NOT JUST ANOTHER AMPLIFIER.

Our compact mixers and 8-bus consoles re-defined their product categories by combining high performance, great value and extra features. Now our Fast Recovery Series™ M•1200 sets a new benchmark for amplifier value.

It can help your speaker cabinets put out tighter bass. It can enhance high-end audibility and detail. And it can survive sizzling ambient temperatures and brown-out voltage drops that shut down lesser amps.

ADVANCED TECHNOLOGY MEETS ADVANCED MANUFACTURING.

The FR engineering team is supervised by Greg Mackie and headed by Cal Perkins. Back in the late '60s, both of them were building their first amps. Greg's blew up a lot. Cal's didn't. Cal went on to become one of the pro audio industry's acknowledged power amplifier experts. Although Greg decided to major in mixers, he maintained an on-going interest in amplifier design. Now Cal & Greg have joined forces — backed by a talented support team and state-of-the-art automated manufacturing facilities that keep prices low and quality high.

The FR Series Development Team

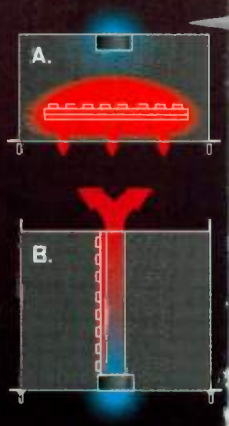
FAST RECOVERY DESIGN SOUNDS GREAT AT MAXIMUM OUTPUT LEVELS.

Thanks to exotic technology borrowed from high-speed digital components — and sparing use of negative feedback — the M•1200 keeps sounding good when driven to the edge and beyond into big, ugly reactive loudspeaker loads. Feedback from an amp's output section "tells" its front end how to behave. Unfortunately, when a conventional amplifier is driven into clipping, "corrective" feedback actually makes things worse. Most amplifiers experience internal saturation that keeps them "latched" in a state of clipping longer than necessary, resulting in painfully audible distortion. The M•1200 uses a high-speed, latch-proof design with extremely low negative feedback. It eliminates high-frequency "sticking" and gives the amp enhanced stability when playing into reactive loads that can cause audible parasitic oscillations. Until now, this solid, proven circuit principle has only been found in very expensive power amplifier designs.

The M•1200 achieves efficiency just 3.5% under the theoretical maximum possible (versus typical amps that run at 65% efficiency or less). For lower distortion and wider power bandwidth, our fully discrete Fast Recovery design employs full complementary-symmetry all the way from input to output. The output stage delivers in excess of 60 amps of current and is capable of 4000 watts dissipation.

T-DESIGN CONSTANT GRADIENT COOLING FOR ENHANCED THERMAL STABILITY.

If the intense heat generated by amplifier output devices isn't conducted away, reliability drops dramatically. Cheaply-built amps just push air through the whole chassis (Fig. A). Not much of it actually gets to the hot output transistors — and the rest ends up coating the amplifier's internal electronics with rat fur and tavern dust. Better amp designs use a linear cooling tunnel with a fan at one end (Fig. B). But the transistors farthest away from the fan get bathed in progressively hotter air, causing a temperature increase of up to



M•1200

1200 WATTS
4 OHMS BRIDGED
WITH LESS THAN 0.05% THD

600+600 WATTS
2 OHMS STEREO

BUILT-IN ELECTRONIC SUBWOOFER CROSSOVER

SWEEPABLE LOW CUT FILTERS

SWEEPABLE CD HORN COMPENSATION & "AIR" EQUALIZATION

SUBSONIC STABILIZER

SHORT CIRCUIT & TEMPERATURE INDICATORS

CONSTANT-GRADIENT T-DESIGN COOLING

AUDIOPHILE SOUND QUALITY

FR FAST RECOVERY SERIES™

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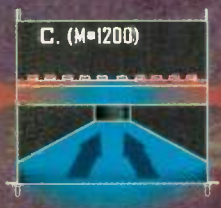
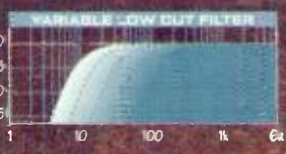
THE AFFORDABLE PREMIUM POWER AMP WITH A WEALTH OF IMPORTANT FEATURES OTHERS LEAVE OUT OR CHARGE EXTRA FOR!



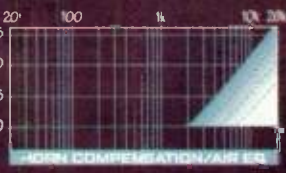
80° F (and potential failure).

The M•1200 uses a T-design that cuts tunnel distance in half. All power transistors are flooded with cool air concentrated through an oversize front manifold (Fig. C) that keeps airborne spooge away from internal electronics. A variable-speed fan controls air flow based on the cooling demands of the amplifier. The result is a far more constant temperature gradient and vastly increased reliability. In fact, the M•1200 will run all day into 2-ohm loads at ambient air temperatures as high as 113° F!



No extra plug-in cards. No unsuccessful fiddling with a graphic equalizer. Instead precise control.

Variable high frequency compensation. All compression drivers mounted on Constant Directivity horns require compensation somewhere between 2.5kHz and 5kHz. But until now you had to rely on hard-to-find, harder-to-adjust crossover modules (or resort to tweaking a graphic equalizer, which works poorly if at all). The M•1200 has variable compensation that's sweepable from 2kHz to 6kHz (we extended the high end boost another 1K so that you can also use the control to add "air" equalization).



Subsonic stabilization. Visible, random woofer cone movement is a symptom of subsonics. Caused by the extended low-end bandwidth of modern condenser mics and exaggerated by stage vibration, subsonics rob amp power and cause intermodulation distortion. The M•1200's input stage includes a circuit that eliminates subsonics. Woofer cones stay rock steady, centered in their voice coil gaps, ready to reproduce only the frequencies that you can hear.

BUILT-IN FEATURES INSTEAD OF EXPENSIVE ADD-ON MODULES.

Switchable low pass subwoofer crossover. Want more bass in your PA system? Just buy an M•1200 and a subwoofer. There's no need for an external electronic crossover or plug-in amp module... because the M•1200 has a built-in 18dB/octave, linear-phase, uniform-time-delay filter with selectable 63 and 120Hz roll-off frequencies.

Variable low cut filter. Feeding a speaker system frequencies below its tuned bass cut-off point, results in terrible sound and potential woofer damage. Our variable low-cut filter lets you dial in the right transition frequency for your speaker cabinets or stage monitors — anywhere up to 170Hz.

WE HAVE BOTH ENDS COVERED.

Compare the M•1200's front LED displays with comparably-priced amps. We not only provide Signal Present, Standby and 5-step level displays for each channel...we also include Cold and Hot temperature indicators and an industry first — a Short Circuit LED that warns you in advance of a short circuit during set-up or operation. Multi-step detented Level controls are calibrated in both dB and volts for accurate system set up and adjustment.

The back panel is equally complete. Instead of just ¼" input jacks found on "stripped down" amp models, we've also included a balanced female/male XLR set to make signal pass-through and signal splitting easy. Outputs include extra-heavy-duty binding posts spaced on ¾" centers for bridged operation.

5-way binding posts & ¼" TS outputs
Rear secondary cooling entry
Ch. 1 Low Cut Filter
Stereo/Mono/Bridge selector
Clipping Eliminator/Subwoofer switch
Ch. 2 horn/"Air" EQ control
Horn Compensation on/off
Subwoofer freq. switch

Plus there are a lot more features including elaborate short circuit, overload and thermal protection, automatic turn-on delay, lighted rocker power switch, double-sided thru-hole-plated fiberglass circuit boards, up-front center of gravity and rear rails for extra stability in road racks.

We could go on and on. And we *will* if you call us toll-free for more detailed information.

Better yet, visit your nearest Mackie Designs dealer and get face to faceplate with an FR Series M•1200 High-Current Power Amplifier.

In terms of specs, features and durability, it's a "spare-no-expense" amp. Yet in terms of watts per dollar, it's a far better value than any comparably-priced model.

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TRINITY
MUSIC WORKSTATION DRS

tations suck.

"...magnificent."

You'll likely be smiling big time if you're a Trinity owner, and not simply because of its silvery good looks and state-of-the-art touch-screen interface. It's one of the most powerful and magnificent-sounding [instruments] we've ever encountered.

- **KEYBOARD** *Magazine*

[The Trinity is] like the transformer of the synth world—pop in a board here, it becomes two synths in one, pop in a board there, it becomes a hard disk recorder...

editor's pick musician magazine

The Trinity takes [the workstation concept] to new heights by virtue of its large number of options...Of course, none of these technical details would be worth squat if Trinity didn't sound good—and it does. The factory programs provide you with every basic tool (clean, crisp pianos, wailing guitars, funky basses, lush strings, punchy brasses, and absolutely killer drums)...

Overall, the Trinity is a real winner...highly recommended instrument that can easily serve as the centerpiece of any live performance or recording rig.

- **MUSICIAN** *Magazine*

ved operating system and a new, low price.

Prophecy sounds will take your breath away. (So much so that you may want to check out this techno-friendly fire-breather as a stand alone instrument.)

With the FlashROM option, you can add an extra 8MB of waveform memory expansion to Trinity's already hefty 24MB. Load in any of the thousands of samples available in Akai® (S-1000/3000), .WAV and AIFF formats from CD-ROM or floppy disk.

Trinity also features a number of realtime switches and a cool new ribbon controller that offer a higher degree of expressivity. And the new 2.0 operating system (free for users) has improved and added many features to this already powerful instrument.

The performance features will inspire you; the DRS features will liberate you. There's never been anything like it in the world of musical instruments.

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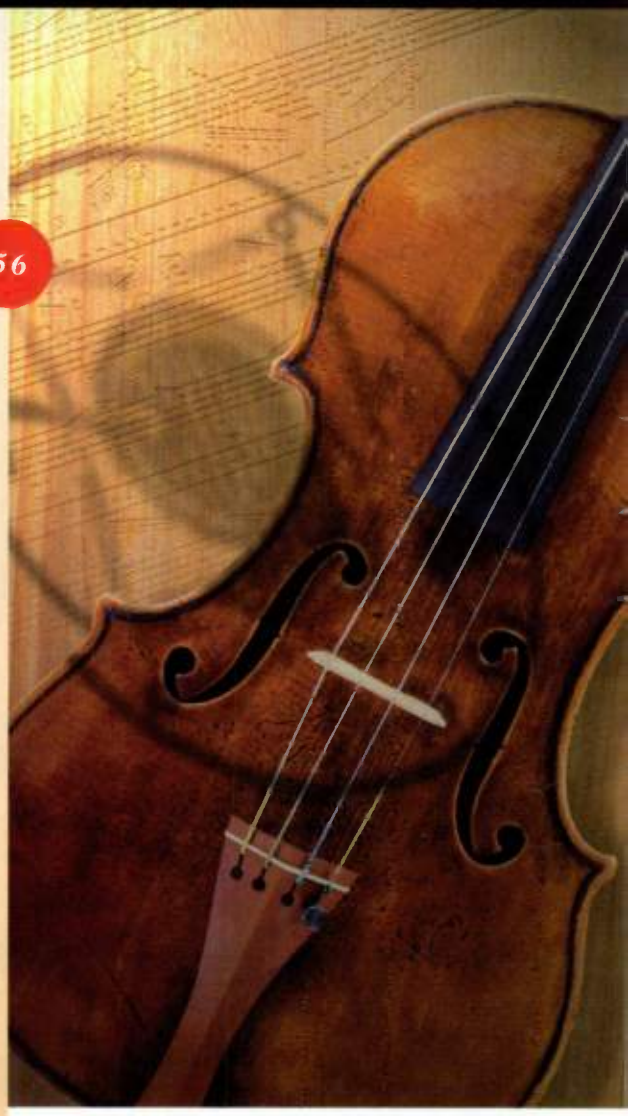
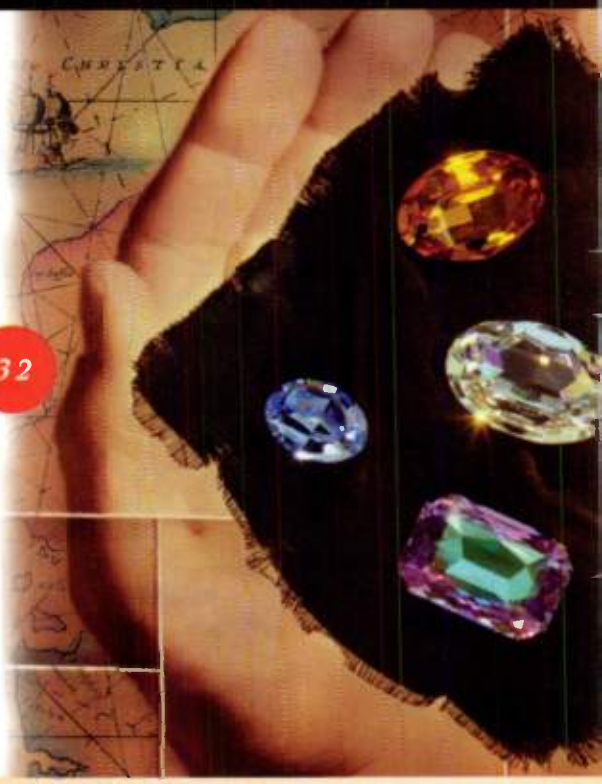


DEPARTMENTS

Electronic Musician®
MAY 1997 VOL. 13, NO. 5

COLUMNS

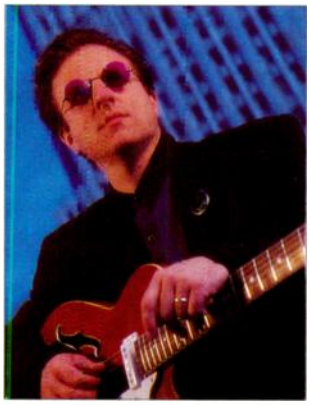


REVIEWS

Cover: Illustration by Dmitry Panich.
Photo of violin courtesy of master craftsman David Gusset.

Letting Go

My master plan to prevent change is failing miserably.



ROBERT PERRY

On most journeys, there comes a time when you must bid adieu to traveling companions who, for whatever reason, decide to explore a different fork in the road. These departures usually trigger a smorgasbord of emotions and often leave both parties towing hefty loads of reflection, hope, and regret.

I speak from experience because I am currently waving goodbye to two dear members of **EM**'s gypsy caravan: Art Director Linda Birch and Director of Advertising Dave Reik. Linda is opting for creative diversity (and self-determination) by striking out as a freelance designer, and Dave is seeking new challenges in the thrill-a-minute world of Web publishing.

Now, as I've written before in this column, ambitious people tend to move onward and upward (and this mag is filthy with talented go-getters). That's the reality of business, and like good business people, we have our succession strategies in place to ensure that **EM** doesn't lose even a half-step of its awesome momentum. But it would be bad manners to let Linda and Dave leave without toasting their accomplishments.

Linda brought the magazine's design to a new level of sophistication. Her bold graphic sense never pandered to "flavor of the moment" visual treatments that sacrificed readability for fashion. Instead, she was a master at assimilating the iconography of pop culture into clean, elegant designs that made dense technological articles appear seductively reader friendly and even—heaven forbid!—*fun*. It was great to open **EM**, a magazine about making music, and have the very essence of creativity echoed by the art design. It is this symmetry of image and content that makes our magazine such a class act.

Dave is a more personal loss because he was my gym drill sergeant, arcade-game competitor, and comedic foil. But besides being a mischievous imp, Dave was a tireless advocate for the **EM** doctrine. His management skills, business experience, and marketing savvy played a large and critical role in the magazine's phenomenal growth. *Vaya con Dios,* you two.

Of course, like in that silly Beatles tune, as our little caravan waves goodbye, it also waves hello. Our new art director is Dmitry Panich, an extremely talented designer and a smokin' keyboardist. I have very high hopes for Dmitry because he brings a musician's headspace to the design process and is bursting with all the wonderful enthusiasm of an overachiever with something to prove. I'm sure he'll be kicking our butts, and that's a good thing because complacency = creative brain death. I welcome his energy.

We've also hired David M. Rubin as an associate editor. David is a classically trained composer and arranger, and the author of many books, including *The Desktop Musician* (McGraw-Hill). He'll work with Senior Editor Steve O. to further improve our excellent desktop-audio coverage. In addition, we've welcomed Steve Ramirez as an art assistant and promoted Diane Lowery to assistant editor.

As you can see, **EM** is not immune to the inevitable changes that twist and transform life's journeys. However, the wisdom and accomplishments of our old friends remain sealed within these pages. The foundation they helped build is rock solid, and it can only be improved by new blood and new ideas. A ton o' thrills still lie in wait for this expedition. Sit back and enjoy the ride.

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LETTERS

ON "EMULATING" ELFMAN

I am governor of the music division of the Academy of Television Arts and Sciences, and I am on the board of directors of the Society of Composers and Lyricists. I also score Fox TV's Saturday morning series *Casper*. Although I really enjoy Danny Elfman's work, I feel his remarks on the "plagiarism" of his scores ("Creative Space: Danny's Big Adventures," February 1997) by other composers were shortsighted and are in desperate need of clarification.

First, an "original score" is something of a contradiction in terms. In the gestalt of the theatrical experience, the audience needs to unconsciously relate what they hear in the score to the action on the screen. Westerns must have "western" sounding music, war epics should pulse with militaristic brass and percussion, love scenes must use the musical palette that reflects and imitates the tenderness of its characters, and so on. All music for film, then, by definition, is an inescapable cliché. If you move too far off the mark with a stylistic approach or tone color, you risk damaging the cinematic moment *and* your future career opportunities.

Scoring in a given style—whether generic or emulating another composer, living or dead—is more the rule than the exception. Most professionals are very careful about this and try to strike a balance between the producers' scoring concepts and their own creative spark and personal integrity. But, when scores are deliberately plagiarized from Danny Elfman's work it is not the fault of unimaginative film composers. The fault lies with the Hollywood practice of using CDs of the most popular soundtracks as temporary scores (temp tracks). When a composer is finally chosen for the finished project, he is often tactfully asked to duplicate the feel of the temp score. If he ignores the producer's wishes, he may lose the job. If he plagiarizes the score, then he risks a phone call from the legal representative of the offended party. (See Schirmer Publishing's *On the Track*, by Fred Karlin and Rayburn Wright, for an in-depth discussion of temp tracks.)

Fortunately for Danny, he *is* hired for his unique approach, so he rarely has to deal with the issues composers at the lower end of the food chain must face. Given his success and position, Danny would *never* be asked to sound like John Williams.

Ron Grant
bjsreg@ix.netcom.com

A WIRY ISSUE

Thank you for the "Home Improvement" article (February 1997). I found it the most comprehensive article I have read on this topic.

However, I must take issue with quotes attributed to Senior Editor Steve Oppenheimer regarding 15- and 20-amp circuits. From reading the article, one might mistakenly conclude that current capacity of a circuit can be changed by simply changing the size of the circuit breaker. Although this will allow more current to enter the circuit, it is an unsafe practice that defeats the purpose of the fuse or circuit breaker. The size of breaker used on a particular circuit is specified in city electrical codes and is based on the size of the wire used for the electrical service. Therefore, in order to increase the current-carrying capacity of a circuit, usually you must not only change the breaker, but also upgrade the wiring. And unless you are lucky enough to have your wire runs exposed via an unfinished basement, attic, etc., that usually means a few hours' work by a licensed electrician. Saying "It's really no big deal" might indicate to some musicians out there that if they can find a breaker that fits, that's all they need to know. That is not the case.

Now, regarding the headroom issue, although I would concede it is better to have adequate power to avoid blown fuses and tripped breakers, I think evidence of "stressing your power" would be anecdotal at best. Power amps are probably the only high-current devices found in most project studios, and unless you're running a rack of Crowns on your NS-10s, I doubt you'll see the lights dim with the kick drum.

Unfortunately, this is what most musicians are going to get out of this part of your article: "Headroom is good in audio circuits, so headroom is good in power circuits. Twenty dB is better than 10 dB, so 20A is better than 15A. So why not use 50A breakers and get even more headroom?" Because it isn't safe; it isn't legal; a larger breaker without sufficient wiring doesn't do any good; and it isn't going to change the way your recordings sound.

The circuit breaker or fuse is there to protect your life and your property. Always consult a knowledgeable professional before making changes that you might regret later.

Brent Wilson
Digital Age Recording
brentatdar@aol.com

Brent—You are inferring things I never intended. In fact, we agree on the underlying safety issues. I didn't mean to imply that upgrading to a 20A circuit was simply a matter of changing the breaker; I did say that the work should be done by an electrician (by which I meant an established, licensed electrician whose work meets or exceeds code).

What is "easy" and "not a big deal" is a relative matter, of course. I had two 20A circuits with isolated ground professionally installed in my studio/office, including completely new wiring and new outlets. These circuits handle studio gear only (including my computer system). The original

VALERIE SPAIN

CONFUSED YET?

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

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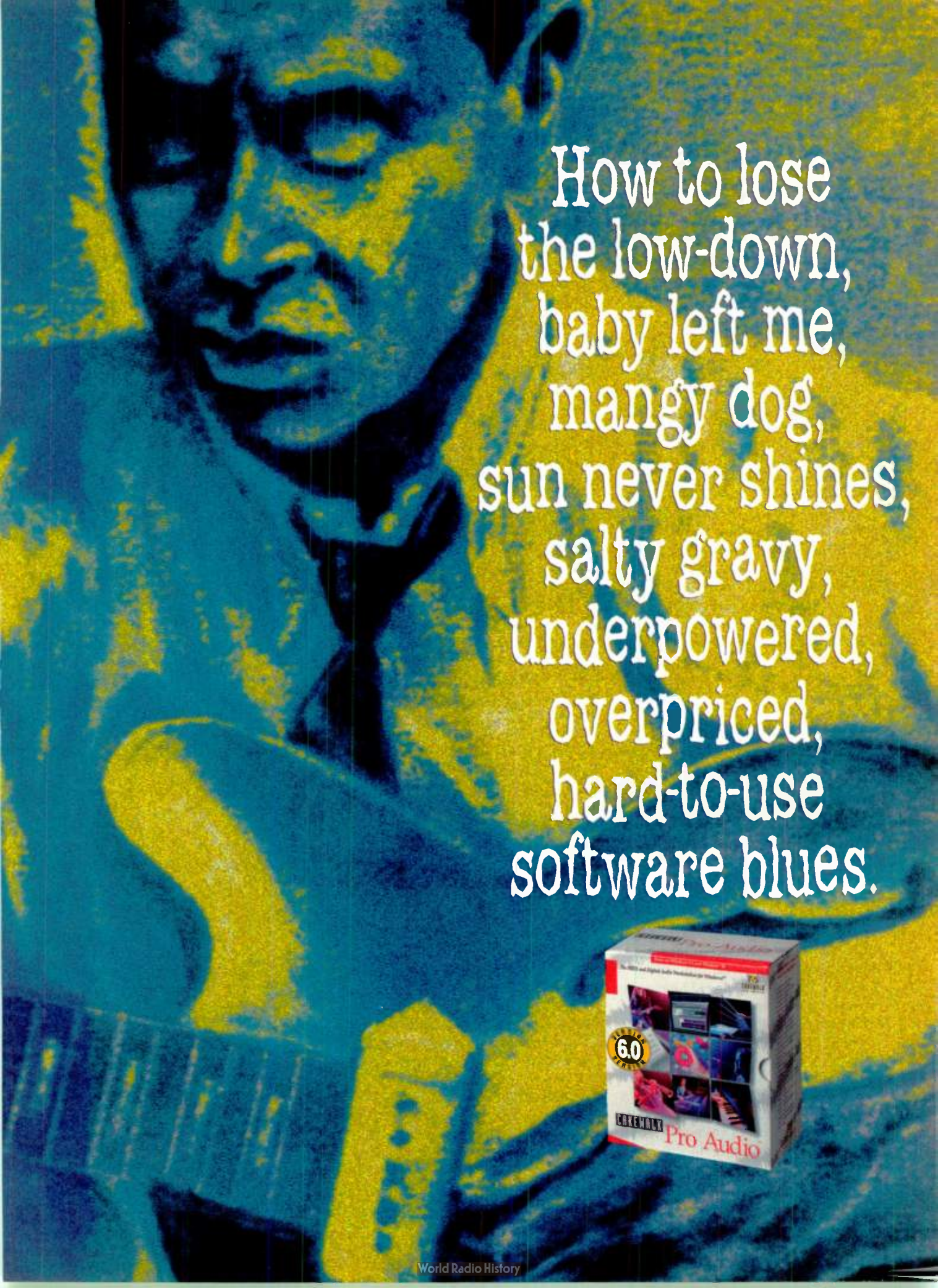

15A circuit remains in service for room lights and small ventilation fans. The isolated ground does *affect the sound of my recordings because I don't get line noise when major appliances turn on. (I also have voltage regulators with line filtering on the studio circuits and a heavy-duty, voltage-regulated UPS for the computer.) This work was part of a $7,000 overhaul of my home's entire electrical system. So installing the 20A circuits was a small part of a huge job. To me, that was not a big deal.*

A reasonable amount of headroom is important for power circuits and not just to avoid tripping breakers. According to my electrician, if you load a circuit right up to its limit for long periods (as in a project studio) but the demand is just short of tripping the breaker, the wiring can get hot enough to create a fire hazard.

Also, keep in mind that power amps aren't the only items that draw a lot of juice; motors, fans, and some older devices with big power supplies also can suck power. My mixers, signal processors, and digital instruments draw relatively little power. But my studio/office includes a tower-style computer with two SCSI chains and a SCSI switcher that handle seven disk drives of various sorts, plus a scanner and a printer. I also use an older 250W power amp and a sampler with an internal drive and fan. There are several large, older analog synths with hefty power supplies and fans, an MDM recorder, and a 2-track analog tape deck. These combine to eat a good bit of power, which is why I wanted the 20A circuits.—Steve O.

DULCIMER ROOTS

Jim Miller's "Sampling the World" article (February 1997) made for enjoyable breakfast reading, as I sat imagining and remembering all those sounds. Though manipulating samples will never capture the soul of a masterful performance on the original instrument, those little electronic snippets can be ever so tantalizing. The biggest problem is that real notes don't stand in isolation. Mr. Miller hit the nail on the head in his paragraph on shakuhachi, where he explains that the basic musical building blocks are phrases and gestures rather than individual notes. I learned a similar sort of lesson while studying cabrette (a southern French bagpipe): there's really no static fingering chart but rather a series of connections to learn for scooping and growling from one note to the next.

I have a correction concerning the Appalachian dulcimer, however: it is not in any way unique to the United States. It grew virtually unchanged out of a Pennsylvania German instrument known in the old country as a *scheidtholt*, and it was known in neighboring Alsace as the *épinette des Vosges*. Swedes and Hungarians, likewise, have their own varieties of fretted zithers. You can hear excellent use of épinette on recordings by the French group Mélusine.

John Bromka
bromka@ican.net

TECH TIME

Scott Wilkinson's February 1997 "Tech Page" was really great! However, he does not get very specific about the hardware available to implement a SHARC DSP in a PC. Was this an evaluation board available from Analog Devices, a third party, or what? I obviously need that board to try out Csound.

Howard Cornell
howard.cornell@
stpete.honeywell.com

Howard—The purpose of "Tech Page" is to introduce an interesting new technology that has a potential application to electronic music but is not yet found in a commercial product. I never have a prototype to play with, so this column is not an evaluation or review of any sort; it's just a description of a technology I think is cool.

Several manufacturers are interested in using the SHARC chip in their products, but no such products are available at this time. However, Analog Devices does offer a PCI development board with the SHARC chip for the PC platform. For more info, contact project manager Lee Ray at Analog Devices (lee.ray@analog.com).

Of course, Csound has been around a lot longer than the SHARC chip, and you don't need the board to try it out; you can download it from various sites on the Internet and run it on your PC. Use your favorite search engine to find Web sites devoted to Csound. However, the SHARC chip is required for real-time operation.—Scott W.

STUDIO OWNERS BEWARE!

I am a faithful subscriber to *Electronic Musician* and have had a personal studio since the mid 1980s. I am writing because I am very lucky to be alive right now. Last night, five armed men (their faces were covered by ski masks) came to rob my home and studio. Fortunately, and by the grace of God, I was unharmed. I can only say that it was a complete miracle that no one was hurt. My pregnant wife had locked the house portion of our building when she heard the commotion and called the cops. Our alarm was going off, but I was forced at gunpoint to disarm it.

I never thought that my studio would ever be a target—nor that one of my clients might mastermind this—but the robbery was probably planned by someone who saw my equipment (a couple of ADATs, a rack of MIDI gear, a mixer, speakers, a Mac, etc.).

I want to spread the word to my fellow subscribers to watch out who you bring into your home or commercial studio. Take careful precautions when working late with clients. If your bread and butter comes from these clients, then take adequate security precautions. All the music in the world is not worth losing your life or the life of a loved one when your studio gear makes you a target.

Ed Ulloa
105036.1247@
compuserve.com

ERROR LOG

March 1997, "Service Clinic," p. 102: Alan Gary Campbell listed specific prices regarding Alesis' scheduled maintenance program for ADAT transports. Although the information is accurate, the prices are specifically for the ADAT XT, not for the original Alesis ADAT. Consult Alesis or their authorized service centers for the actual pricing for ADAT maintenance.

Digital Piano Buyers Guide, 1997 edition: There were some incorrect statements regarding the number of sounds in the Kurzweil Mark 12 88-note digital piano. Here are the facts. Piano sounds-21, Organ-15, Strings-26, Guitars-28, Basses-16, Woodwinds-31, Brass-21, Choirs-8, Synthesizers-48, Other-111, Percussion-226, Rhythms-64.

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.*

The EVENT you know...

(and love :-)

Even if you've never heard of Event (possible—especially if your last name is van Winkle), you already know us very well. Because Event is made up of folks who've been major players in the music and audio industries for a long, long time. Folks who've designed and manufactured some very highly respected and innovative pieces of gear—some of which you may very well own (all the cool people do).

EVENT ELECTRONICS

We founded Event on the principal that "the customer is precious." That means we make only those products that our customers want, need, and can afford. Products that provide access to new levels of musical expression. Products that put high-end, professional tools in the hands of us mere mortals. (That's right. We use the gear we make, so we build the stuff that we want in our own setups.)

We began our business with the microphones and speakers you see pictured on this page. Thanks to you—and to the kind support of the industry at large—these products have been tremendously successful. We want to give our heartfelt thanks to all of you who have bought a set of our speakers or a RØDE™ microphone. We hope you've gotten as much pleasure out of using them as we have.

...is just getting started. And now...

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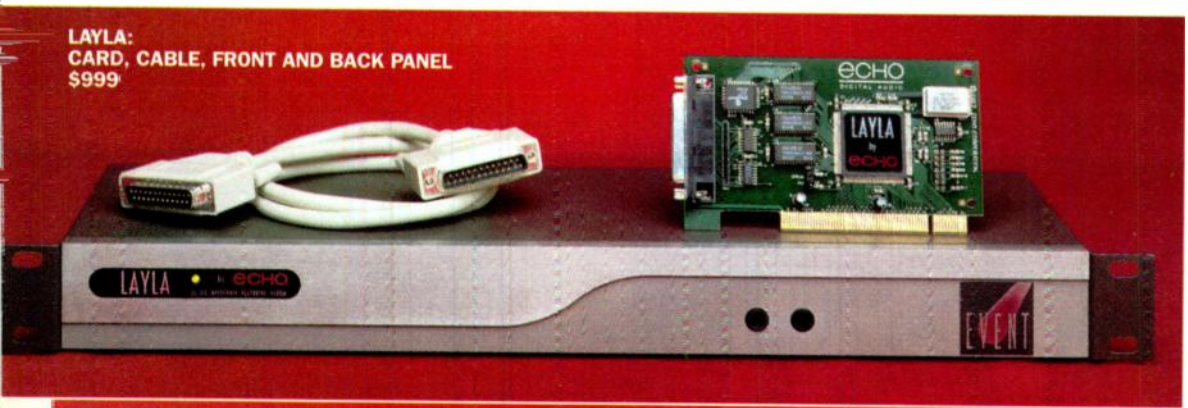
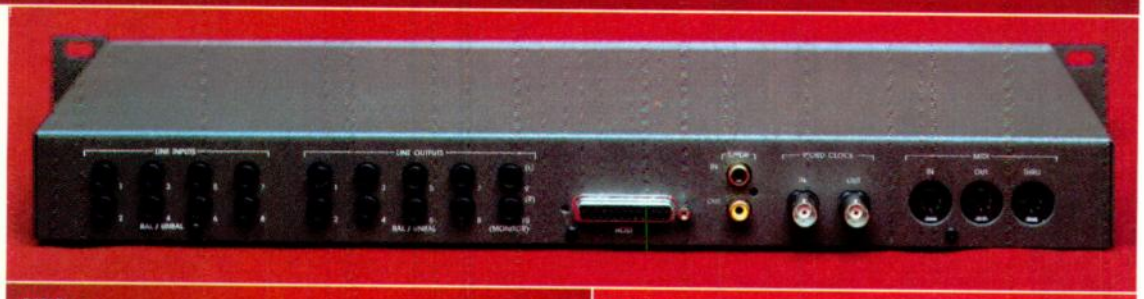
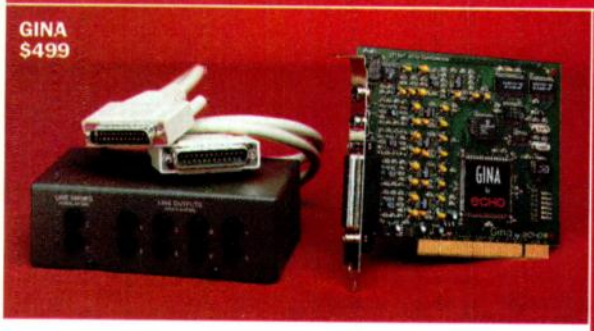
...the EVENT you've been







Affordable Digital Recording Hardware

Introducing our new family of cross-platform PCI-based multitrack audio recording systems, designed by digital audio gurus and Event's strategic partner, ECHO Corporation. Our proudest offering: **Layla by ECHO™**, a rack-mount audio interface with eight balanced analog inputs, ten balanced analog outputs (ins and outs are all simultaneously accessible), digital I/O, a 24-bit signal path, massive on-board DSP, word clock (for sync and expansion), MIDI, and much, much more—all for an amazingly low $999.

Or meet **Gina by ECHO™**: two analog inputs and eight analog outputs (all 20-bit, of course), digital I/O, and on-board 24-bit DSP. Appreciate clean design? So do we. That's why all of the audio connections on *Gina* are pro-quality 1/4" jacks mounted in a rugged breakout box. Appreciate reasonable pricing? *Gina*'s $499 tag is sure to make you smile.

If you only need two analog inputs and eight analog outputs (again, all 20-bit!), on-board DSP, and a breakout box loaded with RCA audio connectors, then say hello to **Darla by ECHO™**—priced to fit just about anyone's budget at only $349. (No, that's not a misprint.)

All three systems are compatible with audio recording and editing software applications that "talk to" the Microsoft Windows 95 .WAV device driver—which means you don't have to give up your favorite software in order to take advantage of the fantastic sound quality that Layla, Gina, and Darla offer. You can, for example (with full apologies to all of the fine software programs we're unintentionally leaving out), run Cakewalk Software's Cakewalk Pro Audio™. Or Steinberg's Cubase Audio™ and WaveLab™. Or Emagic's Logic Audio™. Or Innovative Quality Software's SAW Plus™. Or Sonic Foundry's Sound Forge™. Or Syntrillium Software's Cool Edit Pro™. (In fact, a custom version of Cool Edit Pro comes with each Layla, Gina, and Darla system, so you can be up and running even if you don't already own multitrack recording software.) Plug-ins? You bet. Including perennial favorites from Waves and Arboretum Systems.

And since getting up and running is half the battle (a battle we firmly believe you shouldn't have to fight) all three systems are true Plug and Play™ compliant. We even give you a utilities disk that examines your system before installation, so you know exactly what performance you'll be able to achieve.

Don't worry. We haven't forgotten our Mac-based friends. Our PowerPC-compatible systems (same hardware, new drivers) are coming this summer. Prepare to be stunned.

Precision Monitoring Systems

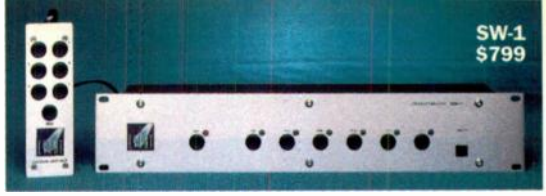
Building on the technological innovations that arose from the 20/20*bas* development, our intrepid engineers, messieurs Kelly and Dick, set out to create an active monitoring system that would be a perfect complement to the digital audio workstation environment. Requirements: small footprint, reference-quality frequency response, non-fatiguing to the ears over long periods of use, magnetically shielded, and *way* cool looks (!). The result: the **Tria™ Triamplified Workstation Monitoring System**. This integrated three-piece system comprises a floor-mounted VLF (Very Low Frequency) driver housed in a cabinet that is also home to five separate power amplifiers, active crossovers, and a full set of calibrated trim and level controls, plus

RØDE™ NT1

Large Diaphragm Condenser Microphone

Hot on the heels of the awesomely successful NT2 comes the **NT1**, a true large diaphragm condenser microphone. Like its predecessor, the NT1 boasts low-noise transformerless FET circuitry, and features the highest quality components. With a 1" gold-sputtered diaphragm inside a proprietary shock-mounting system, a unique head design that provides both durability and pop filtering (while remaining acoustically transparent), and a wide dynamic range that makes the mic ideal for use in a wide variety of applications, the NT1 is destined to become a fixture in the modern project and professional studio. And at only $499, it's just plain scary.

waiting for.

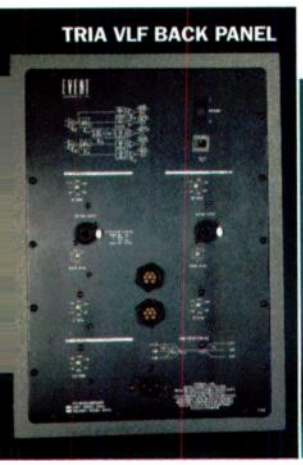


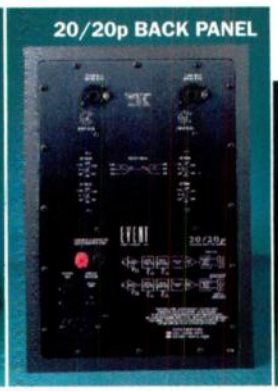
two biamplified satellite speakers, each with a 5-1/4" poly-propylene driver and 1" neodymium soft dome high frequency driver.

What's truly remarkable is that the biamplified satellite speakers reproduce frequencies down to an incredible 55Hz, so the listener experiences full-range sound when positioned in the near field environment (that is, sitting in front of a computer screen). With the addition of the VLF, the system response reaches down to 35Hz, resulting in full bandwidth audio reproduction that is as accurate, precise, and pleasing to the ear as our award-winning 20/20*bas* system. You simply must hear **Tria** to believe it. Even then, you may not believe the price: $849. (Yes, that's for the *entire* system.)

The **20/20p™** is a direct field monitor designed to provide an affordable pathway into the world of powered speakers. Utilizing the proven 20/20 design, the system comprises a 20/20 cabinet with two full-range 100 watt power amplifiers—one of the amps drives the powered cabinet, the other drives a passive 20/20 satellite. The resulting sonic clarity is exactly what you'd expect from a system bearing the 20/20 name: extended low frequency response, exceptionally clear midrange, and sparkling high end. What does this kind of audio quality cost? A low, low $599 per pair.

As with all of our active monitoring systems, the **Tria** and **20/20p** offer continuously variable high and low frequency trim controls, input gain controls, balanced inputs with combination 1/4"/XLR connectors, and full magnetic shielding.

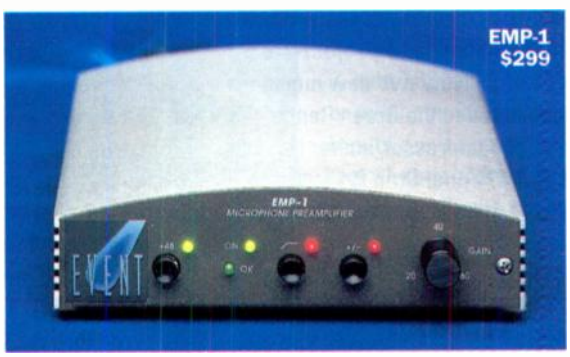




SW-1 Speaker Switcher

Bet you were almost going to pass over this part. After all, a speaker switcher isn't exactly the most exciting product in the world. But the **SW-1™ Speaker Switcher** delivers breakthrough performance and functionality, thanks to the clever engineering of Peter Madnick, who has long been a fixture in high-end audio equipment design. (He's actually pretty scary, possessing serious chops in both the analog and digital domains.)

What makes the **SW-1** unique among switchers is its ability to simultaneously handle both active and passive monitoring systems. Of the six pairs of speakers that can be connected, up to three sets can be active. Switching among them is as easy as pressing a front-panel button. Or use the included remote control so you never have to leave the sweet spot when switching. Naturally, the audio path is beautifully transparent and the switching noiseless. There is one thing about the SW-1 that we haven't quite figured out: If you own a pair of Event monitors, why would you have any other speakers that you needed to switch to?



EMP-1 Microphone Preamplifier

What better to complement a RØDE Classic, NT2, or NT1, than a custom microphone preamp that combines superior sonic performance with the features demanded by today's studio professionals? (Okay, we admit the thing sounds pretty amazing with other brands of mics as well.) First off, you should know that the **EMP-1™ Microphone Preamplifier** was designed by engineering wizard Peter Madnick. Why is that important? Because, in Peter's own inimitable words, it means that the unit features a transformerless design utilizing a common-mode choke input *[translation: RF interference is virtually eliminated]*, a superior differential input *[translation: EM interference is suppressed]*, and servo-controlled DC to maintain zero DC offset *[translation: There are no distortion-inducing capacitors]*. Ahem. Thank you for those fascinating explanations, Peter.

Put in terms the rest of might have a chance relating to: The EMP-1 offers ultra low noise operation, selectable phase, low cut filtering, phantom power, a line output (for running directly into *Layla*, perhaps?), and an internal power supply—all in a downright sexy little box. Now, what does all that mean? It means that the EMP-1 is a mic pre worthy of your finest microphones. (Don't let its low $299 price tag fool you. This preamp is the real thing.)

SPECIAL WINTER NAMM REPORT ▲ ▲ ▲ ▲

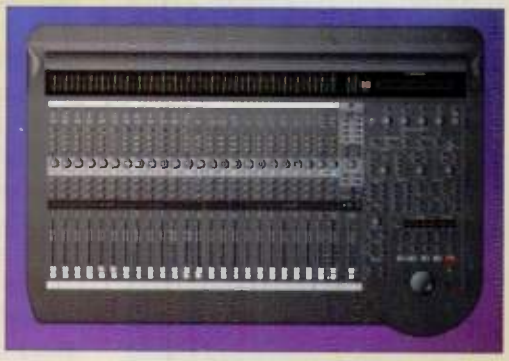
MACKIE DIGITAL 8 • BUS MIXER

Affordable digital mixers for the project studio appear to be the next big thing, and several manufacturers are hard at work trying to deliver winners. For example, Yamaha is already shipping its 02R and showed a prototype of its new 03D at the 1996 AES show, Korg's 168RC should be shipping by the time you read this, and TASCAM showed a prototype of an unnamed digital mixer at AES. (The Yamaha 03D and TASCAM prototypes were described in the February 1997 "What's New" column.)

So it's no surprise that the biggest hit of the 1997 Winter NAMM show was Mackie Designs' Digital 8•Bus mixer, which will list for less than $8,000. Partway through the show, a partially working prototype of this all-digital beast finally arrived at the Mackie booth, though some of it was hacked together at the last minute in a hotel room.

The 48 × 8 × 2 board combines extensive, flexible I/O; a meter bridge; an internal 500 MB hard drive; an internal, DOS-format floppy drive; 8 MB of RAM; and Mackie's UltraMix II automation. (The UltraMix system with v. 1.11 software was reviewed in the October 1996 EM.) Of critical importance is that the Digital 8•Bus offers a conventional mixing surface, in sharp contrast to the limited physical mixing surface of the Yamaha 02R, which obviously will be one of the Mackie console's main competitors.

Each channel has 4-band parametric EQ, twelve (!) balanced aux sends, and two dynamics processors. Phantom power can be individually switched for each channel. In addition to the master L/R fader, there are 24 motorized, assignable faders that can not only be switched between the two sets of 24 channels but also can handle the subgroups, tape returns, and more.



You can automate virtually everything on the board via static Scenes, dynamic onboard automation, or dynamic MIDI automation. The onboard automation can even be synched to a MIDI tempo map. Another touch that should make this board much friendlier than the 02R: you can attach a PC-compatible mouse, PC keyboard, and SVGA monitor.

I wasn't kidding when I said the board had extensive, flexible I/O. Channels 1 to 12 have ¼-inch TRS, analog line inputs; XLR mic inputs with the usual Mackie mic preamps; and insert points. Channels 13 to 24 have only ¼-inch TRS, analog line inputs. You get 24 balanced, line-level tape sends on three DB25 connectors (eight channels each) and 24 analog, line-level tape returns, again on three DB25 connectors. (The eight bus outputs also use a DB25 connector.) All channel inputs and direct outputs use 20-bit, 64x oversampling converters, and the main outs have 24-bit, 64x oversampling DACs. Those are all-pro specs in my league! Better yet, each 8-channel set of analog tape send/returns can be independently replaced with an 8-channel digital I/O card, which can be in AES/EBU, S/PDIF, ADAT Lightpipe, or TASCAM TDIF format.

That's just the beginning of the Digital 8•Bus patching capabilities. The analog master outputs are provided on ¼-inch and XLR connectors. AES/EBU and coax S/PDIF I/O let you digitally transfer two tracks at a time (or digitally output a stereo mix). You also get three stereo pairs of analog 2-track tape returns, three sets of monitor outputs, two independent headphone outs, and footpedal inputs for controlling punch in/out and the talkback system. There's more, but you get the idea.

As if that weren't enough, the operating system resides in Flash memory and can be updated via the floppy drive. For an extra high-tech twist, the mixer has a built-in 33.6 kbps modem. When you want an OS upgrade, the modem dials Mackie's Web site, downloads the new OS into Flash memory, and logs your OS version into Mackie's database so that the tech support team can access the info if you need support. Mackie even gave the board multilingual help: the board switches to your choice of common languages.

Mackie promises delivery by sometime in June, though I am skeptical about that target date. (This is a very sophisticated product, after all.) If the final product performs as promised, EM readers with a yen for digital mixing should be very excited—and Mackie's rivals should be very concerned. Mackie Designs; tel. (800) 898-3211 or (206) 487-4333; fax (206) 487-4337; e-mail mackie@mackie.com.

—Steve Oppenheimer

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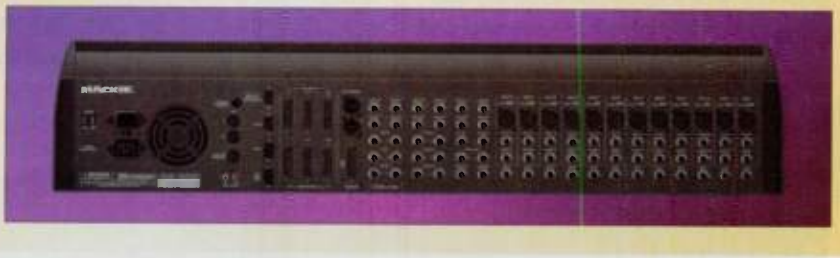

The Logic System:

Logic Audio – The Pros choice. Feature rich 960ppq real-timer Sequencer. Professional Scoring & Printing. Unlimited Virtual Mixers with full automation. Up to 24 tracks of digital audio with intense offline and real-time DSP editing.

