or the sound wave is reflected from a surface, such as a wall or ceiling. This suggests many potential applications, such as surround emitters in front of the listener aimed at the rear wall. And because the emitters can be very small and require no enclosure, they don't take up valuable space. Not only that, they require very little power, eliminating the need for expensive power amps. Keep a sharp ear out for this technology; it could alter the very nature of audio reproduction.

FIG. 1: The original HSS emitter consisted of several piezo mic elements arranged in a hexagonal array. (Courtesy ATC)

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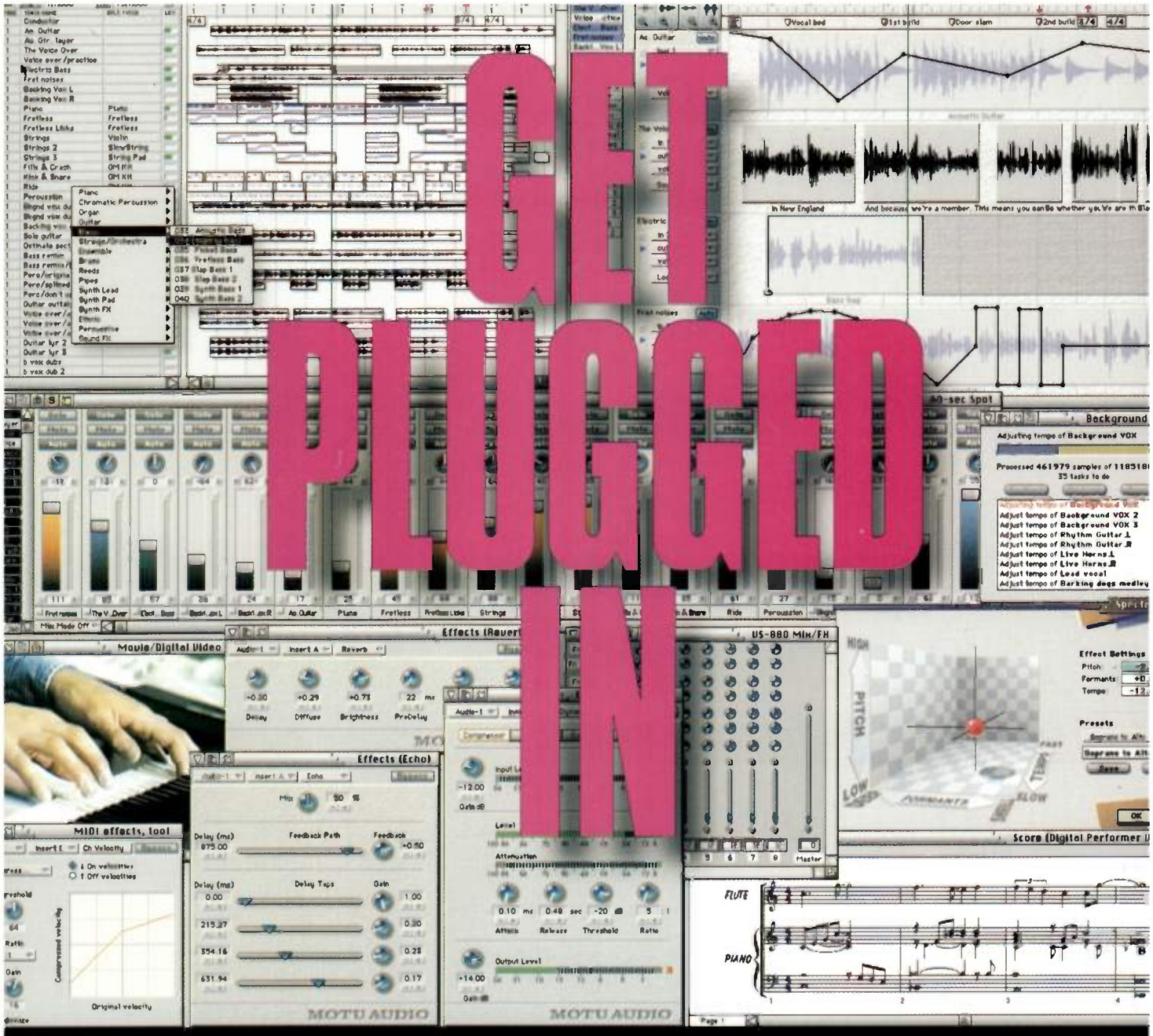

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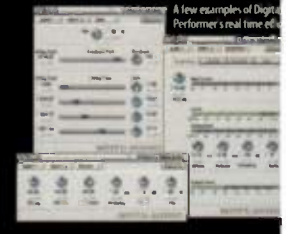

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