Logic Audio Discovery – Entry level price with a professional feature set. 960ppq real-time sequencer with surprising scoring and printing. Simplified MIDI environment with virtual mixers and automation. Even real-time DSP.

Audiowerk8 – Complete Digital Audio Recording Solution. 2 in, 8 out, S/P-DIF I/O, PCI busmaster digital audio card & VMR control surface software for MAC or PC.

Unitor8 – 8 X 8, single rack space, Cross platform MIDI interface. Stack up to 8 for a maximum of 1024 MIDI Channels. Read/write SMPTE for LTC/VITC .

Logic – The MIDI Masterpiece. The most integrated 960ppq real-time sequencer to date. Professional scoring and printing and a totally user definable interface. Unlimited virtual mixers and editors. Full automation, full SYSEX support and more.

MicroLogic – The Beginners Dream. The Perfect introduction into the world of real-time 960ppq MIDI sequencing with surprising scoring and printing. Full GM and GS support included will full automation. A great value.

SoundDiver – The Ultimate in Synthesis Patch Management. Universal Editor/Librarian for Mac or Windows 95.

Got a computer? Start recording.

Digital audio recording is as easy as tape. Introducing Audiowerk8, Emagic's cross platform, PCI busmaster digital audio recording card. With 8 discrete outputs, stereo inputs and digital I/O, Audiowerk8 ships with VMR, the "Virtual Multitrack Recorder". Software so transparent, the manual is optional.

Audiowerk8 and VMR gets you up and running with a complete plug and play digital audio recording solution. It makes hard-disk recording as easy to use as tape.

The VMR control surface is simply a virtual representation of an 8 track linear tape deck. Just like any multitrack, VMR lets you record an instrument on any track, punch in on the fly, mix with a traditional mixer, add outboard effects and your done.

- Playback of 8 tracks while recording two further tracks.
- Practically unlimited number of alternative tracks.
- Seamless cycle and punch in/out on the fly.
- Soft scrolling wave form display.
- Up to 24 position memories, set & recall on the fly.
- 8 discrete outputs and stereo digital I/O with Audiowerk8.

Upgrade to Logic Audio Discovery or Logic Audio for increased track potential, DSP and Automation. Logic Audio can support multiple AW8 cards and can even be used in tandem with any other supported audio soundcard, simultaneously. Audiowerk8 with VMR erases the boundaries between linear tape and modern digital audio recording. The Choice is Simple. MSRP $ 799.

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PRO FILE

Society's Children

Paedon grinds out a topical industrial groove.

By Diane Lowery

On Paedon's debut CD, *Senpäi Kohäi,* singer-songwriter R. A. Paedon and producer-composer-instrumentalist Peter Stanley grab topics from today's headlines for their musical social commentary. Their approach is aggressive and in your face, and they leave no stone unturned, from the shredding antiracism of "100% Stupidity" to the angry attack on media indoctrination in "Mind Grind." To achieve their industrial theater, Stanley engineered and mixed the music with an emphasis on keeping the listener focused on the lyrics.

"Although the music is in the traditional verse-chorus-verse style," says Stanley, "it is definitely not composed in the conventional pop format. For example, you can't hum a few bars of 'American Psycho,' because the lyrics are performed as spoken word rather than sung. So to keep the songs interesting, I create a lot of musical scenes. If I want to switch from a free and open feeling to a sense of claustrophobia, for instance, the mix will go from a very wet ambience to a completely dry one. The average listener may not register that in the forefront of his or her consciousness, but something in the back of the mind will be going, 'Hmm, something's different.'"

Stanley also used found sounds and other sonic elements to create musical textures. For "Thanks for the Fan Mail," he sampled a death threat he saved off his answering machine and placed it over a dark, throbbing bass line. On "American Psycho," he sampled a hand squishing around in a bowl of spaghetti. He liberally sprinkled bloops and bleeps from a Minimoog through almost all of the songs. And on "Bad Lieutenant," he used Paedon as a human wah-wah.

"I double-tracked the guitars and panned them right and left," explains Stanley. "Then I patched the guitar tracks through an Ashly parametric EQ and set it to full boost, while Paedon swept through the frequency range by twiddling the knobs. The effect is subtle, but the tonal sweeps sound better than those produced by the average wah-wah pedal."

Because the songs deliver an onslaught of many different ideas, Stanley constantly changed the musical "space" by adding surprise elements to jar the listener into paying attention. "I really believe in using juxtaposition to make things interesting," says Stanley. "This is something that always appears in good symphonies. Just listen to Beethoven's Ninth Symphony: some sections come at you like pile drivers, and then there's calm. I do the same by, say, using heavy guitars for one section and then shifting to synths."

Not everyone is going to feel comfortable with the songs on *Senpäi Kohäi,* but then, lyrics and music designed to make people stop and think about society are rarely easy to take. "I'm really proud of the general vibe of the album," says Stanley. "There's always something interesting happening in our songs. I strive for that on any album project I'm involved with—the songs should definitely take you on a journey."

For more information contact Studio Apogee, 489 Reynolds Circle, San Jose, CA 95112; tel. (408) 441-7513; fax (408) 436-0653; e-mail gulls1@ix.netcom.com; Web www.best.com/~paedon.

If you have a CD you recorded in your home studio, we'd love to consider it for "Pro/File." Send your CD and background information to Pro/File Editor, Electronic Musician, *6400 Hollis St., #12, Emeryville, CA 94608.*

Peter Stanley of Paedon

Somebody's Finally Giving Inexpensive Powered Mixers A Good Name.

Of all the big names in the powered mixer business, only one—Yamaha—also makes the world's best-selling professional touring console (the kind you see at mega concerts), the world's most advanced digital signal processors and some of the world's most efficient power amplifiers. And only Yamaha can put that expertise into a powered mixer for the working musician, the new Yamaha EMX640.

Powered mixers have always represented the cheapest way to a complete PA system—with an emphasis on cheap. Yamaha, on the other hand, has always put in our powered mixers the same high quality components we use in our professional gear. The result, until now, has been great quality at a high price.

Yamaha challenged our best engineers, the same ones who develop the professional gear, to design a premium powered mixer at a completely affordable price. They did. The Yamaha EMX640 includes everything you need for a small gig in one rugged box: mixer, amplifiers, graphic EQ and a high quality digital reverb. And it's under $649.95.

You can get another powered mixer for this price, but not one with all these features or this quality.

- 6 channels with 1-4 having balanced XLR mic inputs and balanced line inputs. Channels 5-6 have balanced XLR mic inputs as well as dual unbalanced line inputs allowing you to plug in stereo sources, like your piano, without using up two channels.
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HIDDEN Gems

We uncovered a wealth of promising new digital audio products at the 1997 Winter NAMM show.

Attendees at this year's Winter NAMM Show were treated to the usual huge variety of new products: signal processors, speakers, mics, MiniDisc recorders; you name it, it was there. And after all was said and done, most of these products were exactly what we had expected to see, neither more nor less. For the most part, showgoers encountered mature products that were being steadily upgraded. This is by no means a bad thing; it indicates that the industry has come a long way and is now building on what it has learned and accomplished.

Nevertheless, a few product types of particular interest to EM readers were obviously forging ahead in a big way. Perhaps the most remarkable growth on display at NAMM was in computer-based digital audio recording and processing products, both hardware and software. Clearly these new products are appearing in response to steadily increasing end-user demand. (This is not always the case; sometimes manufacturers try to create new demand for products they have already developed despite a waning of consumer enthusiasm. An example of this is sample-based keyboard synths.) In my view, this explosive growth of desktop audio-production tools—not the development of new mics, effects boxes, speakers, or synthesizers—is the biggest and most important long-term trend in our industry.

According to NAMM tradition, the larger and better-established companies have booths on the main Anaheim Convention Center floor, in Halls A through D. That's where you'll find Roland, Korg, Mackie Designs, Alesis, Opcode, MOTU, Steinberg, and so on. A few companies, notably Yamaha, set up shop across the street at the Marriott. But some of the most innovative new products consistently come from the small companies in Hall E, the basement of the Convention Center. (All this will change in 1998 and 1999, by the way, when the show temporarily moves to the Los Angeles Convention Center while the Anaheim building is expanded.)

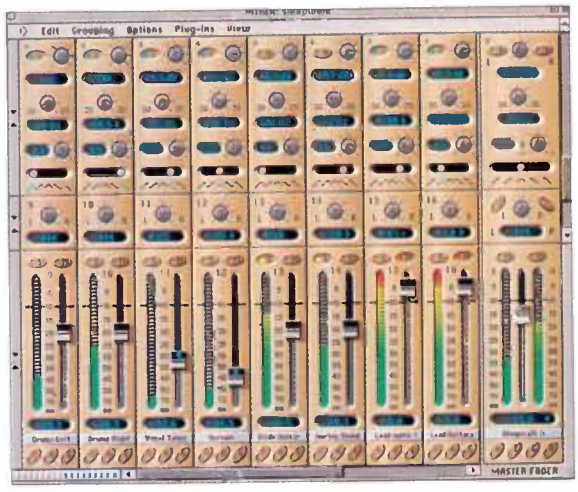
By Steve Oppenheimer

This year was no exception. The companies who generate public relations hoopla were mostly upstairs, and I'll discuss a handful of these. But some very cool stuff was hiding in the show beneath the show, downstairs in Hall E. A lot of showgoers stayed upstairs and just plain missed this stuff, so in most cases there was relatively little show buzz about these products. But as a fan of Golden State Warriors basketball and San Francisco Giants baseball, I'm accustomed to the charms of basement dwellers, so I moseyed downstairs. There I uncovered some real gems and some items that could evolve into jewels in the future.

So this will not be a traditional magazine trade-show report in which we traipse through dozens of unrelated products, focusing mostly on the big companies. You won't find Roland or Yamaha, Opcode or, TASCAM or Alesis in this report. Every one of those companies had cool new products at NAMM, and we'll cover them all—another time.

WITH A VENGEANCE

The biggest buzz at NAMM was about Mackie Designs' Digital 8•Bus mixer, which we have given a full page in this month's "What's New" column (see p. 22). Although it was not nearly as ballyhooed as the Digital 8•Bus, the GigaSampler digital audio sampling system from start-up manufacturer Nemesys potentially represents an even bigger technological breakthrough. (After all, Yamaha is already shipping a digital mixer for the project studio, and TASCAM showed an unnamed prototype of a competing digital mixer at the 1996 AES show.) Nemesis is the Greek goddess of vengeance, which is appropriate because the Nemesys folks intend to assault traditional sampler manufacturers with a vengeance.



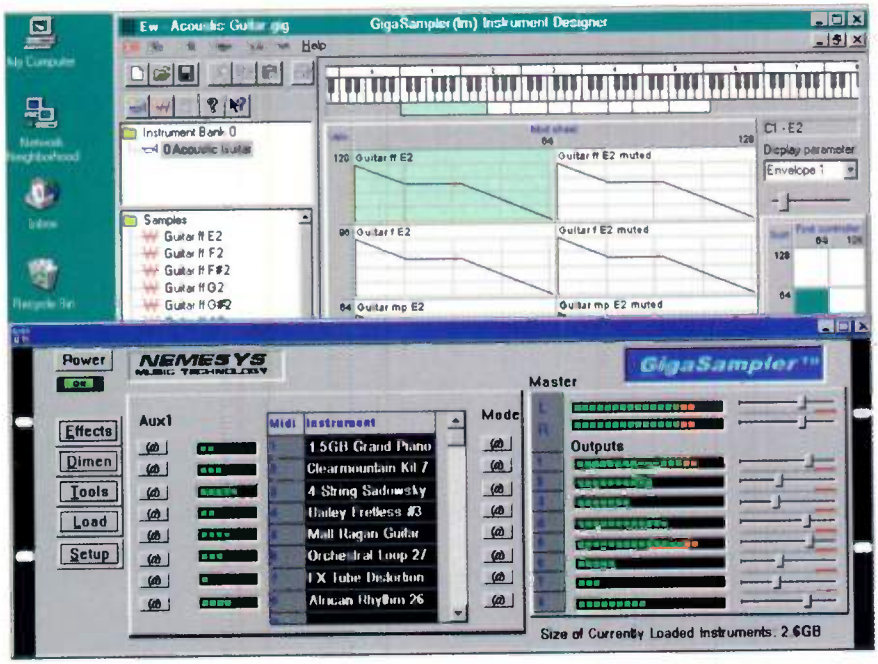
Ensoniq Paris

Instead of using sample RAM, the innovative, PC-based GigaSampler reads sample data directly from disk in real time. Thanks to its partnership with sample-library megavendor East West Communications, Nemesys got a visible upstairs booth despite being a start-up company. Otherwise, the company surely would have been part of the show beneath the show in Hall E, where it belongs in spirit.

Because the GigaSampler uses disk space instead of RAM, it can access and play huge multisamples—up to 4 GB, according to the manufacturer. This technology could lead to such exciting applications as playing unlooped, uncompressed, acoustic-instrument samples that include the sound's entire natural decay; extremely sophisticated Velocity cross-switching or cross-fading between sample layers; and many other variations.

The GigaSampler's programming architecture includes a construct called a Dimension. Each of the unit's five Dimensions is mapped to a set of samples, a keyboard zone, and a set of assignable controllers (e.g., Modulation, Velocity, and Breath Controller). For example, by switching between Dimensions using the controllers, you can emulate the sonic changes that occur when you strike different parts of a drum head or the timbral differences between picking a guitar near the bridge and picking near the neck (or between flatpicking and fingerpicking). You can also create two to four separate Layers of samples. Physical modeling is the only current technology I can think of that has the potential for comparable expressive control.

At the NAMM show, Nemesys demonstrated the GigaSampler using a 1.5 GB Steinway–grand piano multisample by East West Communications that has seven Velocity layers for each note and was created using seven channels of audio. Nemesys' database-management and control software accesses and plays samples using Endless Wave technology developed by the Brooktree division of Rockwell Semiconductor Systems. The manufacturer claims the GigaSampler



Nemesys GigaSampler

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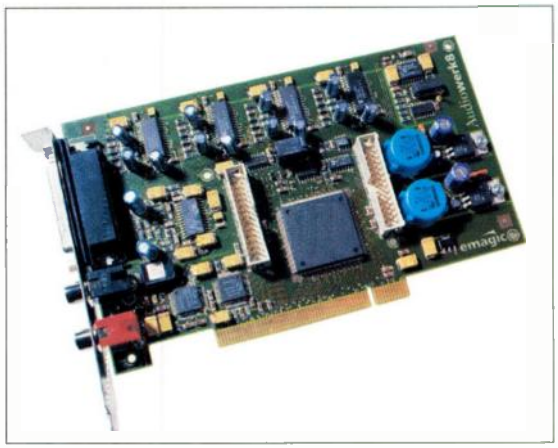
can access and play a note in 5 ms, but access time for the maximum 64-note polyphonic performance was not specified.

The product will be made available in several forms, all of which include the same sound-editing features. The least expensive version is *GigaSampler Project* software for Windows 95 ($250), which requires a sound card and a Pentium or Pentium Pro CPU (with or without MMX). It handles instruments up to 1 GB in size and provides 32-note polyphony, two Layers, and five Dimensions. Sampling rates of 22.05 and 32 kHz are supported. Although you can address both outputs on your sound card, the samples are mono. You can create a synthesized stereo ambience using the real-time effects section. A "light" version of East West Communications' *GigaSampler Sound Collection,* vol. 1, is included.

GigaSampler Studio ($795) is the next version up the line. Like *Project,* it is software and uses any Windows-compliant sound card, but it offers 64-note polyphony; four Layers; sample rates of 32, 44.1, and 48 kHz; instrument samples up to 4 GB; support for up to eight outputs; stereo samples; and such real-time effects as stereo room, hall, chorus, multitap delay, and ambience. In addition, you get the full version of the *GigaSampler Sound Collection,* vol. 1. *GigaSampler Studio* is also available bundled with a Windows 95–compatible audio card ($1,200), which adds S/PDIF inputs. The *Project, Studio,* and Studio with Card package are expected to ship in the third or fourth quarter of 1997.

Topping the Nemesys product line will be the GigaSampler Studio Rack System ($10,000), a complete hardware/software package that is scheduled to ship sometime in the second quarter of this year. Its 3U rack-mount brain comprises a P200 Pentium Pro computer with Windows 95, 128 MB of RAM, fast SCSI, and an audio card Nemesys describes as "professional." It delivers the same features as the Studio with Card package would with a comparable Pentium and 128 MB of RAM. Turnkey solutions are nice, but I was amazed at the huge price disparity between the Studio with Card version and the full Rack System. I suspect they will have to bring that price down to earth.

If this product really works—and it sure appeared to—it could knock sampler manufacturers for a loop (so to speak). Some users will justifiably wonder why they should spend $3,500 or more for a pro-quality RAM-based hardware sampler when they can use far larger samples with the GigaSampler for less money. True, hardware samplers are portable and don't chew up your computer's CPU time, which you might need for sequencing and multitrack recording, and they often include a lot of cool synthesis features. They will still find plenty of enthusiastic buyers. But at these prices, you can dedicate a Pentium PC to the GigaSampler and still end up ahead—and you know you'll find other uses for a second computer.



Emagic Audiowerk8

WHAT A CARD!

Sometimes I feel sure that if I see one more doggone new audio card for Windows PCs, I'm going to give this business up and, well, go to the dogs. (I've been there before; I used to work with German Shepherds and Kuvaszok at various points in my—shall we say, "eclectic"?—past.) At least the dog business doesn't undergo radical change every few months the way the audio-card business does. I can't even come close to keeping track of all the cards on the market now, so I'm just going to discuss a few of the latest "card players" who were dealing at NAMM.

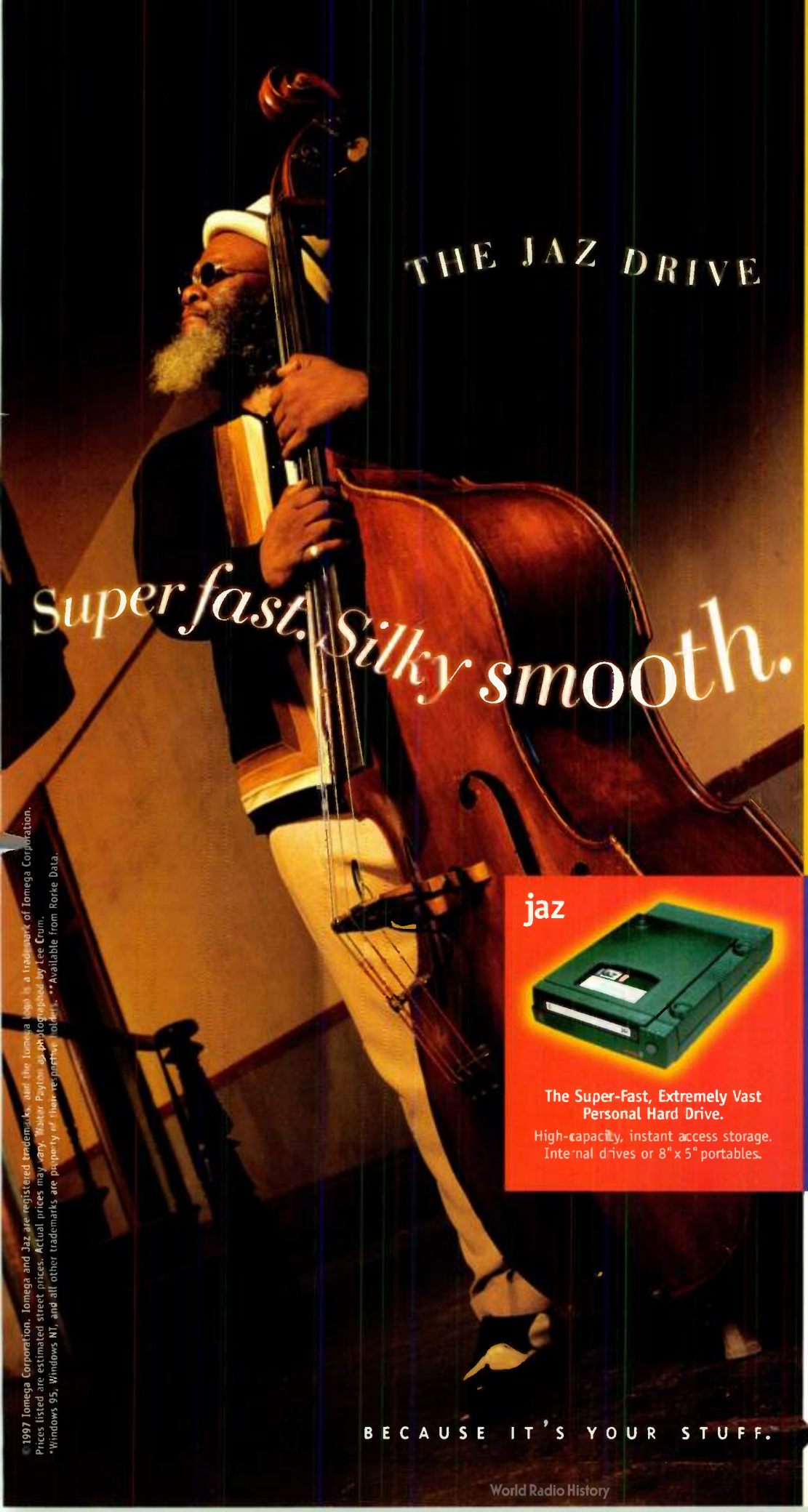
PCI (which stands for "Peripheral Component Interconnect") is the name of a magic bus in the world of computer expansion cards. PCI is magical for **EM** readers because it offers much greater bandwidth and throughput than the older NuBus and ISA buses, which are critical advantages for audio, video, and graphics production. (For a comparison of the PCI and ISA buses on PCs, see "The Windows Studio" in the July 1996 **EM**.) Most newer desktop PCs and Power Macintoshs have PCI slots, so the same card can often be used on either platform, assuming software drivers are available. Of the ten products I'm going to discuss, nine are PCI based; the other uses the ISA bus.

Many of the new generation of PCI audio cards deliver far more features for the price than you got in the past, when there were few pro-quality choices. You also get a much wider selection of features. For example, some cards have both analog and digital I/O, others only offer one or the other, and you can get all of the above in varying amounts, formats, and combinations. Sometimes the I/O ports are on the card, sometimes on breakout cables, sometimes on outboard boxes. Some cards have 16-bit converters, while others offer 18- or even 20-bit converters. The amount and type of onboard DSP chips varies, too. Some are stand-alone cards you can use with any standard audio software, others are sophisticated systems with dedicated software.

The new generation of audio cards—including previously released products from companies such as Antex, AdB, Frontier Design, and Zefiro, as well as the new products I'm about to discuss—demonstrates once again that serious, fair competition is great for the consumer. Hooray for the newcomers!

I LOVE PARIS

Ensoniq's Paris (introductory system $2,999) is a full-blown, computer-based, digital audio workstation (DAW) that includes one or more PCI cards, external hardware, and sophisticated software. Paris was part of the Hall E show beneath the show, so it got less attention than it probably deserved. Believe me, Hall E is a long way from the shores of the Seine! Paris (the DAW, not the city)



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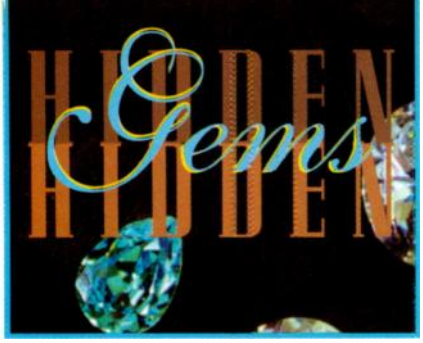
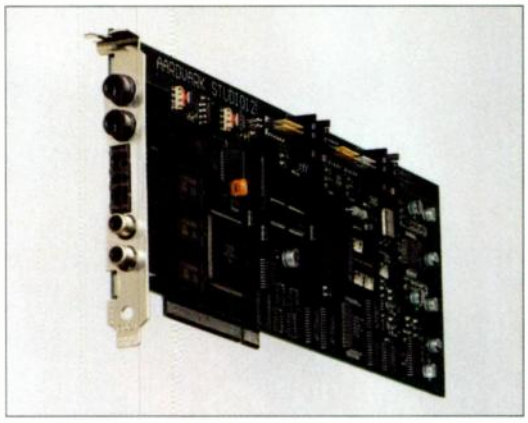


is supposed to ship around midyear.

The Paris operating system and graphical front-end software for Mac and Windows 95/NT was written (presumably in C, not French) by Intelligent Devices, headed by well-known engineer and *Mix* magazine columnist Stephen St. Croix. (Both the Macintosh and Windows 95/NT software are included on CD-ROM.) The software provides a 128-channel mixer with 4-band parametric EQ, dynamics processor, aux sends, and real-time effects on each channel. You can customize the interface by rearranging EQ controls, faders, and so on. This is not merely an eye-candy feature; as Emagic *Logic Audio* users have discovered, if you rearrange the screens to suit your applications, keeping only the features you need, you can work fast, fast, fast!

Full-featured MIDI sequencing is incorporated, so Paris is a complete, OMS-compatible audio-recording and MIDI studio. Like a digital audio sequencer, Paris lets you nondestructively edit sections of a song (MIDI and audio together) in a linear fashion via cut and paste, but it also gives you a free-form edit mode that transcends tracks and layers. A nondestructive waveform editor is also provided. Paris includes a real-time DSP plug-in architecture, though no details were announced.

Paris' core hardware is the Louvre—no, no, it's Ensoniq's EDS-1000 PCI card, which uses six of the company's new ESP-2 24-bit proprietary chips. Keep in mind that Ensoniq's engineers have been designing chips for samplers and digital effects processors almost since the days when Bourbons were beheaded rather than bottled; these folks know a thing or three about DSP chips for audio. And indeed, the six chips deliver a lot of horsepower: each PCI card can mix up to 32 channels of audio, send these to sixteen mono or eight stereo aux buses, connect with up to twenty inputs and twenty outputs with up to 24-bit resolution, handle 24 streams of 24-bit audio, and provide 32 parametric EQs, real-time effects, and a 175-point digital patch bay. But I don't suppose that's enough for you power users, is it? Ah, but we're not done yet. Theoretically, you will be able to use up to eight of these cards.



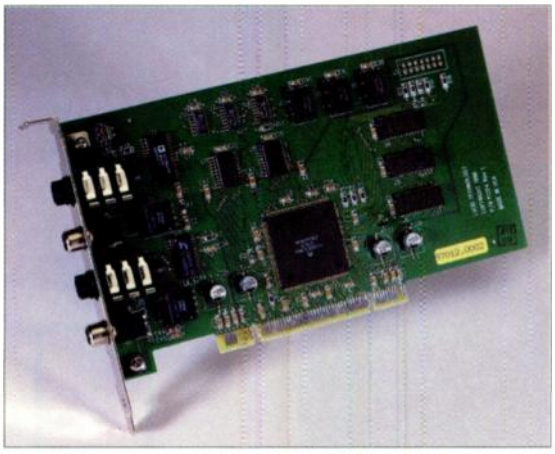
Aardvark Studio 12

Each card links to an external audio I/O interface. The Interface 442, which ships with the system, is a single-rackspace unit that offers four channels of analog I/O on ¼-inch TRS connectors and stereo S/PDIF I/O on RCAs. In addition, it has word-clock I/O on BNC connectors. The optional Interface 2 (price tba) operates at +4 dBu or -10 dBm (switchable) and provides two channels of 20-bit analog I/O on ¼-inch TRS connectors. This provides you with a quality studio control-room monitor system.

The top-level solution is the 4U rackmount Modular Expansion Chassis, or MEC (price tba), a mainframe unit that includes video and word-clock sync. The base module offers the same features as the Interface 442 but with Neutrik XLR/TRS combo jacks instead of regular TRS jacks, and it adds a headphone jack with level control. More importantly, the unit has nine expansion slots that allow you to configure the digital and analog I/O to taste and add other features. Planned expansion modules include analog I/O on XLR and TRS ¼-inch jacks, S/PDIF and AES/EBU digital I/O, ADAT Lightpipe, TASCAM TDIF, and SMPTE time-code generator/reader.

If you expand the system all the way, with eight PCI cards connected to fully loaded MECs, you should be able to achieve 128 real tracks with 320 separate I/O ports, giving you 128 direct ins and outs plus lots of sends, returns, and so on! The ports don't even have to all operate at the same sample rate. And all for the price of the Eiffel Tower. Actually, it's not at all expensive, especially considering that we're talking serious hardware here.

The EDS-1000 card also connects to Ensoniq's EDS Hardware Control Surface, which ships with the system. The controller supplies sixteen channel faders, a master stereo fader, a jog/shuttle wheel, transport controls with autolocate, a numeric keypad, mute and solo buttons, and rotary controls for EQ, aux sends, pan, track arming, and control-room monitor level. The Mac driver software for the controller wasn't finished at NAMM—it worked about as efficiently as the French bureaucracy—but by the time you read this, it should perform as smoothly as Stephane Grappelli.



Lucid PCI24

YOU'VE GOT ME ON MY KNEES

Without a doubt, Event Electronics is an extremely impressive new company. Founded by former Alesis marketing aces Russell Palmer and Ted Keffalo and former JBL and Alesis speaker designer Frank Kelly, Event started out importing Rode microphones from Australia and then began producing a steady stream of quality powered and unpowered monitor speakers. The company also released a mic preamp at NAMM, which **EM** will cover some other time.

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Logic Audio Discovery offer you mixdown capability and much more. *VMR* editing is limited to simple cut/copy/paste.

Audiowerk8 is shipping now for both Power Mac and Windows 95, and Emagic's major public relations push at NAMM resulted in a good bit of show buzz. As good as this card looks, I suspect the buzz may have exceeded the reality somewhat, especially when you consider the other impressive new entrants in this field. One reason—though not the only one—I have this impression is that there is a very definite "gotcha" for some potential users: as of this writing, Audiowerk8 only works with Emagic's *VMR*, *Logic Audio*, and *Logic Audio Discovery* (a new, slightly cut-down version of *Logic Audio*).

Emagic says it will eventually release its API for the card to other software companies, but right now nobody is committed to supporting it. However, regular Windows and Macintosh Sound Manager drivers are being developed. However, if you use Emagic software—and there are many excellent reasons to do so—you now have a new hardware option definitely worth considering.

Audiowerk8's price looks good, too, especially compared to, say, a Digidesign Audiomedia III card. Then again, the value bar was raised a big notch at this NAMM show. As I see it, nobody is likely to strike an early knockout blow in the battle of the audio cards; I predict we're in for a knockdown, drag-out, 12-round fight where even established leaders and well-heeled newcomers had better beware.

BIAS *SFX Machine*

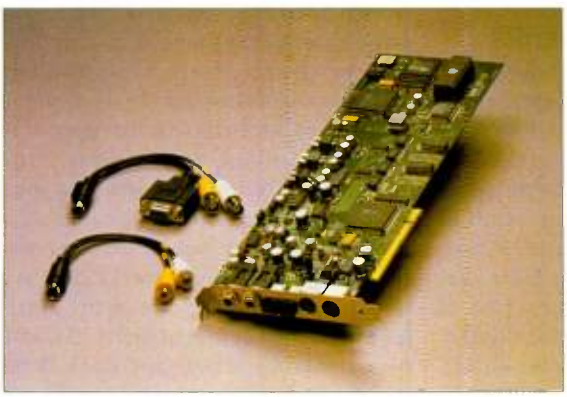
A LUCID DECISION

Last year, the analog audio experts at Symetrix decided to try their luck in the digital audio world. To accomplish this without confusing their many established users, they created a new company called Lucid Technology, which introduced the NB24 NuBus card for Macintosh (described in the January 1997 "What's New" column).

But as noted earlier, the computer world is moving toward the PCI bus, and Lucid Technology is moving right along with the rest, introducing the PCI24 digital audio I/O card ($499). The new card has an onboard Motorola 56301 DSP chip and can perform real-time sample-rate conversion on input signals, supporting 32, 44.1, and 48 kHz rates. Drivers will be provided for both Power Mac and Windows 95.

Unlike many of its competitors, the 2-in, 2-out PCI24 has only 24-bit digital I/O (thus the name). There are three big advantages to not including analog I/O on the card. To begin with, you can use the card with any outboard converters you like. Second, your analog circuitry will be outside the computer, which helps reduce noise and potential grounding problems. Finally, the card is less expensive than it would be with analog I/O, which is great if you already have converters or are routing the audio directly to a device with digital inputs, such as a DAT recorder or digital mixer.

The PCI24's AES/EBU inputs and outputs are on ¼-inch, TRS connectors, and the S/PDIF I/O ports are on RCAs. The former is a little unsettling because the AES/EBU specification clearly calls for XLR connectors. But that caveat aside, this looks like a very interesting card, and we'll explore it in depth as soon as we can get our hands on one. It should be shipping by the time you read this.



Korg 1212 I/O

THE AARDVARK DIGS IN

An aardvark is a burrowing mammal of southern Africa that has a stocky body, large ears, a long snout, and powerful claws for digging. The word "aardvark" is derived from Afrikaans and Middle Dutch and means "earth pig." (The Greek goddess of vengeance, African burrowing mammals—you get a heck of an education reading **EM**!)

At NAMM, the music-industry Aardvark of Ann Arbor, Michigan, announced it will try to dig into the fertile earth of the audio-card field with its new Studio12 (price tba). Although Studio12 is a PCI card, Aardvark only plans to supply drivers for Windows 95 and Windows NT; the company has not announced when it will release a Macintosh version. The product will include an undisclosed DSP chip.

Although it includes two channels of analog I/O with 18-bit converters, Studio12 emphasizes digital I/O. You get stereo S/PDIF I/O on RCA jacks and optical I/O that can be either stereo S/PDIF Toslink or 8-channel ADAT Lightpipe. If you use the optical

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port in ADAT mode, the two analog inputs, and the S/PDIF ports, you can get twelve simultaneous channels in and out. The digital ports are capable of handling up to 24-bit audio.

LITTLE ENGINE THAT MIGHT

Sonorus is one of many small companies that were virtually hidden in the bowels of Hall E, though its staff did a good job of stocking the press room with literature. It's especially hard to make performance predictions with an untested audio card, but with its specs, Sonorus' Studi/o PCI card ($989) could prove a serious contender if the company delivers as promised and markets the card well.

Like Lucid Technologies, Sonorus put the emphasis on digital input and output. In fact, the only inputs are two optical connectors that can be independently software configured as 8-channel ADAT ports or 2-channel S/PDIF ports. With these optical inputs and the two independent optical outputs, you get up to sixteen channels of I/O. I like the fact that you can individually configure the ports so that, if you have one ADAT and a DAT machine, for instance, you can route them

Arboretum *Ionizer*

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The heart of the Levelar family's magic is its unique compression design: An Opto-Isolator (Vactrol®) followed by a hand-selected 12AX7 vacuum tube provides a very transparent, music-friendly sound characteristic. This allows added compression without the fear of "squashing" your signal - characteristics that are not possible with typical VCA-based compressors.

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The entire Levelar family employs this classic compression design (similar to that of the LA 2A, 3 and 4 series) to deliver your music to tape, digital or PA. From the studio-grade Pro VLA, to the rack- and road-savvy Dual Levelar, to the hobbyist-friendly Personal Levelar, there is a model to fit into any music and sound application.

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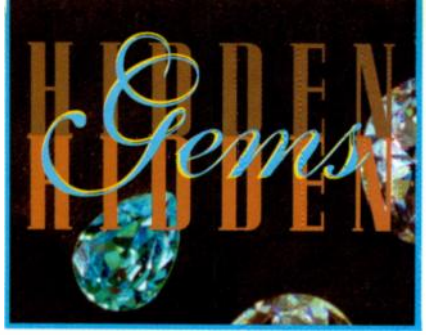


both to the card at the same time, or you can mix two ADATs to DAT. The digital ports are capable of handling up to 24-bit audio. The only analog connections on the card are a stereo pair of 18-bit monitor outputs.

Like the three Event cards, the Studi/o incorporates a Motorola 56301 chip to do its number crunching. It has a special chip that enables two channels of real-time sample-rate conversion. The product is expected to ship in June with Windows 95 WaveAudio drivers and Steinberg VST drivers for both Mac and Windows 95. Windows NT and Linux drivers are planned for fall 1997.

PRICE BUSTERS

Midiman has long specialized in delivering clean, simple products at affordable prices. (So long and well have they done this, in fact, that they have a booth upstairs on the main NAMM show floor.) Following this formula into the brave new world of audio cards, the company introduced DMAN ($249.95), a full-duplex, 16-bit ISA card. The card samples at multiple rates up to 48 kHz and includes two channels of analog, line-level I/O; a high-impedance mic input (which is not simultaneously available with the line-level inputs); and a pair of auxiliary stereo inputs (for CD players and the like) that are not recorded but are internally mixed to the unit's outputs.

The DMAN has a standard header for a wavetable synth daughterboard, and it includes a built-in MIDI interface with a D-sub connector that breaks out to MIDI In and Out ports. The MIDI interface can address the optional daughterboard or an external MIDI device. Midiman will offer the DMAN card alone or as part of the DMAN Digital Studio ($299.95), in which the card is bundled with SEK'D's *Samplitude Multimedia* 4-track audio-recording software.

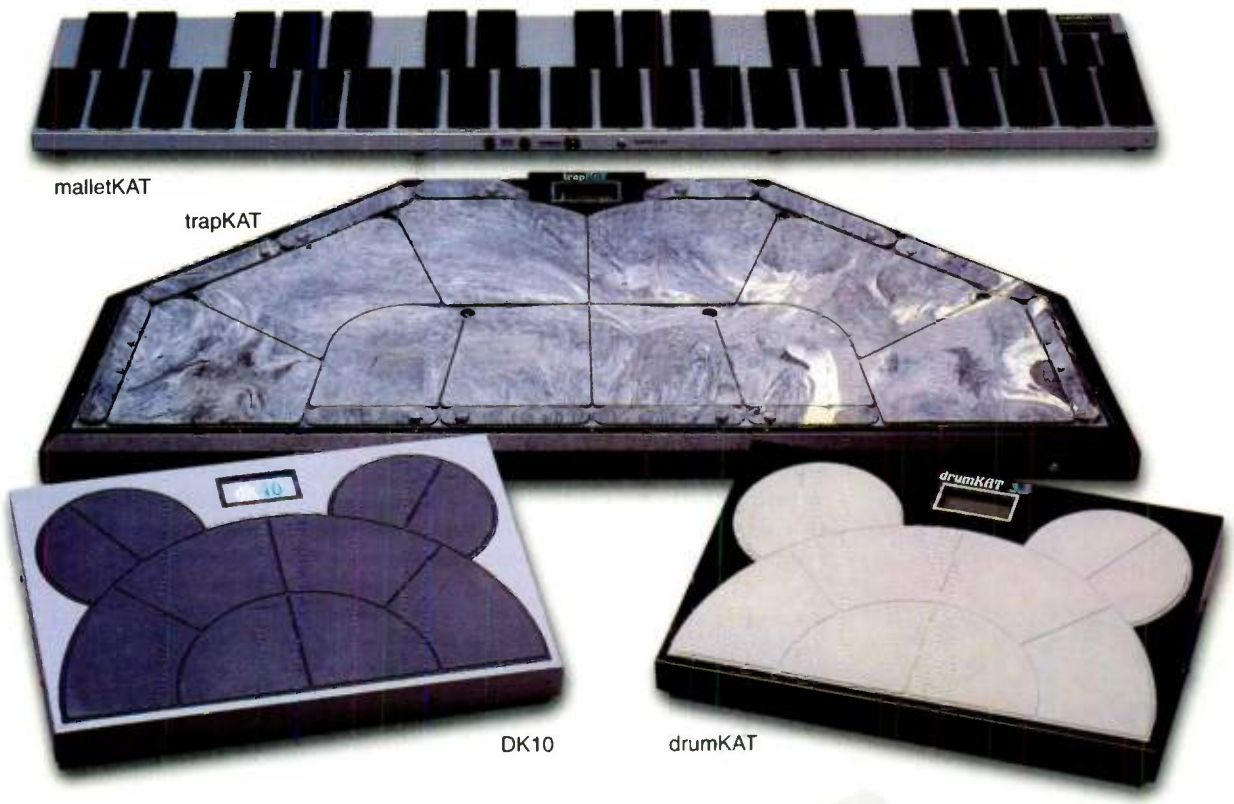
STILL COMING...

A year ago, in "NAMM's Greatest Hits" (May 1996 **EM**), I told you about a hot new PCI audio card from Korg called the SoundLink 1212 I/O ($1,250). Silly me—I thought it would be shipping in 1996. Korg apparently thought so, too. However, as of this writing, the 1212 I/O card is still slated to ship Any Time Now. And it still looks like a hot card, though the competition has stiffened considerably in the interim.

The Korg card's features are essentially unchanged since I described it last year. The 1212 I/O gives you a total of twelve inputs and outputs, configured as two channels of analog on ¼-inch TRS, with 20-bit A/D converters and 18-bit DACs; stereo S/PDIF (RCA) I/O on breakout cables attached to a mini-DIN connector; and 8-channel ADAT Lightpipe I/O. Another mini-DIN breaks out to BNC word-clock I/O. The card reads ADAT time code via a 9-pin D-sub connector.

Additionally, Korg will offer two optional I/O boxes for the 1212 I/O card: the 880 A/D ($950) and 880 D/A ($800). The 880 A/D is an 8-channel

When was the last time a family of KATs came back and you were thrilled?



You can bet a lot of people will be thrilled about the return of the legendary KAT drum controllers, now distributed by E-mu Systems. With superb response and feel, KATs are the perfect compliment to E-mu's line of sound modules and samplers. **And the beat goes on:**

malletKAT – The premier controller for mallet players. Provides real-time control and unlimited splits. 128 individual set-ups for instant access to complex MIDI settings. The malletKAT will control any MIDI sound source.

trapKAT – Ergonomically designed for both studio and live performance. 24 pads offer the ultimate in flexibility and MIDI control.

drumKAT – KAT's flagship controller for studio or live performance features eight notes per pad. Nine trigger ins for acoustic and electronic pad triggering. Plus a built-in sequencer and unparalleled programmability.

dk10 – An awesome addition to the project studio or live set up. This ten-pad controller has the same dynamic range as the drumKAT. And it's fast and easy to use.

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analog-to-ADAT Lightpipe converter that offers two balanced XLR mic/line inputs and six balanced TRS analog inputs, all with 18-bit A/D converters and individual level controls. The ADAT optical digital input and internal routing features allow you to select analog or digital input signals in channel pairs. A BNC word-clock connector allows the unit to sync to internal clock, external clock, or ADAT time code. The 880 D/A gives you eight TRS balanced analog outputs with 18-bit DACs and ADAT optical I/O. It can operate at -10 dBu or +4 dBu. Each 880 unit includes eight LED level meters.

The 1212 I/O card initially will be released for the Power Mac with Apple Sound Manager and will be bundled with Macromedia's *Deck II* multitrack recording software for the Mac. Software developers BIAS Systems *(Peak)*, Steinberg *(Cubase VST)*, Emagic *(Logic Audio)*, and Mark of the Unicorn *(Digital Performer)* all have announced upgrades that will support the 1212 I/O. Korg will add Windows support this summer.

THE SHOW BELOW

With one exception, all of the nifty software I'm about to discuss was part of the show beneath the show in the underworld of Hall E. Hall E is a mixed bag: it contains guitar-string vendors, traditional stringed-instrument makers, and the like, but it also is a land of creative software. Some stuff is so far out there you wonder whether the creator is permanently tripping on acid, and the other stuff is so practical you wonder why the heck nobody did it before. The practical programs, the avant-garde stuff, or both could be just what you are looking for. Then again, a few items in Hall E are just some creative wackos' pet projects that ought to stay home.

One of the true gems in Hall E was BIAS Software's *Peak* 1.5 audio editor for the Macintosh ($499). Not content to rest on its 1997 EM Editors' Choice award, BIAS introduced *Peak LE* ($99), a streamlined version with many of the basic features found in *Peak* 1.5 but

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For the power hungry with an appetite for PERFECTION.

The Best System Starts with the Best Parts.

JBL has more experience in designing and building transducers for professional studio monitors than any other company in the industry. We not only use the latest engineering and design equipment, but also the most important test device of all, the human ear. We believe in physics, not fads, so while other companies pick parts off somebody else's shelf, we create our components from scratch. And by utilizing more than 50 years of experience in transducer design, we create the perfect transducer for each system.

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Combining individual transducers into a system is a delicate balance of acoustics, electronics and architecture. Our exclusive Multi-Radial baffle is contoured to bring the drivers into perfect alignment, so the high and low frequencies reach your ears simultaneously. This reduces time smear for a smooth transition between the low and high frequency drivers. In addition, the gently rounded edges of the 6208 provide controlled dispersion and balanced power response. That means even off-axis, you will hear an accurate representation with wide stereo separation and an immense depth of field.

Gold/Titanium Hybrid Dome.

By mating the materials to a large magnetic structure, the 6208 can produce extremely flat frequency response and low distortion for hours of fatigue-free listening. JBL pioneered the use of the light but rigid gold/titanium hybrid construction to provide a transient response that is quick and precise for pinpoint accuracy.

Shielded Drivers for Flexible Placement.

JBL shields all of the drivers so you can place the 6208 right next to your audio workstations without interaction. Gone are the days of compromised monitor placement in your production environment.

Why Bi-Amplification?

It's a simple fact, a separate amp for each speaker produces the most accurate sound. Each of the 6208's two amplifiers is designed to reproduce the assigned frequencies. And by combining the amplifiers inside the cabinet, you improve the amplifier's ability to control the speaker it's driving for controlled low end punch.

> "We played just about every type of instrument through these speakers and they reproduced it with flying colors."
> - Bobby Owsinski, EQ Magazine

Active Crossovers Provide Accurate Response Tailoring.

By carefully tailoring each amplifier's performance to the response characteristics of the drivers, you get the most faithful reproduction possible. By using active crossovers, power is not robbed by passive components like inductors and resistors. The result is clear, accurate sound at the highest levels.

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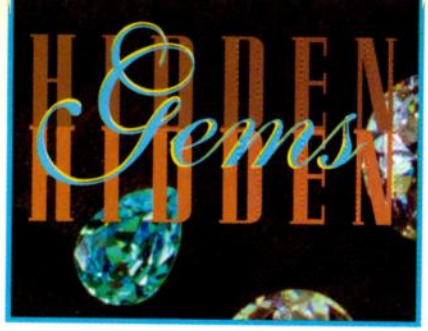


without advanced features such as the Playlist and time-code support. *Peak LE* provides two channels of nondestructive editing and supports up to three Premiere-format plug-ins. It's a big-time bargain at this price. If you're a Mac user and don't need all the power-user features in *Peak*, just buy *Peak LE* and thank me later.

But the coolest thing at BIAS' booth besides *Peak* 1.5 was *SFX Machine* ($299), a Premiere-format plug-in for Power Macintosh written by BIAS staffer Earl Vickers. Inspired by modular synthesizers, Vickers has created an impressive effects-processing tool which lets you combine processing modules to create complex patches. You get eight stereo modules that can use as their source an audio signal or a simple, program-supplied waveform (sine, triangle, square, saw, or white noise). These can be manipulated using any of eleven processes, including an envelope follower, pitch tracker, filters, delay, sample-and-hold, etc. Then you can perform any of thirteen modulations: amplitude modulation, ring modulation, FM, phase mod, etc.

All of that applies to *each* of the eight stereo modules. You can produce a bunch of conventional effects, but wait until you dig in and try for some unique sounds! For example, Vickers programmed just two modules to extract the pitch of a solo voice, raise it two octaves, and modulate the center frequency of a bandpass filter applied to white noise. The result was a sound that whistles along with the melody, which sounded way cool. Try that with your average plug-in!

Be warned, the user interface of the *SFX Machine* beta displayed at NAMM looks like something of a bear, even though BIAS provides a number of presets. If you want to get practical work done in a reasonable amount of time (as opposed to experimenting in hopes of serendipity coming to the rescue), it appears you will need to have a good idea of what you are trying to accomplish before you dig in. With this type of program, I would prefer to see a *MAX*-like interface in which you click and drag connections between functional objects. But if you are willing to invest the time, or like to wing it wildly, you can create amazing sounds.

CHARGING AHEAD

Like BIAS, Arboretum Systems is a small company that produces some of my favorite audio-processing software. Its *Hyperprism* garnered a 1995 EM Editors' Choice award and has since been released in several forms, including an application that runs on a Power Mac using Apple's Sound Manager to do its thing without external hardware—the original program required a Digidesign card—and a plug-in available in several formats (see "What's New" on p. 20). But *Hyperprism* was Arboretum's only product until now.

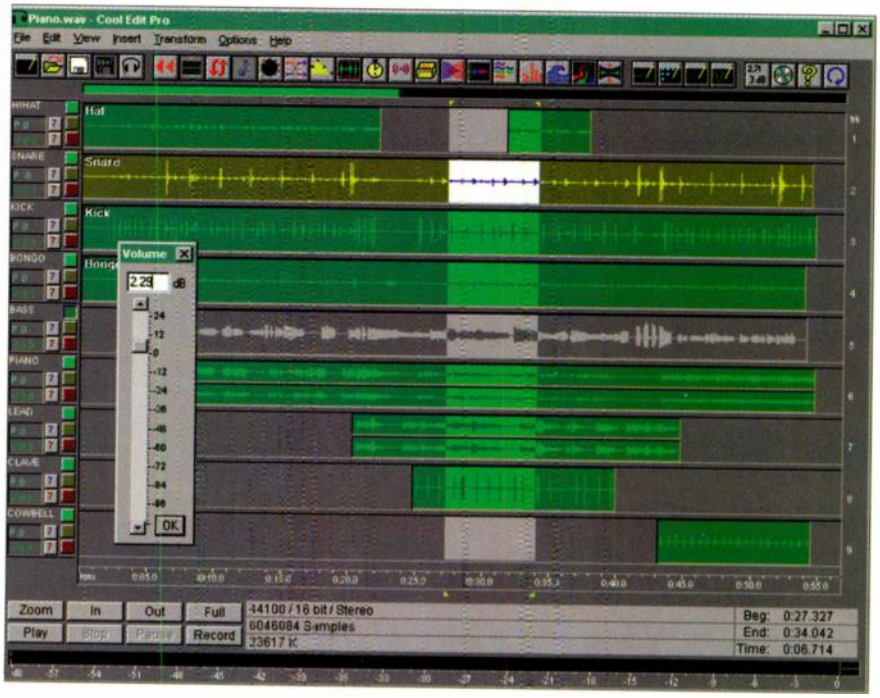
This year, the company introduced the *Ionizer* ($790), a Premiere plug-in for the Mac that combines simultaneous, multiband, upward and downward expansion and compression; up to 512 simultaneous bands of parametric EQ; a sidechain for control equalization and/or dynamics processing with EQ and/or dynamics from a different sound file; and virtually instant spectral analysis. You can even apply the *Ionizer* in multiple windows simultaneously. Friends, that is one heck of a lot of processing capability!

The user accomplishes dynamic, real-time effects by setting values at multiple breakpoints for each effect. When you set up several of these sets of values, the results appear onscreen as independent "strings." The combination of compression and EQ with extremely fine control allows you to create noise-reduction patches and other constructs that are especially useful for mastering and restoring old recordings but also can be used to create wild sound effects. From what I saw, the program runs wicked fast. Although *Hyperprism* mostly appealed to effects-processing junkies, *Ionizer* would be useful not only to that group but also to staid, Mac-based mastering engineers.

THINK "COOL"

Another cool denizen of Hall E was Syntrillium, which showed its *Cool Edit Pro* multitrack recording software for Windows 95/NT ($399).

Cool Edit Pro is a commercial product, and it's a big step up from its shareware ancestor. (The shareware *Cool Edit* was described in "Cool Tools" in the October 1996 **EM** and "Share and Share Alike" in the June 1994 issue.) For one thing, it won't run under Windows 3.1; it needs the power of Windows 95 or NT. More importantly, the shareware version let you record and play just two tracks of audio, whereas *Cool Edit Pro* supports up to 64 tracks using any Windows-compliant sound card. Tracks can be soloed, muted, and internally mixed.



Syntrillium *Cool Edit Pro*

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BOTH MODELS HAVE:

Studio-grade mic preamps with discrete circuitry for high headroom low noise (–129.5 dBm E.I.N.) and wide frequency response (over 300kHz!).

Low Cut filters (18dB/oct. @75Hz) on mono mic/line channels allow use of low-frequency EQ on vocals without boosting room rumble, mic thumps, P-pops and wind noise.

Trim Controls on mono channels have 60dB total gain range for boosting weak sound sources and a 10dB "virtual pad" for taming hot digital multitrack outputs.

2 Aux Sends per channel (one globally switchable pre/post, one post-fader), each with 15dB of gain above Unity to boost weak effects.

3-band equalization with 12kHz High shelving EQ, broadband musical 2.5kHz peaking Midrange & 80Hz Low shelving EQ.

Constant loudness pan controls.

Stereo In-place Solo.

Mute button routes signal to "bonus" **Alt 3-4 stereo bus** outputs & Control Room matrix. Handy for both recording and live applications.

MS1402-VLZ ONLY: 60mm logarithmic-taper faders based on our exclusive 8•Bus design. Long-wearing wiper material and tight polymer lip seals to protect against dust & other crud.

Built-in power supplies — no outlet-eating wall warts or hum-inducing line lumps.

Phantom power so you can use high quality condenser microphones.

XLR outputs with mic-line level switch (along with 1/4" TRS outputs on top panel).

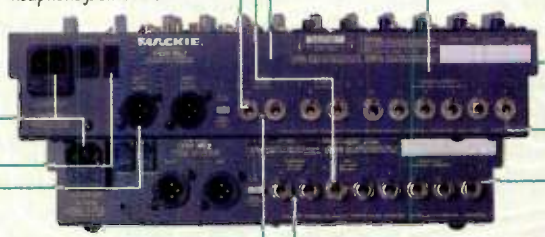
MS1202-VLZ • 12x2 • 4 MIC PREAMPS

MS1402-VLZ • 14x2 • 6 MIC PREAMPS

All inputs & outputs are balanced[1] to cut hum & allow extra-long cable runs, but can also be used with unbalanced electronics.

[1] except RCA tape jacks, headphone jack & inserts.

VLZ (Very Low Impedance) circuitry first developed for our 8•Bus console series dramatically reduces thermal noise & crosstalk in critical areas.



Control Room outputs feed monitor speakers without tying up the headphone jack.

BOTH MODELS HAVE:

Radio Frequency Interference protection via metal jacks & washers plus internal shunting capacitors.

High-output headphone amp can drive virtually any set of phones to levels even a drummer can appreciate.

Aux 1 Master level control & pre/post switch.

Effects Return to Monitor switch folds Aux Return 1 effects into a stage monitor mix via Aux Return 2 level control.

RCA-type tape inputs & outputs.

Peak-reading LED meters with Level Set LED combined with In-Place Solo allows fast, accurate setting of channel operating levels for maximum headroom and lowest noise floor.

Control Room/Phones Matrix adds monitoring, mixdown & metering flexibility. Select any combination of Main Mix, Tape In and Alt 3-4 signals for routing to phones, Control Room outputs and meters. Can be used as extra monitor or headphone mix, tape monitor, or separate submix. Way cool.

Tape Assign To Main Mix assigns unbalanced RCA tape inputs to main mix. Besides its obvious use as a tape monitor, it can also add an extra stereo tape or CD feed into a mix or play music during a break.

MS1402-VLZ only: Global Solo Mode selects PFL or AFL solo modes.

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Not every production project requires dozens of input channels and boatloads of buses.

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Since both are basically chips off our blockbuster 8•Bus Series consoles, they have big-board specs: greater than 90dBu signal to noise ratio, less than 0.005% distortion, more dynamic range than compact discs and frequency response that's only down 1dB at 60,000 Hz.

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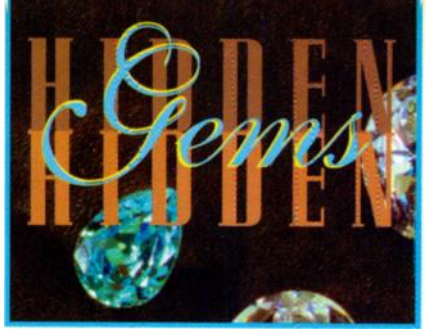

As with previous versions, the focus is on effects processing. You get reverb, multitap delay, dynamics processing, pitch shifting, distortion, a variety of EQs, and a whole lot more. You can clean up your files with noise gating, hiss reduction, and a click and pop eliminator. And you can preview your edits in real time. There's a built-in sound generator that produces basic synth-type waveforms (sine, square, etc.), three types of noise, and DTMF tones for phone systems.

But wait! Let's not forget cue/play lists, sample-rate conversion, timed recording, multiple levels of undo, and both horizontal and vertical zoom down to the sample level. The number of file formats supported is so long I won't even try to list them. And the user interface appears friendly for such a powerful program, including context-sensitive online help in almost every screen. To top it off, the product supports the ActiveMovie real-time DSP plug-in architecture. That makes *Cool Edit Pro* a very cool deal indeed.

SHAPE OF THINGS TO COME

The obviously vibrant and growing software-development community is an encouraging indication of the shape of things to come. Only yesterday, music software was for experimenting hobbyists and a few wild-eyed pros who liked to live dangerously. The upstart companies of that day—Digidesign, Blank, Southworth, Opcode, Intelligent Music, MOTU, Voyetra, Hybrid Arts, Passport, Dr. T's, and a few others—harbingered a new way of working. Today, some of these pioneers are gone, while others live on and continue to innovate. A few have even grown large and powerful.

Following these ground breakers' lead, a new generation of companies is arising to help the now-established stalwarts move forward. Of the twelve companies whose products I have introduced here, only two—card-manufacturers Ensoniq and Midiman, who made MIDI interfaces in days of yore—were developing computer music products just four years ago.

So here's to these forward-looking people. They offered their precious gems for sale to everyone, but their jewels were best appreciated by those who took the time to explore the show beneath the show.

EM *Senior Editor* **Steve O.***'s former nickname and stage name is "the Wolf." As a result, he is very interested in the newly developed scientific technique for cloning sheep.*

We made the console,

...you wrote the ad.

"I just sold my Mackie 8-bus and purchased the new Ghost console. The difference is amazing. The Ghost is the warmest sounding board I've ever used." - Mike Perkin (The Lab Recording Studio, Emmaus, Pa)

"I replaced a console that was more than 3 times the price, and got a quieter, more transparent, and sweeter sounding console! Big console feel, with an amazing price!" - Kurt Bevers, Brownell Sound, Oregon.

"An incredibly musical console, ultra flexible with a real usable EQ. It is absolutely the best sounding project studio board that I've heard". - Howard Givens, Spotted Peccary Studios."

"I love the desk, the EQ is just marvellous. Ghost is the best 8 bus recording desk on the market." - Lee Hamblyn, Engineer.

"Intuitive handling, flexible routing, great Soundcraft sound." - Melvin Fernandes, Recording Engineer, CMM Studios, India.

"I use the Ghost for several radio shows doing live performances. The EQ is amazing, I'm on air in 5 minutes! Doing dance stuff is one, doing live stuff is another. But I use only one board for both of them, The Soundcraft Ghost." - Barney Broomer, Sonic One Rotterdam.

"Ease of operation and the numerous in-line inputs for my synthesizers and samplers is why I purchased the Soundcraft Ghost console." - says President of Saban Entertainment and producer of Mighty Morphin Power Rangers Shuki Levy.

"I didn't know how useful mute groups could be and how good the EQ had to be until we used the Soundcraft Ghost." - Stefaan Windey, La Linea Musicproductions b.v.b.a., Belgium.

"It sounds great and the EQ is very precise which makes it very easy to pin-point the frequencies I need to work on. Ghost enables me to finish mixes on the console at home, without having to use any other studio." - Phil Kelsey (Remix Engineer)

"The console is very user-friendly and is constructed so well that it can easily withstand the rigors of even the most hectic of production schedules." - Corey Dissin, Producer at Paul Turner Productions.

"Both myself and our Production Director Jeff Thomas used the console for PowerStation and were equally very, very impressed. For the money, the console is fantastically versatile, has good headroom and a very impressive EQ." - Alex Lakey (Engineer for PowerStation)

Ghost

"Let us know what you think about the Soundcraft Ghost by visiting our web site at **http://www.soundcraft.com** or via e-mail to **info@soundcraft.com**"

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With 8 expansion slots, the JV-2080 sets a new standard for user-expandability, giving you access to more than 2,900 patches when fully expanded. To help you take advantage of all these classic Roland sounds, we've added the Patch Finder so you can hear and audition only strings when you need strings, separate your basses from your brasses, and quickly locate any of your favorite internal or expansion patches.

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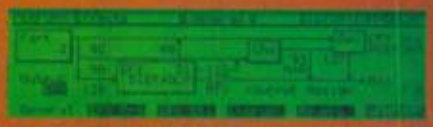

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Capturing the Classics

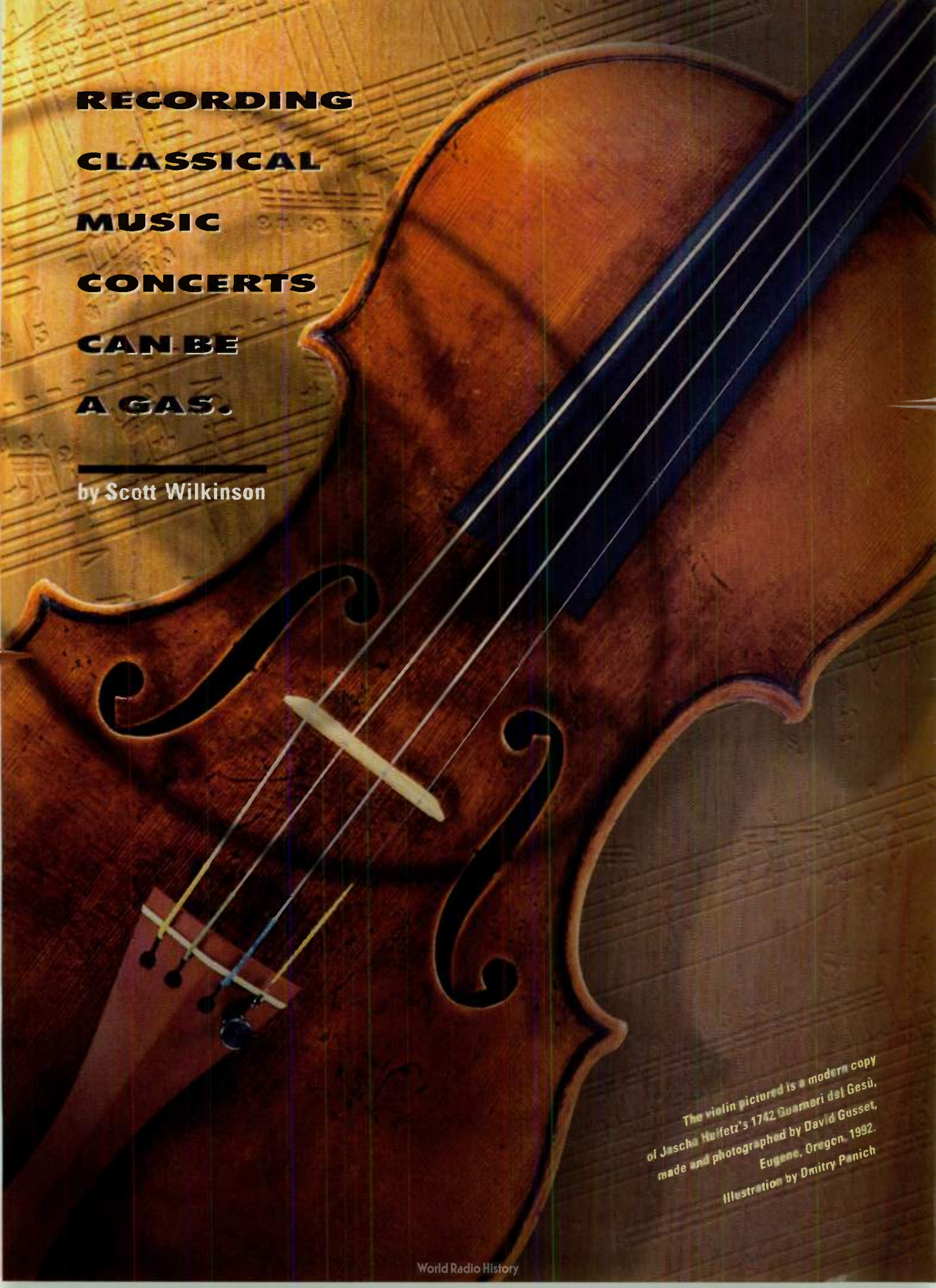
As the house lights dim, the audience hubbub subsides to a whisper. Then, the conductor walks briskly toward the podium, inspiring polite applause. After bowing to the audience, he turns to the orchestra, raps the baton on his music stand a few times, and raises his arms. The musicians ready their instruments as the audience falls into expectant silence. After a moment that seems suspended in time, the conductor lowers his arm, and the orchestra explodes into glorious sound.

Anyone who has attended an orchestra concert recognizes this ritual, which has remained essentially unchanged for several hundred years. Until this century, however, attending a live performance was the only way to experience the masterpieces of Western art music, which has come to be called classical music in common usage. (Technically, the term "classical" refers to a specific style and period in music history, roughly 1750 to 1825, that followed the baroque era and preceded the romantic. However, most people use this term to mean any art music—as opposed to popular or folk music—from the European tradition of the last thousand years or so.)

With the advent of sound-recording technology, this music escaped the confines of the concert hall and made its way into the homes of aficionados everywhere. In the early days of recording, many people were concerned that it would put an end to live concerts. Of course, this was not the case; most major cities and many smaller towns have at least one symphony orchestra and various chamber ensembles that perform regularly.

RECORDING CLASSICAL MUSIC CONCERTS CAN BE A GAS.

by Scott Wilkinson



The violin pictured is a modern copy of Jascha Heifetz's 1742 Guarneri del Gesù, made and photographed by David Gusset, Eugene, Oregon, 1992. Illustration by Dmitry Panich

Capturing the Classics

IS IT LIVE OR MEMOREX?

Despite the continuing popularity of live performance, there is intense interest in capturing the classical concert experience on tape. and electronic musicians are in an excellent position to provide this service. Even if you're not recording the New York Philharmonic or Anonymous Four, there are many lesser-known ensembles that want to have their concert performances recorded.

Of course, recording a concert has its pitfalls, such as audience noise and musical clams. (You know, the guy who coughs in the middle of a quiet passage or the horn player who cracks a high note.) However, these problems are not insurmountable, and there are several important reasons to take these risks.

For example, the acoustics of most commercial and home studios tend to be rather dry. This means the engineer must add artificial ambience, but the use of digital reverb and other effects is not well received by the classical community, as natural acoustics play an important part in the classical-music experience. Many pro engineers share the opinion that digital reverb just doesn't cut it when recording the classics.

In addition, the typical studio recording method is to use separate mics for each individual musician and then artificially position the tracks in a final mix. This gives the engineer lots of flexibility and control over the soundscape, but it can further detract from replicating the concert experience. After all, you don't have eighteen ears, each located a few feet from each section of the orchestra, when you attend a concert, do you? To maintain the *natural* aural experience of a performance within a concert hall, many classical concerts are recorded with two main mics in a stereo configuration (with perhaps a few other mics placed for subtle reinforcement of specific instruments and/or room ambience).

Finally, the energy and spontaneity of a live concert are ineffable qualities missing from most studio recordings. There's something about the presence of an audience that gets the musicians' adrenaline pumping, which can inspire them to new heights of expression (or cause them to crash and burn, but we won't get into that).

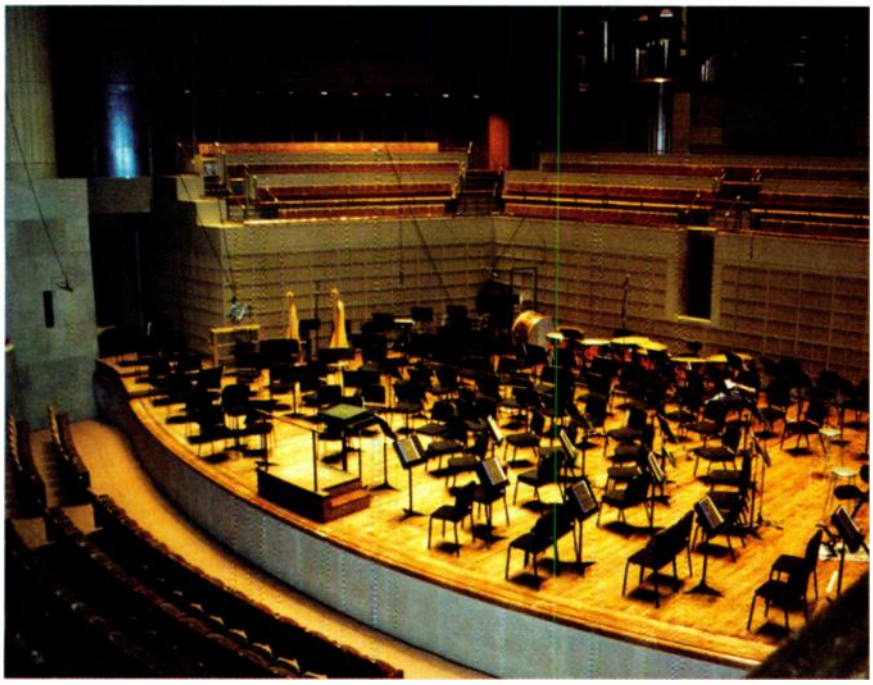
The Santa Fe Chamber Music Festival has been showcasing the world's best chamber ensembles in the adobe surroundings of New Mexico for 25 years. (Courtesy Santa Fe Chamber Music Festival)

THE THREE TENORS

To better understand the process of recording classical music in a live performance, I spoke with three engineers who bring lots of experience to this endeavor. John Atkinson is currently the editor of *Stereophile*, a magazine for high-end audio-enthusiasts that is based in Santa Fe, New Mexico. He also regularly records the prestigious Santa Fe Chamber Music Festival, which has been showcasing some of the best chamber ensembles in the world for the last 25 years.

Trained as a session player and engineer, Atkinson has worked on both sides of the microphone. He became interested in the process of recording classical performances while working as an audio critic.

"In the 1950s and '60s, engineers were capturing the sound of orchestras in a relatively purist fashion," he says. "They wanted the sound of the orchestra in relation to the hall. In the '70s, however, the emphasis shifted toward the rock-recording philosophy, in which you go for maximum isolation between instruments. Every instrument is miked separately, and the soundstage is assembled in the mix from those discrete,



The stage plot at McDermott Hall in Dallas for the recording of Holst's *The Planets* by the Dallas Symphony Orchestra. Note the absence of risers on the stage and the careful positioning of multiple mics. (Courtesy Delos International)

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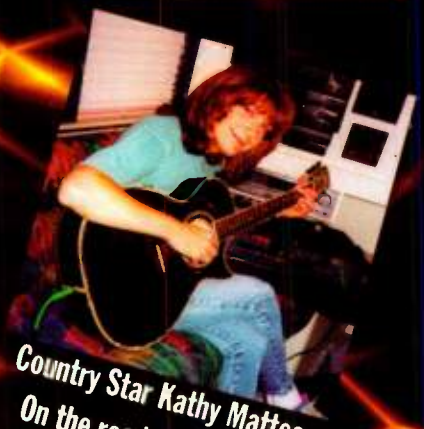

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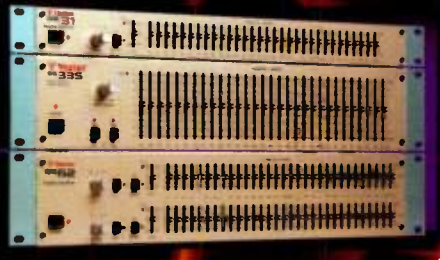
Additional features like balanced TRS inputs and outputs, 3 auxiliaries per channel, a built in digital mixer with 3 band EQ with parametric midrange, and a front panel XLR mic input with built in preamp make the new HDR-V8 a serious virtual studio for the road. New easy to use menus make completely non-destructive (real time) editing a breeze.

For full compatibility, the HDR-V8 can be interfaced with DA88 and ADAT recorders. For unlimited mass storage, optional removable drives can be installed. Other options like remote control, SMPTE interface and multiple machine lock make the Pro Series Hard Disk Recorders king of the road. And if the standard one gigabyte drive isn't enough, the HDR-V8 is expandable to 4 gigs without sending it to the factory!

Of course, living on the road has its price, but at least with the highly affordable new HDR-V8 Pro Series, you'll have change left over.



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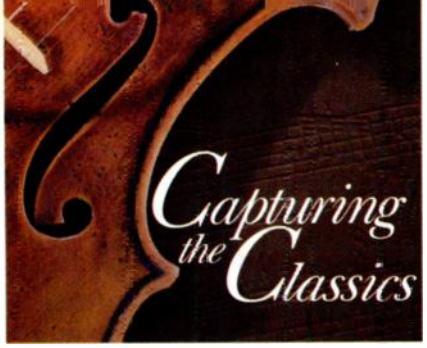

isolated recordings. When this technique was applied to classical recording, each pair of violins would have a separate mic, each woodwind and brass instrument would have its own mic, and so on. Everything was recorded on separate tracks, which would then be mixed and assembled just like a rock recording. As a critic, this sounded completely alien to me. When I got the opportunity to do my own classical recordings, I wanted to capture the sound of the ensemble in the hall as a holistic entity. This is sometimes called a documentary approach."

Peter McGrath, chief engineer for the Florida Philharmonic Orchestra, agrees with the documentary approach but with a slight twist. "I generally subscribe to the 'less is more' philosophy," he says. "I do very minimal things with microphones. But in many cases, the venues I work in record better than they sound to the audience because I can locate the mics to pick up sounds you simply can't hear from any of the seats. Am I replicating the concert experience? In some ways, I'm arguably surpassing it because the mic is hearing things from a perspective that nobody in the concert hall ever had. This raises a fundamental question about the criteria for judging a recording. At its best, a recording can be a surrealistic experience in that it gives you a better-than-real representation of what took place in the hall."

John Eargle is a highly respected, Grammy-nominated engineer and author of many books on recording. He took a somewhat different approach in his recent recording of the Dallas Symphony performing Gustav Holst's *The Planets*. "I'm going to get castigated for saying this," he exclaims, "but I'll say it anyway: you cannot make an acceptable commercial recording of a full orchestra with only two mics. The size of the ensemble, front to back, works against you. For example, the back of the orchestra just will not be there unless you use some additional mics to cover it." For his recording of *The Planets*, Eargle used eighteen mics; we'll examine his miking technique shortly.

THE HALL

All three engineers agree that the acoustic characteristics of the concert hall are of paramount importance when recording live classical music. According to Atkinson, "You have to look

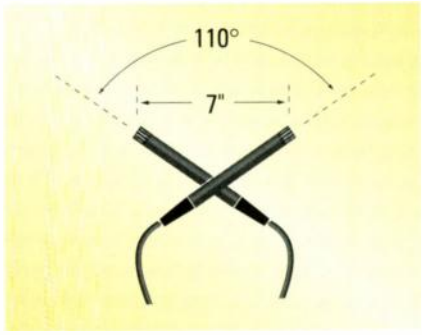

FIG. 1: In an ORTF configuration, two cardioid mics are angled at 110° with the capsules separated by seven inches to simulate the distance between the listener's ears.

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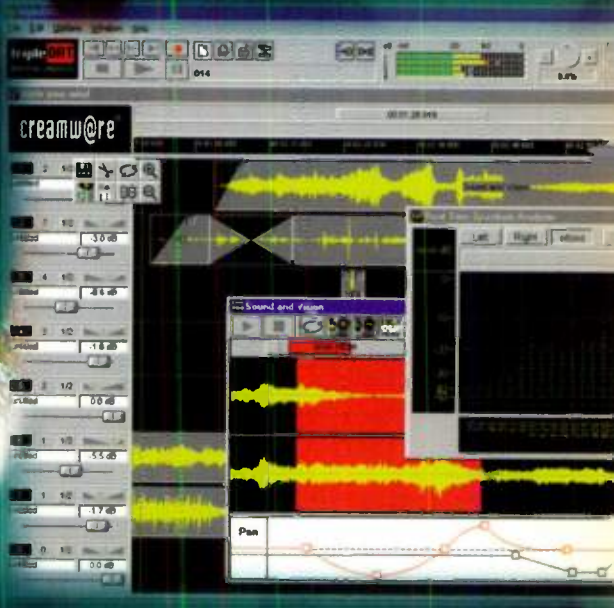

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for places that have an intrinsically friendly, supportive acoustic environment for the ensemble you plan to record. For example, we used a hall in Santa Fe called the Chapel of Loretto to record some piano, solo guitar, and double bass for the first *Stereophile* test CD. This hall has a long reverberation time, which sounds wonderful for solo classical guitar. However, if you were to put a small orchestra in there, the reverberation would be so dominant that all the sounds would smear together.

"For solo piano, you need a room with a reverberation time of no more than two seconds," continues Atkinson. "If the reverb time is longer, the sound gets muddy. In addition, you don't want a room that has a slap echo because that may compromise timing cues and produce annoying sonic flutters. You also don't want a room that sounds cold. For example, a room might have lots of reverberation, but if it has too much high-frequency content, it'll sound cold and 'bathroomy.' You can work around this to some extent with judicious selection and placement of the mics, but you should try to find an environment that sounds warm and gives a sense of space without being so dominant that it smears all the notes together."

SOUND CHECK

Unfortunately, it is often impractical to do a sound check before a classical concert. This can make it extremely stressful if you're recording an ensemble for the first time in an unfamiliar hall. For live classical recordings, experience truly counts.

"If you have already recorded in a room and you have accurate notes from those previous sessions, you don't really need a sound check," says Eargle. "Complete notes include the location of every mic, including their height above the floor. These dimensions should be accurate within six inches. Other notes include console settings, which you can enter on a form you create yourself. If you don't have notes, or if you're working in a hall that's unfamiliar to you, you're going to be flying blind because you're typically not ready to record by the time the orchestra has its last rehearsal on the morning of the concert."

Of course, "flying blind" is not the best option when you have one opportunity to make a brilliant recording. If possible, try to get the conductor to let you record a dress rehearsal as a test.

"I usually work in halls I know very well," says McGrath. "But if I'm doing something unusual, I'll go and record a rehearsal. I'll set up the mics, record for a while, then change the mics, record for a while, and so on. I document everything; then I listen at home and select the best setup to use on the actual concert date."

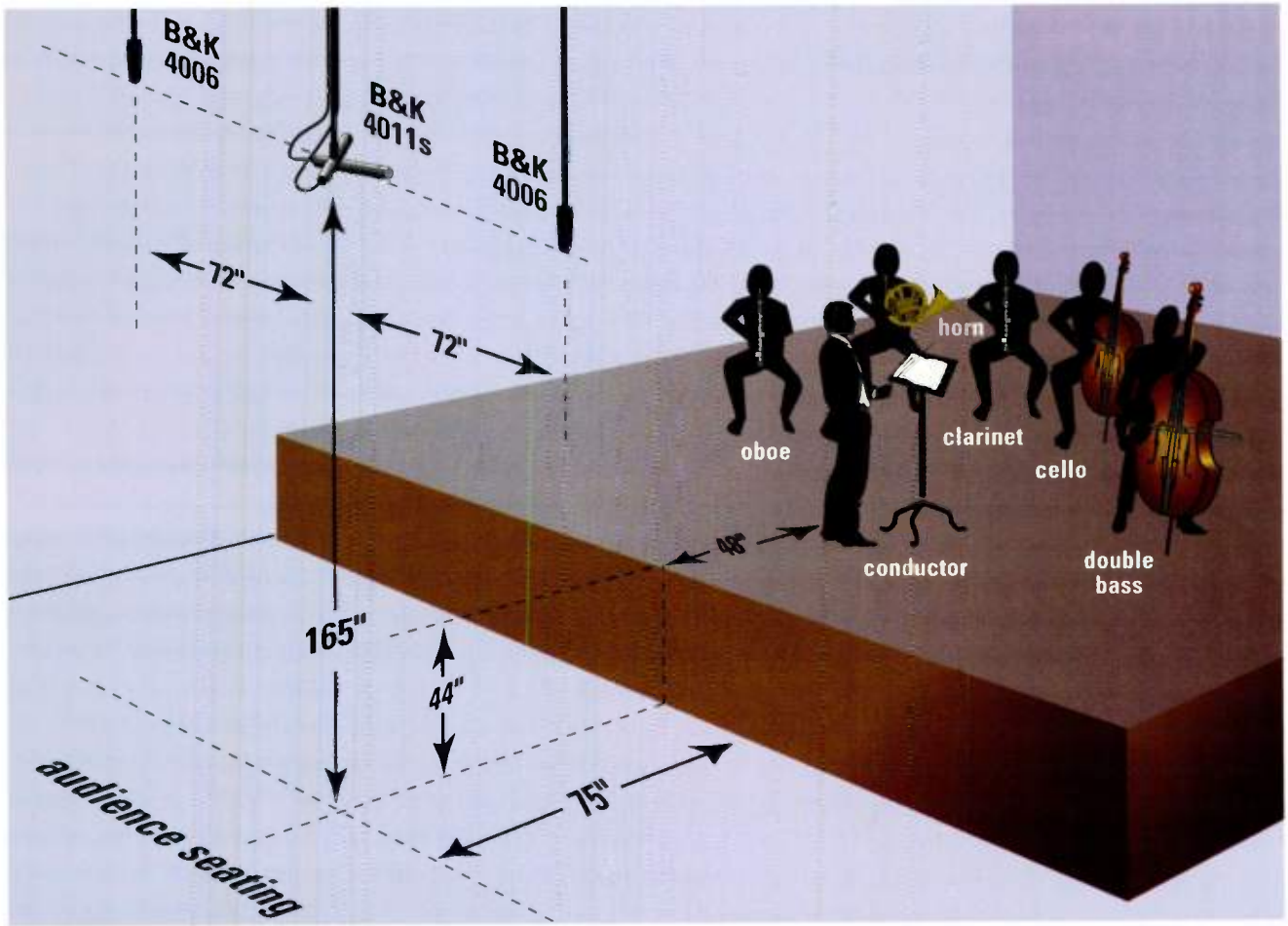

FIG. 2: John Atkinson uses an ORTF pair in the center of the stage flanked by two spaced omnis for recording chamber ensembles.

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These days it seems like everyone and their brother is making PCI audio interface cards for the PC and Mac. To say the marketplace is a bit confused is like saying Times Square on New Year's Eve is kinda crowded. So how do you separate the good from the bad and the ugly? Easy. Look hard at the features, determine what's important to you, then balance that against what's going on in your pocketbook.

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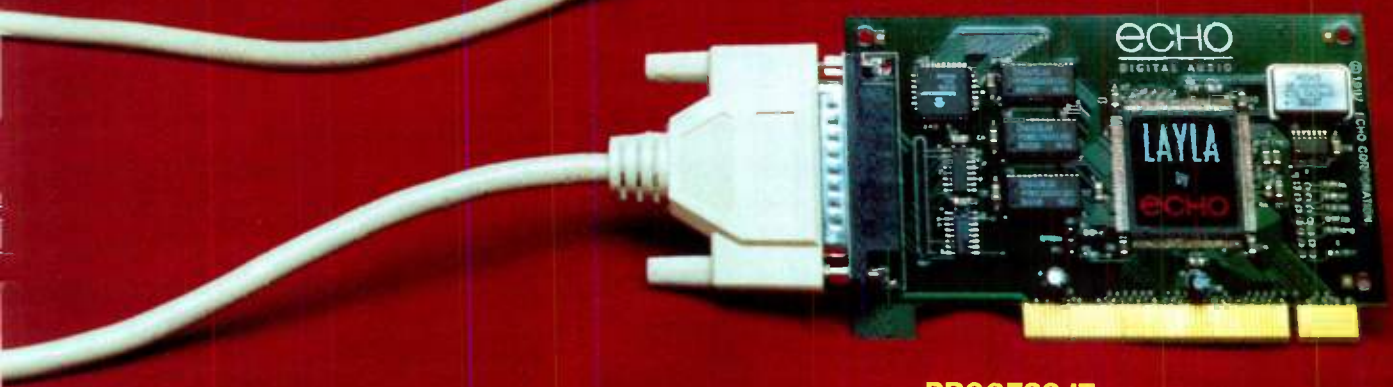
EXPAND IT Now for the really big news: You can synchronize multiple Layla systems—expansion is as simple as plugging in another card and connecting the word clock output of the master unit into the word clock input of the slave. (Daisy-chain as many Layla units as you have PCI slots in your computer.) When you build a larger system you not only get more hardware ins and outs (how does 24 inputs x 30 outputs grab ya?), you get more (lots more!) DSP horsepower.

MIDI IT(!) All right. We admit that MIDI in/out/thru probably isn't the most earth-shattering feature you've ever seen (even if it is opto-isolated). But we know you'll appreciate the convenience of being able to create a simple, yet powerful audio/MIDI multitrack recording system without having to hook up a ton of additional gear (or worrying about your MIDI interface card conflicting with the IRQ on your digital I/O card, which conflicts with your SCSI card, which conflicts—you get the picture). Did we mention that Layla is a true Plug-and-Play™ system? That's right, no jumpers to set, no IRQs to configure (in fact, only one IRQ is used for both audio and MIDI functions and no DMA channels at all are used). Setup is as simple as plugging in the card and connecting the included multipin cable from the card to the audio I/O unit.

SYNC IT Layla offers synchronization capabilities that make it perfectly at home in a variety of professional environments. Synchronize to picture via SMPTE/MTC. Lock to external word clock. Generate sample-accurate sync from the master clock out. (Our word clock provides continuous single-sample resolution from 5kHz to 50kHz.)

DIG IT Create a 24-bit stereo master mix to send to the digital output. (Yes, Virginia, there's stereo 24-bit digital input as well.) Or maybe an all-digital effects loop is more to your liking? Whatever the application, your precious audio tracks are handled with 24-bit precision throughout Layla's internal audio path.



EDIT IT Work with total freedom. Edit your music with the precision and flexibility that only random-access disk-based recording can provide. Layla is compatible with any audio recording/editing application that uses standard Microsoft Windows 95 calls—which means Layla works with virtually all of today's most popular programs, including Cakewalk's Cakewalk Pro Audio™, Steinberg's Cubase Audio™, and Sonic Foundry's Sound Forge™ (to name just a few). You also get support for software plug-ins from respected manufacturers like Waves and Arboretum Systems. Don't yet own recording software? Not to worry: Layla comes complete with a custom version of Syntrillium Software's Cool Edit Pro™—a powerful multitrack audio recording and editing environment—so you can enjoy a no-hassle musical experience right out of the box. (Our Macintosh software package, which provides compatibility with a host of professional audio and MIDI sequencing applications, is scheduled for release in Summer '97.)

PROCESS IT That big black square sitting in the middle of the Layla PCI interface is Motorola's latest generation DSP—the 56301, a 24-bit chip running at an astounding 80 million instructions per second. In addition to being a giant chunk of raw processing power, it's the PCI bus master, meaning that it handles all the routing of data in and around your system. That leaves your computer's CPU free to do things like drawing screens really fast. The 301 also handles audio timing information, so you get dead-on synchronization accuracy and—here's one for the engineers out there—zero-latency sample-positioning (in other words, it always knows what audio is supposed to play when and where).

ECHO IT Why does it say ECHO on the card? Simple. Our strategic partners, ECHO Corporation, are the engineering team behind Layla. ECHO has been providing audio ASICs and DSP system software and drivers to the computer industry for the last 17 years, and their designs have been sold and licensed to such industry leaders as Analog Devices™, Motorola™, Rockwell™, Sony™, S3™, and VLSI™. Why should you care? Because it's your way of knowing that the Layla hardware and software driver (the key to making Layla compatible with so many of the great Windows 95 audio applications) were designed by people who really—we mean really—know computer-based digital audio.

EVENT
ELECTRONICS INC

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Although any recording of a live concert is bound to include some audience noise, you can reduce it to a surprisingly workable degree by making an announcement before the performance begins. If you announce that a recording is being made and request that all beeping pagers and watches be silenced, the noise level will be appreciably lower. You can also request that concertgoers refrain from coughing during the music and announce that they will be given ample time between movements to clear their throats.

RUNNING REMOTE

Typically, when recording classical concerts, the audio equipment is set up in a remote room rather than in the hall itself. For one thing, you want to isolate yourself enough to allow critical listening. Setting up this way, however, often requires mic cables with lengths of 200 feet or more. In addition, the recording is usually digital, which means you need high-quality analog-to-digital converters (ADCs).

To ensure pristine audio quality, Atkinson recommends putting the mic preamps and ADCs as close to the mics as possible. "If you run extremely long mic cables, you can have problems with induced noise," he says. "So it makes sense to convert the signal to digital as close to the mic as possible and then run a long AES/EBU cable to the gear. Digital data is immune to noise, so this is a very transparent way to transmit signals over long distances."

However, McGrath feels differently: "I don't subscribe to the notion that you have to put the mic preamp as close to the mic as possible. How can I put a preamp on a stand in the middle of the house? I set up my equipment offstage rather than in a distant room, and I monitor everything on headphones. The musicians have to trip over me to get on stage, but this setup lets me keep the cable lengths shorter. Rarely do I run more than 80 or 90 feet from the mic to the preamp. In addition, I use premium cables from Transparent Audio. Ultimately, I doubt there is a significant audible difference between running 10 or 20 feet and 80 or 90 feet, particularly when using premium cables."

Eargle agrees with McGrath on this point. "If you take high-grade Canare cable or something equivalent in a *star-quad configuration* [a "double" balanced cable with a ground, two positive conductors, and two negative conductors that delivers optimal noise rejection] and measure the frequency response, you can run the cable up to 600 feet before you see any rolloff at 20 kHz. That's good enough as far as I'm concerned. In addition, onstage mic preamps can be a real problem. For instance, what if you have to trim the level during the performance?"

DIGITAL TRACKING

There are two basic, ideal ways to record the classics: straight to 2-track DAT or multitracked on an MDM. However, upscale options are always readily available. Atkinson, for example, likes to use a high-ticket Nagra digital 4-track, which also allows him to record sans mixer.

"I record the signal from each mic to one channel of the Nagra, which can record with up to 24-bit resolution," he says. "The Alesis ADAT and TASCAM DA-88 record in 16-bit resolution, whereas I prefer to use at least 20 bits."

Because Eargle was using so many microphones for the Dallas Symphony recordings of *The Planets*, he took a

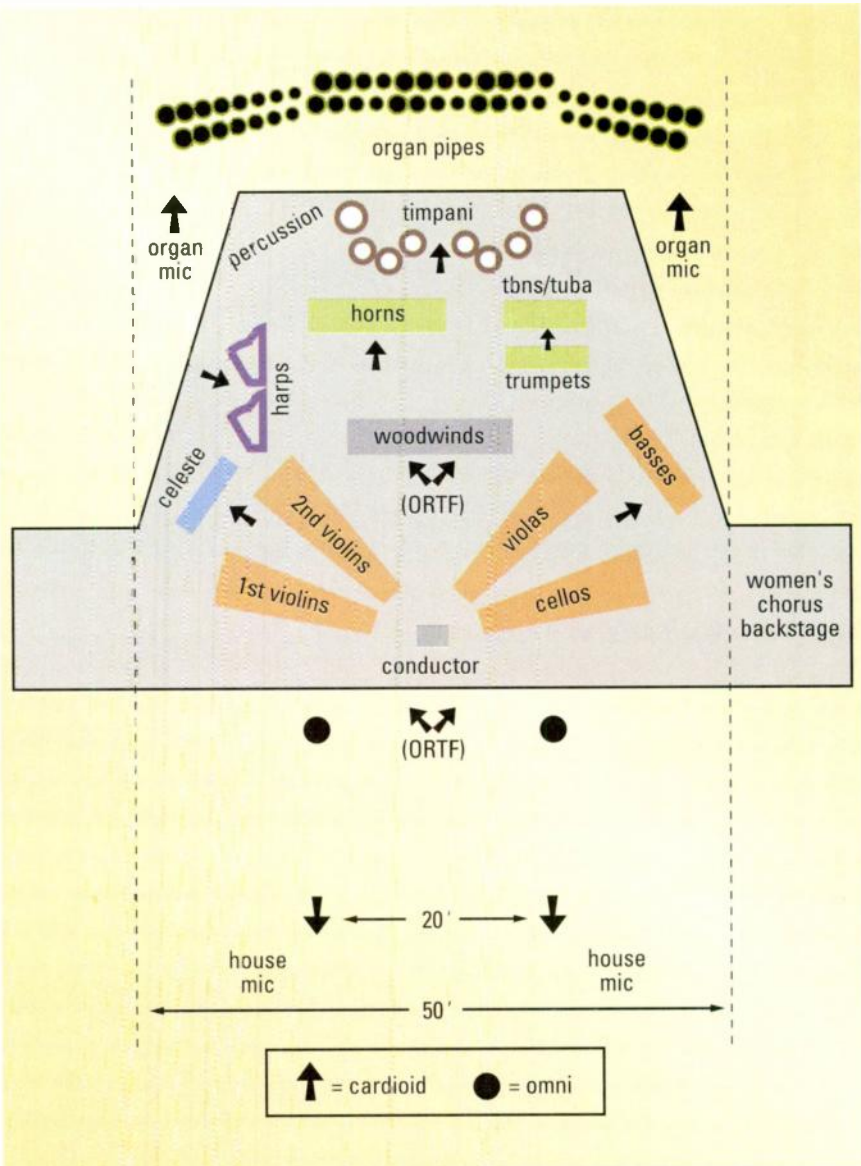


FIG. 3: To record the huge orchestra required by Holst's *The Planets*, John Eargle employed spot mics in addition to the main mic configuration of an ORTF pair, two spaced omnis, and two house mics.

slightly different approach. Using a Soundcraft K1 mixer, he routed a stereo mix of all the mics to DAT *and* to two tracks of a DA-88 for backup. He also bused the main mic pair and the house mics to two separate pairs of DA-88 tracks.

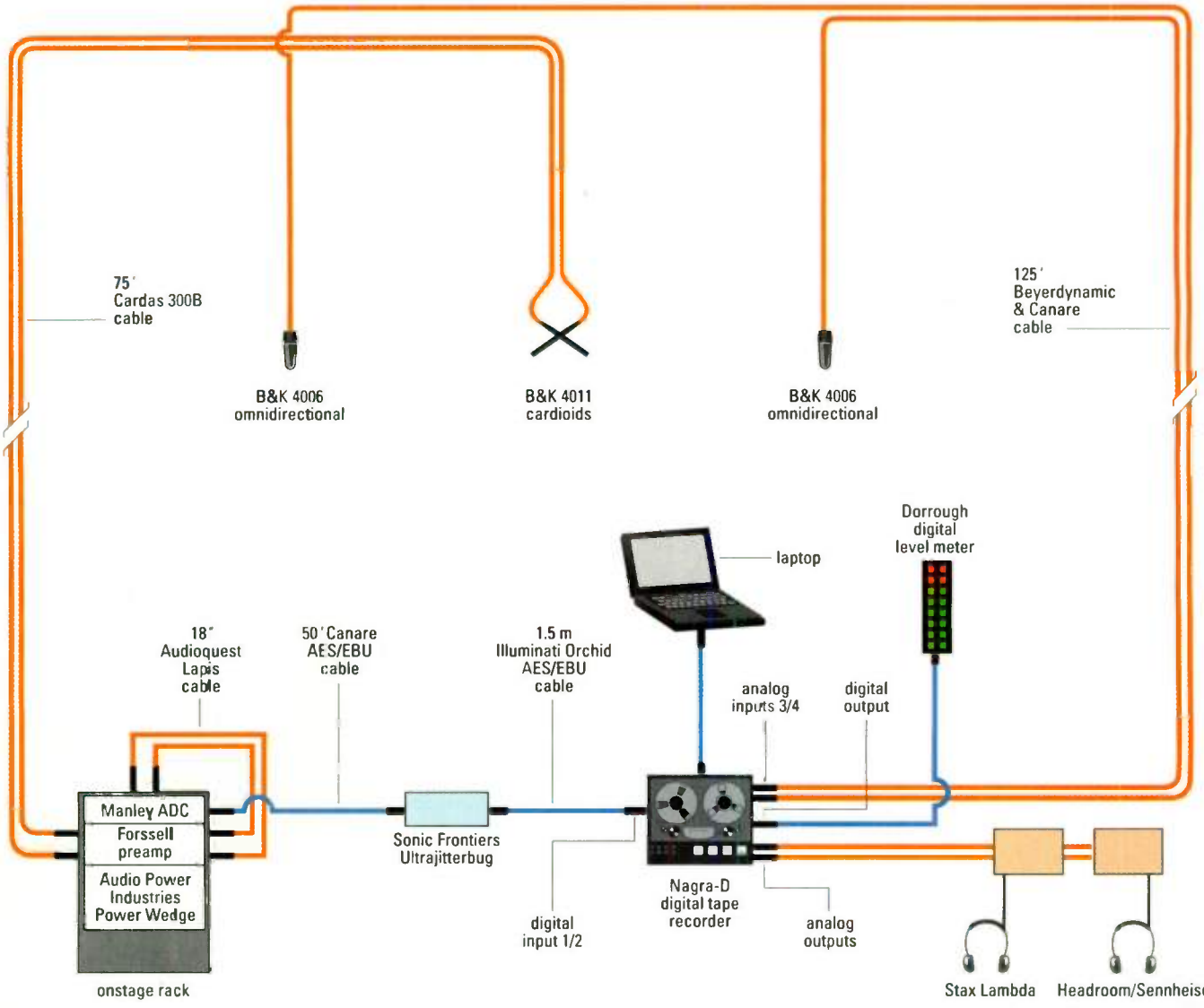
But, whether you use a mixer or not, you need to document the sounds with sterling quality. For some pros, like Atkinson, a conventional ADAT, DA-88, or DAT recorder with 16-bit resolution simply doesn't make the cut. For example, McGrath normally records with 20-bit resolution. He uses Prism AD-1 A/D converters when he can, but these devices are very expensive to own or rent. One alternative is the Benchmark Media Systems AD200OR, which provides four channels of 20-bit A/D for about $2,000. "It sounds magnificent; for the money, it's unbeatable," he says.

Eargle's A/D converter of choice is the Prism AD-1, which he uses to record with 20-bit resolution on six tracks of a DA-88. Actually, the six primary tracks store sixteen bits, and the extra bits are stored on the two remaining tracks. The AD-1 also allows him to record four tracks at 24-bit resolution—using the other four tracks to store the additional bits—but Eargle sees no value in this.

"There is no reason to record anything at 24-bit resolution," he maintains. "I think that is pure hype. The difference between sixteen and twenty bits can be heard in the finished product because we now have microphones that are detailed enough to deliver that level of audio resolution. But we do *not* have mics that can take advantage of 24-bit resolution. Having said that, however, any postproduction processing should be done at the highest resolution possible to ensure that all internal calculations and the final 16-bit master are ideal."

MIC PLACEMENT

Once you know the characteristics of the hall, microphone selection is a matter of finding models that enhance the sonic space. Atkinson offers some advice in this regard: "Get the best,



John Atkinson sets up his mic preamps and A/D converters on stage to minimize the length of mic cables.

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most neutral-sounding mics you can lay your hands on. In addition, you should have more than one model available. You might go into a hall, set up the mics you think will work, and find that they don't work because the hall is reinforcing the negative aspects of that particular mic's character. Perhaps a certain mic will sound too thin or too muddy. In these situations, it's critical to have alternatives readily available."

All three engineers typically start with a main pair of mics centered on the stage. Atkinson and Eargle often use an ORTF (Office de Radiodiffusion-Television Française) configuration (see **Fig. 1**), in which two cardioid mics form an angle of about 110 degrees with the capsules separated by about seven inches (the average ear-to-ear distance on a human head). This position effectively captures directional information from the various sources on stage. Atkinson's preferred mics for this application are B&K 4011s whereas Eargle likes Sanken CU41s.

In addition, both Atkinson and Eargle often place an omni mic on either side of their main ORTF pair (see **Figs. 2** and **3**). As Atkinson explains, "The cardioid pattern always rolls off some bass because it captures sound from behind the capsule as well as the front, which causes phase cancellation at low frequencies. On the other hand, an omnidirectional pattern gives you great bass response at the expense of imaging. I try to get the best of both worlds by combining the accurate imaging and clean highs of the cardioids with the bass energy produced by the omnis."

Atkinson prefers B&K 4006s for the spaced omni mics whereas Eargle uses Sennheiser MKH20s. Both engineers align the main ORTF pair and the omnis in a straight line in front of the stage.

McGrath takes a slightly different approach, using a Schoeps KFM-6 stereo mic for the main pair (see **Fig. 4**). This unusual mic, which looks like a bowling ball, houses two omnidirectional capsules. "The placement of the sphere depends on the orchestra and the hall," explains McGrath. "I like positioning the sphere closer to the orchestra than most people would place mics because I get a little more sonic detail that way.

FIG. 4: The Schoeps KFM-6 is a stereo mic with two omni capsules encased within a sphere the size of a bowling ball. (Courtesy Posthorn Recording)

Usually, the KFM-6 is placed over the first row of seats and about fourteen feet above the level of the stage. To record a smaller chamber ensemble, I'd bring the sphere in even closer."

As mentioned earlier, preserving the ambience of the hall is very important in live classical recording. The spaced omnis used by Atkinson and Eargle pick up some ambience, and Eargle often supplements this placement with a pair of cardioids in the middle of the hall, facing away from the stage. For the Dallas concerts, he placed two cardioid mics about 25 feet from the first row of players, about 20 feet apart, and about 20 feet above the floor.

For very small ensembles, a single pair of mics might be enough to capture a wonderful blend of source sound and room ambience, although you should listen critically to determine whether a few "support" mics will capture a more balanced representation of the instruments and the room.

"For solo piano, I would use two omnis spaced about 27 or 28 inches apart at a height of about seven feet pointed down just below the piano lid," says Eargle. "This configuration also works with a string quartet. For a piano accompanying a soloist, however, I would put the omnis a little closer to the piano to minimize leakage from the soloist, and I might space the mics farther apart to get a little larger piano image. Then, I would hang an ORTF pair over the soloist. I wouldn't even try to get any room sound because it's probably a small room, and the room sound in a small space full of people is usually nothing but noise."

SPOT MIKING

For most orchestral recordings, Eargle's standard configuration includes a main ORTF pair, two spaced omni mics in line with the main pair, two cardioid "house" mics to capture room ambience, and another ORTF pair over the woodwinds. However, *The Planets* calls for a huge orchestra, so he used additional cardioid mics as spot mics to focus on specific instruments or sections: one about seven feet above the floor for the two harps and another about six feet above the floor for the celeste; one above the horns and another above the trumpets, trombones, and tuba (both about ten feet above the floor); one over the timpani about eight feet above the floor; and one for the first two stands of basses. In addition, he placed two cardioids about 30 feet apart pointed at the organ case at a distance of about fifteen feet, and another pair of spaced omnis near the offstage women's chorus.

"The additional mics were used only as enhancers and were mixed in with the main mics at fairly low levels," explains Eargle. "The spot mics let me boost sounds that might otherwise get a bit lost. In a work this big on a stage this spread out, we really needed them. For example, the mics on the women's chorus were considered backups because, normally, the voices will bleed into the main mics and be sufficiently audible. But the spot mics were there if we needed them to clarify the vocal sound, and they also provided another ingredient to play with if we later wanted to do a surround-sound mix."

McGrath also uses spot mics occasionally but only in stereo pairs placed along the center line of the orchestra, such as an ORTF pair over the woodwinds. "I don't do monaural spot miking," he says, "because I want to avoid

the phase cancellation often caused by panning several monaural source sounds into a stereo mix. Frankly, though, I haven't been doing much spot miking at all lately. I'm finding that with judicious positioning of the KFM-6 sphere, the need for extra mics is minimized."

Atkinson, however, tries to avoid spot mics altogether. "One of the big problems with using multiple mics for classical recording is that you can destroy all the time information because every mic is roughly the same distance from its respective instrument," he says. "For example, if you have a main stereo pair on the orchestra and a spot mic on the flute for a solo, the flute will appear several milliseconds before it's audible through the main mic pair. This can result in a ghost echo of the flute, along with unnatural timing cues that compromise the soundstage."

To combat such timing problems, some engineers use digital delays on the spot mics to restore the natural sonic balance with respect to the main pair. If you are recording directly to 2-track, you have to add the delay as you record, whereas if you are multitracking, you can assign the spot mics to separate tracks and process them during the mix. Yet another solution is to time-shift the spot tracks in a digital audio workstation during postproduction editing (provided, of course, that they were recorded on separate tracks).

MONITORING

Both Atkinson and McGrath use Stax Lambda electrostatic headphones for monitoring during the performance. As Atkinson puts it: "I've used the Lambdas for so long, I know how they sound, and I know how that sound will translate to conventional speakers. In addition, the conditions for monitoring on speakers during a live recording are normally terrible—you're usually in a vestry or a storage closet. My experience in the worst situations is that speaker monitoring can only give you 'go/no go' information about whether or not the mics are picking up anything, and that's about all you can tell. Under those conditions, headphones are more rigorous and more exacting."

On the other hand, Eargle prefers to use monitors when recording. "With speakers, you can tell a lot more about imaging," he says. "When you monitor over headphones, everything sounds bigger than life. Any slight change you make in balance comes at you like gangbusters. I will put headphones on if I want to hear a little more of something, or if someone says 'you've got a noise over here' and I missed it on the speakers. But unless I was doing a 2-mic recording, I would never use headphones for setting balances."

POST-PRODUCTION

If you are recording a single performance, there's not much you can do to improve the final result other than adjust the mix of signals from a multitrack device. According to Atkinson, "I leave the omnis panned hard right and left during mixdown. You can't really bring them in toward the center because you get some very noticeable combing and phasing problems. In the last two *Stereophile* recordings, I left the ORTF pair panned hard left and right, as well. The pair are at about 0 dB, and the omnis are at about -5 dB. The omnis are also rolled off in the highs so the random high-frequency phase information doesn't mess up the nice soundstage from the ORTF pair. For a recent recording of a Lizst piano sonata, I used a KFM-6 for the main pair. In that situation, I ended up mixing the spaced omnis about 3 dB above the level of the KFM-6. On its own, the Schoeps was a little too cold sounding, even though it offered nice, well-defined imaging. Conversely, the spaced omnis by themselves provided a terrific sound quality, but the imaging was far too vague."

If you can record more than one performance of the same material (especially if the concerts are in the same hall), you can use a DAW to edit the material into a final form that combines the best parts of each performance and is, therefore, superior to any of the individual concerts. In preparation for this process, listen to each performance with a score of the music and make notes about which sections of each performance have problems, such as audience noise or clams.

In most professional situations, selecting the sections to be edited is the producer's job. As Eargle explains: "Every take has a number, and the beginning and ending of each take is also indicated by a time-code number. For example, the producer might put a '-1' in the score at a certain point; this means that there is a problem at that point in take one. If he also puts a '+2' at the same point, that means take two is fine and we should use it at that point."

Eargle goes on to say that splicing different performances together should be done with care. "You aren't putting a performance together out of pieces and bits," he states, "you are merely correcting an excellent 'foundation' take. Hopefully, you have nice, long sections that are exactly what you want musically and are only flawed every now and then by a noise, a funny performance attack, or a split note. These things go by in a moment in concert—you don't know they're coming so you hardly notice when they happen—but if you make a recording with those things in there, you'll regret it. You can't go in and fix a single instrumental note, so you have to hope that you have another version of that section with a better note and no other problems. If you don't, you may be in deep trouble. Ultimately, it's the producer's job to determine if everything is covered—that is, you have good, editable versions of all sections of the music."

This string quintet is rehearsing for the Santa Fe Chamber Music Festival. Note the ORTF pair and spaced omnis hanging above the ensemble. (Courtesy Santa Fe Chamber Music Festival)

Both Atkinson and Eargle use a Sonic Solutions system for editing. For the Dallas concerts, Eargle dumped all six DA-88 tracks from the sections selected by the producer into the DAW. "We ended up with an edited 6-track file," he says. "The complete stereo mix of all the mics (which was duplicated on the DAT) became the final stereo recording, and the other tracks can be used later on to create a surround-sound mix."

If you edit several performances into a single recording (or simply edit out the applause and audience noise between pieces), you will probably want to insert a few seconds of silence between the selections. But fading to absolute silence in a live recording can be disconcerting for the listener. Instead, Atkinson recommends that you record a few minutes of silence in the hall before the audience arrives and insert this between the selections. "You don't want to fade to black between cuts; you want to fade into the natural sound of the hall so that the listening experience is not interrupted," he says. "I record several minutes of silence in the hall, and I put some of this between cuts."

Of course, you want the final recording to sound as good as possible, but if you dice and splice too much, you run the risk of destroying the "feel" of the performance. "It's an artistic decision regarding how much work you do to make the recording note-perfect, versus the risk of emasculating the performance with too much editing," stresses Atkinson. "You have to balance those two things. And every producer and artist has their own idea as to where they draw that line."

FINAL APPLAUSE

Recording classical music in concert can be a very rewarding experience. Of course, you must be prepared for some frustration, and you must learn to live with certain disadvantages that are largely irrelevant in studio settings. But the thrill of reliving an inspiring performance and the potential for making some money (or at least deriving some self-satisfaction) doing something you love are far greater than the problems you might encounter.

EM *Technical Editor* **Scott Wilkinson** *performs with many chamber ensembles and orchestras and knows the effects of adrenaline quite well.*

Home Electronics

By Mary Cosola

David Michael Matuch faces many of the same challenges as other musicians who struggle to write, engineer, and produce their own music. On the creative end of his musical endeavors, he writes and performs his own ambient compositions and does so using a small home-studio setup. On the business end, he runs his own label, Infinite Monkey Productions, from his home in Cicero, Illinois, and works on his own and with the folks at Heart & Soul Records to pursue retailers and send out promo packages to reviewers. Anyone who has ever tried to wear these various hats knows it's no easy task. That Matuch has managed to release not one, but two albums in this manner is certainly to be lauded, and when you consider that he has accomplished all this with muscular dystrophy, you know we're talking about one dynamic, strong-willed, and creative individual.

COMMITMENT ISSUES

Matuch has just released his second album, *Before Reality*, the follow-up to his critically acclaimed debut, *Masquerade* (both released on Infinite Monkey Productions; *Masquerade* is distributed by Heart & Soul Records in Chicago). His approach to recording his songs depends on the equipment he is using at the time. Matuch buys, sells, swaps, and borrows gear the way an NBA team deals players before the trade deadline. Therefore, his equipment lineup varies dramatically from song to song. (See table, "Reality Breakdown," for a complete listing of the gear he used on *Before Reality*.)

"I don't know if a person can really have a 'commitment problem' with an instrument, but that seems to be the case with me," laughs Matuch. "I build up and break down my setup pretty frequently. The whole idea is to not get too attached to a particular piece of gear, because when I do, I notice that I reach a period of stagnation. I had a Kurzweil K2000RS for a while, and I found that I could make these wonderful sounds, but then I looked back and realized that I had hardly made any music during that time. All I did was create samples and get the perfect loop. I was so into that piece of gear that I forgot what it was for, which is to make music."

David Michael Matuch invites a wide assortment of gear to his ambient pad.

Illustration by Dennis Irwin

Matuch composed and recorded two songs on the K2000RS before he rotated it out of his lineup. Those tracks, "After Thought" and "To Believe in Forever," were heavily influenced by Matuch's ability to sample, loop, and sequence all in one instrument. In "To Believe in Forever," he used bell, cello, and flute patterns, playing them all in harmony. He soloed each pattern and recorded them dry to his TASCAM DA-30 DAT deck. Then he took those pieces and sampled two or three minutes of each back into the K2000RS, creating short loops for each part, layering them, and mixing the final composition.

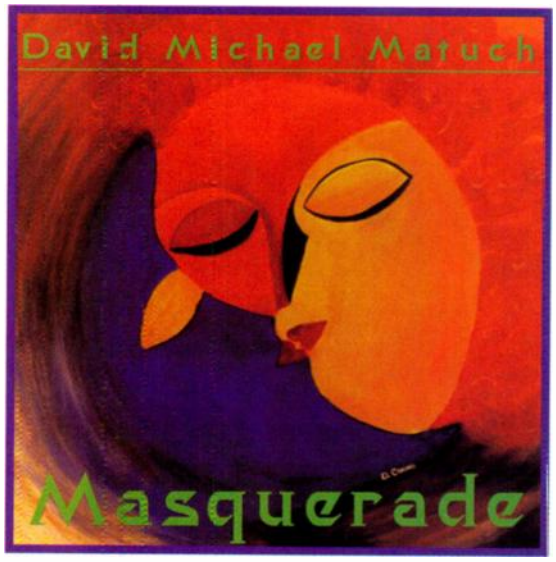
"I had the K2000RS set to where all I had to do was press a key and make a multisample of each pattern, and then I created three 30-second loops," explains Matuch. "From there, I just started playing. For example, I played the bell pattern at an octave below and an octave above the original sample. I played them at the same time to set an interlocking rhythm. Each of those patterns was set to fade in with long envelope times, usually over the course of a minute or so. I worry like crazy about having all my parts in sync, but this worked out well. The two parts that were interweaving—the cello and the flute—constantly changed but would come back to the beginning at different points. That way, it wasn't stagnant; it didn't sound like the same pattern over and over again. In fact, it sounds like two players improvising.

"'After Thought' was born out of 'To Believe in Forever,'" he continues. "I took that flute part and played a chord on the K2000RS. When I did that, it sounded like three flute players improvising meditative-like music, which set the tone for that piece."

MIDI HEAVEN

After completing the two songs with the K2000RS, Matuch decided it was time to get back to his MIDI roots. His friend Mike Mooney loaned him a sizable gear collection that included a Roland JD-990 synth, a Korg WaveStation AD synth, an Ensoniq DP/4 effects processor, an E-mu Morpheus synth, and a Yamaha TX81Z synth and ProMix 01 digital mixer; he sequenced with *Cakewalk* 4.0 on an 80286 PC. Using this setup, he recorded "Comfort of Darkness" and "Time of the Signs." (Mooney also contributed his talent by playing bass on the song "Comfort of Darkness.")

"I just went nuts with all that MIDI gear," he says. "After having only 24 voices on the K2000RS, it felt great to not have to fight for space. I could stretch out with the freedom of all this available polyphony. Because of that, I think the two songs I did with the borrowed setup are much more rhythmic than other tracks on the album. 'Time of the Signs' is a little more aggressive than some of the other songs. It has a 'chug-a-chug' rhythm I programmed using the Morpheus. It's not a drum sound, but I played it with a drumming style. I was going for an apocalyptic feel; I envisioned something akin to the Four Horsemen riding across the sound field."

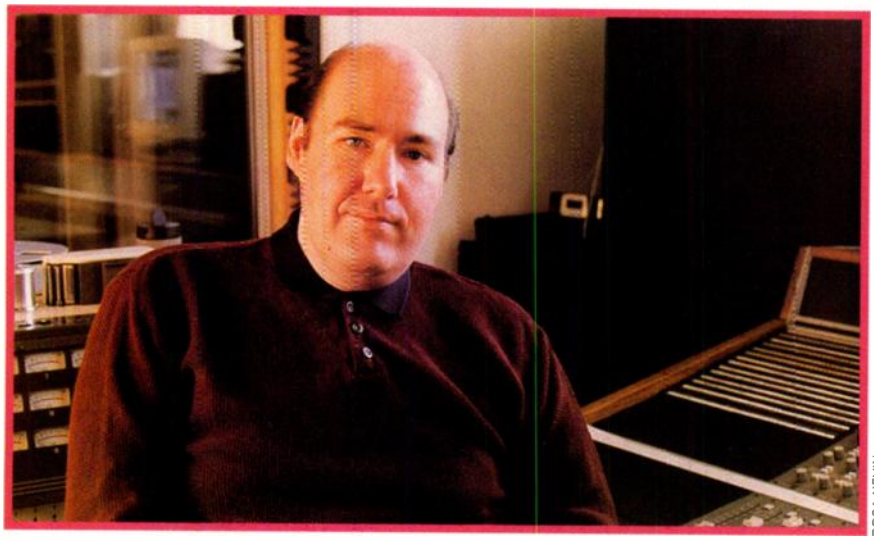


Matuch's debut album, *Masquerade*, received wide critical acclaim in new age music circles.

The tone of the compositions was influenced not only by all the new equipment at hand but also by the sweltering Midwestern summer heat. "It was unbelievably hot when I was working on those two songs," says Matuch. "If you listen closely to 'Comfort of Darkness,' you'll notice some pads that come in searingly, like they're burning in. That was because of the heat. When I listen to it, I'm always reminded of extreme heat. I had to get the equipment back to my friend before it all melted together and created a literal Morpheus."

MINDING THE FACTORY

Matuch's favorite track on *Before Reality* is "Somewhere in the Mind Factory," a 27-minute journey into an ambient-industrial netherworld. The track is



BOB A NEVIN

David Michael Matuch at Heart & Soul's Acoustic Cafe recording studio, where he recorded some of the tracks for *Before Reality*.

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5. Winners will be notified by mail and must sign and return an affidavit of eligibility/songwriting rights/publicity release within 14 days of notification date. The affidavit will state that winners song is original work and he/she holds all rights to song. Failure to sign and return such affidavit within 14 days or provision of false/inaccurate information therein will result in immediate disqualification and an alternate winner will be selected. Affidavits of winners under 18 years of age at time of award must be countersigned by parent or legal guardian. Affidavits subject to verification by JLSC and its agents. Entry constitutes permission to use winner's names, likenesses, and voices for future advertising and publicity purposes without additional compensation.
6. To insure anonymity for judging purposes, entrant's name should appear only on the entry form. Do not put name or address on cassette or lyric sheet. Cassettes and lyrics will not be returned. (Winners will be determined by December15, 1997.)

I have read and understand the rules of The John Lennon Songwriting Contest and I accept the terms and conditions of participation. (If entrant is under 18 years old, the signature of a parent or guardian is required.)

Signature _____ Date _____

essentially five separate pieces that he strung together to make listeners feel as though they were on a conveyor belt, moving through a factory in a sci-fi movie. The sounds that float through the track range from darkly sparse and eerie synthesized bleeps to intense pulsing mechanical sounds to melodic keyboards, strings, and drums.

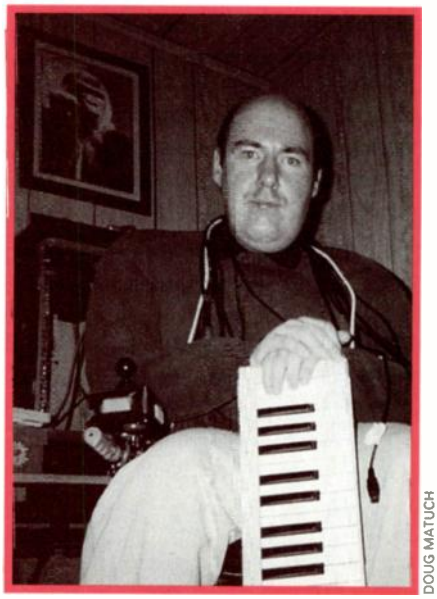
"I love that song because of the way it takes the listener through several different environments," he says. "It sounds like it was composed using a bunch of really expensive gear, but it was all done on an old Peavey DPMV-3 synth that I bought used for $250.

"The DPMV-3 is only a 16-voice module, which is a little limiting. I started using it just to sketch out ideas," he continues. "Eventually I ended up creating different sounds and then soloing and sampling them. I sequenced those samples and played them through an effects processor into my sequencer, trying to find the effect that sounded best with each part. I got some pretty wild sounds by doing things like putting a ring modulator on a drum track. Once that process was completed, I recorded the parts into my DAT machine."

Matuch took his stack of DATs to Heart & Soul's Acoustic Cafe recording studio, where he had access to Pro Tools II for assembling the final composition. He worked for a few weeks trying to piece together the parts so they would work well together rhythmically but would still maintain their distinct personalities.

"In order to make the different elements work together, I did gradual crossfades between parts that spanned anywhere from a minute to two minutes. Also, each loop was a stereo loop with effects on it, which helped give the piece its depth. As I was putting it together, the piece would sometimes get too complex, so I would have to break it down to the basics and start all over."

Matuch continued working in that fashion with Pro Tools until he was happy with the main body of the piece.



DOUG MATUCH

Matuch in his home studio with a keyboard that actually stuck around long enough to be photographed.

To get ideas for the song's intro and ending, he went back to his DAT archives, culling old noises and samples he had recorded years earlier. "I found a bunch of industrial noises from old synthesizers and chose about five or six that sounded really great together," explains Matuch. "I layered them, trying to create something that sounded like a little engine room, and used that new part at the beginning and end of the song. It's like you're moving forward into the Mind Factory, and then you're ushered out of it at the end."

AFTER REALITY

Now that he has two self-produced albums under his belt, Matuch practically qualifies for industry-veteran status. With the first album, *Masquerade*, Matuch admits that he probably made the songs a little denser than they should have been. Even though that album was well received by critics and listeners alike, on *Before Reality* he learned to occasionally let the spaces between sounds do the talking.

"I think the compositions on *Before Reality* are a little more complex and fit together well as a whole. After the first album, I really learned about creating more moods and more spaces in the songs," he explains. "*Masquerade* was a little more disjointed. I worked too much on including things like bug noises and diverse ethnic music styles.

REALITY BREAKDOWN

Because David Michael Matuch's home studio is a continual work in progress, the equipment list given below is broken down on a song-by-song basis. There were, however, a few constants throughout the process. He monitors his work through Sennheiser HD 580 headphones and Alesis Monitor Ones; he uses *Cakewalk* 4.0 for sequencing; and his DAT machine—which, true to form, he had just sold at press time—was a TASCAM DA-30. Matuch can be contacted via e-mail at infmonk@aol.com.

Song Title	Equipment
After Thought	Kurzweil K2000RS rack-mount synth module; Ensoniq DP/4 effects processor
Comfort of Darkness	Roland JD-990 synth; Korg WaveStation AD synth; Yamaha TX81Z synth; E-mu Morpheus synth; Ensoniq DP/4 effects processor; Yamaha ProMix 01 digital mixer
Somewhere in the Mind Factory	Peavey DPMV-3 synth; Yamaha SY77 synth; Sony HR-MP5
Time of the Signs	Roland JD-990 synth; Korg WaveStation AD synth; Yamaha TX81Z synth; E-mu Morpheus synth; Casio VZ-10M rack-mount synth; Ensoniq DP/4 effects processor; Yamaha ProMix 01 digital mixer; Roland SDE-330 spatial delay and SRV-330 spatial reverb
To Believe in Forever	Kurzweil K2000RS rack-mount synth module; Ensoniq DP/4 effects processor

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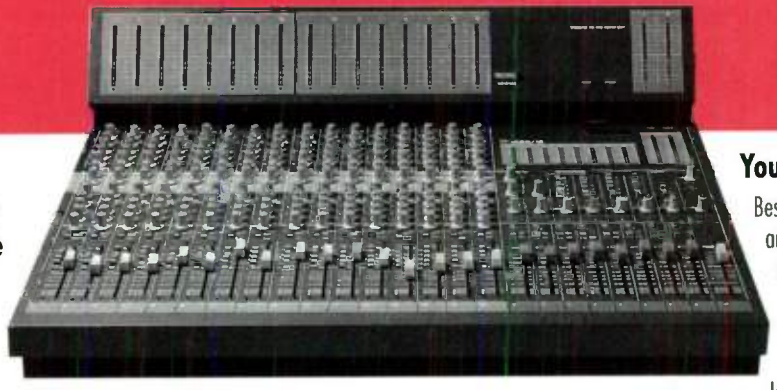

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If I had to compare, I'd say the first album was about experimentation, and the second one was more a study of textures and depth."

Another thing Matuch has worked on in his compositions is the concept of "bending time," as he refers to it. "I love it when you're listening to an album, and maybe an hour has gone by, but you think it's only been fifteen minutes," he says. "That's why I work on songs that take you far away and bring you back again, like 'Somewhere

in the Mind Factory.' That's also why I like fading parts in and out during a song: there's nothing that makes the listener conscious of a break, no abrupt stop to snap you out of it."

Matuch's approach illustrates one of the great aspects of the ambient genre. Ambient artists generally have more freedom to experiment with compositional structures than they would if they were working in another style of contemporary music. Given that he has the ability to bend time and take the occasional musical trip to the future—all from his home studio—it would seem that Matuch is using that compositional freedom and electronic technology to its fullest.

If Managing Editor **Mary Cosola** *were to make a soundtrack for her life, it would be filled with sounds of cement trucks colliding.*

Sound Forge Heats Up With ActiveMovie

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

Sound Forge also supports the ActiveX Streaming Format (ASF) – the new audio and video Internet and intranet streaming standard used by Microsoft's NetShow On-Demand.

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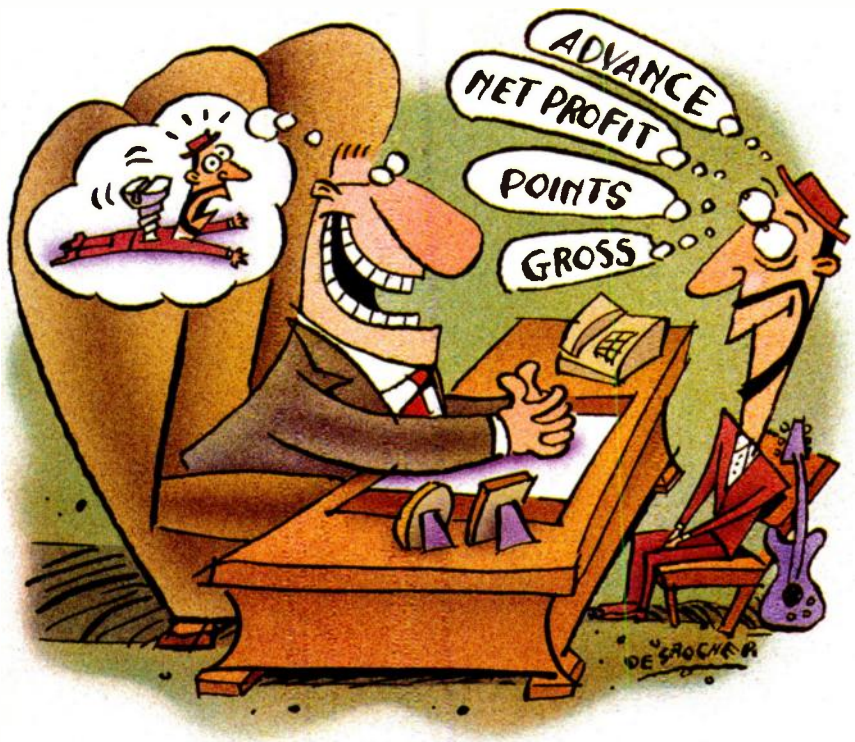
WORKING MUSICIAN

Words and Music

From Advances to Zero Royalties: A Music-Business Glossary.

By Michael A. Aczon

In my practice of entertainment law, I find that artists get frustrated when, part of the way through a negotiation, they discover that they've been speaking a different language from the business execs associated with their deal. In an effort to help you not only to walk the walk but also to talk the talk, I have compiled a number of key—and often misunderstood—music-business terms. Throughout these definitions, I use the term "artist" to describe writers, recording artists, or producers (any person who creates the work that is being traded). I use "company" to describe record, management, production, or publishing companies.



JACK DESROCHER

advance Moneys paid to an artist in anticipation of future earnings, such as recording or publishing royalties. Advances come in the form of *general artist advances,* which are cash payments to artists; *all-in advances,* which include recording budgets; and *third-party advances,* which are payments made to third parties on the artists' behalf, such as payments to record promoters. Although sometimes viewed as loans, advances are not repaid in the same manner as conventional loans because the company making the advance is taking a calculated risk that the advance will be repaid from royalties. For example, if a record does not sell well, the company must absorb the loss.

budget The amount of money allocated by a company to complete a specific project. This is usually a major part of any contract negotiation because it sets the tone for the dollar commitment that a record label, independent production company, or artist is willing to risk in order to make a project happen. Because it affects the choice of recording studio and personnel, the size and

of the new features. The chips will run all your current applications just fine—in fact, faster than previous Pentiums could—and they will run new MMX-enabled software even faster.

MMX technology specifically refers to 57 new instructions that the processor handles as it runs programs. These instructions enable the processor to work on several chunks of data simultaneously. The acronym used to describe this new capability is "SIMD," which stands for Single Instruction, Multiple [bits of] Data.

Real-world applications of SIMD might include a DSP-type audio effect, such as EQ, or a filtering effect in a photo-editing application. In each of these cases, an MMX processor could alter eight bits of data in parallel, as a DSP coprocessor does, instead of processing each one serially, as a traditional Pentium does. Unfortunately, there are numerous other issues that prevent a true 8× improvement in overall processing speed, but Intel claims (and real-world benchmarks attest to) 60 percent or better speed increases

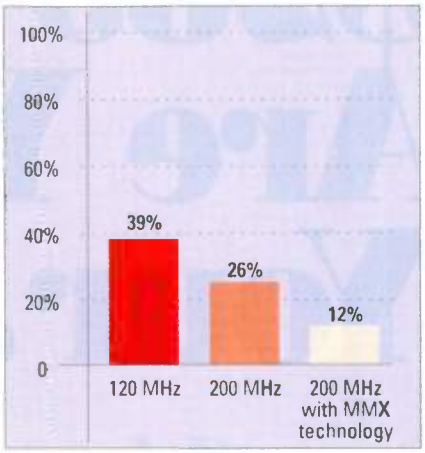


FIG. 2: Processing audio data can be extremely CPU intensive, but MMX technology takes over much of this work, easing the load on the main Pentium CPU. (Courtesy Intel Corp.)

in certain MMX-optimized functions (see Fig. 1).

As previously mentioned, software has to be written specifically to take advantage of the MMX instructions in order to achieve such performance improvements, hence the "Designed for MMX" logo on certain software packages. MMX-specific code will not run on regular Pentiums, but Intel has encouraged developers to include both MMX and non-MMX code in applications so that new applications can run on both new and old machines. As the application boots, it can look to see whether an MMX-enabled chip is present and then choose the appropriate code set, much as fat-binary applications operate in the Mac world. The end result is that software with the "Designed for MMX" logo generally can still run on standard Pentiums, unless the software company has chosen not to include standard Pentium instructions.

Intel achieved this faster performance and virtually seamless backward compatibility by pulling a clever trick. They use the chip's floating-point registers (places where the processor stores bits of data while it's working on them) to hold MMX-processed data. This means that applications can't run floating-point and MMX instructions at the same time. Applications can have both types of code in them, and MMX chips handle each type of processing just fine, but switching between the two modes during a particular function incurs a minor performance penalty. As a result, developers who are already using floating-point math—including

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many music-software developers—have to decide whether to keep their floating-point code, change it to MMX instructions, or figure out an amalgamation that cleanly separates each type of code into different parts of the program.

On non-MMX applications, the new-generation chips achieve roughly 6 to 15 percent performance improvements through a doubling of the on-chip (or L1) memory cache from 16 KB to 32 KB. This cache is used by applications to store recently used data and instructions so that they can be quickly fetched and operated on as the program runs. The expanded cache is one of several new features, which also includes improved branch prediction, that have nothing to do with MMX but are simply improvements to the standard Pentium architecture that just happened to be ready at the same time as MMX and were included in the package. Thanks to these features, everything runs at least a little faster on Pentiums with MMX.

Only the fastest processor speeds—currently 166 and 200 MHz for desktops and 150 and 166 MHz for notebooks—are available with MMX, though a lower-cost 133 MHz version is due this summer. Speaking of costs, the difference between equivalent-speed Pentiums and Pentiums with MMX is relatively small (10 percent to 20 percent in raw chip cost but closer to 5 or 10 percent in overall system cost), making MMX systems a good value.

A big benefit for notebook users is that this is the first time Intel has offered similar-speed processors for notebooks and desktops. Instead of having to wait half a year or more for desktop technology to filter down to notebooks, consumers can now buy notebooks that run as fast as today's best desktops (albeit at a relatively steep price), which is a significant change.

WHAT DOES IT ALL MEAN?

Faster performance is all fine and good, but faster chips are constantly being developed and introduced. MMX offers the possibility for more than just a speed increase; its important architectural changes permit the creation of products that didn't exist before.

One of the best examples of this (and one of the first in a handful of MMX-specific applications) is Yamaha's new *S-YXG50C*, a software-only, programmable, 32-voice, XG-compliant, wavetable synthesizer with effects. Because it requires the capabilities of MMX, this application does not have a standard Pentium equivalent.

The *S-YXG50C* runs entirely on the Intel microprocessor. The software synth uses about 30 percent of the chip's bandwidth, which is too processor intensive for use with some games but leaves plenty of processing power for use in conjunction with (or at the same time as) less demanding applications. It's also significantly less than the 70 percent processor usage required by some software synthesizers on non-MMX platforms.

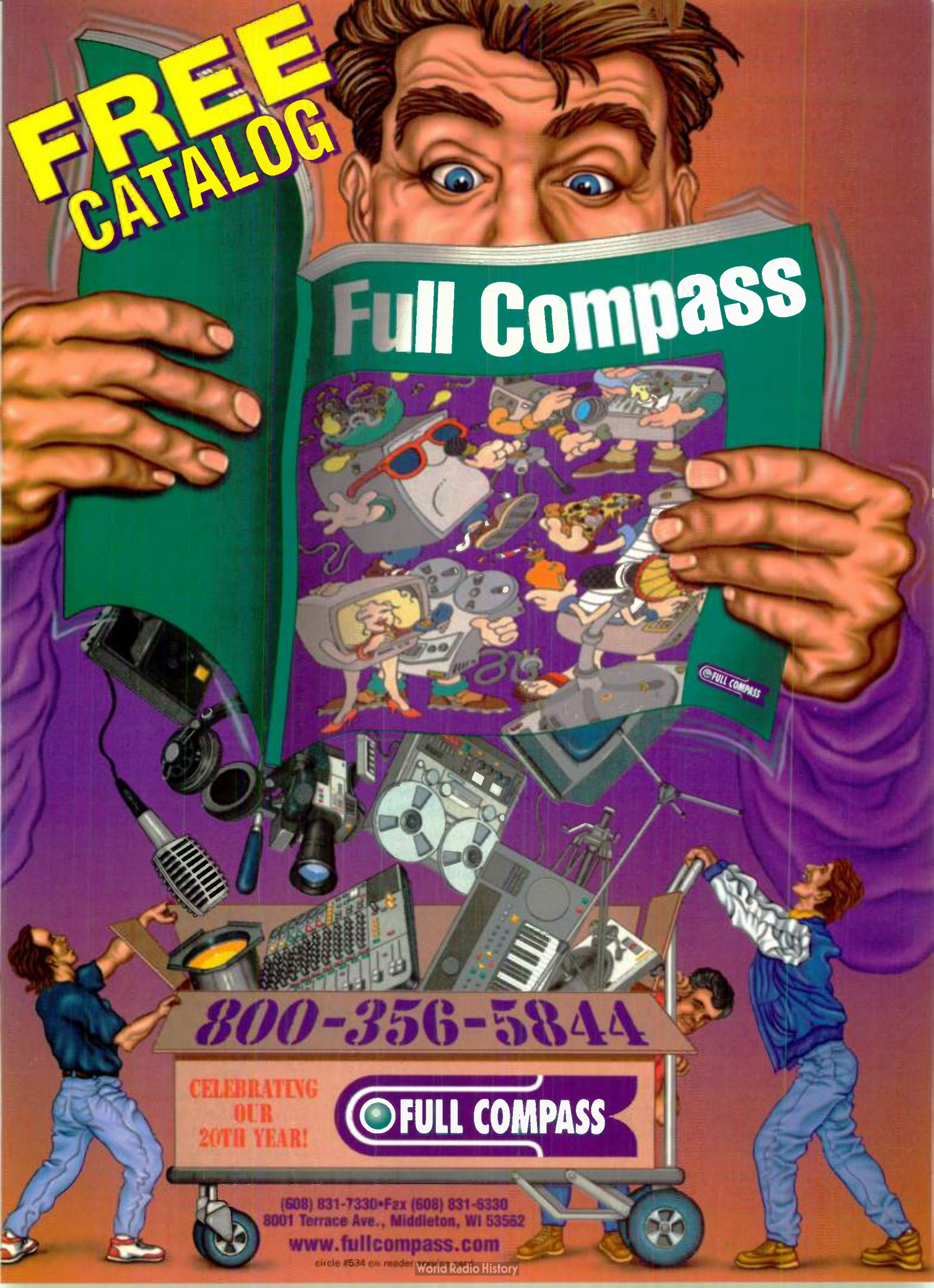
The synth isn't completely hardware-free, of course, because to actually hear the sound, your system needs to have digital-to-analog converters. Of course, depending on the quality of the DACs you use, the *S-YXG50C* might not sound quite as good as Yamaha's latest hardware synths, which use 18-bit DACs. But the sonic differences are subtle. Best of all, the software synth is a lot cheaper than a hardware synth.

Yamaha provides a driver that works in conjunction with Windows' MIDI Mapper to allow existing Windows 3.1 or Windows 95 packages that use MIDI Mapper to control the synth directly. As a result, you're able to patch your sequencer to your wavetable synth within the software. Pretty cool.

THE MMX QUANDARY

MMX has the potential to beef up the capabilities of existing music-software packages, particularly those involved with processing, editing, and mixing digital audio (see **Fig. 2**). In theory, for example, MMX should enable more real-time effects while mixing multiple tracks of digital audio.

After speaking with several music-software vendors about their plans for MMX, however, it became clear that, despite the universally keen interest in the technology, there are important obstacles that must be overcome. Hristo Doichev, a software engineer for Innovative Quality Software (the producer of *SAW* multitrack digital audio recording and editing software), pointed out that "the development tools don't really support MMX yet. So you have to do a lot of low-level assembly-language programming, which many software companies aren't equipped to



handle. Though," he was quick to add, "we at IQS are equipped to handle it."

Still, because the effort required to adapt a program to take advantage of MMX can be extensive, Doichev thinks IQS will wait until enough customers ask for it. "There's no point in doing all the work until we know we can justify the expense," he notes. Once that happens, he foresees an MMX-enabled version of *SAW* that has faster screen displays and can handle more effects simultaneously on more tracks while monitoring in real time.

The dilemmas are different for Steinberg. The German developer's *Cubase* line of sequencers will soon include *Cubase VST* for Windows 95, which incorporates a digital audio studio in software. According to Steve Garth, vice president of sales/marketing for Steinberg North America, the company has been working on porting its VST technology, which is based on floating-point code, over from the Mac. Switching to MMX at this point would delay the release of the product. "We've done a lot of research into MMX and think it's great technology," said Garth, "but it's probably something we'll use for new projects."

Monty Schmidt, president of Sonic Foundry, the makers of *Sound Forge* audio recording and editing software, had yet another problem with implementing MMX. "Our customers keep pushing us to deliver the absolute best audio quality, and to do that we need the higher precision of floating-point math. Part of MMX's speed comes from 16-bit processing, which doesn't provide enough headroom for our audio effects." Consequently, Sonic Foundry isn't planning to implement MMX-specific code for its audio functions, preferring instead the floating-point prowess of Intel's Pentium Pro and, for Windows NT users, Digital Equipment Corporation's Alpha. (IQS' Doichev also made reference to the appeal of the DEC Alpha chip.)

▼ The MMX-enabled Pentium can be thought of as a "Pentium Plus."

Schmidt felt MMX would be good for speeding up video playback. He also enthusiastically endorsed the technology for what he thought could be its most appealing aspect. "I'm looking forward to seeing more MMX-enabled games; those are going to be amazing. You should be able to do a lot of interesting audio effects with MMX."

Ultimately, the PC-based musician should find that MMX-equipped machines deliver a high-speed, high-power computing environment. We won't enjoy the full benefits of the technology right away, but there are interesting new possibilities already and plenty of signs pointing towards an even more intriguing future.

Former **EM** *Editor* **Bob O'Donnell** *is executive editor of InfoWorld Electric (www.infoworld.com) and the host of O'Donnell on Computers, a weekly talk show heard every Saturday morning from 10:00 a.m. to 1:00 p.m. on San Francisco Bay Area radio station KSFO (560 AM).*

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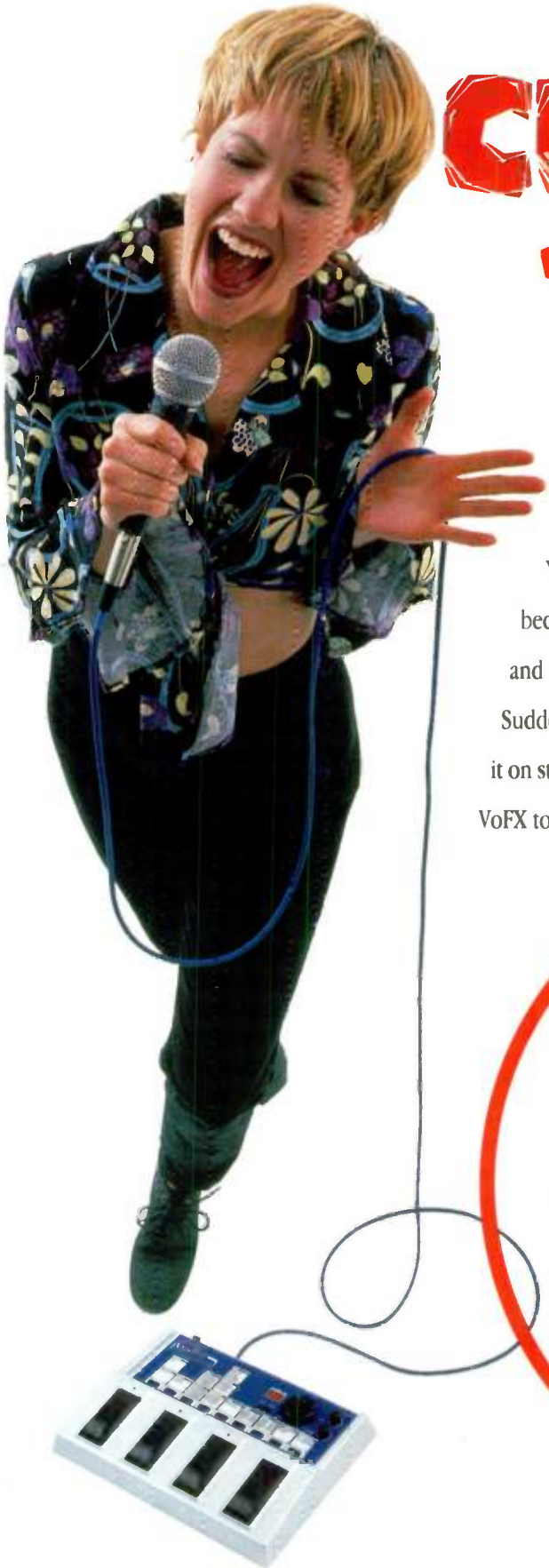

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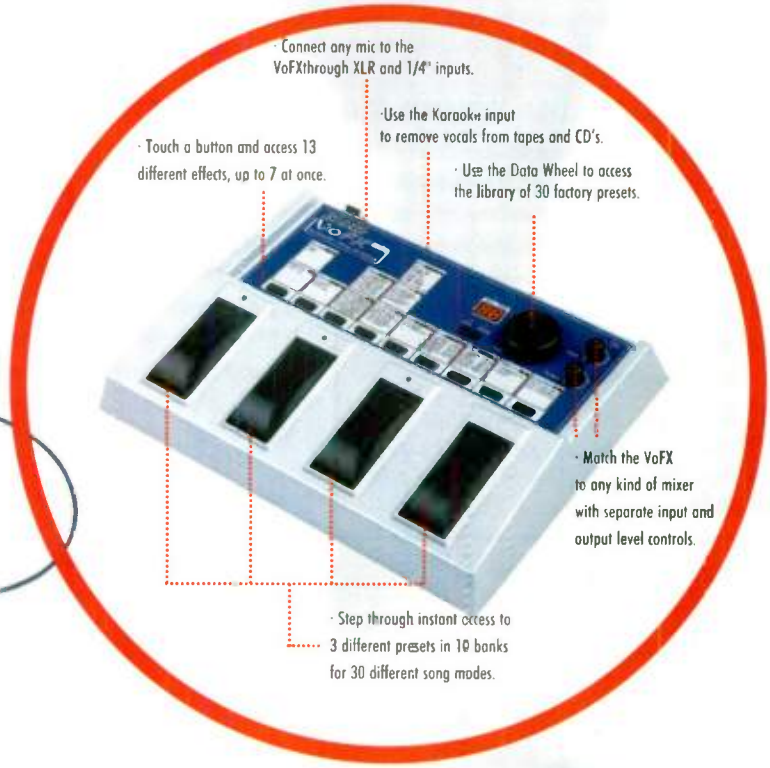

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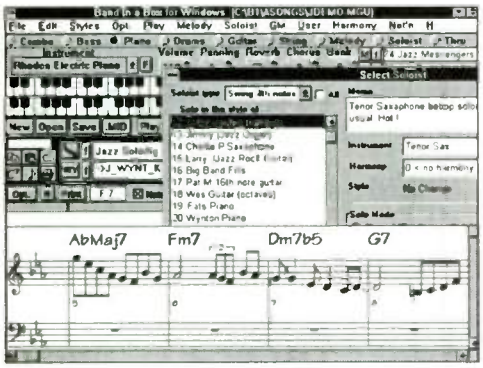

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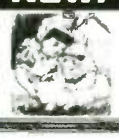

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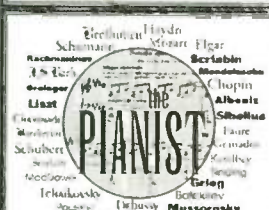

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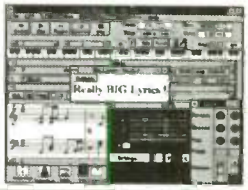

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Ready, Set, Compress!

Use these settings to put the squeeze on unruly signals.

By Brian Knave

When I scored my first compressor years ago (a used unit with no owner's manual) and was a bit bewildered by the thing, a well-meaning engineer told me just to think of it as an automatic volume control. I knew what he meant—sort of—but his comment didn't really help me use the compressor. Now, there are plenty of books that explain how compressors do their thing. But if you're looking to improve your mixes as quickly as possible, you don't need explanations—you need examples!

When it comes to mondo compression, Nine Inch Nails is one band that believes no ratio is too high.

So this month I've put together some suggested settings for compressing a number of common instruments, along with some helpful hints for dialing up your own settings. After all, the sooner you start turning knobs and listening to the results, the sooner you'll know how to use this fundamental piece of gear. (For a more detailed account of how compressors work, check out "Square One: Dynamic Duos, part 1" in the December 1994 **EM** and "The Sophisticated Mix" in the April 1996 **EM**.)

UP AND RUNNING

There's no single way to use a compressor; you can insert one into the signal path pretty much anywhere you want. However, we're going to deal with the most common way, which is to plug the compressor into a console insert jack using a ¼-inch TRS cable.

We will assume your compressor has controls for five basic functions: threshold, ratio, attack time, release time, and output (also called gain, output gain, or make-up gain). Some units may not offer attack or release time, in which case those parameters are controlled automatically. If this is the case with your unit, go ahead and try the other parameter settings anyway; most likely the sound will still work for the intended application.

The following settings can be used either while tracking or during mixdown. However, it's generally better to

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use them while mixing because once the dynamics are squashed to tape, you can't effectively unsquash them. Of course, if a source signal is in desperate need of dynamics control (e.g., you are recording an inexperienced drummer whose kick or snare hits are dynamically inconsistent), then by all means use a compressor while tracking.

Another good reason to compress while recording is that you may not have enough compressors for all the tracks you wish to compress during mixdown. In general, if you do compress while tracking, compress lightly so you don't end up with an overly squashed track. You can always compress again while mixing if the dynamic range is still unwieldy.

Another good rule of thumb is to set the compressor before tweaking the equalization. This is because the compressor may alter the instrument's sound, especially its sustain and decay. On some instruments (such as bass drum), this can result in tonal or timbral shifts that reduce the need for equalization.

Don't have time to fiddle with all those knobs? The PreSonus Blue Max is a "smart" compressor that offers fifteen presets for various instruments as well as a manual mode for more leisurely mixes.

STARTING FROM SCRATCH

Here's a procedure for setting a compressor from scratch. First, insert the TRS cable into the desired console insert. Set the compressor's ratio at 1:1 and the threshold at maximum, making sure all auxiliary features (bypass, soft knee, slave, etc.) are off. The compressor is now in the signal path but is not yet affecting the signal. If the unit has input and output controls, set both at unity gain.

Next, set the attack- and release-time controls at medium values and the ratio to 3:1 or 4:1. Now, roll the tape and start lowering the threshold while listening to the signal and watching the gain-reduction meters. Until you see activity on the meters, no compression is taking place. As a starting point, lower the threshold until it reacts to the quietest section of the input signal.

After setting the threshold level, go back and vary the other controls one at a time, noting the results. I usually start with the attack time, listening for the point where the compressor does its job quickly enough but without chopping off the signal's transients. (Transients help us identify an instrument's sound. You'll know when you've chopped them off because the instrument's attack will be muted.) Next, I'll fiddle with the release time, listening for a setting that's slow enough to maintain a natural decay yet fast enough not to interfere with the next incoming signal above the threshold setting. Obviously, song tempo can largely determine the appropriate release time for a given track.

Actually, there's no right or wrong sequence to setting any of these controls, but doing things in a particular order will help you focus on how each parameter affects the others and, ultimately, the input signal. The relationship between threshold and ratio is especially critical because it determines how much gain reduction takes place as well as how the unit achieves the gain reduction.

Here are two more tips: First, remember to add make-up gain to compensate for the amount of gain reduction imposed by the compressor. Many units have an output-level control expressly for this purpose. Otherwise, be sure to leave some headroom in your mix so you can increase the volume of compressed signals until they are audible. Second, after finding a setting you like, remember to A/B it (using the bypass switch) with the unprocessed signal. If you find that the compressor isn't really helping the instrument to sound better in the mix, you need a different setting—or else no compression at all.

VOCALS

For singers who maintain a fairly consistent dynamic range, try a light ratio (between 1.5:1 and 3:1), a medium attack (30 ms), and a medium release (between 0.5 and 1 second). Set the threshold at -8 dB or -10 dB to achieve a moderate amount of gain change. (Of course, the actual setting will depend on how hot, or how low, the source signal was recorded.) On the other hand, if it's a Nirvana kind of vocal that goes from sedate musing to harried howls (or even a jazz or classical piece with a huge dynamic range), crank up the ratio accordingly, all the way to 10:1 if necessary. And make sure the threshold is low enough to capture the quiet stuff.

On a rap vocal, it often sounds cool to bring low-level words into the foreground and to accentuate rhythmic breaths, so an extreme ratio (15:1 to 20:1) and threshold (-15 dB to -20 dB) may be called for. Also, try speeding up the release time to accommodate a rapid-fire stream of hard-hitting words.

KICK DRUM

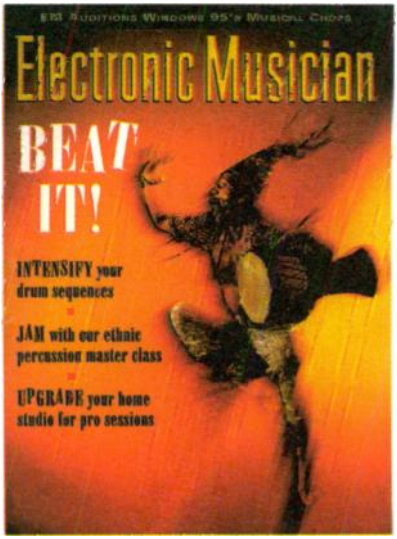
I like a medium to high ratio on kick drum—somewhere between 5:1 and 10:1—because it ensures a consistent level, making each and every kick the same volume. But note that a tight-sounding, single-headed bass drum (stuffed with a pillow or blanket) may require less compression than an unmuffled, 2-headed drum with a soundhole cut into the front head. To reduce boom and add more snap to the latter, increase the ratio and lower the threshold. A medium attack (10 to 30 ms) and release (0.25 to 1 second) usually works nicely, though you can further reduce resonance by slowing down the release. The goal (except, perhaps, in a pure jazz setting) is to create a steady and dynamically consistent kick-drum sound with ample oomph and beater attack.

SNARE DRUM

Again, unless you're producing traditional jazz, strive for a consistent backbeat with an authoritative "pop." A medium ratio (3:1 to 5:1) is often sufficient, but use a relatively fast attack (5 to 10 ms) and medium-fast release (0.10 to 0.25 second). To get more stick sound, use a slower attack time. To thicken the sound, try a slower release. These settings work well on timbales, too.

(continued on p. 183)

More Inspiration



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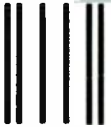

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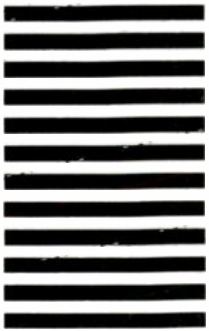

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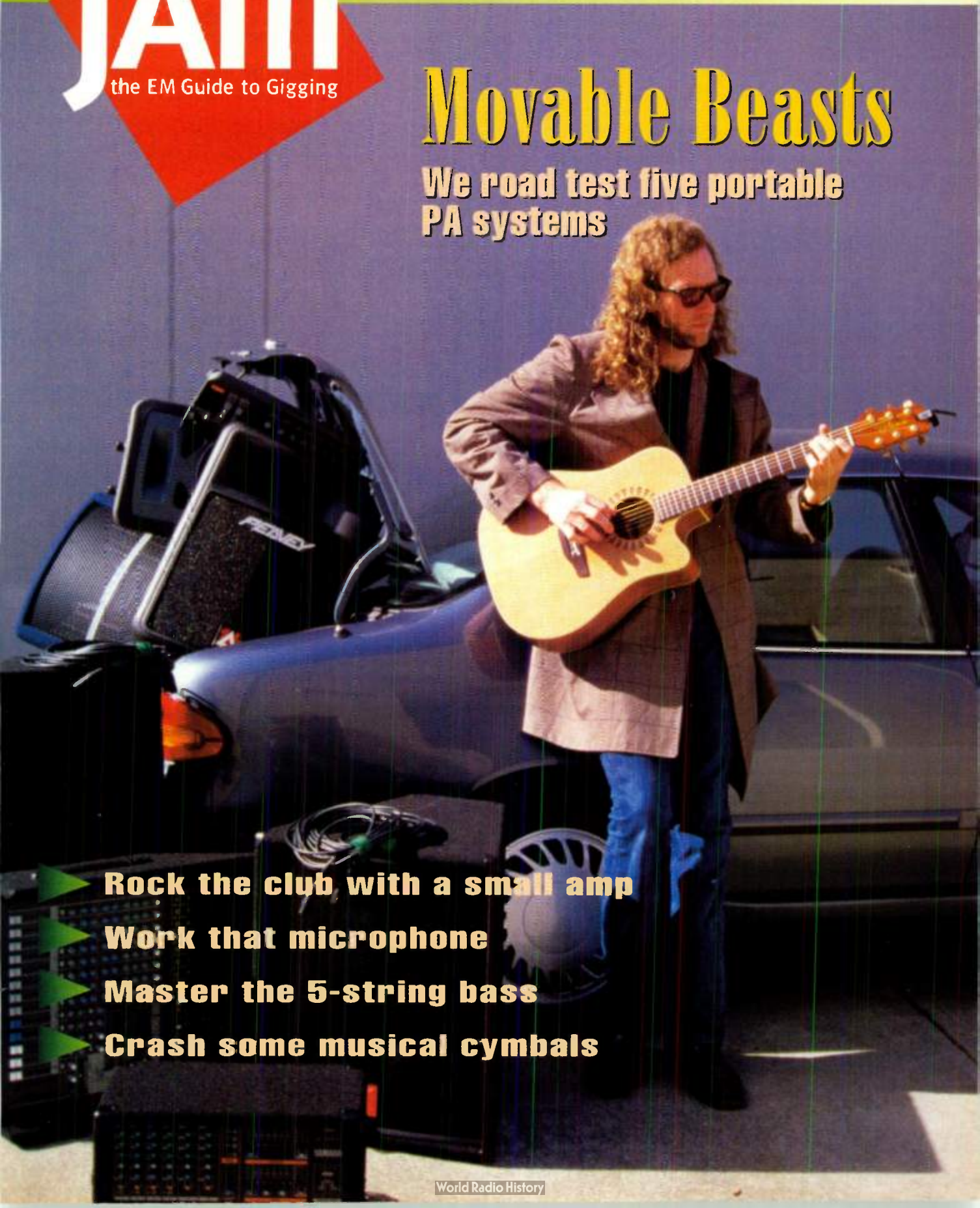

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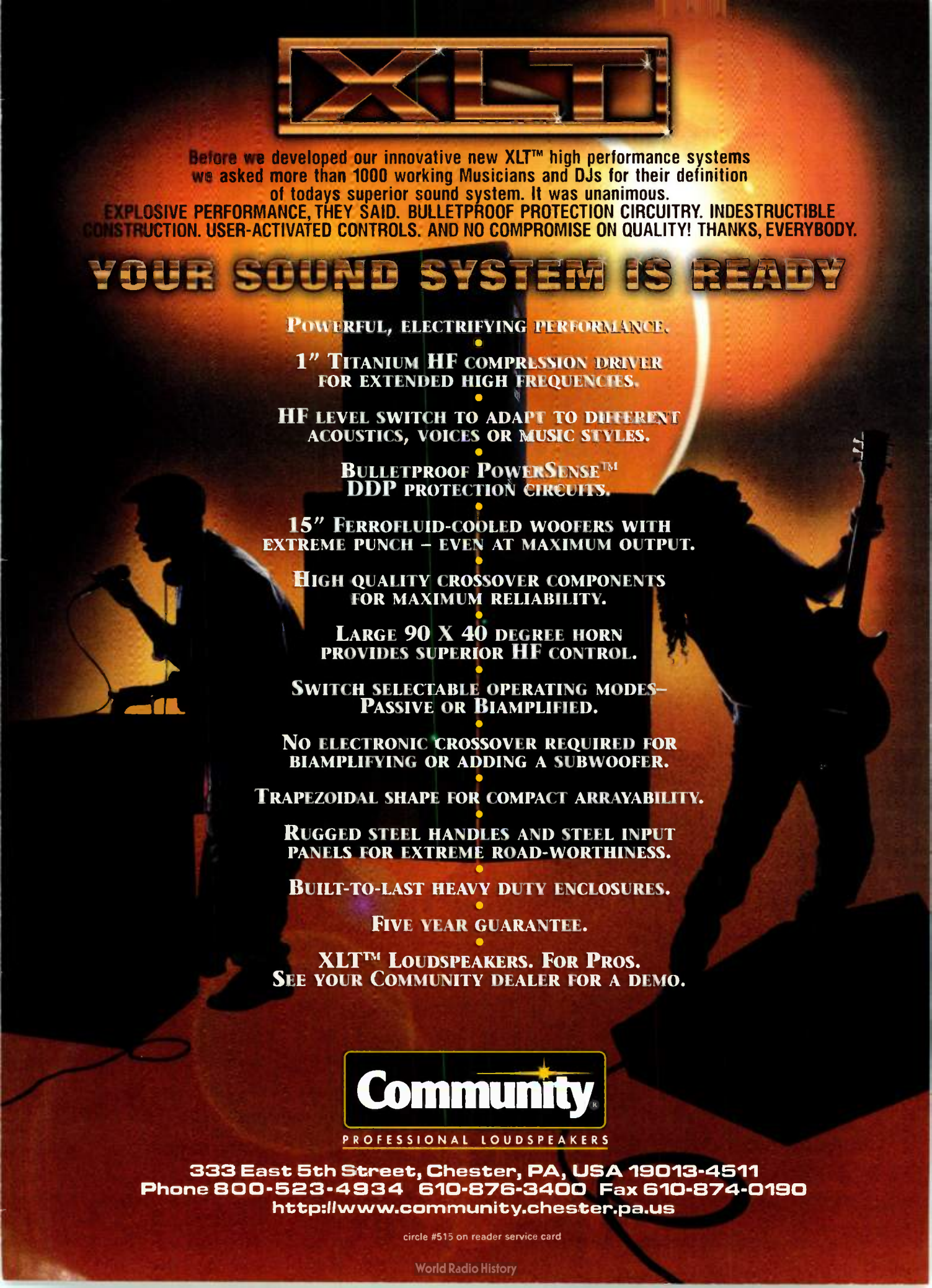

setList

The May JAM Supplement

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Opener

TELL THE TRUTH: IS THERE A VIBRANT CLUB SCENE IN YOUR TOWN? And I'm not talking about two or three hip venues that cater to the posh crowd. An ideal live-performance community embraces a plethora of musical styles and offers a number of fun, quirky clubs spread throughout the city. Club crawlers should be able to choose among nightly concert listings of blues, jazz, Celtic, salsa, techno, alternative rock, and any other style that strikes their fancy. For musicians, such an environment provides bountiful gigs and opportunities to check out other players and explore unfamiliar genres.

Sadly, for many of us, the ideal club scene is something from the fantasy world of Hans Christian Andersen. But does a dearth of "official" venues mean that your musical growth must be limited to solitary endeavors eked out within your personal studio? Not a chance. Musicians who "know what time it is" are always on the lookout for ways to expand their audience. Ambition is the fuel that drives self-starters to release independent CDs, develop Web sites, and explore audio for multimedia. In short, the true believers never say die.

It's that kind of DIY attitude that can turn a desert into a bustling live music scene, literally. A few years ago, young bands in the Palm Springs area carted generators out into the desert sands and performed to packs of bored twenty-somethings. The loose parties developed into a community of sorts, and one of the acts (Kyuss) even scored a major record deal.

The lesson here is that a live venue is a state of mind. It can be a bar, a coffeehouse, a warehouse, a parking lot, or any number of (hopefully) legal gathering places. All you need is a sound system, and the world is your concert stage. And guess what? Today, a high-quality, portable P.A. system can fit into a small car and offer onboard effects, EQ, and enough power to fill mid-sized spaces. It's child's play to turn yourself into a mobile music guerrilla.

Even if you don't want to hit the road, a portable P.A. is a great tool for band rehearsals, choir concerts, speaking engagements, small theatrical performances, museum installations, and modern dance concerts. I'm sold on the concept, and if you want to check out some of the systems for yourself, take a peek at "Movable Beasts" on p.104.

Speaking of mobile units, we've added some new faces to the *JAM* crew. **Sam Molineaux** is a transplanted Brit who has penned scores of articles for the European music trades. **Glenn Letsch** is a renowned bassist and author. His latest book, *Glenn Letsch's Bass Masters Class* (Hal Leonard Publishers) hits the stores this summer. **Bean** is a member of the popular cyber-techno-tribal ensemble D'CüCKOO. I also want to thank **EM**'s own **Tami Herrick-Needham**, who stepped up to the plate as the art director for this second issue of *JAM* and smacked a grand slam. The "stage" looks great, Tami! Let's rock.

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7 Bus Outputs

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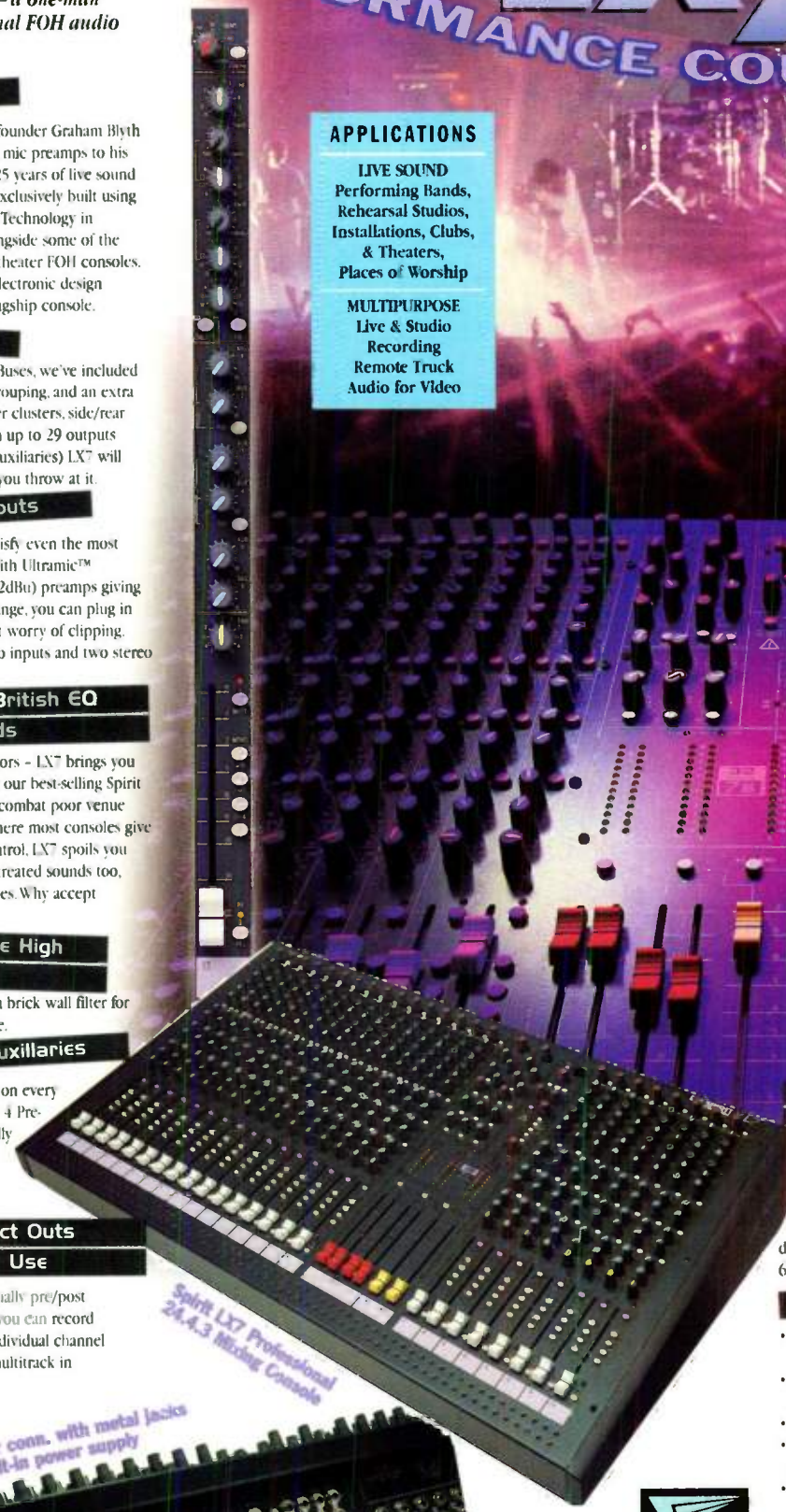

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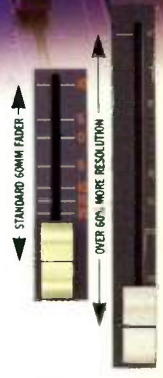

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- Full engineer talkback/monitoring capability
- 2-Track Return routable to Mix
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Movable

Do you have any idea how wonderful it feels

to drop a serious P.A. system into the trunk of a Toyota Tercel? Please forgive my giddiness, but I remember when you needed a pickup truck just to play at a frat party. Back then, a hip personal P.A.—meaning a sound system that a working club band could afford, transport, and operate—typically included mammoth Altec "Voice of the Theater" speakers and a powered mixer big enough to serve Thanksgiving dinner on. By necessity, band members were often chosen as much for their vehicles as for their musical chops.

By Michael Molenda

BEASTS

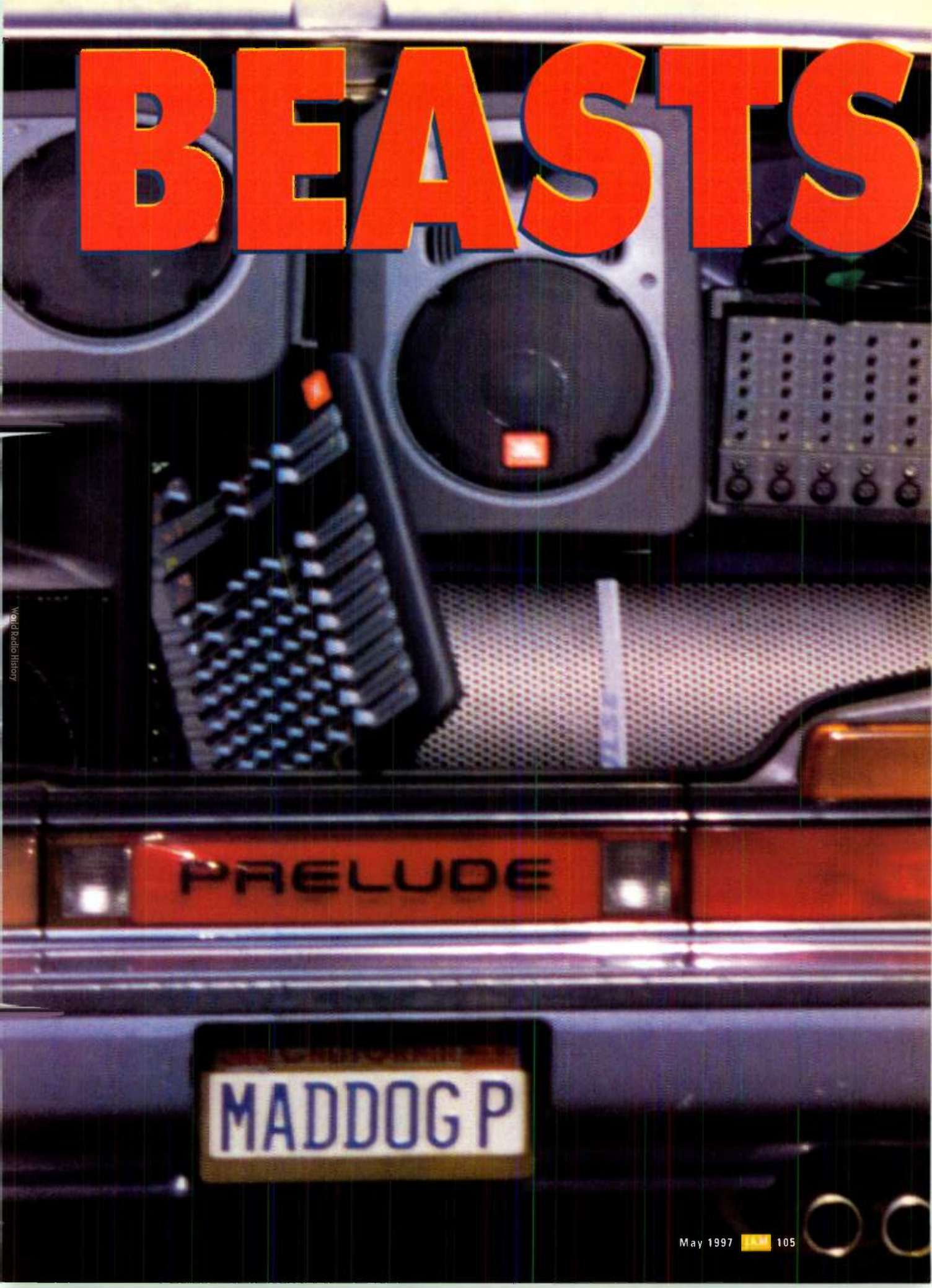

PHOTO BY MARK C. DAVIS

Fender PX-2208D

If only I could have put my hands on one of these compact sound systems 25 years ago, I would have escaped sharing bandstands with psychotic malcontents who just happened to own vans. Oh well, that was then and this is now. Today, a band or solo performer can fit a system powerful enough to shake the rafters at a small club into a two-door sedan. (I did it myself; I wasn't joking about that Toyota Tercel!) Even better, these systems can be set up and operated by one person in less time than it takes your drummer to antagonize the club owner. All of this seemed too good to be true, so I put five portable sound systems from Fender, JBL, Peavey, Yamaha, and Yorkville to the test.

To check overall frequency response, I played commercial CDs, cassette instrumental mixes, and an Alesis SR-16 drum machine through each system. I auditioned vocal power with a solo voice singing through a Shure SM58 dynamic mic, a Conneaut Audio Devices CAD95 condenser mic, and—just for grins—a Rode Classic tube condenser.

Finally, I simulated a small club performance at my project studio, Tiki Town. (The main room has cement floors, large glass windows, sheet rock walls covered with groovy, canvas tiki murals painted by the talented drummer-artist Prairie Prince, and a 30-foot ceiling.) A power trio of guitar, bass, and drums used (and abused) each P.A., and the tests were not limited to determining whether a system was loud enough to project vocals over the din of a band. In addition to lead and background vocals, I ran the bass (via a direct box), the guitar (via the XLR direct out on a Tech 21 Trademark 60 amp), and the kick drum (miked with an AKG D-112) through the systems.

The good news is that the systems handled the band onslaught with aplomb. There were no shredded tweeters, blown woofers, or flaming power amps. Every system produced enough volume to ensure crisp vocal articulation, even when the drummer was playing too darn loud. The instruments—when brought subtly into the mix to fill out the room sound—did not overtax the systems. As long was my gain stages were optimized, none of the systems produced audible distortion or mushy sound. These little dudes can really do the job! Now, let's check out the features of each system.

FENDER PX-2208D

The PX-2208D is the most professional of the units I tested, and will definitely appeal to bands as *the* system for small clubs, DIY venues, and rehearsal halls. You get "pro P.A." features such as pre-fader listen (PFL) solo, channel inserts, faders, and an ingenious road case that doubles as a mixer stand. It's a stupendous package—even before you start messing with the 127 onboard digital effects.

THE WORKS

I'm really impressed with the PX-2208D's way cool road case/stand. It's a great idea that's incredibly functional: I could set up the console, by myself, in less than two minutes. I'm less impressed with the control knobs—which had a cheap, plastic feel—and the tiny, hard-to-manipulate sliders on the onboard graphic equalizers. In addition, the faders are a bit too tight: you have to exert a fair amount of "finger grease" to get them moving. The 115-ELC speakers are big and bulletproof, yet easy to carry.

TONAL CHOPS

Before you touch the EQ, the combination of the PX-2208D and the 115-ELC speakers produces a full, well-balanced tonal spectrum. Low frequencies are tight and tough, and mid and high frequencies are clean and clear. The excellent "out of the box" sound is fortunate because you should twist the PX-2208D's channel EQ knobs with caution. The channel EQ delivers one heck of a wallop; for the highs and mids, any boost greater than 6 dB can be searing. The aggressive tone controls certainly help signals slice through stage levels, but I would not call the channel EQ musical.

By contrast, the two 9-band graphic equalizers assigned to the master module are very musical. Boosts and cuts sound smooth, and the frequency bands (63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz) cover a serviceable spectrum for enhancing music and diminishing feedback.

ONBOARD EFFECTS

The PX-2208D's effects section is formidable for a compact, integrated system. The sheer number of available effects (127) is awesome—but the real benefit of this bountiful menu is that you can select between eight reverb decay times (from short to long) *and* choose a dark or bright timbre. Singers will especially appreciate the PX-2208D's ability to tailor the effects to the room.

For example, a big, sexy reverb isn't always what the doctor ordered. In a live, submarine-shaped club with brick walls, a long reverb decay will likely stir

JBL EON MusicMix 10

PHOTO BY MARK C. DAVIS

The AT4050 goes live.

"The 4050 gives a true sound with no coloration. Clear, transparent, really smooth."

Russell Fischer
Sound Engineer for Garbage, Veruca Salt, Patty Smyth

"Using AT4050's is like plugging the guitars straight into the PA."

Mick Hughes
Sound Engineer for Metallica

"The 4050 made a world of difference. It sounds so natural and unmasked."

Alan Miller
Sound Engineer for Bruce Hornsby, Alan Jackson

"The 4050 gives back exactly what you're putting into it."

Brad Madix
Sound Engineer for Def Leppard, Queensrÿche

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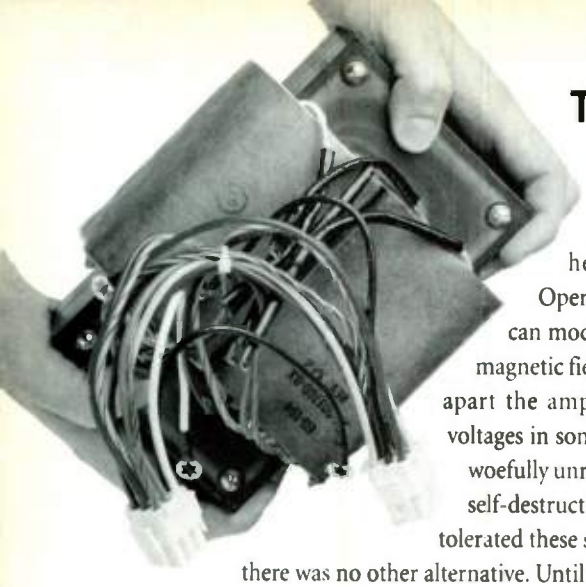


THE PAST...

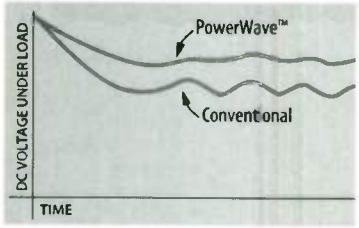
High power amplifiers with old fashioned iron core transformers are dinosaurs. While effective at delivering raw power, these big, heavy, and slow devices have weaknesses. Operating at AC line frequency, the supply voltage can modulate the audio signal under clipping. Strong magnetic fields induce AC hum. Big transformers can tear apart the amp and racks on the road. Poorly regulated voltages in some popular high end brands cause them to be woefully unreliable and inclined to self-destruct. Audio engineers have tolerated these shortcomings because there was no other alternative. Until now...

> *"...excellent bass response... performance can exceed that of traditional amps, with the weight and energy savings as an added bonus."*
>
> **Mix** *Magazine*
>
> *"...the pure, high-quality, rich sound this amp provides is unmistakable."*
>
> **Pro Audio Review** *Magazine*

The new PL 2.0^{HV} was designed for maximum power at 4ohms in a 2RU chassis, while the new PL 3.4 provides maximum power from a standard 120V, 15A line cord

...AND THE FUTURE

PowerLight™ amplifiers use patented PowerWave™ power supplies, the most efficient power supply available in audio. Operating at 114kHz, a one pound PowerWave™ transformer has more current capacity than a 50 pound conventional 60Hz transformer. Primary capacitors operating at a higher voltages more than double their energy storage. The result—a stiffer supply with more power and more energy storage for gut-wrenching bass. AC magnetic fields never enter amplifier circuitry—reducing hum to inaudible levels and increasing dynamic range. Reliability is increased because light weight prevents transit damage while the robust design and Intelligent Amplifier Protection™ keep the things working under conditions that would kill a conventional amp.



PowerWave sags less under load and has less AC ripple

Output Power in Watts per Channel			
MODEL	8Ω*	4Ω*	2Ω**
PowerLight 1.0	200	325	500
PowerLight 1.4	300	500	700
PowerLight 1.8	400	650	900
PowerLight 2.0^{HV}	650	1000	N/A
PowerLight 3.4	725	1150	1700
PowerLight 4.0	900	1400	2000

*20Hz-20kHz, 0.1% THD **1kHz, 1% THD

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QSC's PowerLight Project Team *(clockwise from left):* ***Darrell Austin,*** *Technical Services Manager,* ***Pat Quilter,*** *Chief Technical Officer,* ***Robert Becker,*** *Design Engineer,* ***Greg McLagan,*** *Market Manager (Live Sound),* ***Doug Teulie,*** *Industrial Designer*

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> **Mike Southard**
> *Southard Audio (Mt. Crawford, VA)*
>
> *"I bought one ton of PowerLights and replaced 3 tons of conventional amps...you do the trucking math!"*
> **Dave Cousins**
> *Sound Arts (Winnepeg, Canada)*
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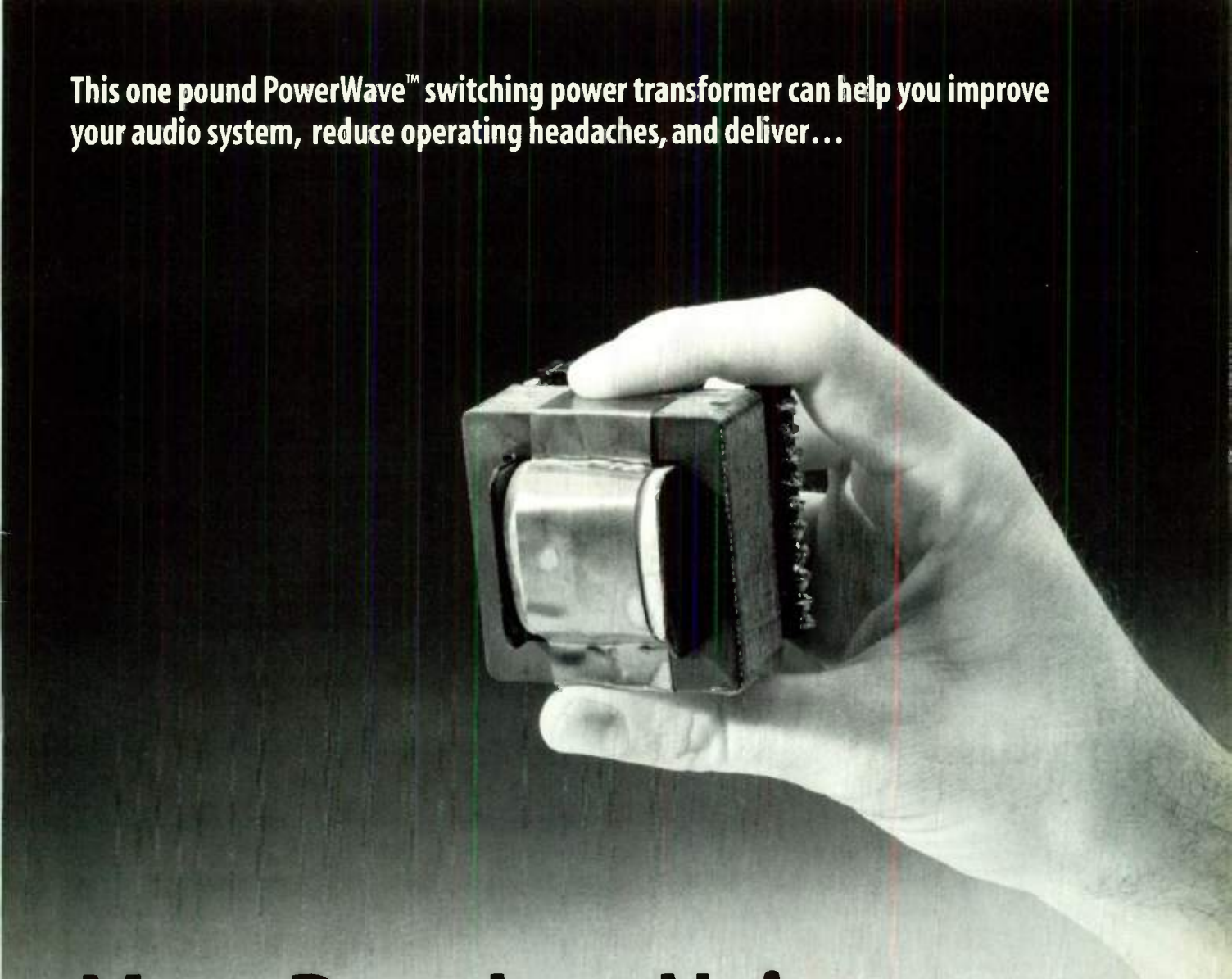

More Bass, Less Noise and Fewer Problems

PowerLight amplifiers are the first lightweight amps to surpass conventional technology in both audio performance and reliability. Advanced PowerWave™ technology eliminates the bulky, heavy power transformers and their problems while improving audio. Large sound systems powered by PowerLight amplifiers are better sounding, more compact, lighter and more reliable than systems using the traditional solutions.

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QSC™ AUDIO

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the vocals into an unintelligible reverb stew. But the PX-2208D user can simply shorten the reverb time (to let the room ambience do the lion's share of the work) and darken the reverb timbre (to ensure that the brick walls don't cause an already bright reverb to sound cheap and tinny).

The overall sound quality of the PX-2208D's effects is quite good. The audio punch is not on the level of a Lexicon MPX 1 or an Alesis QuadraVerb 2, but the effects are clean and sharp and can cut through a dense stage mix without sounding strident or gritty. And if you can't live without a certain effect, you can always patch your favorite signal processor into the console and run it in tandem with the PX-2208D's onboard effects.

PHOTO BY MARK C. DAVIS

Peavey XR 600E

Applause Meter

The PX-2208D is a kick-butt mobile music system. Even the instruction manual is top rate. In addition to the basic operational directions, it offers beginners (and crusty veterans in need of a refresher course) a comprehensive grounding in nearly all aspects of sound reinforcement, including speaker design, mic selection, system trouble-shooting, and polarity and phasing. It's like getting a sound system *and* a private tutorial for one price.

Of course, at $2,459.97, the PX-2208D is the most expensive system I tested, but I can't think of a hipper compact sound system for bands teetering on the edge of the professional ranks. For example, the PX-2208D's easy setup, integrated console stand, and decent-sized faders make it a natural for young bands who must mix themselves from the stage. However, when the band gets to the point where it can hire a sound person, the PX-2208D offers enough pro-level features that there's no need to immediately upgrade the sound system. Although the channel EQ could be a tad more musical and the console faders and knobs are less than stellar, the PX-2208D is definitely a system that can follow you a good distance up your career path.

JBL EON MUSICMIX 10

The MusicMix 10 system is so portable that you could toss it into a cab without taxing the cabbie's nerves. Every aspect of the system, from the mixer to the powered speakers, is intelligently designed for easy mobility. The EON Power 10s are surprisingly weightless for speakers with power amps packed inside, and the console is so light that my four-year-old niece could carry it for me.

The Works

Unfortunately, extreme portability often requires some trade-offs. In the MusicMix 10's case, the compromise is a featherweight, plastic construction that feels uncomfortably toy-like. Console controls feel loose and scratchy, although the faders manage to exhibit a very smooth motion. In addition, there are no center detents on the EQ knobs. By comparison, the Power 10 speakers feel as solid and road rugged as Sherman tanks.

Ergonomically, the EON system is extremely well thought out. On the MusicMix 10, all connections and controls are conveniently accessed from the top of the console, and every single function is clearly labeled. The console's "signal present" lights (on each channel) are a nice perk, as are the very visible green "on" lights on the faces of the Power 10 speakers.

Tonal Chops

There is nothing flimsy about the sound of the MusicMix 10—the audio quality is truly exceptional for such a compact system. Running the system flat gives you robust lows and clear highs, and playing with the channel EQ only improves upon a good thing. When boosted, the low EQ is very warm and round, and the mid EQ is present without being obnoxiously bright. The high EQ really doesn't do much until it is cranked all the way, at which point it adds a clean, crystalline shimmer. Frequency cuts are not clearly audible until the knobs are turned all the way to the left, but I didn't really need to cut frequencies on this system: the frequency response is so well balanced that tonal anomalies such as muddiness and shrillness are pretty much nonexistent.

Onboard Effects

The MusicMix 10 does not offer onboard effects, opting to let users patch in their own signal processors through an effects send (monaural) and return (stereo).

Applause Meter

It's hard to beat the MusicMix 10 for portability and ease of set up. This system is truly a compact wonder: the console and speakers could fit into a teeny Mazda Miata and still leave room for a couple of mic stands and guitar cases. The sound of the MusicMix 10, however, is far from puny. The biamped Power 10 speakers deliver a balanced frequency spectrum with a nice punch, and the console EQ sounds very good.

Keep in mind that this system is not

built for abuse. During transport, I recommend protecting the console in some sort of padded tote bag or road case. In addition, you'll need to bring a signal processor to the gig, because the system does not include onboard effects. But, as these quibbles can be easily dealt with, I'd rate the EON MusicMix 10 as an excellent system for small clubs and cafes.

PEAVEY XR 600E

Like the Yamaha EMX 640 and the Yorkville MP10DS, the XR 600E's console has the "box with knobs" configuration that seems to be the popular design for semipro, "band" sound systems. The main advantages of these boxes are: they are as easy to carry as an amp head, have all cable connections and parameter controls face front and looking right at you, and they take up precious little real estate in a car trunk. The primary disadvantage of the design, however, is that you're committed to using small knobs for level and tonal adjustments.

THE WORKS

The XR 600E's control knobs are tiny, but they have a solid, tight feel. Although the knobs are color-coded for each parameter (EQ, level, etc.), their size makes it difficult to see the controls in low light. Given their lack of visibility, it's reassuring that the EQ knobs have a taut center detent. The Impulse 200 speakers are well constructed and have the largest, most comfortable handles of all the speakers tested.

TONAL CHOPS

Sonically, the XR 600E system is not as warm as the JBL MusicMix 10 when run flat. Although the sound is very full, the mids tend to be a little brittle. The XR 600E's responsive EQ is nice and aggressive. When boosted, high frequencies slice, and low frequencies roar. The midrange EQ, however, is in a strange spot for vocal work. Boosting or cutting 600 Hz really will not enhance the typical voice.

ONBOARD EFFECTS

The XR 600E offers a single effect: a reverb with a relatively long decay. The sound quality is rather "springy" and thin. I'd use the onboard reverb as a secondary ambience and employ the console's external effect send/return to enlist an outboard signal processor for your primary effects.

APPLAUSE METER

Although not as full featured as its competition, the XR 600E is no slouch on perhaps the most important feature of a sound system: audio quality. The XR 600E system delivers enough power to fill a midsized club with clean, full-bandwidth sound.

PHOTO BY MARK C. DAVIS

Yamaha EMX 640

YAMAHA EMX 640

Yamaha's EMX 640 crams a lot of firepower into a small package. The EMX 640's two dedicated power amps can be bridged together with the flip of a switch, assigning up to 400 watts to the main speaker system, or the amps can be run separately to power both house speakers *and* monitor speakers. In addition, you get separate, 7-band graphic equalizers for the master monitor and main speaker outputs. You even get a 30 dB pad on channels 1 through 4 to facilitate screaming signal levels from mic or line inputs.

THE WORKS

The EMX 640's control knobs are small, but they feel solid and smooth. There are center detents on the channel EQ knobs, and all controls are color-coded for easy visibility. The EMX 640 is also the only "box" system offering output meters for the monitor and master sections—a nice touch. The slim-line S112III speakers are very easy to carry—you get two handles, one on each side of the speaker—and are definitely tough enough for the road.

TONAL CHOPS

The EMX 640 seems tuned to cut through dense stage mixes. Even when the system is run flat, the midrange and high frequencies are sharp and present. The lows, however, are somewhat tamer than those produced by the other systems. The sound of the channel EQ is very sweet, although cranking the mids can be dangerous. The master graphic equalizers also share a certain "crankiness" in the mids, and the 7-band configuration is not as musical as the 9-band

Yorkville MP10DS

PHOTO BY MARK C. DAVIS

EQ on the Fender, Peavey, and Yorkville systems.

Onboard Effects

The three reverb offerings (small hall, large hall, and vocal) produce somewhat limited tonal shadings, as they are slanted toward long decays. The audio quality, however, is excellent: smooth and lush with just a hint of high-end sheen.

Applause Meter

On a price-to-performance ratio, the EMX 640 is clearly the value leader. At $1,387.95, it is the least expensive system, yet its feature set is only surpassed by the over-$2,000 Fender PX-2208D. It also happens to be the most powerful system of the bunch (200 watts into 4 ohms). Although the lack of pan pots is a drag and the master EQ is a tad brittle, the EMX 640 is a hot little number.

YORKVILLE MP10DS

Like the Peavey XR 600E and the Yamaha EMX 640, the MP10DS is designed to be a basic, integrated system that can get you on stage with a minimum of fuss. However, the MP10DS offers the most versatile effects section of the "box" units, and its signal processing power rivals even that of the Fender PX-2208D. The generous effects menu can be a big advantage when an act is faced with filling a problematic acoustic space.

The Works

You get those small control knobs again, but they feel smooth and tight. Sadly, there is no center detent on the EQ knobs. The rounded silhouette of the Pulse speakers offers a refined look, and they are built tough as nails.

Tonal Chops

Run flat, the MP10DS system produces a very clean, well-balanced tonal spectrum. In fact, of all the systems tested, the MP10DS sounded the best on first "power up," *sans* EQ. The mixer's channel EQ also delivered the most punch of the bunch; the aggressive high and low EQ will truly rock your world. Unfortunately, the mid EQ, with its center frequency of 500 Hz, is positioned too low to add snap to your vocals. The master graphic EQ, however, is very musical and can be used to spice up the overall mix.

Onboard Effects

The digital effects on the MP10DS are simply marvelous. You not only get a great menu of effects, but you also get a good amount of parameter control. The sounds are smooth and balanced, with no sizzle or "springy" quality. Like the Fender PX-2208D, you can find an effect for just about every application.

Applause Meter

With stunning effects, solid construction, and excellent audio quality, the MP10DS is one heck of a sound system. At $1,737, it's the most expensive of the "box" systems, but the its onboard effects are certainly worth the bucks. I only wish that the channel midrange EQ was centered at around 2.5 kHz. With the channel EQ optimized for vocals, the MP10DS would be downright *heroic*. ◆

Monstrous Specs

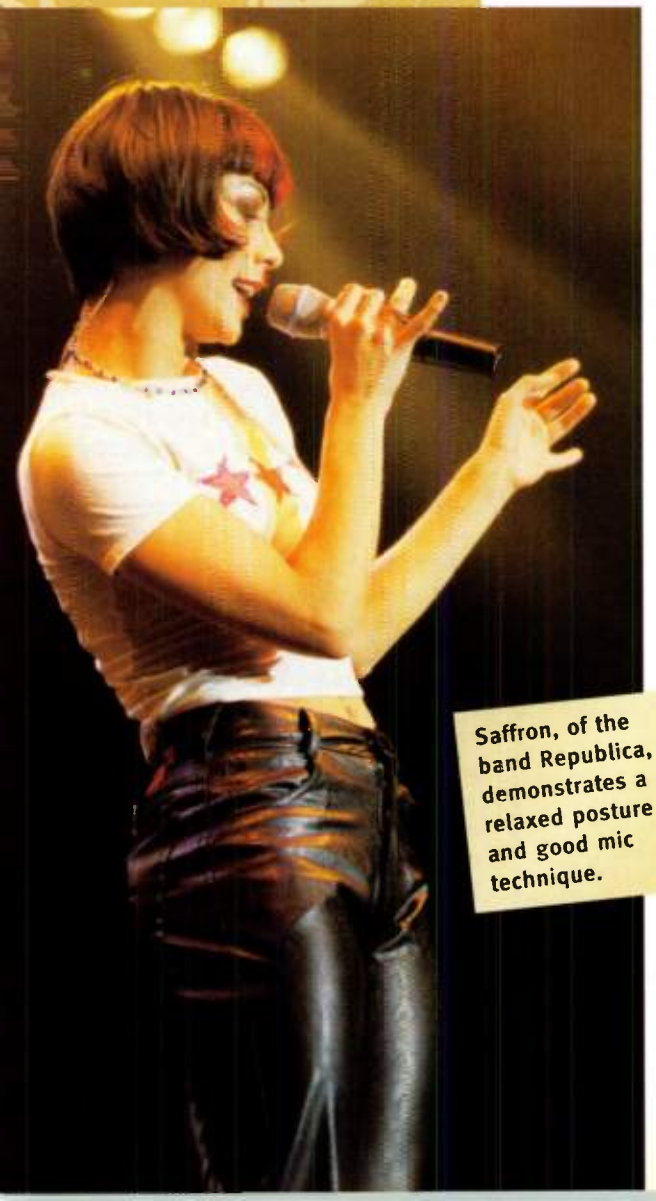
Beastie	Channel Configuration	Channel Inputs	Channel EQ	Onboard Effects	Power Output	Special Features	System Price (as tested)
Fender PX-2208D with 115-ELC speakers	8 mono	XLR (8) 1/4" (8)	3-band: 12 kHz (±15 dB), 2.5 kHz (±12 dB), 80 Hz (±15 dB)	combo effects, delay, echo, reverb (hall, gated, plate, reverse, room)	150 watts (4 ohms)	12-segment LED output meters (L/R mix); aux send/return, clip indicators; faders; headphone jack; lamp connector; pan knobs; phantom power; solo (PFL); tape in/out; road case/stand; master 9-band graphic EQ (2)	PX-2208D $1899.99 **115-ELC:** $279.99 each
JBL EON MusicMix 10 with EON Power 10 speakers	6 mono, 2 stereo	XLR (6), 1/4" (10), RCA (2 pair)	3-band: 12.5 kHz, 2.5 kHz, 63 Hz (all ±12 dB)	none	60 watts per speaker (bi-amped)	12-segment LED output meters (L/R mix); faders; headphone jack; mono/stereo button; pan knobs; phantom power, signal present, and overload indicators; tape out	**MusicMix 10:** $679 **Power 10:** $653 each
Peavey XR 600E with Impulse 200 speakers	6 mono	XLR (6), 1/4" (6)	3-band: 10 kHz (±15 dB), 600 Hz (±12 dB), 50 Hz (±15 dB)	reverb	150 watts (4 ohms)	external effect send/return; phantom power; tape in/out (with dedicated level control); master 9-band graphic EQ	**XR 600E:** $639.99 **Impulse 200:** $449.99 each
Yamaha EMX 640 with S112III speakers	6 mono and/or 4 mono 2 stereo	XLR (6) 1/4" (8)	3-band: 12 kHz 2.5 kHz, 80 Hz (all ±15 dB)	reverb (large hall, small hall, vocal)	200 watts (4 ohms)	5-segment LED output meters; -30 dB pad (channels 1-4); external effect send/return; footswitch on/off for reverb; internal limiter on main output; phantom power; selectable power amp output; tape in/out; master 7-band graphic EQ (2)	**EMX 640:** $649.95 **S112III:** $369 each
Yorkville MP10DS with Pulse speakers	6 mono, 2 stereo	XLR (6) 1/4" (10), RCA (2 pair)	3-band: 15 kHz 500 Hz, 200 Hz (all ±15 dB)	chorus, combo effects, delay, reverb (room, hall chamber, plate gated, reverse)	160 watts (8 ohms)	clip indicators; footswitch jack for effects; pan knobs; phantom power; tape in/out; master 9-band graphic EQ	**MP10DS:** $999 **Pulse:** $369 each

Vox

By Jennifer Conrad Seidel

Mastering Microphone Technique

YOU'VE COME A LONG WAY from lip synching in front of your bedroom mirror with a hairbrush microphone. But is your mic technique any better than it was during the Bedroom Tour? Are you straining for volume until the veins on your neck pop out? Do you bounce around on stage with a fat lip because you constantly bash yourself in the face with your microphone? Or do you look like a mad puppet as you push and pull the mic from your mouth? Well, just in case your mic technique hasn't matured with the rest of you, here are some tips for maximizing the benefits of your microphone.



Saffron, of the band Republica, demonstrates a relaxed posture and good mic technique.

PHOTO BY STEVE JENNINGS

Choose a reliable partner. Unfortunately, good mic technique will not compensate for a bad mic. A microphone that is a poor match for your vocal tone and singing style can make the audience wince, deep-sixing your confidence. The best bet is to buy your own mic so you can avoid the "mystery mic factor" altogether. (See "Vox: Choose the Perfect Vocal Mic" in the February 1997 **EM**.) But if you can't afford a personal microphone, you should at least acquaint yourself with a few different models and take notes on how your voice works with each one. Be sure to try Shure SM57 and SM58 mics: they are pretty much *the* standard club mics. You may also want to see how your voice reacts to a hand-held condenser mic, such as CAD's CAD 95: many clubs are gearing up with this type of "stage tough" condenser. Bringing your notes to each gig will help you assess what your voice can and can't do with the mics at hand.

Get consistent. If you can give the sound person a uniform volume level, he or she will feel safer putting the vocal right up front where it belongs. After all, few things unbalance a stage mix faster than a singer crooning one moment and screaming the next, all the while planting his or her lips right on the mic, oblivious of the dynamic shifts. (Can you say "distortion"?)

"It's critical that you keep a consistent airflow through your vocal cords," says Dave Stroud, a San Francisco Bay Area voice instructor. "The best way to learn how to do this is to hook up a mic to a mixing console or a tape deck and watch the VU meter while you sing. If the meter pegs on certain notes, you know your technique needs work. Sure, sometimes you'll want to lean into it, but the issue then is tone, not volume."

But even if you don't quite have your airflow under control, you can still save the audience (and the sound person) from obnoxious banshee wails by compensating for your volume fluctuations with mic technique. "If your vocal technique isn't very good, you'll need to learn how to move back from the mic to get consistent volume," says vocalist Sharon Pucci, who has been performing and teaching for almost 30 years. "The average singer keeps the mic two to three inches away from his or her mouth, but

people with strong or weak voices may need to adjust that distance to fit their vocal style."

The easiest way to confirm whether your mic moves are working *with* your vocal technique is to record a band rehearsal. Listen for any instances where your voice disappears into the "stage" mix or explodes into shrill bombast. Make note of problem areas for each song and strive to correct the performance by either working with your voice or moving the mic closer or farther away from your mouth.

Cheat. If you simply can't get your voice under control, consider bringing a compressor to the gig. "A sound person with a good grasp of compression techniques can set the compressor's threshold to ensure that the input level to the mixing board is relatively consistent, no matter what level he or she is getting from the vocalist," says Stroud.

However, putting a compressor on the job doesn't mean you can jettison your mic technique. For example, compression can accentuate low frequencies, so if you eat the mic, your vocal tone may turn into an incomprehensible "mud bath." On the other hand, if you move the mic too far away from your mouth (or swing it at your side when you're not singing), the compressor may boost the level of signal bleed from the stage. And cymbal splatters and shredding guitars leaking into the vocal mic are seldom fun for the audience.

To avoid such problems, practice working with a compressor in your home studio. Seek out optimum compression-ratio and threshold settings for your voice, and determine the best distances to hold the mic from your mouth when singing loud and soft passages. Ideally, the combination of mic technique and compression should "seat" your voice above the band, with minimal dynamic fluctuations, whether you bellow or croon.

Stand and deliver. Of course, not every vocalist sings with a hand-held mic. Many singers are also instrumentalists and must sing and play simultaneously. In these situations, it is imperative that a sturdy boom stand is available. Forget about straight stands. You need the clearance a boom offers so you can position the mic away from the stand. Few things are more frustrating for a guitarist than moving into the mic for an emotive, crooning vocal and having the guitar smash up against a straight mic stand. It kind of ruins the moment. (And you can bang up your hands pretty good, too!) Obviously, drummers and keyboardists require booms to get the mics up and over their gear, but even background vocalists—who are typically stuck with the straight stands no one else wants—should *strenuously* petition for boom stands. If you can't comfortably get near the mic, you can't work it.

Learn from mistakes. Pulling the mic too far from your mouth invites stage bleed, whereas putting it too close risks distortion and booming plosives. So if you completely botch a show with horrid mic technique, figure out what you did wrong and don't do it again! Taping your performances helps because you can determine—after the fact—whether your voice was too shrill, too muddy, or slaughtered with so much signal bleed that the sound person was unable to get the vocal level above the band.

Get balanced. Proper posture and position are often neglected in live performance, but centering your body can actually improve your vocal tone, which in turn can effect your mic technique. "You want your head to sit effortlessly on your spine, as though your body is hanging on a string," says Pucci, who teaches the Alexander technique. Stroud adds that when you sing, your head should be in the same position that it's in when you speak. "Don't lift it up and strain your throat," he says, "and don't point your chin down and cut off your airflow."

Don't panic. Hearing yourself on stage is essential to delivering a comfortable performance, but if your monitor mix is atrocious, don't compensate by abandoning your technical discipline. "Mic technique typically goes out the window when you can't hear yourself," says Stroud. "But what you end up doing is eating the mic to get more volume, and all this does is distort your sound."

Being proactive during the sound check can increase the chances that the gig runs smoothly. "Sing the softest and loudest parts of the set during the sound check so the sound person can determine the monitor level you need," says Pucci. "You should also encourage your band members to be sensitive to vocal dynamics. The voice is unlike any other instrument because you can't throttle it to get more level. When the vocal line gets softer, the music needs to come down in volume." ◆

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By Michael Molenda

Six Small Amps with Big Sounds

YOUR FAVORITE BAND may sell a ton of records and look as cool as cucumbers on MTV, but on the road, you can bet that—member for member—they're a bunch of sissies. After all, their gear "magically" appears on the back line, all set up and ready to go, and they don't even carry their own guitars the short distance from the dressing room to the stage. A guitar tech hands out the axes as the band awaits the opening fusillade of spotlights and the roar of an adoring crowd. Tough life, huh?

Rave on with these "jumbo shrimps" from Crate, Fender, Rocket, Roland, Tech 21, and Vox.

Meanwhile, out in the real world, working guitarists have to schlep their own amps, guitars, gig bags, and effects racks from club to club. And that stuff is heavy. My Marshall combo weighs as much as a fully loaded Federal Express van, and I've lugged that sucker up and down more flights of stairs, across more parking lots, and through more crowded clubs than I care to remember.

So a few years ago, I "downsized" to a small, lightweight amp. Now I can swing my gig bag over my shoulder, grab my amp with one hand, snatch my guitar case with the other, and happily trot on and off the stage. I can actually make a 10 P.M. gig by walking into the club at 9:30—I just set my amp on a chair, tune my guitar, wash my face, grab a cup of tea, and beat the drummer to the bandstand. When the show is over, I'm out the door within ten minutes, and I'm usually enjoying a hot bath before the headliner is offstage. Now *that's* living!

Of course, some guitarists still believe that becoming a sweat-drenched beast of burden is the price you must pay for the transcendent timbre of a monster amp. (Be advised, however, that Pete Townshend once considered the painful roar in his ears as a necessary—sometimes even blissful—component of playing rock 'n' roll, and we all know where that got him!) Well, just because an amp is small doesn't mean that it sputters out puny tones. To prove this "minor" point, I recently tested six bantam amps from Crate, Fender, Rocket, Roland, Tech 21, and Vox that can rock the house without forcing you to grit your teeth through spasms of lower back pain. Here's how each of these tiny titans roared.

CRATE GX-60D ($675)

The solid-state GX-60D incorporates a hefty menu of digital effects into a smart, black tolex package. You get two channels—overdrive and clean—that deliver 30 watts apiece through a single 10-inch Crate speaker. Cool features include a headphone jack (that disables the internal and external speakers when plugged in), footswitch jacks for optional chorus-on/off and channel-select footswitches, a stereo effects loop, a 1/4-inch insert jack, and external left/right speaker outputs.

PHOTO BY MARK C. DAVIS

Fumble factor. Ham-handed guitarists will have no fun adjusting the diminutive knobs that spread single file across the GX-60D's front panel. However, raised gray indicator lines on the black dials make it easy to see knob positions, and the controls are elegantly laid out in Channel A, Channel B, DSP, and Chorus sections. A puzzling layout compromises the DSP section: the 31 digital effects—labeled as numbers 1 through 31—are crammed onto a dial less than half an inch in diameter, making it difficult to see the effect you've chosen.

Tonal chops. Idiosyncratic is the word that best describes the sound of the GX-60D. The clean tone is pristine but lacks personality—the sound is almost identical to the timbre you get when you plug your guitar directly into a mixing console. In addition, the tone controls on the clean channel have a marked effect on the overall volume. For example, I had the level turned down low for an initial run-through, and as I cranked up the bass knob, the amp exploded with an unexpected volume increase. (Ouch!) Interestingly, the overdrive channel doesn't play this naughty little trick.

The GX-60D's squashed, solid-state overdrive sound will not seduce a purist into breaking a smile, but the GX-60D's fuzzlike funkiness is far from tragic. In fact, you can really dial in some wild sounds: quirky, jagged tones that are brilliant for slicing into techno, ambient, industrial, and progressive rock and pop tracks. I dubbed the GX-60D the "New Wave" amp because it can emulate the tweaked-out sonics of '80s bands such as A Flock of Seagulls and Missing Persons. The DSP effects (reverbs, echoes, and delays) add audible hiss and a clanging, steel-like edge to the GX-60D's tone, but you probably will not hear these artifacts over the noise of a band.

Basic bark. The GX-60D's 30-watt output is loud enough to handle most club work. However, clean tones will start to fray somewhat if the level is cranked.

Hauling limit. Crate's spec chart lists the GX-60D's weight at 55 pounds. Although the rubber handle is a bit uncomfortable, I could carry this baby across the street and up a flight of stairs before I'd need a "sit down." Beware of the front-mounted control knobs, however, as they can scratch your leg.

The bottom line. The GX-60D is not an amp for everyone, but guitarists infected with a 1980s New Wave Love Jones will absolutely adore it.

FENDER HOT ROD DELUXE ($699.99)

True to its classic heritage, the Deluxe packs 40 watts of tube power (12AX7As and 5881/6L6s) into a stark black tolex cabinet with a silver grille. You get a single 12-inch speaker, spring reverb, an effects loop, a preamp out, an external speaker output, and a 2-button footswitch for channel select and drive.

Fumble factor. I was tickled by the Deluxe's way cool black knobs set against a chrome surface—the only drag is that you can't read the white labels in low light. Viewing the top control panel from a 45-degree angle seems to offer the clearest picture. Sight lines aside, the controls are intelligently positioned, the knobs feel smooth as silk, and there is ample room between controls.

Tonal chops. Hey, it's a Fender! All the classic rock, blues, country, and R&B tones seem to be built right in. The clean sound is extremely articulate, and it resonates with the classic Fender "gronk" when you dig into your guitar strings. The snap and punch are maintained when you kick in the Drive level; overdriven timbres remain tight, even when the volume is pushed to the limit.

Basic bark. Trust me, the Deluxe is loud enough to fill any club, and I'm talking about pure, *clean* power. I cranked the volume to "12" and didn't lose even a smidgen of crystalline sparkle. Likewise, the drive channel can be completely maxed out, yet the amp's singing distortion will not turn to mush.

Hauling limit. The amp feels lighter than its 49 pounds, and the cushy, double-thick rubber handle is comfortable. I figure that I could park two blocks away from the club and tote the Deluxe without having to worry about my arm being wrenched from its socket.

The bottom line. The Deluxe is a tough, rockin' little unit that can bestow acoustic-electric guitars with pristine, shimmering tones and then turn around and energize a Strat with a brutal sting. It's a no-brainer: if you yearn for the classic American guitar sound, buy this amp.

ROCKET MODEL A10 ($449.95)

The Model A10 tube amp evokes a kooky yet classy retro look with a large George Jetson–esque logo on the front of its brown leatherette cabinet. (Our former art director, Linda Birch, thought that the logo was *ultra*cool, and she is not easily impressed.) In fact, the amp was modeled after an unidentified 1940s-era combo amp discovered at a Southern California garage sale. The Model A10 employs an EL-84 tube for its power section and a 12AX7A for the preamp stage. A 12-inch speaker completes the package.

Fumble factor. Only King Kong could bumble operating the Model A10. The control panel is simplicity itself: three knobs (volume, treble, bass), three switches (bright, gain boost, power amp thrust), an on/off switch, and a power indicator light. All parameters are clearly marked, and there is liberal space between the controls.

Tonal chops. This is one sweet amp. The tone controls are responsive and exhibit a lot of personality. At low levels, the Model A10 delivers a nice, robust twang with a hint of edge. At higher volumes, the edginess becomes more pronounced, but the amp's fundamental tone never degenerates into a wash of distortion. Flipping the mysterious Power Amp Thrust switch does not launch the amp from the stage. What seems to happen is that the midrange frequencies ring out with a sharper punch. In any case, it's a nice effect that's perfect for twangy single-note melodies.

Basic bark. Expecting the Model A10 to rock out with ten watts of power is pushing the envelope a bit. (To be fair, the amp was designed for studio applications.) I could play a small club without worrying about the A10 cutting through, but filling a midsize club would require cranking the amp to its maximum volume and activating the gain boost, which makes the tone ragged and "garagey." If your band sounds like the early Kinks, that timbre is a truly beautiful thing, but I wouldn't unleash it during a jazz set.

Hauling limit. At 38 pounds, the Model A10 is nearly weightless, and the genuine leather handle is easy on the hands. I could almost *walk* to the club from my house with this amp.

The bottom line. The Model A10 is a value-priced, fly-weight amp that delivers a vintage rumble. A class act from its construction to its tone, the A10's lack of a standby switch—a feature that's essential for coddling your tubes whether you rock onstage or in the studio—is the amp's only bummer. And although Rocket designed the A10 expressly as a "recording" amp, you will not want to confine this beauty to the studio once you audition its tonal chops. Just keep in mind that you'll need to mic the amp if you play mid- to large-size clubs.

ROLAND BC-60/310 ($779)

From a dead-on front view, the solid-state BC-60/310 "Blues Cube" sports a vintage look, with a copper grille cloth and a cream-colored chassis smartly appointed with matte-black corner guards. The top-mounted, plastic knobs pretty much ruin the vintage vibe, but this fashion faux pas will probably remain unseen from the audience's perspective. This 75-watt powerhouse includes *three* 10-inch speakers, jacks for optional reverb and channel-select footswitches, an effects loop with a wet/dry mix control and a switch for line-level effects or stomp boxes, and a spring reverb.

Fumble factor. The controls on the BC-60/310 are extremely well organized. Each channel and feature section is clearly labeled, and the gold lettering on a black surface is easy to read in low light conditions. The switches (Power, Boost, Tube/Diode, etc.) are very sturdy, but the knobs (Volume, Bass, Treble, etc.) look and feel rather cheesy. In addition, the knobs are set so close together that you can't avoid brushing neighboring controls with your thumb and forefinger.

Tonal chops. I was very impressed with the BC-60/310's normal channel. The tone is clean and punchy, and when you dig into your guitar strings, the amp responds with some sweet, soulful grit. The Rectifex tube-emulation circuit is really a kick; in Tube mode, the timbre is reminiscent of Stevie Ray Vaughn's spankin' bright rhythm tone, whereas Diode mode darkens the sound for a classic blues solo vibe. The solo channel, unfortunately, doesn't cut the mustard. The overdriven tones are uncomfortably close to the cranky, metallic midrange sounds that cause purists to view solid-state amps as abominations.

Basic bark. We're talking Doberman here—the BC-60/310 packs 75 watts and it screams. There is more than enough power to keep clean tones shimmering at high volumes. The dirty stuff? Forget about it! Dig into a crunch chord too hard and you'll shatter the Chivas Regal bottles over the bar.

Hauling limit. The BC-60/310 weighs in at almost 60 pounds, so it pays to burn a stick of incense for the parking god to ensure a spot right in front of the club. Invest in a dolly or a hand cart, and pray that you never have to drag the amp down a flight of stairs. For short distances, however, the rubber handle is easy on the hands, and the amp has no sharp edges that can cut into your fleshy

parts. And if you simply can't hang with a 60-pound box, the Blues Cube is also available with a single 12-inch speaker, which drops the amp's weight to approximately 42 pounds.

The bottom line. Viewed as a single-channel amp, the BC-60/310 is brilliant. Just stick to the clean channel and you'll be one happy guitarist because the tone is worthy of a serious blues raver.

TECH 21 TRADEMARK 60 ($695)

A simple and elegant package in black tolex with a gold grille, the Trademark 60 pumps (surprise!) 60 watts of solid-state power through a single 12-inch speaker. The generous feature set includes a 3-button footswitch for channel select, boost/reverb, and effect-loop on/off; an XLR direct out with ground-lift switch; an effects loop; a headphone jack (that deactivates the internal speaker); and spring reverb.

Fumble factor. You'd have to be a mutant to botch the operation of the Trademark 60. The Channel 1, Channel 2, and Master sections are clearly "roped off" by black boxes, and the bold black lettering on the chrome top panel is extremely visible in all lighting conditions. To the eye, the black knobs seem a little small and cramped, but when I actually started tweaking sounds, I never bumped into a neighboring control by accident.

Tonal chops. The Trademark 60 is a sonic *arsenal*. The amp's tonal control is simply awesome, and I could dial in just about any sound I wanted. For example, if I ever got to a place where the tone was icky, a twist of the, say, Growl or Punch knob would transform the sound into something wonderful. Overall, the Trademark 60 delivers a magnificent roar, although a slight screechy quality mars some of the more aggressive overdrive timbres.

Basic bark. With 60 watts at your back, you will not have any problems cutting through the stage mix. But if you *do* need a little more oomph in the house, the amp's XLR direct out lets you plug right into the mixing console without having to snatch an "extra" mic or direct box.

Hauling limit. The Trademark 60 weighs a deliciously light 36 pounds. Given the cozy leather handle and smooth cabinet surfaces (that will not chafe against legs), I could carry the Trademark 60 on the bus, walk ten blocks from the bus stop to the club—stopping at a corner store to pick up some crackers—and then lug the amp up three flights of stairs. I might even break a sweat.

The bottom line. This is perhaps *the* perfect club amp. It's a marvel of function and versatility. You can carry the Trademark 60 for days without experiencing fatigue, and the tonal palette this beauty drops into your hands is staggering. Some of the sounds produce a little more audible hiss and sizzle than I'd like, but for all intents and purposes, these sonic blemishes will disappear the instant the entire band kicks in.

VOX AC15 ($999)

The reissued and revamped AC15 1 x 12 combo—its classic look brings back childhood memories of The Beatles on the Ed Sullivan Show—offers fifteen watts of Class A tube power via two EL84s and a 5Y3 rectifier tube. A no-nonsense tone machine, the AC15 includes tremolo, spring reverb, a 2-button footswitch for tremolo and reverb, and a line out.

Fumble factor. As you might guess, the AC15 is an exquisitely simple amp. The handsome black knobs are spaced miles apart, and the volume, tone, reverb, and tremolo controls are separated by clearly labeled sections. In addition, the thick, gold lettering on the AC15's black top panel ensures adequate visibility in low stage lighting.

Tonal chops. The AC15 produces a tone to die for: it's simultaneously sweet, aggressive, harmonically rich, and articulate. Clean tones are crystalline and almost chime-like, and distorted tones stab and dance with impunity. Every time I plug into the AC15, I fall into a state of bliss. If it was legal, I'd marry this amp.

Basic bark. Yipes, this sucker screams! Don't be fooled by the 15-watt output: the AC15 can knock balcony dwellers out of their seats. And although the clean tone can effectively ring through a small club, tonal clarity is not compromised when running the amp full out. The AC15 maintains its aggressive shimmer without collapsing into sonic oatmeal.

Hauling limit. The AC15 weighs around 40 pounds. Its thick, rubber handle is comfortable, and the amp surfaces have no flesh-threatening protrusions, but I'd still limit my "pack mule" excursions to a couple of blocks.

The bottom line. If the classic Vox tone was good enough for The Beatles and Brian May, it's good enough for me. 'Nuff said!

Keys

By Sam Molineaux

Grand Sounds from Piano Samples

MOST KEYBOARD PLAYERS WILL attest that one good-quality, sample-based synth can cover just about all the bases for live performance work. Unfortunately, the one sound that often eludes sonic perfection is the grandest sound of them all: the acoustic piano. But, however nice it would be, it's too impractical for the average club band to cart a 9-foot Bösendorfer from gig to gig. Most keyboardists, therefore, have no choice but to rely on samples for their piano sounds—which is often far from a grand situation.

Susie Davis (shown in major makeup from her Billy Idol days) still pounds the sampled ivories on an old Korg SG-1D.

PHOTO BY STEVE JENNINGS

"I almost always feel compromised when performing a so-called 'acoustic piano' part with a sampled grand piano sound," says keyboardist Brad Cole, currently on tour with Phil Collins. "The grand piano sound and the feel of the electronic keyboard do not match up. There's a vastly limited dynamic range, and it's difficult to shade notes dynamically even within a chord. In order to make the sound work, I have to think 'electric piano' and play accordingly."

In many cases, the sound of the sample itself can be disappointing because the grand piano is one of the most difficult instruments to sample well. The piano has the broadest frequency range of any acoustic instrument, and each sampled note should include a long decay to accurately reproduce the harmonic resonance of the piano strings. This leads to another problem: a good piano sample swallows up a ton of memory—often as much as 10 MB.

"Usually the samples you get are of a mezzoforte (*mf*) or fortissimo (*ff*) strike, and then filters are used to simulate quieter dynamic levels," explains Scott Plunkett, who plays a Yamaha P300 and a Kurzweil K2500X with Don Henley and Boz Scaggs. "Generally, this sampling method is how you get the brightest, biggest sound out of a piano. And for most situations, this type of sound is exactly what you need to compete with the rest of the band on stage. However, a natural piano envelope is completely different, depending on the Velocity of the strike. When you play a fine piano quietly, the volume decays very evenly. In other words, you can make a melody flow smoothly from note to note without a lot of

attack. On the other hand, when you play hard on a piano, there is a much bigger percussive burst at the onset of the note, followed by a big drop in volume as the string decays. So when you try to play a ballad with a sample that has the *ff* envelope, you get the effect you'd expect: most of the playing sensitivity is gone because there is a noticeable clunk at the beginning of each note, and then the volume drops off, making all of the notes sound completely detached."

Given the inherent limitations of piano samples, however, keyboardists *can* make stylistic and technical adjustments that will produce a compelling piano sound when playing live.

Dump the frills. If you're sharing the stage with massive amplification, don't even try to play as light as a feather—the soft passages simply will not translate. "Stage performance is all about compromise," professes the legendary Rick Wakeman, who uses a Korg X5DR, a Korg O1/W Pro X, and a Kurzweil K2500 in concert. "Delicacies really have to go out of the window, as they just get lost when you have to compete with powerful amplification."

Tailor your tonality. Few samples or patches are all things to all songs. Try to customize your sounds to the tonal requirements of the music you're playing—even adjusting certain parameters to enhance individual pieces.

"One of the inherent weaknesses of electronic pianos is that you only have one sound," says Tollak Ollestad (currently switching between tours with Michael McDonald, Kenny Loggins, and the re-formed Ambrosia). "So I solve that problem by using two different piano sounds on stage: a rock sound and a ballad sound. I use the Roland JV-1000's 'Nice Piano' patch a lot, and I've also got the piano expansion card. In addition, I custom made another patch by adjusting some of the attack and decay on the 'Nice Piano' patch for more of a heavier R&B sound."

Julie Homi, a pianist first and foremost, who "earns a living playing synths" with artists such as Peter Cetera, Martin Page, Tracy Chapman, and Yanni, also likes to experiment with different piano sounds.

"Generally for ballads—as well as pieces where the piano is exposed—I go for a fat, warm sound," she explains. "For rock piano solos where the band is going full tilt, I go for loud and bright, and I make sure I stay above middle C so I can cut through the band. However, a bright sample can sound thin in the bass register, so I might add a second, fatter sound in the first two octaves. Especially when playing single-note lines, it helps to add another piano sound an octave lower for emphasis."

Homi's "sound system" for her Cetera gig includes a Kurzweil MicroPiano layered with a Roland JV-1080 expander and a Roland JD-800. When performing with Martin Page she adds a Roland MKS-20, and for Yanni she uses a Korg SG-1D layered with an E-mu EIII (loaded with the EIII's Bösendorfer sample).

For Brad Cole, the band going "full tilt" is something he must deal with night after night, as Phil Collins' show is often rather bombastic. Obviously, the piano can easily get lost amongst the drums and percussion.

"Most of the time, the piano is a rhythm instrument in Phil's band, so I have to use bright sounds with a lot of attack to ensure the piano will cut through the mix," he explains. "Even for ballads such as 'Against All Odds,' the piano has to have an edgy sound to be audible over the drums. I'll do anything to give the piano the necessary tough, sharp edge: brighten the tone with EQ, compress the signal, and maybe even add a little 'CP70 Electric Grand' from the Roland P-55 module. Obviously, this approach means that I lose some warmth and richness, but what I gain is more rhythmic vitality and presence."

Although the approach eats up a lot of memory, Plunkett deals with the sound-tailoring dilemma by using Velocity to trigger two or more versions of a single sample, each with an envelope designed to produce a specific performance dynamic.

"Another option is to program a more responsive sound for softer passages," he says. "First, I'll mute the attack of the hard strike at the beginning of a sample using filters. Then, I'll control the decay time with Velocity so that lower Velocities produce longer decays. The resulting sound delivers a smooth transition from note to note, which is particularly useful for ballads."

Add some rumble. Plunkett, something of a perfectionist when it comes to achieving realistic piano sounds, also believes that it helps to emulate the *tactile* experience of playing the piano.

"My Yamaha P300 has internal speakers, so it vibrates whenever you play," he says. "I always leave the speakers on when I play live because, even though I can't hear them, I can *feel* the vibrations. This kind of feedback is what I'm used to when I play an acoustic piano. Also, the Kurzweil K2500 I play has a keyboard that actually activates a weighted 'hammer,' producing the kind of movement under my hands that approximates what I feel when I play a real piano. These are all things you can certainly live without, but they can increase your comfort level when performing."

Be yourself. Although it makes good sense to tailor your piano sound to the music—and the type of band you're gigging with—it's also important to choose a piano sample that matches your own individual playing style.

"It's vital that the piano sound is compatible with you as a player rather than something that only works within the confines of your current band situation," asserts Ollestad. "The sound ultimately should be an extension of your own musicality, your own touch, and the way you play. For example, I like to play with a lot of nuance, so I use a sample that responds to my touch very dynamically. When I play lightly, the resulting sound is very light, and so on. The bottom line, however, is the quality of the original sample. No amount of processing or editing is going to change the fundamental sound of the sample very much."

"The trick to producing an authentic piano sound is not going beyond what the sample can realistically give you," adds Cole, who typically plays an E-mu Proformance and a Roland JV-1080 (with piano expansion card). "This means you must be aware of your playing style and how it relates to a specific sample. Reverb and EQ can help a sound by adding warmth and the illusion of a concert hall, but ultimately the key to an evocative piano sound is the performance."

Of course, sometimes—if you are lucky—a sound works perfectly *as is.*

"Since 1987, I have been playing the same Korg SG-1—which was updated to an SG-1D in '89—and I have never needed to make its piano sound more authentic," says Susie Davis, who has toured with scores of artists, including Pat Benatar, Melissa Etheridge, Daryl Hall, Mick Jagger, and Sheila E. "The sound always works within the context of the band's sound, and I never adjust it. The SG-1D is truly excellent for any live situation, and it lets me forget about everything and just play!" ◆

bottom

By Glenn Letsch

Taming the Five-String Bass

ARE YOU THINKING OF RETIRING your trusty 4-string bass to the closet and moving up to the mighty 5 with the big bad B? Are you already playing a 5-string bass but are beginning to wonder if the 5-stringer is right for you? Are the members of your band pressuring you to join the Club of Five? If you're pondering these questions, you're not alone. Welcome to the wonderful world of bass-player angst.

Bassist extraordinaire Glenn Letsch "going for 5" at Pajama Studios in Oakland, California.

Deciding whether to move up to five strings can be a frustrating process. Your choice will ultimately make you adjust your performance techniques and perhaps even change the way you write your bass parts. However, the dilemma does not have to induce ulcers. Making music is an intimate process where you must feel free to flow and hit the "zone." So, if you are not 100 percent satisfied with the places a 4-string bass takes you creatively, it's time to explore some other options.

The 5-string bass is not a monster, but it may take a little work before you're comfortable playing it. Let's identify some of the characteristics of the 5-string bass, talk about optimum performance techniques, and (hopefully) lead you toward a rational decision. In the end, just make sure that your choice of bass enhances your ability to be soulful, creative, and spontaneous.

Flabby B Syndrome. The traditional 4-string bass has a 34-inch neck, measured from the nut to the bridge. When the strings are tuned to concert pitch, the 34-inch neck maintains ideal string tension and maximizes the fundamental frequency of each string. This is why, for example, the low E string sounds wonderful, punchy, and tight.

However, when you string a low B on a 34-inch neck, the sound is often muddy and "loose" because the fundamental frequency needs more string tension to clearly define itself. This is a classic case of "flabby B syndrome." Only a bass with a 35-inch neck provides the tension the B string requires to ensure a tight and muscular-sounding low B. Some manufacturers build 34-inch scale basses with harder neck and body woods and more metal mass to enhance the instrument's resonant frequency. This method can help diminish the flabby B, but it will never solve the problem entirely. The laws of physics simply favor the 35-inch neck. So, if a tight-sounding B string is an absolute necessity, you must play a 35-inch scale bass.

Lighten up. Sometimes the laws of physics can work against you. In the case of the 35-inch scale, 5-string bass, the increased string tension that makes the B string happy can cause the other four strings to feel too tight. And, if the E, A, D, and G strings are too stiff, they probably will not respond easily to slapping and other performance nuances. If the tension is messing with your playing style, try using lighter-gauge strings. If you've changed gauges and the feel is still unacceptable, the 35-inch bass may not be for you.

PHOTO BY JOHN GRIVAS

Watch your grip. Some 35-inch scale players have reported cases of carpal tunnel syndrome, tendonitis, and bone spurs. Unfortunately, this is because the larger neck requires more hand and wrist movement. If playing the larger scale neck is uncomfortable, get the neck shaved or design a thinner, narrower neck. (Some manufacturers offer choices of necks or have custom shops that can tailor an instrument to your needs.) If this solves your problem, great. If not, don't play a 35-inch scale bass.

Slap happy. All fingers are not created equal in size and thickness, but most basses are made as if they are. This can be a problem if slapping is a major part of your playing style and the strings on your 5-string are too close together. Fortunately, you don't have to change your style, you just have to adjust the string spacing on your bridge. Most instrument repair shops will do this for you (for a fee), or you can seek the assistance of a bassist who has gone the DIY route.

If, for some reason, the bridge can't be adjusted, replace it with a model that offers lateral adjustment. Before you buy a new bridge, however, determine whether the neck is wide enough to accommodate your desired string width. If the neck is too narrow, you'll need a new neck or a new bass.

Although customizing a bass can be costly, it is exactly what the pros do to ensure that their instruments conform to their playing styles. Manufacturers design basses for the largest demographic, so it's a given that most beginners are forced to adjust to the bass. Advanced players, however, adjust basses to *their* needs. If your 5-string bass is forcing you to make stylistic compromises, you may want to individualize your instrument.

If 4 were 5. If you dislike playing a 5-string bass but find it necessary to hit the low notes the added B-string offers, there are some tricks a 4-stringer can do to emulate that rock-bottom sound. For example, you can try tuning your bass down to D, G, C, and F. This is actually a great technique. When I joined Robin Trower's band, the previous bassist said I was going to have a tough time playing the songs if I didn't have a 5-string bass. Trower tunes down a whole step because he uses heavy-gauge strings that sound very dense but are tough to bend unless the string tension is reduced. I simply tuned down so that Robin and I were on the same page. A small truss-rod adjustment was all that was needed, and the "detuning" worked like a champ. If you plan to try this method, I'd also recommend having another bass available that's tuned to concert pitch. That way, you'll get the best of both worlds.

If you're really bold, you can tune down to C#, F#, B, and E when you need to go deep. This tuning drops your bass down 1½ steps, and that's about the limit. I know some great studio cats who do this on a regular basis. (I've done it myself!) They *never* play 5-string bass. Admittedly, this tuning might get a little touchy on stage because the strings are so loose. Going a whole night with this tuning could get a little sloppy. Typically, this technique works better in the studio where you're doing one song at a time and it's easier to control your performance technique. A word of advice: Don't hit the strings too hard!

You can also restring your 4-string to B, E, A, and D. Obviously, this tuning works best on a 35-inch neck because of the string tension problem we discussed earlier. If you use this tuning, you *will* miss having the G string and you'll probably find yourself jumping up the neck to hit the notes you usually play. In addition, you will not be able to hang out on the B string as much as you would if the string were tuned to E. The main problem is that the low B can sound so low that constant riffing on that string will turn your tone to mud. Annoyances such as that aside, this tuning will work, but I'd recommend having another bass on the gig that's in standard tuning.

A *mechanical* way to drop down to the low lows is to install a Hipshot Bass Extender on your axe. Attach this detuning device to your E string and it will lower the pitch up to 1½ steps at the flick of a lever. Hit the switch again and the tuning returns to E. Of course, when you detune your E string, you'll have to do some fast transposing to make your parts work. But overall, the Bass Extender is a convenient way to change tunings.

B kind. You can always tell a new 5-string owner because he or she is playing way too much on the B. Be aware that constantly riffing on the B string can become oppressive to listeners. The notes are so low that they can sound murky and sonically distant. I recommend playing in the traditional realm of a 4-string bass because that sonic territory usually meshes best with the rest of the band and the music. Then, when you *do* go to the low B, it will be a special, unexpected, and exhilarating moment. ◆

bang

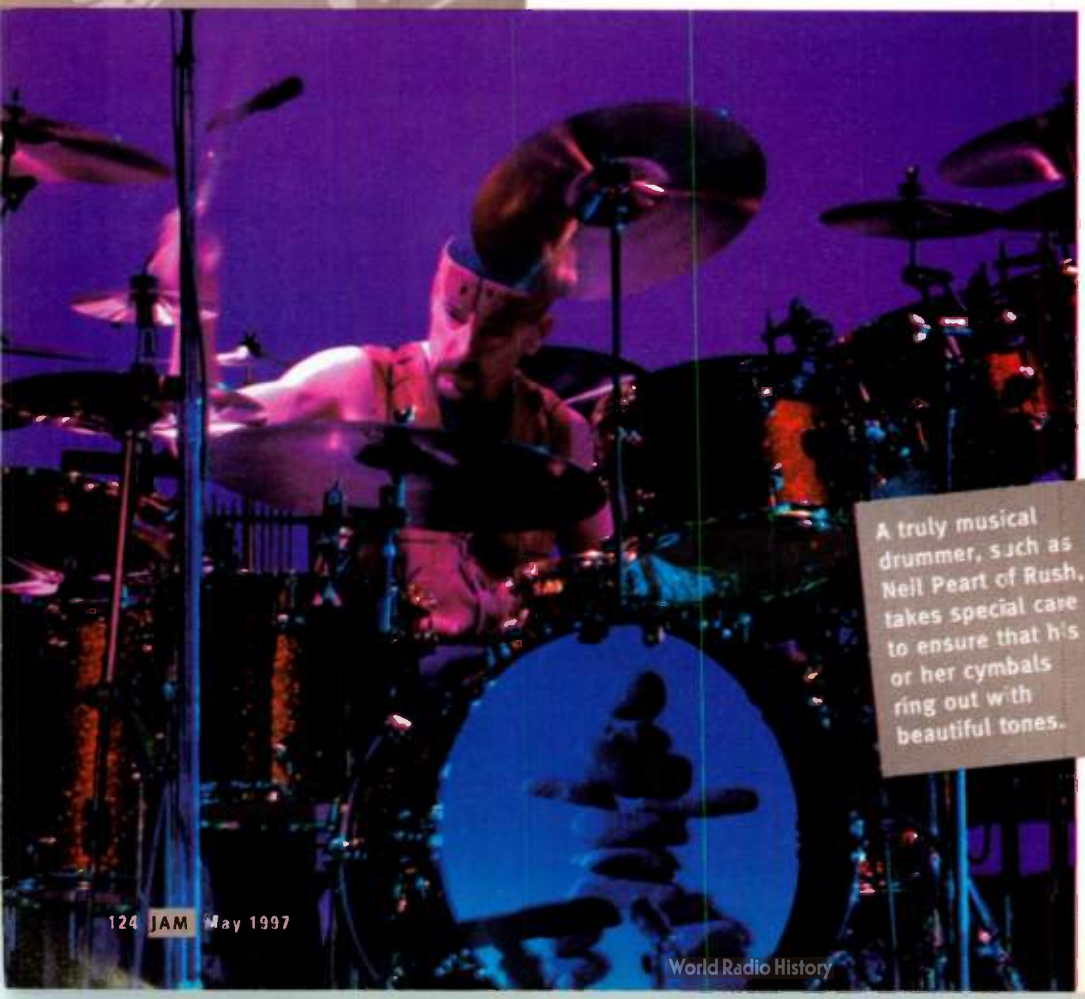
By Brian Knave

The Quest for Musical Cymbals

A LAME SET OF CYMBALS can taint the sound of a band almost as much as an out-of-tune guitar. So why do drummers spend endless hours—not to mention small fortunes—obsessing over drums, rims, and heads for the laudable goal of attaining the ultimate drum sound and then turn around and outfit their prize kits with baneful bronze? It's like wearing Kmart shoes with an Armani suit.

Make no mistake: musical-sounding cymbals are the crowning jewel of a drum kit. In fact, when it comes to distinguishing artist from novice, I listen to the sound and blend of the cymbals every bit as much as I listen to the drummer's musicality, technique, and tuning. The ability to choose cymbals well is one of the finer points of drumming.

Of course, choosing cymbals is not as simple a process as choosing a soft drink. Not only are there countless types, makes, shapes, and sizes of cymbals to choose from, there's also the fact that cymbals well suited to one musical style (or performance environment) may not work as well in another. However, you can make intelligent, musical choices by keeping the following considerations in mind.



A truly musical drummer, such as Neil Peart of Rush, takes special care to ensure that his or her cymbals ring out with beautiful tones.

PHOTO BY STEVE JENNINGS

Cymbal Anatomy. Before we go shopping, let's take a quick cymbal class. Every cymbal has a unique anatomy that determines its sound. Knowing how size, weight, thickness, and shape interact to affect tone can help when it comes to selecting the best cymbals for your kit. For example, a cymbal's bell size affects overtones and sustain. Generally, the larger the bell, the more overtones. That's why flat-ride cymbals (those without a bell) produce a very controlled "ping" sound whereas crash cymbals tend to have large bells (relative to the size of the cymbal).

Overall size determines volume: the bigger the cymbal, the louder it is. Also, larger cymbals react slower, have more sustain, and tend to be lower in pitch whereas smaller cymbals (such as splash

cymbals) typically respond and decay quicker and produce a higher pitch.

The weight of a cymbal affects both its pitch and response. Heavier cymbals are usually higher pitched and produce more stick definition with few overtones. Conversely, light- and medium-weight cymbals tend to respond faster and produce a lower pitch with more overtones and "shimmer."

Another factor that determines a cymbal's sound is its bow, or the amount of curvature from the bell to the edge of the cymbal. As the bow increases, the cymbal's pitch goes up and the amount of overtones decreases. A very flat cymbal, on the other hand, will be lower in pitch and have more overtones.

Shopping Strategy. Before waltzing into the drum shop, you should have an idea of what you're after. Do you need a ping ride? A splash? A china? A well-stocked store may have thousands of cymbals to choose from. Knowing that you need, for example, a 16-inch, dark-sounding crash will help you narrow the field and save time.

Because retailers won't let you return a used cymbal, in-store testing is a must. Locate a sympathetic retailer, preferably one that offers a cymbal-testing room. It's essential that you be able to play the cymbals loudly and for as long as it takes to find the gem you're looking for. If someone at the store gives you flak, go elsewhere.

Seek Harmony. Take along your current set of cymbals to ensure the new cymbal blends well with the old (assuming, that is, that the others already sound good together). Bring your own sticks, too, because different weights and bead types can produce markedly different cymbal sounds. It's also smart to bring mallets, brushes, and whatever else you use to strike cymbals.

Now, gather all of the cymbals of the type and size you want to buy. Then set up your old cymbals along with a couple of extra stands for testing the new ones. Listen to each cymbal individually at first, just to weed out the dogs. Sometimes a cymbal's harmonic overtones will clash with its fundamental tone, creating an unpleasant sound. In my experience, the most musically useful cymbals produce a clear primary tone with even, complementary harmonics, yet they somehow blend with every note, chord, and instrument. Simply put, they sound beautiful with or without music.

After narrowing the selection, play each contender simultaneously with each other cymbal in the set to hear the blend. How do you determine a good blend? First, make sure the new cymbal doesn't audibly *clash* with the others. Are the sounds complementary rather than dissonant? Are the "intervals" between the cymbals clear and distinct? A nicely blended cymbal set may not suggest a chord (although it might), but it *will* sound "melodic" when the cymbals are played in succession as well as "harmonious" when they are struck together.

As you narrow the selection further, test the remaining cymbals for versatility, playability, and range. Play them loudly, softly, and at every point from center hole to edge. Also audition brush beats, mallet swells, and other techniques you might use on the gig.

Also, don't forget that cymbals sound different from the audience's perspective than they do from the drummer's up-close-and-personal view. It's wise, therefore, to bring a friend who can strike the cymbals while you stand across the room and listen. If no one is available to come with you, ask for help from store clerks or customers. In addition, your ears can get fatigued after an hour or two of listening, so second opinions are often invaluable.

Variety is Spice. Go for tonal variety. Don't choose a cymbal that sounds almost identical to one you already own. If you have one large crash and are looking to add another, pick one that covers a different frequency range. For example, my second crash is a full fifth away from the fundamental tone of my primary crash.

The more cymbals you add to your rig, the wider you need to make the tonal spectrum. Otherwise, why have so many voices? Furthermore, most listeners will not be able to hear the difference between, say, five 18-inch, heavy-crash cymbals. So, after acquiring the basics—hi-hats, ride, and one or two crashes—seek to broaden your palette of colors with specialty cymbals such as chinas, splashes, unlathed models, and so on. Redundancy is pointless.

Brand, Shmand. All the major companies make great-sounding cymbals these days, so unless you're a stickler for uniformity, ignore brand names and just listen for cymbals that sound wonderful. My current set includes a cymbal from each leading brand—and only a bountiful endorsement deal will make me give up all those gorgeous, hard-won sounds!

Menu and Venue. Most importantly, choose cymbals that are appropriate to the gig. Those dry, dark, hand-hammered jewels may be choice for a jazz trio tucked in the corner of a cafe, but they'll have a hard time cutting through the roar of a Marshall stack. Unless your kit is being miked with overheads and amplified through a PA system, you'll need loud cymbals for loud gigs.

Response and decay times are other factors that can determine a cymbal's appropriateness for a particular style of music. For example, a thin, quick-decaying crash cymbal that works beautifully on a snappy pop or funk tune may not have sufficient sustain to energize a raucous blues ballad. Conversely, a thick, 18-inch crash with a gong-like decay will likely prove all but useless in a low-volume, "unplugged" setting.

Of course, that's one advantage of a large cymbal set: you're more likely to always have what you need. But remember that some of the world's greatest drummers forged brilliant careers using only two cymbals. Ultimately, it's not how many cymbals you have, but how much music you get out of each one. ◆

tech

By Bean

Jamming on an Interactive Stage

BEING ON THE CUTTING EDGE of technology doesn't have to mean joining the revolutionary insanity of the techno-elite. It does, however, require a sense of commitment to push yourself, your gear, and your crew beyond creative and technical conventions. Of course, you're reading **EM**, so you've already made the leap into the great beyond and are embracing the electronic frontier. But by pushing the envelope a bit further, you can add a whole new dimension to your music by infusing your stage act with other media. Whatever form it takes—multilayered slides *à la* Laurie Anderson, processed video, television walls, real-time computer graphics, or computer-generated puppet characters—multimedia elements can enhance your music with new depth and meaning. In addition, jamming in the inspirational space that is created by combining the audio and visual realms can energize your performance chops.

The enraptured throng at the 1994 Gavin Convention in San Francisco "jam" with D'CüCKOO's marvelous MIDIBall.

PHOTO BY STEPHEN HILL

Real-time interactive dementia. In my band, the cyber-tribal world funk ensemble known as D'CüCKOO, the impetus behind integrating participatory forms of technology in performance is the search for new ways to bring people together.

One of our initial endeavors was the interactive show toy, the D'CüCKOO MIDIBall. The wireless, 5-foot sphere—which was designed by D'CüCKOO's co-founder, Candice Pacheco—uses radio signals to trigger audio samples and real-time, 3-D computer graphics each time it is hit by the audience. The MIDIBall actually debuted at the Grateful Dead's Mardi Gras show at the Oakland Coliseum in February 1992. Customized samples for that show included brief sound bites of Jerry Garcia singing "Come Hear Uncle John's Band" and James Brown howling "Hit me." Eventually, the audience caught on that they were jamming visually and sonically with the band onstage via the MIDIBall. It wasn't long before the crowd was cheering and enthusiastically trying to dismantle the MIDIBall in search of Jerry G.

We also involve ourselves in the multimedia act by routing a MIDI signal from our custom-built electronic marimbas and drum triggers to a Silicon Graphics workstation via a Digital Music Corp. MX-8 MIDI Patchbay. With this setup, the band is able to choose which instruments affect the visual environment from song to song. One of the most obvious implementations of this idea was put into action by Silicon Studio's Ron Fischer with a multicolored, 3-dimensional grid that pulsates in direct correspondence to low- or high-pitched samples triggered by the MIDI controllers. D'CüCKOO's other musical "mind meld" experiments have included audience trigger pads, fractal designs, New Tek Video Toasters, and a Biomuse Controller that serves to interface human electrical signals (EEG and EMG) with MIDI.

Don't look behind that curtain. D'CüCKOO is always looking for challenging new projects, and one of our latest is a computer-generated interactive puppet named RiGBy. If you have attended a computer-graphics or entertainment-industry trade show in the last few years, you may have already "interacted" with Super Mario, an animated digital puppet designed by SimGraphics. Behind the scenes is a VActor (virtual actor) sporting a facial armature that positions sensors on the VActor's forehead, chin, lips, and jaw to detect muscle movements. The VActor's facial movements are mapped onto the screen character and coordinated with a 3-D mouse that controls the movement of the digital puppet's head.

For our own low-tech version of real-time character animation, Fischer developed a software program that allows a virtual puppet named RiGBy (designed by Maggie Hoppe), to interact with D'CüCKOO onstage. A peek behind the curtain reveals Linda Jacobson as RiGBy's alter ego, using a microphone as an audio input which effects the movement of the virtual puppet's mouth and lips. Fischer, as the virtual puppeteer, uses a Silicon Graphics workstation with a mouse and 3-D spaceball to maneuver RiGBy's head in response to spontaneous conversations held in real time with band members and the audience. RiGBy's greatest challenge to date has been interacting from a floating stage with 500,000 people celebrating the city of Cleveland's Bicentennial Celebration. Someday, we hope to endow RiGBy with all the joys of body language by attaching motion-capture sensors to Jacobson's limbs.

Multidimensional paganism. Another D'CüCKOO collaboration involved Imaja interactive magician Greg Jalbert, the developer of the intuitive software program *Bliss Paint*. As the name implies, *Bliss Paint* is a psychedelic real-time animation tool. Jalbert employs a Power Mac 8100 AV along with assorted MIDI keyboards, a MIDI interface, and color monitors to generate textures and background images. As a band performs, the audience is invited to interact with the music by playing the keyboards to control color synthesis algorithms that orchestrate a "synaesthetic" collage. Projecting *Bliss Paint*'s imagery is relatively easy with an NTSC or RGB video projector, a video switcher, a time-base corrector, and a VCR (if you want to mix video footage with the graphics). Projection surfaces are only limited by the imagination. For example, if a band can't afford to rent large video screens or monitors, large white balloons or white fabric stretched over a Hula-Hoop frame can work wonders.

Embracing the now. Any band or artist can start planning an interactive performance. You don't need to wait for huge arts grants, wealthy "angels," or funding from a major record label. First, try to connect with multimedia artists at your gigs, and put the word out to your friends and fan base that you're looking for people interested in enhancing your act with new media. Be sure to spread the word on the Web, as well, because many techno-pioneers are seeking artists, musicians, graphic designers, and programmers to exchange ideas and beta test software.

You should also check out the multimedia departments at local universities. With a little luck, you may be able to get students to donate their time, equipment, and resources because they like your music and want to support your project. Your project may even excite your friends enough that they'll donate their time and energy to help you experiment and work out bugs. And don't let equipment needs slow you down: plan your show so that it can be produced with whatever tools you can beg, borrow, or (affordably) rent.

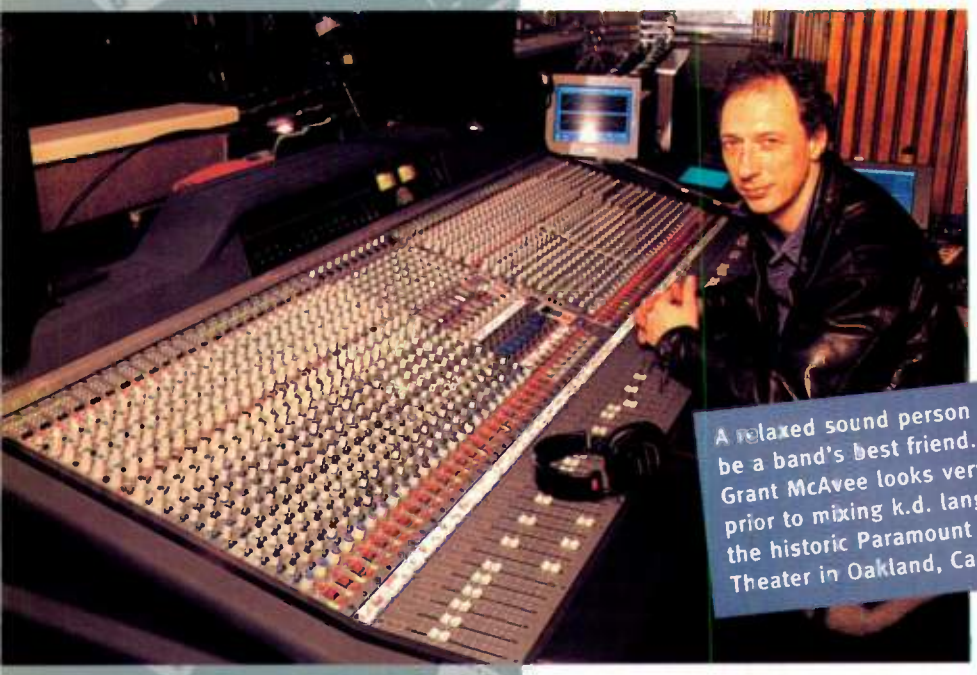
If you've got the ideas, the juju, and the dedication, nothing should stop your multimedia production from reaching the stage. You could be up and running with new groove food in no time! ◆

house

By Brett Ratner

Help the Sound Person Help You

YOU JUST PULLED OFF a flawless performance. All your licks were clean, and you nailed the backup vocals. In short, you rocked. So, you step off stage, wipe the sweat from your brow, and head to the bar for some refreshment. Your buddy is there waiting to congratulate you on a great show. Or so you think. Instead, he's the bearer of bad news. "I could barely hear you," he says. "None of your solos were cutting through." Instantly, your performance glow dissipates: you have been victimized by a bad house mix.



A relaxed sound person can be a band's best friend. Here, Grant McAvee looks very calm prior to mixing k.d. lang at the historic Paramount Theater in Oakland, California.

PHOTO BY STEVE JENNINGS

But before you instinctively head to the sound booth to raise some hell, remember that even the best engineers can only do so much when the band doesn't give them something to work with. In other words, a great mix starts on the stage.

Let's face it: in most club situations, a thorough sound check is a luxury. And you can hardly expect a house sound person to react to every nuance of your music after a half hour of "set up and play." Until you're able to hire your own sound crew, you must accept a good measure of responsibility for your live sound. And the key to a good mix lies in making the house sound person's job as easy as possible.

Here are some ways you can help the sound person get some great tones happening quickly and easily. In a best-case scenario, your thoughtfulness and attention to detail may even inspire the sound person to do a brilliant mix.

Plot the stage. Providing the sound person with a diagram of the band members and their stage positions is a no-brainer that few club bands seem to figure out. You should also chart the position and types of amps and instruments and whether certain members require microphone stands with booms.

Armed with this simple sheet of paper, the sound crew can immediately set up instrument and vocal mics in the right positions. Then, when the band is on stage during the sound check, all the mixer has to do is look at the sheet to see that "Jane Doe," the rhythm guitarist, is on stage left and playing through a Vox AC30. No more having to yell across the club: "Hey, guitar player! Which amp is yours? Do you need a vocal mic?" Everything the sound person needs to know is documented on the stage plot.

Vocal harmony. Singers should know how to control their dynamics with good microphone technique (see "VOX: Mastering Microphone Technique" on p.113)

so the sound person doesn't have to constantly adjust levels to keep the vocals up front in the mix. It also helps if the vocalist is aware of feedback "trouble spots" on stage.

"Professional singers know not to drop the microphone to their side where it might be too close to the monitors," says Jack Irwin, house engineer at Nashville's 12th & Porter. "And they are always mindful of moving out in front of the house speakers, too."

Level-headed keys. Keyboardists can save the sound person from dealing with swift and deadly changes in volume by programming consistent gain levels for each and every patch used during the performance.

"There's nothing worse than when a keyboardist changes sounds and you get a huge jump or drop in signal," says Jonathan Laster of the Tennessee Performing Arts Center. "I try to get direct outs from the keyboards whenever possible, and then I ask the player to leave the volume controls alone and keep their patches even."

To accommodate direct feeds from your keyboards, it pays to invest in your own direct boxes—one for each sound module you cart on stage. You can still use a keyboard amp for personal monitoring, but direct lines provide the sound person with a clean, consistent signal.

Nonaggression pacts. If there's any instrument that's notorious for clashing with the sound person, it's the electric guitar. To avoid a battle that no one usually wins—especially the audience—noted Nashville session guitarist–producer Kenny Greenburg suggests keeping your rockin' roar *out* of the sound person's face.

"Don't point your amp right at the mixing console," he says. "If the guitar is blasting at the sound person, he or she will avoid putting the guitar in the house mix. You should also try to find a compromise level between playing loud enough to get your sound and overpowering the entire band."

In addition, Greenburg says it's important to realize a good live sound is different from a good studio tone. "Amps sound brighter on the live concert or club stage than they do in a studio," he says. "You'll definitely want to dial in more low end when playing live, and you should use as few effects as possible. A typical club environment has natural reverb and delay in the room, so adding a bunch of effects tends to make the sound muddy."

The bottom line. For clear, clean low end, Laster suggests that the bassist give the engineer the liberty to lift the sound from the optimal point in the signal path. "If the player has a garbage bass rig, you want to be able to decide what you want to hear," he says. "Do you want to hear the sound the guitar is producing, or do you want to hear the sound the amp is producing? So, unless a distorted amp is part of the bassist's signature sound, I'll typically plug the bass into a direct box and use the sound coming from the instrument itself."

Drums o' plenty. The drummer's stubborn tendency to play loud is often the biggest cause of poor sound. "The main problem I run into from a level standpoint is if the drummer plays too hard or if his cymbal selection isn't exactly tuneful. Some of those cymbal bells are so loud," says Irwin. "If you have a drummer who is constantly bashing, you have to bring the rest of the band up to that level, and sometimes the PA can't handle that volume. If the drummer has his volume and attack under control, the rest of the mix is a lot easier." ◆

tools

Here's the **MANUFACTURER INFORMATION** for some of the products discussed in this issue of **JAM.**

HEADLINER Portable Sound Systems

Fender Musical Instruments Corp. tel. (602) 596-9690; fax (602) 596-1384; Web www.fender.com
JBL Professional tel. (800) 852-5770 or (818) 894-8850; fax (818) 830-1220; Web www.jblpro.com
Peavey Electronics Corp. tel. (601) 483-5365; fax (601) 486-1278; Web www.peavey.com
Yamaha Corp. of America tel. (714) 522-9011; fax (714) 739-2680; e-mail info@yamaha.com; Web www.yamaha.com
Yorkville Sound tel. (716) 297-2920; fax (800) 466-9329; e-mail yssales@yorkville.com; Web www.yorkville.com

VOX Microphones

AKG Acoustics tel. (800) 878-7571 or (615) 399-2199; fax (615) 367-9046
Audio-Technica U.S., Inc. tel. (330) 686-2600; fax (330) 686-0719; e-mail pro@atus.com
Audix tel. (800) 966-8261 or (503) 682-6933; fax (503) 682-7114; e-mail audix@apc.net; Web www.audixusa.com
beyerdynamic tel. (800) 293-4463 or (516) 293-3200; fax (516) 293-3288
CAD Professional Microphones tel. (800) 762-9266 or (216) 593-1111; fax (216) 593-5395; e-mail salesdept@astatic.com; Web www.astatic.com
Crown International tel. (800) 342-6939 or (219) 294-8314; fax (219) 294-8250; e-mail 1ponder@crownintl.com; Web www.crownintl.com
Electro-Voice, Inc. tel. (800) 234-6831 or (616) 695-6831; fax (616) 695-1304
Peavey Electronics Corp. tel. (601) 483-5365; fax (601) 486-1278; Web www.peavey.com
Sennheiser tel. (860) 434-9190; fax (860) 434-9022; e-mail jciaudelli@sennheiserusa.com; Web www.sennheiserusa.com
Shure Brothers, Inc. tel. (800) 257-4873 or (847) 866-2200; fax (847) 866-2279; e-mail marcom@shure.com; Web www.shure.com

RIFFS Amplifiers

Crate tel. (314) 727-4512; fax (314) 727-8929
Fender Musical Instruments Corp. tel. (602) 596-9690; fax (602) 596-1384; Web www.fender.com
Rocket Amps tel. (510) 532-1181; fax (510) 532-1641; e-mail rocket@adasignal.com; Web www.adasignal.com
Roland Corp. U.S. tel. (213) 685-5141; fax (213) 722-0911; Web www.rolandus.com
Tech 21, Inc. tel. (212) 315-1116, fax (212) 315-0825; e-mail info@tech21nyc.com; Web www.tech21nyc.com
Vox Amplification tel. (516) 333-9100; fax (516) 333-9108

KEYS Keyboards (grand piano sounds)

Alesis Corp. tel. (310) 558-4530; fax (310) 836-9192; e-mail alecorp@alesis1.usa.com; Web www.alesis1.com
E-mu Systems, Inc. tel. (408) 438-1921; fax (408) 438-7854; e-mail info@emu.com; Web www.emu.com
Ensoniq Digital Systems tel. (610) 647-3930; fax (617) 647-8908; e-mail music-support@ensoniq.com; Web www.ensoniq.com
Generalmusic Corp. tel. (800) 323-0280 or (708) 766-8230; fax (708) 766-8281; Web www.generalmusic.com
Kawai America Corp. tel. (800) 421-2177 or (310) 631-1771; fax (310) 604-6913; e-mail 76307.2247@compuserve.com; Web www.kawaius.com
Korg USA, Inc. tel. (516) 333-9100; fax (516) 333-9100
Kurzweil Music Systems tel. (310) 926-3200; fax (310) 404-0748; e-mail kurzweil@aol.com; Web www.youngchang.com/kurzweil
Peavey Electronics Corp. tel. (601) 483-5365; fax (601) 486-1278; Web www.peavey.com
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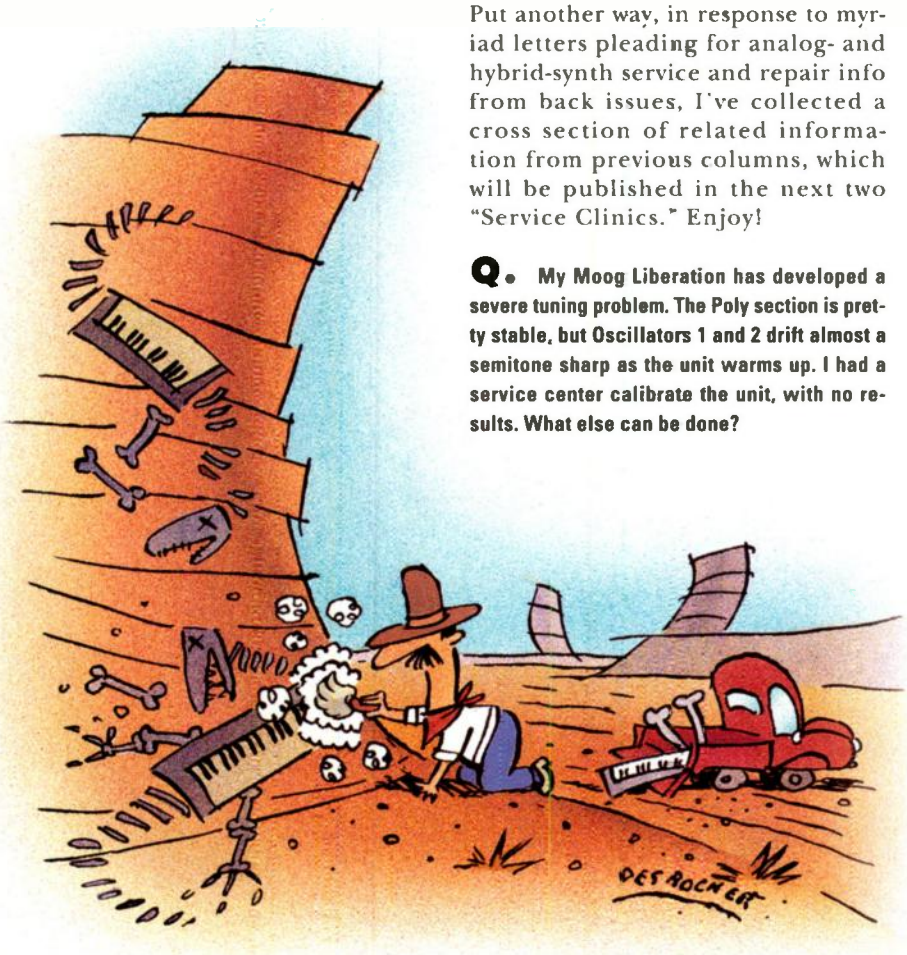
SERVICE CLINIC

A Dinosaur Quarry

How to care for and feed your favorite prehistoric reptiles.

By Alan Gary Campbell

This month, we seek to resurrect the elusive Synthosaurus, basically by cloning (shades of Jurassic Keyboard–bus Park!). Put another way, in response to myriad letters pleading for analog- and hybrid-synth service and repair info from back issues, I've collected a cross section of related information from previous columns, which will be published in the next two "Service Clinics." Enjoy!



JACK DESROCHER

Q. My Moog Liberation has developed a severe tuning problem. The Poly section is pretty stable, but Oscillators 1 and 2 drift almost a semitone sharp as the unit warms up. I had a service center calibrate the unit, with no results. What else can be done?

A. The Liberation can be difficult for an inexperienced technician to calibrate. The Oscillator Range and Scale adjustments are accessible through holes in the back cover, but the High Frequency Tracking adjustments are not. A technician who has experience with this hybrid synth will remove the cover and set all the trims, but the instrument's heat-transfer characteristics are different with the cover off, and this can affect the tuning. Often it's necessary to readjust the Range and Scale trims once the cover is back on.

Nonetheless, significant tuning drift implies a problem that requires more than routine calibration. Test for power-supply drift or a thermally dependent offset voltage in the keyboard-control or performance-control circuits. If these check out, perform the "Chip Temperature Adjustment" described in the "Technical Service Information" packet (stored in a pouch inside the Power Supply/Interface module). Note that this adjustment is critical and involves a calculation based on an accurate measurement of the ambient temperature, which requires a laboratory-grade thermometer. Furthermore, the environmental

Q. Can the Moog Liberation be retrofitted for MIDI?

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temperature must remain constant during the procedure, and the instrument should be shielded from drafts. Surround it with an "air dam" (e.g., a big cardboard box) if necessary.

A monophonic MIDI Out can be added to the Liberation simply by connecting its control voltage and trigger outputs to a CV-to-MIDI converter. Most such converters quantize the input voltage, however, so the Liberation's pitch-bend and modulation control-voltage transmission capabilities won't work as intended. Adding a polyphonic MIDI In or Out would be an involved process, as the instrument was definitely not designed with that sort of thing in mind.

Although it might be possible to add the necessary contacts to the keyboard for a MIDI Out, there isn't much room inside the instrument for the required electronics, and creating a bidirectional, Velocity-sensing version would be daunting.

Here are some service tips for all Liberations. Dismount the top panel and check the XLR connector for the presence of a jumper between the two green wires at pin 5 and ground, respectively. If the jumper is not present, add it. This mod connects the chassis ground and safety ground together, preventing catastrophic failure of the Power Supply/Interface if the cable becomes intermittent.

Note that if the Liberation interface cable becomes an open conductor (a common failure), it is often possible to repair the cable. Many Liberation cables have a spare, unused conductor that can be accessed and used by removing the plug shells. It is sometimes necessary to replace one or both of the plugs. When this is the case, it is prudent to refer the job to an experienced tech because soldering multiple XLR cable connections can be tricky.

Q. **I have an Oberheim Matrix-6R rack-mount synth that frequently gets "confused." The alphanumeric display comes up with weird "scrolling" or "hash" in the leftmost digits, and the unit won't play. I can sometimes reset it but not always. Is there a fix?**

A. Keyboard and rack-mount versions of the Matrix-6 are extremely sensitive to power outages and transients. If a Matrix-6 is turned off and then back on too quickly—as can happen during a power outage—the display module will get "confused," though in most cases the unit will play. To clear the display, turn the unit off, wait five seconds, and then turn it back on. If that doesn't work, reset the Matrix-6 as follows: Turn the power off, press and hold the red Store button, turn on the power, and then release the button. The unit will enter Calibration mode and then return to a normal display.

A common Matrix-6 service problem that can cause similar symptoms is a broken solder joint at the spade-type ground connector located at the right of the power-supply board. Also, some Matrix-6 power-supply boards have so much flux residue on the circuit side of the board that the flux, having absorbed moisture from the air, begins to conduct significant leakage current, leaving a charcoal-like residue on the board.

Obviously, boards found to be in this condition should be thoroughly defluxed and cleaned. A commercial flux remover is desirable in this circumstance, but common isopropyl (rubbing) alcohol, combined with an old toothbrush, some patience, and a lot of elbow grease, will get the job done.

Caution: Alcohol is flammable. Keep away from all sources of combustion, including resistive heaters. Disconnect all cables, including the AC power cable, before attempting to service the power-supply board. If you do not have considerable service experience, refer the job to a qualified technician.

Q. **The display on my Sequential Circuits Prophet-5 flickers, and the unit sometimes locks up. I can clear this by jiggling the Filter Cutoff pot. Is this a pot problem or an electronic problem?**

A. If the display merely flickers continuously as if you were repeatedly pressing a switch or turning a pot, clean the pot with silicon spray lubricant. (If you have a Prophet-5 Service Manual and considerable experience, this is a reasonable do-it-yourself cleaning project, though it requires significant disassembly. Otherwise, have this done by a technician.) Inspect the solder joints at the pot leads, and resolder any that are suspect.

If that doesn't fix it, try replacing the 4051 IC that multiplexes the Cutoff pot (U202 on PCB2) and/or try replacing the pot. Note that desoldering on the Prophet PC boards is not trivial; if you do not have extensive service experience, refer the work to a qualified technician.

Q. **I have an old but seemingly indestructible Fender Polaris synth, a model that no local**

The Oberheim Matrix-6 and Matrix-6R (pictured) are extremely sensitive to power transients. If the synth is turned off and then back on too quickly (e.g., as a result of a power failure), the display module gets "confused."

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tech has ever even heard of. Recently, the memory got scrambled. I opened the keyboard and discovered what appeared to be two flashlight batteries inside. Do these back up the memory, and is it okay to replace them with regular batteries?

A. The two D cells in the battery holder adjacent to the power supply do, in fact, back up the memory. What's even more amazing is that, after years of service, the original batteries in many of these units are, to quote a famous advertisement, "still going...." Their long life is at least partially attributable to the low current consumption in this application.

The batteries should be replaced if the combined terminal voltage (measured with a high-impedance DVM only; do not use an analog VOM) drops below 2.7 volts. Bunny spotting notwithstanding, I recommend Duracell batteries in this application.

The Polaris is somewhat sensitive to line transients, which can scramble memory. The batteries may still be good. Either way, you'll have to reset and recalibrate the unit and reload the programs.

Q. The only way to back up programs electronically on many of my vintage synths is via audio cassette, but I often have trouble getting this to work properly. I have to fiddle with the volume a lot, try different decks, etc. I'm sure this can be made to work better, but how?

A. Some cassette interfaces simply are very level sensitive, and it is necessary to gradually adjust the playback level across the entire range to discover the correct setting. Once discovered, the correct setting should be marked on the cassette label for future reference. Level settings to record data are not quite so critical. Frequently, it is acceptable to run the input gain wide open.

Other factors also affect the ease of use of a cassette interface. It is important to use high-quality, normal-bias cassettes, though these can be hard to find. Cassettes especially designed to store data—so-called "data cassettes"—are ideal but are much less readily available today than they once were. Furthermore, all noise reduction (Dolby, dbx, etc.) must be off when recording or playing back data.

Synthesizer cassette interfaces are generally not picky about the type and quality of the deck used. Some even work better with the hefty output drive provided by inexpensive portable decks intended primarily for voice recording. In fact, some tape-interface outputs (e.g., those on the Korg DW-800 synth) are designed to work only with mic inputs and require a preamp to drive the line inputs of a component deck.

▼

Bunny spotting notwithstanding, I recommend Duracells.

In most cases, a viable copy of a data cassette cannot be made by dubbing between cassette decks. The nature of the stored signal is such that the duplication process can reduce data integrity significantly. A copy should be made by saving the current memory contents of the original unit (if needed), loading the data from the tape to be copied, and saving the data directly from the instrument to a cassette recorder that holds a fresh cassette.

Interestingly, cassette interfaces can often be used to transfer data directly between two instruments of the same type. The cassette output of one unit simply connects to the cassette input of the other; one unit is set to Save, the other to Load. This procedure works particularly well with the Moog Source and Memorymoog.

EM *Contributing Editor* **Alan Gary Campbell** *is the publisher and editor of the* New Music Journal *and the owner of Musitech, a consulting firm specializing in electronic-music product support.*

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Reviews

Kawai K5000W

By Rob Rayle

It's additive!
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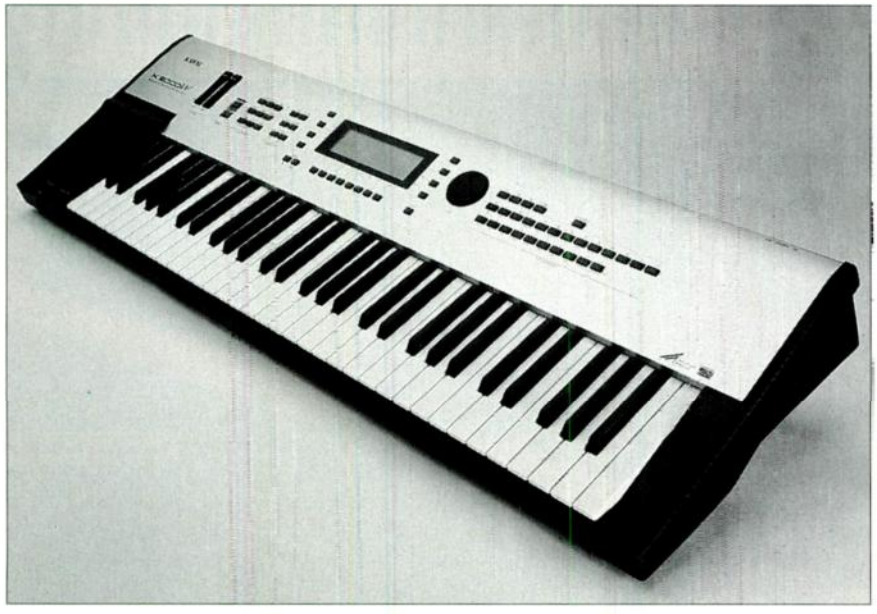
It's two synths in one!

Toward the end of the 1980s, as the long reign of the Yamaha DX7 was coming to an end, Kawai came out with an additive synthesizer called the K5 (see "Additive Programming: The Secret Life of the Kawai K5" in the February 1989 **EM**). Although it didn't become the DX7's successor, as its manufacturer had hoped, the K5 did attract a cult following among synth programmers. Kawai has now brought back an improved version of this technology as part of a workstation synth called the K5000W and a performance-oriented synth called the K5000S, each of which provides a 61-note keyboard that is sensitive to Velocity and Channel Pressure (Aftertouch). There's also a rack-mount version of the K5000S called the K5000R (see sidebar "K5000S and K5000R.")



The K5000W is a powerful keyboard workstation with independent additive and PCM-based synthesizers. These are joined by a comprehensive sequencer with algorithmic-composition capabilities and five effects processors.

The K5000W has an industrial look, thanks to the unpainted, brushed-aluminum front panel. In the middle of this panel is a backlit, graphic, 240 × 64–pixel LCD. Sixteen soft buttons surround the display, and 45 other buttons are organized into functional groups. In addition, there are two volume faders and a data wheel. To the left of the keyboard are pitch-bend and modulation wheels as well as a floppy-disk drive.

The back panel includes two complete sets of MIDI In, Out, and Thru jacks; four audio outputs on unbalanced ¼-inch jacks; and ¼-inch jacks for a sustain pedal and an assignable expression pedal. A power switch and IEC power-cord receptacle round out the back panel.

The K5000W keyboard workstation combines two distinct synthesizers, onboard effects, and a 40-track sequencer with auto-accompaniment/algorithmic-composition features. One of the synths is a fairly conventional, ROM-based, sample-playback engine; the other synth employs an additive architecture, called Advanced Additive, and is a direct descendant of the K5.

Each internal synth provides 32 voices of polyphony, so the K5000W provides a total of 64 voices. However, these synths are completely separate, so you can't have more than 32 additive voices or 32 PCM voices. Many sounds use more than one voice per note, so the actual polyphony varies depending on the program. With two sets of MIDI In, Out, and Thru jacks, the K5000W can play up to 32 multitimbral parts, but it must be in Compose (sequencer) mode to do so.

VOICE ARCHITECTURE

Both synthesizers use a hierarchical voice architecture. At the lowest level are Sources. In the additive synth, up to

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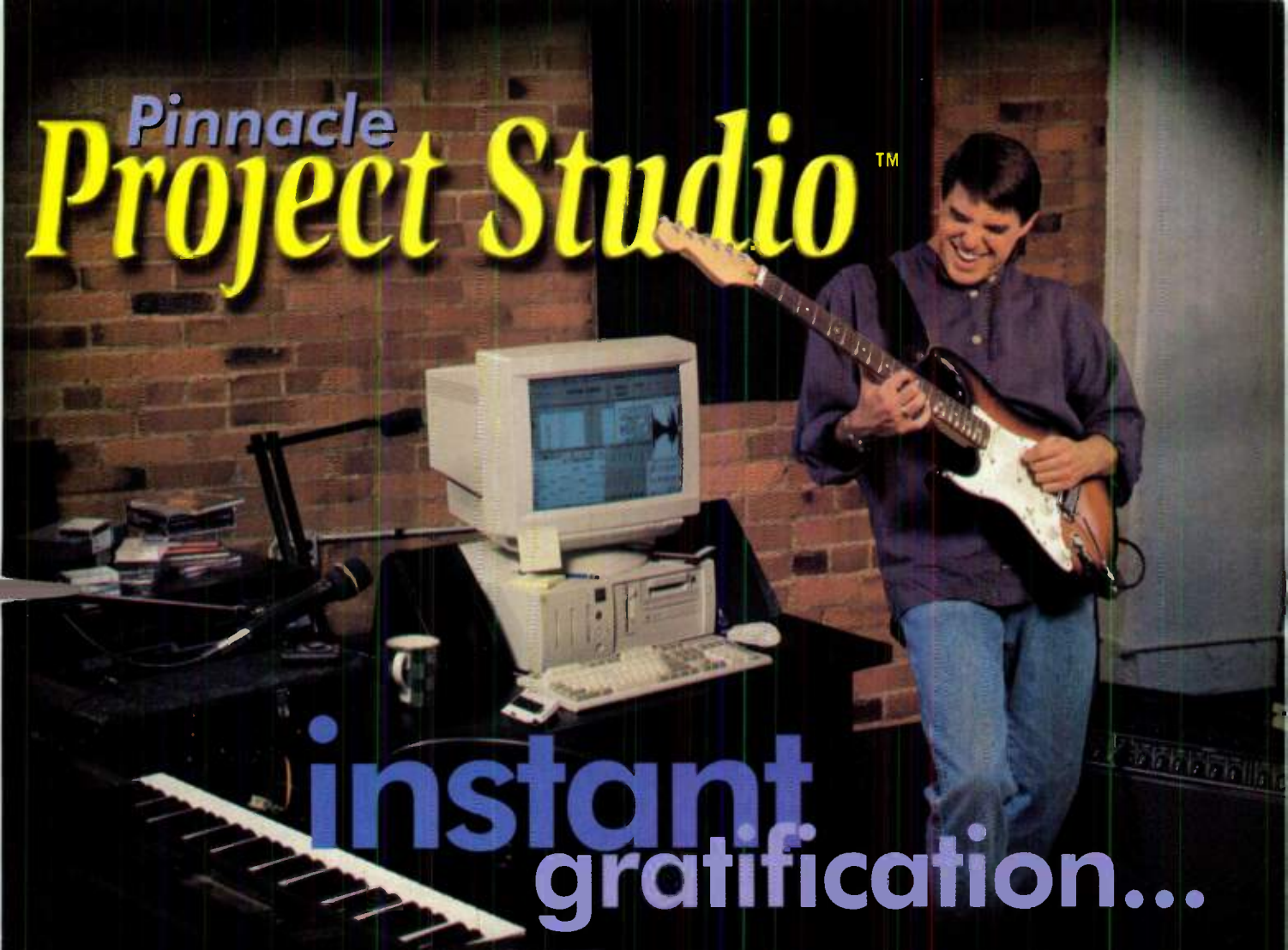

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can specify whether a Source plays harmonics 1 through 64 or harmonics 65 through 128. Each harmonic has its own 5-stage, looping, level/rate–type envelope generator. (That's right, kids, 64 envelope generators per oscillator!)

The harmonics in each additive Source are filtered by a formant filter, which I consider the ultimate in user-configurable filters. It's essentially a 128-band graphic equalizer whose frequencies can be swept by another dedicated envelope generator or LFO (but not both). For example, you can use this filter to emulate the formants of an acoustic instrument or set up a quadruple notch filter with 3 dB resonant peaks on both sides of all four notches.

PERFORMANCE CONTROLS

The K5000W has several performance-related controls for modifying the sound in real time. These controls appear on the LCD screen in two pages, and they can be manipulated in two ways: one at a time from the data wheel or simultaneously with nonassignable MIDI Control Change messages.

There are eight performance controls available for PCM and additive sounds: filter cutoff and resonance; envelope attack, decay, and release time; Velocity sensitivity; effects level; and reverb level. These controls affect the corresponding parameters in all Sources relatively (e.g., if you reduce the filter-cutoff control by a certain amount, the filter cutoff in each Source is reduced from its programmed value by that amount).

Another six performance controls apply only to additive sounds, and like the global controls, they affect each corresponding parameter in a relative manner. The Low Harmonics control changes the level of the lower 32 harmonics, and the High Harmonics control performs a similar function on the upper 32 harmonics. The Even/Odd Harmonics control changes the ratio of the even to odd harmonics, which lets you sweep from a square wave through a sawtooth to a pulse-like wave. The Formant Filter Bias control shifts the formant-filter frequencies up and down, and the Formant Filter Speed control modifies the rates of the formant-filter envelope or the speed of the formant-filter LFO. The Formant Filter Depth control modifies the amount of the formant-filter envelope or LFO.

You can only modify one of these controls at a time using the data wheel. However, they are all available simultaneously via MIDI. The K5000S includes dedicated knobs to adjust each performance control (see sidebar "K5000S and K5000R").

Quick MIDI mode uses a similar system to provide control over the transmission of various MIDI messages via MIDI Out A or B on the unit's current System Channel. The available messages include Volume, Pan, and one user-selectable Control Change message. In addition, you can send a user-specified Bank Select and Program

K5000W Specifications

Keyboard	61-key, unweighted
Synthesis Types	additive, PCM subtractive
Polyphony	64 notes (32 additive, 32 PCM)
Multitimbral Parts	32
Additive Singles (RAM/ROM)	up to 128/0
PCM Singles (RAM/ROM)	48/80
GM Singles (RAM/ROM)	0/128
Combinations (RAM/ROM)	64/0
PCM Waveform Memory	16 MB
Stereo Effects Processors	5
Effects Types	11 reverb, 37 various
Sequencer	40 tracks/2 songs/107 styles
Total Sequencer Events	40,000
Audio Outputs	4 (¼")
Floppy-Disk Drive	3.5", 1.44 MB, MS-DOS format
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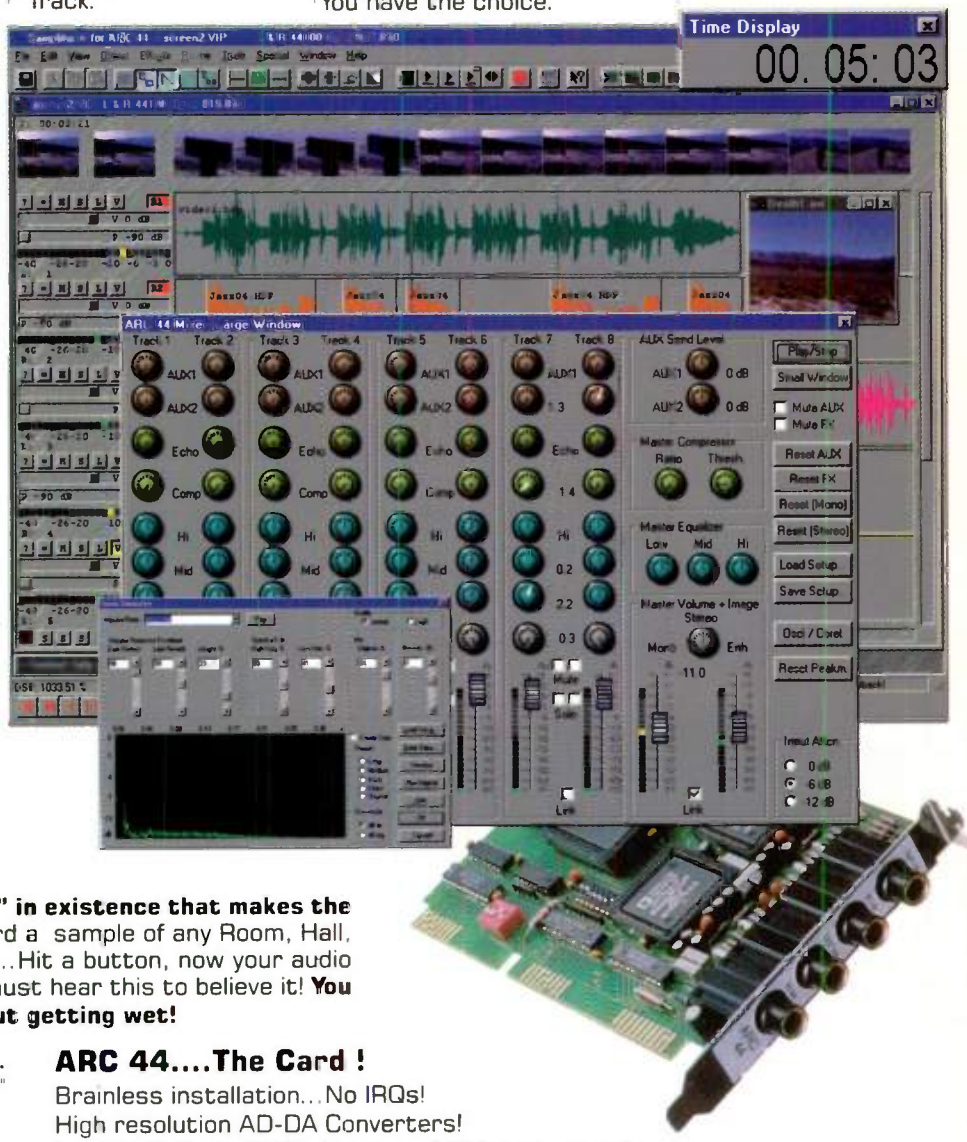

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Change directly from the front panel. The Bank System parameter determines whether Bank Select is sent as an MSB, LSB, or not at all. This last setting is called Normal, and the manual states that it causes the Bank Select message to be sent "by itself," which is incorrect. The Normal setting should send both MSB and LSB, and there should be an Off setting to disable Bank Select. Kawai should fix this.

THE SOUND

The PCM samples do a pretty good job of covering the bases. I always want more ROM in these things, and some sample RAM that is loadable from the disk drive or MIDI Sample Dump Standard would be nice. But that would jack up the price, and this instrument's primary focus is the additive synth.

The additive synth has a unique sound; the only thing I've heard that sounds like it is the K5, but the sound of the K5000W is a big improvement. Unlike a classic additive synth, the K5000W produces component waves that are not pure sine waves. They are a pretty good approximation of sine waves, but they do have extra frequency components in addition to the intended frequency.

The most annoying limitation of the K5000W additive synth is that components with frequencies above about 12.5 kHz exhibit severe aliasing. (I determined this frequency by sampling the highest single additive harmonic that does not exhibit aliasing and by performing a frequency analysis on it.) The K5000W normally gets around this problem by removing components with fundamental frequencies above 12.5 kHz. However, it is possible to work around this. One way is to use high negative values for the Formant Filter Bias parameter. This procedure gives you more high end at the cost of aliasing.

I actually like the fact that you can make the instrument alias if you want to. (Remember those weird tones in Thomas Dolby's "She Blinded Me with Science"? That's what aliasing sounds like.) However, I'd much rather it start at frequencies higher than I can hear.

This problem effectively reduces the number of component waves that are available when playing at the top of the keyboard. Without downward transposition, the seventh harmonic hits this limiting frequency at the top of the 5-octave keyboard on the K5000W. As a result, the additive sounds lose much of their complexity and character in the upper ranges of the keyboard.

On the other hand, many instruments (e.g., electric guitars, organs, and some types of old analog synthesizers) have little or no frequency content above 12.5 kHz. The K5000W can be very effective at emulating these types of instruments. In addition, the PCM sounds in the additive engine can be used to compensate somewhat for this problem, particularly for instruments that have inharmonic components or high-frequency components in the attack transients.

The factory sounds in the K5000W provide effective demonstrations of what the instrument can do, but none of them grabbed me by the shirt and said, "You must use me in one of your songs! Quick, record me now!" Fortunately, Kawai is releasing several sound libraries ($49.95 each), five of which should be available by the time you

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read this. These initial offerings include *Session Toolkit* (a variety of useful session sounds); *Leads, Solos, and Basses; Pads and Comping; Vintage Sounds;* and *Collection* (a potpourri of various sounds that is also bundled with the ME-1 memory expansion). Demos of many sounds are available on Kawai's Web site.

PROGRAMMING

If you decide to program the machine, you must learn to deal with the user interface in more than a superficial way. There is no editing software available as I write this, but Kawai showed a beta version of a K5000 module for Emagic's *SoundDiver* universal editor/librarian at the recent NAMM show. Among other features, the module includes a tool that converts any sample to an additive sound. This lets you capture the basic "fingerprint" of a sound and tweak it any way you want, which should please resynthesis freaks. This software is free to K5000 owners and should be available by the time you read this.

I found the navigation system to be a bit inconsistent. Depending on where you are in the menu hierarchy, you either press a Back soft button or the Exit key to return to the previous screen. Most screens can be accessed with no more than two button presses, although there is one menu chain that requires five button presses to traverse. The Patch Select buttons double as Quick Edit buttons when you're in Edit mode; these buttons are labeled with the names of various functional elements (e.g., DCF, DCA, etc.) and take you directly to the corresponding edit screen.

Most parameters are represented in unitless numbers (e.g., 33), although a few are expressed in meaningful units (e.g., 3 dB, 10 ms, 2,400 cents). I wish all of the parameters included real units of measure. The manual includes charts that allow you to see the real values of some of these numbers, but this is far less useful than seeing them in the display.

Incredibly, there is no edit-compare function, which would revert the parameters you are editing to their previously saved values. This function is critical in a complex synth; programmers often revert to the starting point to see whether they are headed in the right direction with the sound.

One cool aspect of the additive engine is the fact that each Source includes two sets of harmonic-level settings, or coefficients, which are designated as "soft" and "loud." You can assign a Velocity curve to each Source and crossfade between the soft and loud harmonic coefficients, which helps make the additive sounds more

Product Summary

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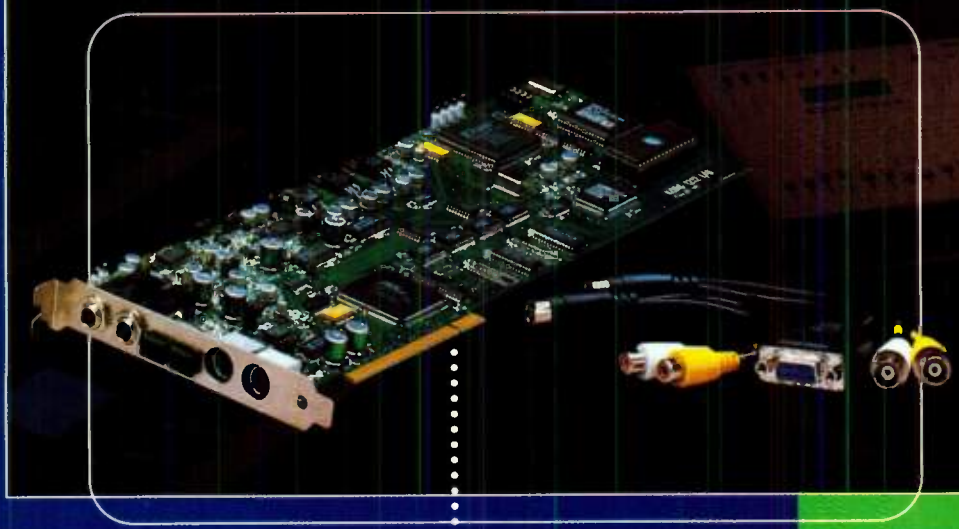

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dynamic without eating up additional polyphony.

The main difficulty in programming the K5000W is that there are so many parameters. Kawai has provided a few ways to simplify the task. To help in setting up the initial 64 harmonic levels, selection macros let you work with multiple harmonics as a group. You can select dark (lower 32), bright (upper 32), odd, even, octave, or fifth harmonics. I would have liked some combinations (e.g., bright odd), but only single groupings are provided. A harmonic-envelope page lets you edit one segment at a time for all harmonic envelopes, and the selection macros are available here, as well.

A Morf mode lets you create a sound by selecting up to four additive Sources to morph between. This sets up the harmonic levels and envelopes so that the harmonics move between the settings for the four Sources at the rates you select. You can specify a separate rate between each pair of Sources, but you can't control the morph manually from a real-time controller.

The interface for configuring the 128-band formant filter lets you adjust a single band or simultaneously adjust groups of adjacent bands; groups can consist of five, ten, fifteen, twenty, or all 128 bands. In addition, a Graphic EQ mode turns the formant filter into a standard, 8-band graphic EQ. Each of these "bands" encompasses sixteen actual bands of the formant filter, and raising or lowering the level of each "band" affects the center frequency more than the outer frequencies within the selected group. For all these settings, two soft buttons let you select which group of bands you want to manipulate.

Programming power has its price—you could get lost for months in these parameters—but it also has its rewards. Kawai is sponsoring an Advanced Additive Patch Contest, in which users are invited to submit their best additive patches. The contest is open until May 31, 1997, and first prize is $1,000. Visit Kawai's Web site for details.

SEQUENCER

The K5000W includes a 40-track sequencer with 96 ppqn resolution. Each track can be assigned to one of 32 internal "channels" (to play internal additive or PCM sounds) or 32 external MIDI channels (thanks to two MIDI

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Out ports). The usual step-time and real-time recording are provided, and the sequencer can play back Standard MIDI Files directly from the floppy drive without loading them into RAM.

Once recorded, tracks can be edited using an event-list interface. Events can be quantized with resolutions from a quarter-note to 64th-note triplets, and quantization can be set to affect only those notes that fall outside of a user-defined threshold (i.e., quantize only the notes that are way off and leave alone the ones within the threshold). The Groove Quantize feature includes ten different groove templates. However, there is no partial quantization (e.g., move the selected events halfway from their current position to the nearest quantization location).

The sequencer can bias the Velocity values of all notes in a track and create a crescendo or diminuendo by adjusting the Velocity values within the selected area. In addition, you can split various events, such as controllers, to a separate track. A Gating function multiplies the duration of all notes in a track by a percentage value, which lets you make a whole track more legato or staccato. The note-mapping function lets you map a given note to another note throughout a track, which is handy for changing the instruments used in a drum track. For a keyboard-workstation sequencer, this is a very full feature set.

The most unusual aspect of the sequencer is its Automatic Phrase Generator (APG). The APG generates parts algorithmically, based on a "seed track," which is typically a basic chordal sketch of a song's harmonic movement (i.e., simple piano comp chords). The APG can then add drums, percussion, bass lines, rhythm accompaniments, and melodic lines based on the seed track. A feature called Chord Advice suggests alternative chords based on your specified preferences, including the song's key and whether you want simple or complex chords.

The APG provides 107 different Styles, including eight flavors of techno, eleven types of contemporary, fourteen kinds of dance, eight varieties of pop, fourteen species of rock, twelve hues of jazz, seven shades of blues, and many more. Each Style includes six variations and six different fills. If this is not enough for you, Styles from Technics, Roland, Korg, Generalmusic, Wersi, and Solton can be converted into APG Styles using special software supplied with the unit.

If you are into the "intelligent arranger" concept, you might find this aspect of the sequencer useful. Some Styles work better than others; for example, the techno Styles sound like techno to me. Artistic value judgments obviously are subjective, so I recommend trying this feature out on a sample piece.

SOFTWARE UPDATE

By the time you read this, version 2.0 of the K5000 operating system should be available from Kawai's Web site. The OS is stored in flash ROM and can be updated by the user from the floppy drive, which is far better than swapping EPROM chips.

The new OS offers many enhancements, including the ability to delete bars and songs from the sequencer and rehearse punch-ins before you actually record them. In addition, portamento has been added to the K5000W, and patches can be selected with the value dial. Pressing one of the Bank buttons recalls the last selected item in that bank, and the sustain-pedal polarity is now switchable. The new OS is required for compatibility with the ME-1 memory expansion option.

CONCLUSION

The K5000W is a distinctive instrument; no currently available instrument is quite like it. There certainly is room for improvement on some things, such as the aliasing, but overall Kawai has done a good job. You'll have to put some time into learning how to create original sounds because, as I mentioned, you can really get lost in the parameters. But if you're sated with sample-playback synths and want something different, well, here it is. And you get a modest amount of sample-playback synthesis in the bargain.

I think this machine will have strong appeal for certain types of synthophiles. Somebody who wants to program a very powerful additive synth could have a lot of fun with this beast. Those who need a powerful sequencer but don't want to use a computer should also check this machine out.

Rob Rayle *owns and operates Reality Recording on the east side of San Francisco Bay. They'll let anybody have a studio these days.*

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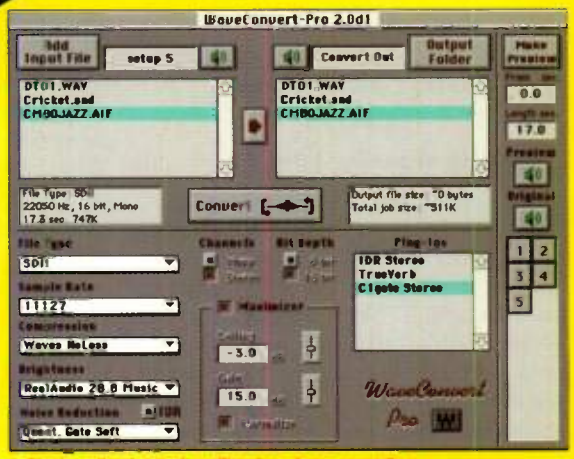

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William Coakley Perfect Piano Series

By Gerry Bassermann

Concert grand pianos sampled with stunning realism.

There's nothing like the sound of a concert grand piano. Wandering off from a party some months ago, I found myself in a deserted ballroom with a magnificent grand. Seizing the moment, I threw myself down onto the keyboard with bodily abandon, playing a kind of postmodern, dual-forearm cluster. Laying head to wood, I listened to the incredible chordal wave as it roared and danced and endlessly subsided. It was like the sound of everything at once, as large as a universe yet infinitesimally fine.

Throughout the many years of electronic-instrument development, sound designers have sought to replicate the rich, complex sound of the acoustic grand piano. The advent of digital sampling has brought the quest substantially closer to fruition, yet even the best digital "pianos" often sound less than grand. But just the other night, I loaded a new piano CD-ROM into my sampler and smashed the controller with both arms. What I heard called up an astonishingly powerful and detailed memory of my experience that evening in the grand ballroom.

The product is named, aptly enough, *The Perfect Piano Series*, and is packaged in two volumes. Volume 1's principal offering is a 9-foot Steinway D concert grand, circa 1986, sampled on the stage of an acoustically "perfect" theater using various mic positions and equalization. A second piano, a Kawai B grand, is also offered, though with less extensive variations. Volume 2 features what is, to my knowledge, the only sample set of the nearly mythical Fazioli 10-foot, 2-inch piano from Italy; a 1979 Steinway D; and an assortment of other specialized pianos. The CD-ROMs are available in several sampler formats, including E-mu Emulator IIIx/IV, Akai S1000/3000, Digidesign SampleCell II, Ensoniq ASR-10 (vol. 1 only), Roland S-770, and Kurzweil K2000/K2500.

THE MAN, THE PLAN

The creator of *The Perfect Piano Series*, William Coakley, got into the sampling business simply because he "wanted something decent to play." He had tried every sampled piano on the market and found deficiencies in each, whether mismatched notes or ranges, unnatural velocity switching, strange recording ambiences, or tonal defects in the instrument itself. So he decided to create his own samples.

Fortunately, Coakley was well suited to the task. A stint as a piano tuner for Baldwin (he has tuned pianos for Liberace, Ferranti and Teisher, and Andre Watts) helped him select and prepare source candidates, and many years spent as a professional recording engineer allowed him to capture and process the recordings properly. Moreover, a lifetime of piano playing helped him expertly voice the instruments and gauge the results.

Coakley lavished time and TLC on the project. Some of the sounds that ended up on volume 1, for example, were culled from his *fortieth* set of samples. Indeed, Coakley produced such refined work that he was eventually prevailed upon to make his disc available to the public.

To date, his marketing style is straightforward and personable: not only does Coakley personally answer the phone and provide around-the-clock tech support, he also burns each CD-R himself and signs, serializes, and registers it before shipping. Though I was initially dismayed by the dearth of documentation provided with the discs, having Coakley instantly accessible by phone more than made up for the scant text and proved a welcome relief from the average support line's voice-mail labyrinth.

William Coakley sampled this lovely Steinway D concert grand piano for volume 1 of *The Perfect Piano Series*. The series offers some of the best acoustic grand piano samples available.

VOLUME 1

I auditioned volume 1 on a Kurzweil K2000. There are six banks containing one program each: four of the Steinway and two of the Kawai. The Steinway programs consist of two different sample sets—numbers 28 and 40—along with two variations of number 40. The first variation has been equalized and the second compressed into 8 MB RAM (as opposed to the 16 MB required by the other loads). For the Kawai, one program maintains recorded levels while the other has been normalized. Altogether, the six banks comprise 88 MB of data.

Coakley experimented with numerous microphones, mic positions, and recording environments before finding the optimum combination of elements for sampling the Steinway D. The final mic selection remains a carefully guarded secret, but Coakley has revealed that the samples were made in a 1,000-seat theater (though he is loath to say which one). This setting allowed for a big sound free of troublesome reflections.

Program D40, the sampled Steinway, sounds round and clear, with a broad bass end, making it particularly well suited to solo playing. Tonal consistency up and down the keyboard is very smooth, and the stereo image is wide and consistently present across the middle. No sample zones stick out unnaturally or are uncomfortable to play. Clearly, Coakley selected a first-rate instrument, one that is free of odd hammer knocks or weak-sounding areas of the sounding board.

It's also evident that he carefully tuned the piano and maintained the tuning throughout the sampling process. If only one of a piano note's three unison strings is slightly out of tune, the note will suffer a considerable loss of sustain. On the D40, the ease with which the player can bring out a singing melody in the right hand over a full, arpeggiated bass and chordally dense midrange testifies to a high standard of intonation.

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To further ensure a balanced sound, Coakley took pains to map his samples carefully. The D40 piano has enough samples (around twenty per layer) so that none have to be transposed more than a few semitones by the sampler. Still another technical achievement is the smoothness of the Velocity-controlled switching between different dynamic layers. The layers of the D40 are so well matched note-for-note along the keyboard, and the K2000's filters are so well employed, that there is never a feeling of switching samples, only a natural and expressive touch control. All of these elements together made playing the Steinway D40 program from a weighted, 88-note Wersi controller quite satisfying.

The only less-than-satisfying thing is the timbral reduction that occurs 2.4 seconds after notes are struck. Coakley has programmed the set so that nearly every sample enters a single-cycle loop at this point. His reasoning, as the documentation states, is that "greater than 90 percent of all playing consists of note durations less than 2.4 seconds."

I guess that's true in general—and believing it certainly helps when you need to fit all of those 44 kHz stereo samples into 16 MB of memory! But the lower notes of a piano, which use long strings with brass windings, are distinguished by having a dynamic spectral shape. When those unwinding timbres turn suddenly static after 2.4 seconds, it's disappointing. Though the reduction is hardly noticeable if other notes are played before the 2.4 seconds is up (so you won't notice it under most playing conditions), I would have opted for longer bass files with longer crossfade loops and successively shorter—and, if necessary, fewer—samples above, say, G4.

The other pianos on the disc evidence equal attention paid to such details as intonation, sample mapping, and cross-switching, but these samples are quite different in character. The Steinway D28, for example, has a more introverted quality than the D40. Curiously, though, it seems to be more dynamic, perhaps because there is more tonal disparity between the layers. The Kawai B has the fresh presence of a fairly new piano. Unfortunately, though, it has some frustratingly short envelopes in the center octave. The equalized version of the Kawai (which is not looped) cuts through thick textures easily with the hard layer adding very metallic highs.

VOLUME 2

Released late last year, volume 2 reflects state-of-the-art developments in sampling hardware: memory is now in abundant, affordable supply (with 32 MB the standard configuration), and polyphonic-voice capability is steadily on the rise. I reviewed volume 2 on my E-mu Emulator IV, which has 128-note polyphony, so that I could throw some romantic blockbusters like Chopin's "Revolutionary Etude" at the pianos in Coakley's second disc.

The main event on volume 2 is the Italian Fazioli concert grand piano. Known to players and technicians around the world, the Fazioli has an unsurpassed reputation for excellence. Of twenty or so extant, there is only one in the Americas—the one that Coakley sampled. Coakley traveled to hear and play it, met with Paulo Fazioli, and convinced him that he was the right person to capture the sound of this beautiful instrument.

My first impression was that this is a very large sound with a palpable sense of depth as well as a wide, full stereo image. (At ten feet, two inches, the Fazioli is the longest concert grand piano in production.) This is also an extremely consistent piano timbrally, from bottom to top, providing a warm, "woody" tone throughout. The various samples work together like a pure conspiracy of sound. I think it's the closest I've come to the acoustic grand experience in my MIDI studio.

Product Summary

PRODUCT:
The Perfect Piano Series, vols. 1 and 2, sample library
PRICE:
$299/vol.
MANUFACTURER:
William Coakley
tel. (800) 742-6625
fax (561) 547-8205
e-mail wdco@aol.com
Web www.wdcoakley.com
CIRCLE #438 ON READER SERVICE CARD

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

Though similar sounding, the "F1" piano is actually a hybrid of piano source materials, definitely part Fazioli but with, I think, some Steinway thrown in for good measure. It is absolutely brilliant and is my personal favorite on the disc. The right-hand melody range (fourth and fifth octaves) sings with little effort over a confident bass and midrange. This could just as well have been the piano with which I had the near-mystical experience that night in the deserted ballroom!

The third offering, "Km EQ," is a piano that seems built for cutting through rock textures, so powerful is its midrange and highs. There's even a hyper-EQ'd version that sounds like an in-your-face tack or lacquered-hammer piano. Neither of the "Km" instruments is looped.

The Steinway on volume 2 has a sparkling tone and features presets with varying levels of dynamic control as well as bass and treble boosts. Finally, there are also versions of both the Fazioli and Steinway that were processed with noise-reduction software.

The pianos on volume 2 require more memory (between 22 and 31 megabytes) than those on volume 1, and the sounds are correspondingly larger. This is definitely a welcome change. Although the bass tones still tend to go to single-cycle loops, they do so after four or five seconds, rendering the reduction effect far less noticeable than on volume 1. Of course, the improvement does kind of make one hanker for 128 MB EIV versions of all of these pianos!

LID DOWN

The two discs composing William Coakley's *The Perfect Piano Series* are as much works of art as they are feats of technical mastery. Creating virtual musical instruments which believably emulate the pianoforte requires not only technique and diligence but discerning musical taste, as well. Coakley is clearly in possession of all three.

Although these discs don't offer the biggest variety or quantity of programs, they do provide carefully distilled, well-balanced, and gorgeous-sounding piano samples—the best you're ever likely to play.

Gerry Bassermann *is a composer, musician, and sound designer who lives in the San Francisco Bay Area.*

Soundtrek The Jammer Professional 2.08 (Win)

By Allan Metts

Music-generation software that's a potent creative tool.

There was a time when I couldn't take algorithmic music-generation programs seriously. If I didn't compose and play the parts myself, I felt I was cheating somehow. But lately, I've begun to see these programs as compositional aids, the perfect tools for getting me out of a creative rut.

Soundtrek's *The Jammer Professional* is an excellent case in point. When my latest chord progression started sounding like the last twelve songs I had written, *The Jammer* let me hear the chords in a new context. Within minutes, my boring rock arrangement was transformed into a cool swing-jazz piece.

The Jammer Professional combines a 256-track sequencer with some highly intelligent composition tools. (Incidentally, Soundtrek also sells a reduced-feature version of the program for $89.) Unlike many other programs in this genre, *The Jammer* lets you record any part you don't want the computer to generate. If you let *The Jammer* do the composing, it can create terrific rhythm, melody, and harmony parts in no time. *The Jammer* can even write chord progressions for you!

FIRST LOOK

I installed *The Jammer* on a Pentium 120 machine and was up and running within minutes. The program supports GM synths and also provides Mix files, which map instrument names to Program Change numbers for several flavors of Creative Labs Sound Blasters and Roland Sound Canvases. You can create your own Mix files, but these cannot include Bank Select messages. Whenever I have such an option, I usually take the time to create instrument mappings for all six banks in my sample-based synth, but I had to settle for GM in this case.

Most of the action is found in the program's two main windows (see **Fig. 1**). The Measures window is used to lay out chord progressions, and the Tracks window controls the behavior of each part. To have *The Jammer* compose something, simply select the measures to compose in the Measures window and the tracks to compose in the Tracks window, and press Comp.

Surrounding the Tracks and Measures windows are several buttons that provide easy access to the program's instruments and menu items. Also present is a set of transport buttons and indicators for punch and loop points, number of measures, feel (straight, swing, or swing 6/8), tempo, key, and current position (in measure:beat and minutes:seconds formats). You can click on most of these indicators to change their values.

MEASURING UP

Using *The Jammer* typically starts with establishing the measures to compose. One click on a button opens the Add Measures dialog box, where you can insert any number of measures into your song. You can specify any time signature, key signature, and mode (major, minor, mixolydian, dorian, etc.) for these measures. You can also have *The Jammer* automatically create drum fills every fourth bar.

Soundtrek recognizes that most people tend to work on songs in sections, and *The Jammer* is organized accordingly. The program only records or composes in the measures between the punch-in and punch-out points. You can set playback looping to include additional measures or turn off looping altogether.

Entering chords is easy: you simply move around the Measures window and type them in on any eighth note. *The Jammer* recognizes all sorts of strange chords; it had no trouble interpreting "bb7#5b9/eb" as a B♭7 (#5/♭9) chord with E♭ in the bass.

The program also provides a handy chord-editing window (see **Fig. 2**) that lets you specify any chord the program supports, which is a convenient alternative to typing chords into the Measure window. You can preview chords with the right mouse button and assign your favorite chords to one of five buttons for quick access.

The Jammer offers a few other goodies in its Measures window. You can place a short or long drum-fill marker in any measure, and the program will generate an appropriate fill at that point. You can also enter up to 35 characters of lyrics into each measure. The program provides tools for copying, moving, clearing, and deleting measures, and it can "pack" the measures to show more of them on the screen (with less detail, of course).

I especially like the Progression Composer. With this tool, the program generates chord progressions appropriate for the music you want to create. You specify a time signature, key signature, and mode, after which *The Jammer*

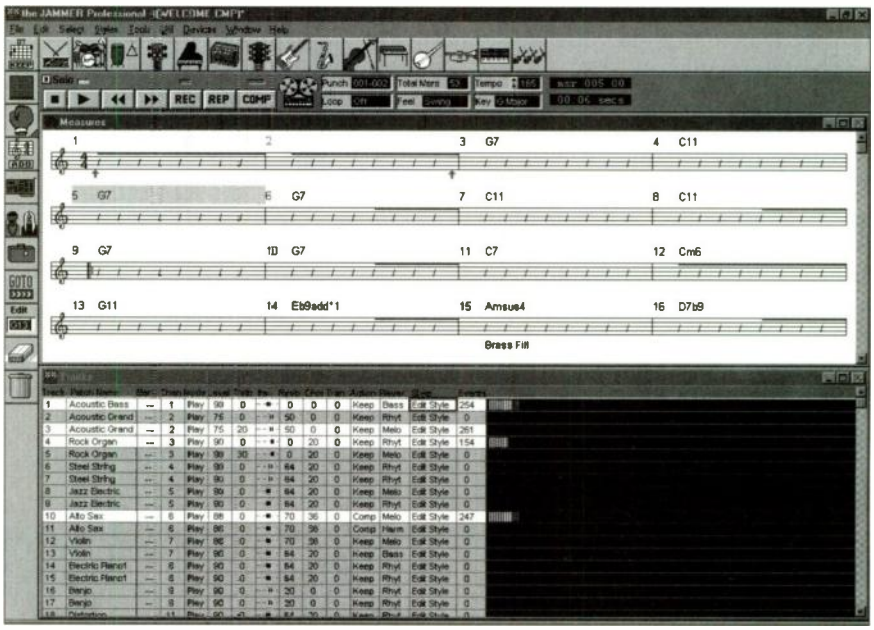

FIG. 1: Most of your time in *The Jammer* is spent in its two main windows. The Measures window is used to enter chord progressions, and the Tracks window controls the behavior of the instruments.

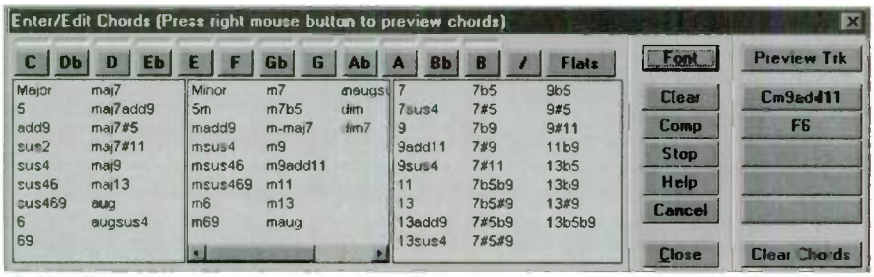

FIG. 2: *The Jammer*'s chord-editing window lets you create and preview any of the chords *The Jammer* supports. Several conveniences are provided for easy chord entry.

creates a new progression each time you hit the Compose button. You can specify how often the chords change, how often they stray from the root or a I-IV-V progression, and whether the progression should sound more like a verse or refrain (or neither).

You can also tell *The Jammer* how often to use specific chord colors. You can choose between "Pop" (triads), "Breezy" (6th, maj7, and 6/9 chords), "Blues" (dominant 7, 9th, and 13th chords), and "Jazz" (6th, 13th, major 9, and 9/11 chords). I have a tendency to use the same chords over and over again, so I find the Progression Composer to be a great idea generator. However, I generally had to compose five or six times before I found something I liked.

ON TRACK

Once the chord progression of your song is in place, the Tracks window lets you record, compose, and play back each instrument track. This window is quite similar to the track screen found in most sequencers, with a different instrument in each row and track parameters in the columns.

The Jammer's Styles assume that specific instruments appear in tracks 1 through 55. (Percussion instruments occupy half of these tracks.) If you want to include an orchestral bagpipe synth patch in your composition, put it in a track above 55. I didn't find this restriction too inconvenient because *The Jammer* lets you filter the display to show only the tracks with MIDI events in them.

For each track, you can specify a Program Change, Bank Select, channel, Volume, Velocity offset, pitch offset (transpose), Pan, Chorus Depth, Reverb Depth, and mute/solo status. MIDI Velocity meters and event counters are also displayed for each track.

Unfortunately, you can only access patches by name; MIDI Program Change numbers are only found in the Mix files. If you stray from the supported synths, you must build a Mix file to display the proper patch names.

(continued on p. 163)

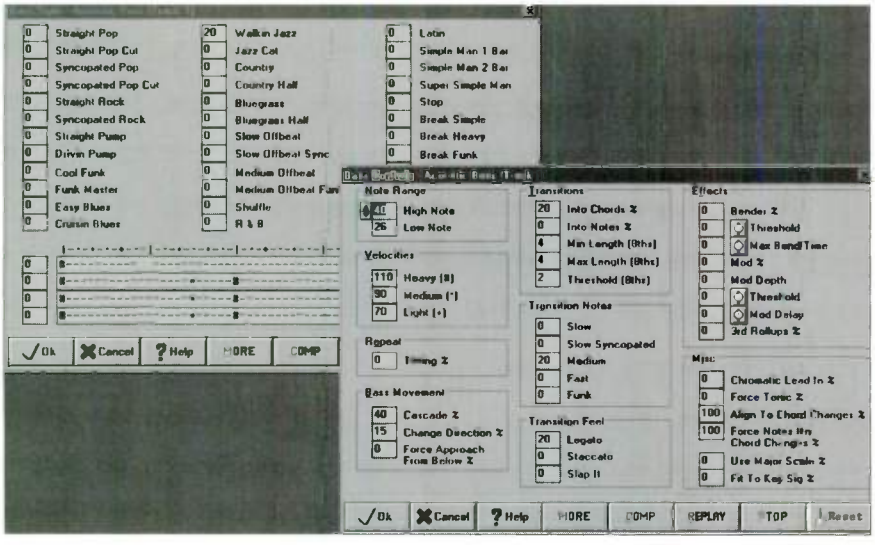

FIG. 3: *The Jammer* provides specialized Composers for different kinds of tracks. This Bass Composer provides extensive control for creating all sorts of bass lines.

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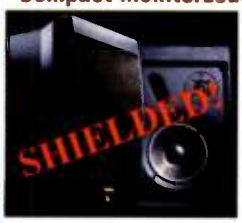
JBL
Control 5
Compact MonitorLoudspeaker



The Control 5 is a high performance monitor for use in a variety of applications. It's smooth, extended frequency response combines with a wide dynamic range to provide acoustic performance that's ideal for recording studios, A/V control rooms & remote trucks.

- 6-1/2" low frequency driver provides solid, powerful bass response to 50 Hz and a pure titanium 1" dome handles high frequency response to 20 kHz.
- Choice of black, gray or white finish.
- A host of mounting systems including ceiling, rack and tripod allow positioning in exactly the right spot.

4206 & 4208
Near-Field Reference Monitors

The 4206 and 4208 near field monitors are 6" and 8" respectively. Both offer exceptional sonic performance, setting the standard for today's multi-purpose studio environment.

- Multi-Radial baffle.
- ABS baffle virtually eliminates baffle distortion.
- Superb imaging & greatly reduced phase distortion.
- Vertical alignment of the transducers across the baffle center.
- Pure titanium diaphragm high frequency transducer provides smooth, extended response.

• Magnetically shielded for use near video monitors.

CASES

CALZONE Case Co

Calzone manufactures a complete line of E.I.A. case products for transporting delicate electronic, computer, audio, and video components. Built to ATA 300 specifications, their rackmount cases offer maximum protection in 3 standard designs– Case in Case, Standard Rack and Shockmount, Floating Case in Case

Titan Series– Developed to meet the rigorous criteria of the U.S military.

Escort Series– Their most popular line of cases, built to ATA (Airline Transportation Association) spec.

LD-ATA Series– Developed especially for the musician ready for the road.

Have any case custom built to your personal specifications.

MIXING BOARDS

MACKIE

MS1202-VLZ
12-Channel Compact Mic/Line Mixer

- Gain control, pan, 2 band EQ, and 2 Aux sends.
- 4 mono, 4 stereo channels (12 inputs total).
- Great for "extra inputs" on the fly.
- Phantom-power.

MS1402-VLZ
14-Channel Compact Mic/Line Mixer

- Mic preamps w/Trim control (channels 1-6).
- 60mm "long" faders.
- Mute switch routes to alt 3&4 bus.
- Low-cut filter.
- Phantom-power.

CR1604-VLZ
16 x 4 x 2 Mic/Line Mixer

- 7 Aux sends, 3 band EQ.
- Large 10-segment LED meter.
- Lowest noise/Highest headroom.
- 16 studio grade mic pre's.
- 3 different setup positions.
- Low-cut filter. • Phantom-power.

The new MS-1202, 1402 and 1604 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.

SR24x4 • SR32x4
Sound Reinforcement Consoles

These consoles 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.

TASCAM
M-1600
16/24 Channel 8-bus Console

NEW!

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 option for inputs and outputs and uses the same, easy to install D-sub connectors as Tascam's more expensive console, 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 and 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 multi-track. Using MiniDisc technology, the 564 has many powerful recording and editing features never before found in a portable recorder.

- 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

STUDIO MONITORS

ALESIS

Monitor 1
Near Field Reference Monitors
IN STOCK!

Monitor Two
Mid Field Studio Reference Monitors

Today's popular music demands more bass at louder volumes than a small near field monitor can possibly produce, the Monitor 2 is the answer.

- 10", 3- way speaker design delivers the same accurate tonal balance and imaging of the Monitor One—but with a much larger sound field.
- 5" mid frequency driver offers exceptional mid frequency detail.
- 1" silk dome high frequency driver delivers a broad but natural frequency response from 40Hz to 18kHz.

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 Series II
Near-field Reference Monitors

The PBM II Series is the industry standard for reference monitors providing true dynamic capability and real world accuracy.

PBM 5 II

- Custom 5" injection-molded bass driver
- Woofer blends seamlessly with the 3/4" polymide soft dome ferro-fluid cooled tweeter providing extended bandwidth

PBM 6.5 II

- 6.5" lowfrequency driver and 3/4" tweeter
- Fully radiused and ported cabinet design reduces resonance and diffraction while providing deep linear extended bass.

PBM 8 II

- High tech 1" soft dome tweeter and 8" driver capable of powerful bass extension under high SPL demands.
- Hard wired crossover features true bi-wire capability.
- Full cross-braced matrix medite structure virtually eliminates cabinet resonance as a factor.
- Ensures precise low frequency tuning by incorporating a large diameter port featuring laminar air flow at higher port velocities.

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PROCESSING

ALESIS

QuadraVerb 2
2 Ch. Master Effects

Alesis' most powerful signal processor, the Q2 offers amazing audio fidelity in a versatile multi-effects unit.

- 100 preset and 200 user-editableprograms.
- 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.

MidiVerb 4
Parallel Effects Processor w/Auto Level Sensing

The **MidiVerb 4** extends Alesis' line of affordable professional multi-effects processing. It provides the sonic quality and programming power required for studio recording and live sound reinforcement at an affordable price. *1 rack space.*

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.

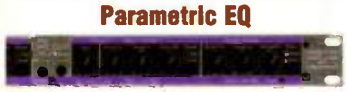
- 250 factory programs including reverb, pitch delay, chorus, flange, phase, EQ, de-essing, compression, limiting, expansion, gating and stereo enhancement
- 20-bit A/D conversion, AES/EBU and S/PDIF digital I/O.
- "Wizard" help menus, 16-bit dithering tools,
- Tap and MIDI tempo modes.
- Single page parameter editing, 1 rack space.

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 unique features, flexibility and sound.

Great for "warming up" digital signals.

PROCESSING

JUST IN

Lexicon

Buy a PCM-80 & receive a FREE Pitch FX Card valid 4/1/97 thru 7/31/97

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 480L and 300L effects systems. From tiny phone booths to the grand canyon, the PCM 90 is incredibly realistic. Together, they make an excellent addition to any rack mount arsenal.

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 accessable from the front panel, as well as TRS and XLR balanced I/O and complete MIDI implementation, the MPX-1creates a new standard for cost and quality in a multi-effects device.

CD & CASSETTE DUPLICATION

marantz

CDR615 / CDR620 Compact Disc Recorder

Both next-generation stand-alone write-once CD recorders they offer built-in sample rate conversion, CD/DAT/MD/DtC subcode conversion, and adjustable dB level sensing. Additional features include adjustable fade in/fade out, record mute time, and analog level automatic track incrementing. A 9-pin parallel (GPI) port and heaphone output with level control are also included.

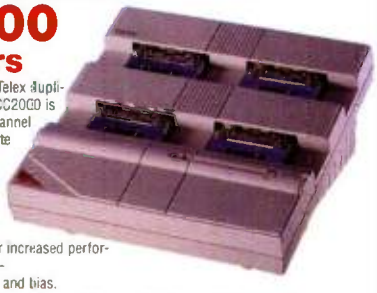
CDR620 *Additional Features–*

- 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

ACC2000/4000
Cassette Duplicators



Designed for high performance and high production, Telex duplicators offer easy maintenance and operation. The ACC2000 is a 2-channel monaural duplicator, the ACC4000 is a 4-channel stereo duplicator. Each produces 3 copies from a cassette master at 16X normal speed and with additional copy modules you can duplicate up to 27 copies of a C-60 original ***in under two minutes.*** And they copy both sides at once!

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 and bias.

Telex Copyette EH Series Duplicators

The Copyette series produce high quality, low cost cassettes in large quantities at approximately 16X normal speed. The 2 versions are capable of duplicating either 1 or 3 cassettes at a time. Available in both mono and stereo.

Stereo Copyette 1•2•1
Weighing only 8 lbs (3.6 kg), this unit has a durable, impact resistant housing and includes a removable power cord, carrying handle and protective cover. Optical, non-reflective end-of -tape sensing system provides gentle tape handling.

Stereo Copyette 1•2•3
This duplicator copies both sides of three cassettes at once, yet it's as small as the 1•2•1. It weighs only 12 pounds (5.4 kg) and includes a hard cover to protect the unit while not in use. It uses all DC Servo motors for the ultimate in reliability.

COPYETTE CASH REBATE OFFER

Recieve direct from Telex $50 cash when you purchase a Copyette EH 121 Mono or Stereo duplicator. Recieve $100 on the Copyette EH 123 Mono.

OFFER AVAILABLE THROUGH MAY 31ST, 1997.

HEADPHONES

AKG

K240M

JUST IN

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

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.

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 features to help you easily dub, edit, record or playback using 1 or 2 cassettes.

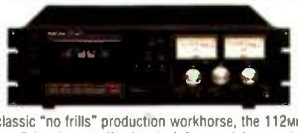
- Dual Auto Reverse, Normal and high-speed dubbing.
- "Dolby HX Pro" extends high frequency performance and minimizes distortion.
- Auto sensing for Normal, Metal and CrO2 tape.
- Functions like Intro Check, Computerized Program Search, Blank Scan and One Program quickly find the beginning of tracks you want.

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.

- Individual/Simultaneous record capability on both decks
- 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 separateHigh performance record and playback heads as well as precision FG servo direct drive capstan motors.

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TASCAM
DA-20/DA-30MKII

- 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 equipment.

Panasonic.
SV-3800/SV-4100

The SV-3800/SV-4100 feature highly accurate and reliable transport mechanisms with search speeds up to 400X normal. Both use 20-bit D/A converters to satisfy the highest professional expectations. The **SV-4100** features instant start, program and cue assignment, enhanced system diagnostics, multiple digital interfaces and more.

FOSTEX
D-15/D-25/D-30

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 hours.
HM1000 Headphone Matrix provides a rotary switch for selection of Stereo, Monon Left, Momo Sum, & M/S (mid-side) Stereo modes.

JUST IN

KEYBOARDS & SOUND MODULES

Roland A-90EX
Master Controller for the Next Century

The A-90EX is an 88-note, weighted master controller with the best keyboard action currently on the market—bar none. 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.

Keyboard Controls

- Master Volume Slider and Global Transpose features allow you to send control commands to your entire MIDI setup without changing the balance between connected units.
- Sequencer Control Section lets you control song selection, tempo and other parameters quickly.
- The keyboard can be split into eight zones and features 20 different controls and connectors.

Superb Sound

- 2 types of stereo-sampled grand pianos, various acoustic and electric pianos (including a great classic Rhodes).
- 128 patches selected from Rolands extensive "JV" and "JD" series library.
- 64-voice polyphony. Built in effects

Extensive Performance Configurations

- Stores up to 64 Performances (128 w/optional M-512E card) which may consist of up to 4 preset Patches along with various user-configurable parameters such as zone, effects, and MIDI channel.

88 Key Keyboard

- Proprietary 88-note hammer-action, velocity sensitive keyboard with aftertouch offers the natural resistance and rebound of an acoustic piano, and the control of a synth.

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 independent effects sets plus independent reverb/delay and chorus.
- 6 outputs, Main Stereo and 4 assignable.
- **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

NEW SR-JV80-10 "BASS & DRUMS" EXPANSION BOARD NOW AVAILABLE!

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 arppegiator 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.

- 8 note polyphonic, 49-key velocity sensitive keyboard.
- Newly developed DSP oscillator.
- "Motion Control".
- Single, Dual, & Split mode, assingable "on-the-fly".
- 128 user/ 128 preset patches, 64 user/64 preset performances.
- Tone control, 12 chorus, and 5 delay effects.

PMA-5
Personal Music Assistant

The PMA-5 is a completely new concept in personal backing machines. This little guy fits in the palm of your hand and includes a 306 tone GS/GM sound source, an 8-track sequencer, and a powerful intelligent arranger with 600 patterns and variations. A custom LCD touch panel user interface makes operation a breeze.

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 multiple 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 sequncing software also available.

JUST IN

Mark of the Unicorn
MIDI Time Piece AV
8x8 Mac/PC MIDI Interface

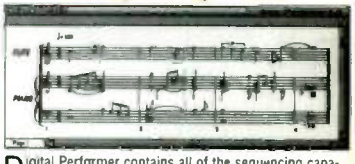
The MTP AV takes the world renowned MTP II and adds syncronization that you rely need like video genlock, ADAT sync, and word clock sync, even Digidesign superclock!

- 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- ***IN REALTIME!***

- MIDI Machine Conrol, Quicktime Video playback.
- Sample rate conversion.
- Spectral effects, pitch correction.
- Real-time editing and effects processing.
- Complete Notation.

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May 1997

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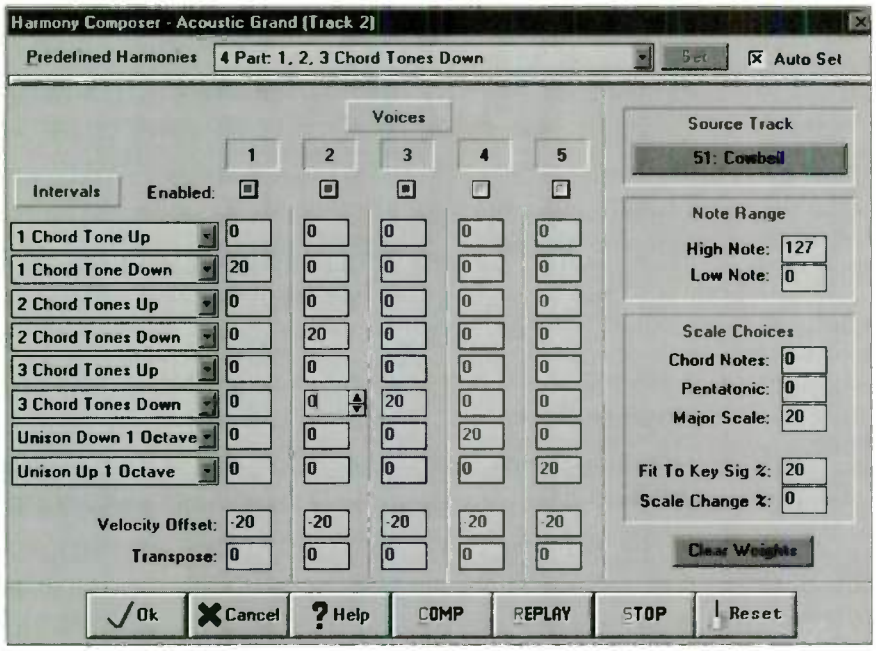

FIG. 4: The Harmony Composer adds up to five voices to a melody that appears on any other track.

COMPOSE THOSE

At the heart of *The Jammer* are the Composers, which are algorithms that generate different musical parts. The Bass Composer, for example, knows how to create a bass part, the Rhythm Composer knows how to comp a piano or guitar part, the Melody Composer can make a Melody, and the Harmony Composer can harmonize the melody. There are separate Composers for the kick drum, snare drum, and ancillary percussion, as well as a Duplicator Composer that is great for layering and stacking sounds.

For each Composer, you provide playing instructions in the form of weightings, probabilities, and values. The weightings are best described as "votes" for a Composer to use a particular playing Style. For example, if you cast twenty votes for "Driving Pump" and ten votes for "Syncopated Rock" in the Bass Composer, the bass will play a driving pump feel twice as often as a syncopated rock feel. The Bass Composer can play in any of 37 different Styles, including four that you define yourself.

But *The Jammer* gives you even more control over the Bass Composer. You can restrict the playing range to certain notes, specify the probability that it will change direction from an ascending sequence to a descending one, and instruct it to hit the tonic a certain percentage of the time (see **Fig. 3**). There are many more parameters for the Bass Composer, and each Composer has a unique set of features.

Even with all this control and complexity, the Composers are easy and enjoyable to use thanks to a consistent user interface. Soundtrek also built in some conveniences that encourage experimentation. For instance, double-clicking a weighting field locks the Composer into that Style. In the Bass Composer example, double-clicking the Syncopated Rock field selects that playing Style, turns off all other Styles, composes the track, and begins playback. I really like this feature, which lets you hear the effects of each setting with little effort.

The Harmony Composer deserves special mention (see **Fig. 4**). This tool lets you add up to five voices to a melody that appears in any other track. Harmonies can include chord tones, scale tones, and octaves, and you have complete control over how often each type of harmony occurs in each voice. The Harmony Composer comes with several predefined harmonies, as well.

Three fields in the Tracks window control the behavior of *The Jammer*'s Composers for each Track. The Action field tells the program to compose something new in that track, erase what's there, or leave the track unaltered. This lets you run each Composer until you get something you like, after which you can lock it in. Only the measures within the punch points are affected. The Player field specifies which of eight Composers will be used when the track is composed, and clicking the Style field opens a dialog box to edit the settings of the chosen Composer.

During the creative process, I found myself working in a predictable cycle. I added eight or twelve measures, entered my chords, and set the punch points to include the new measures.

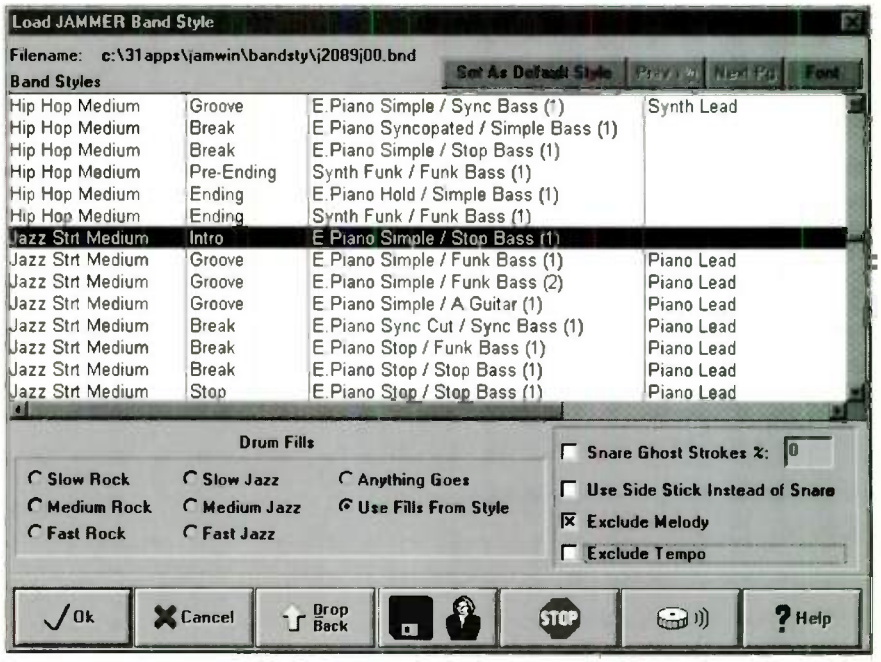

FIG. 5: By displaying lots of information in the Load Style dialog box, *The Jammer* lets you zero in on a particular Style with minimal auditioning.

Then I had *The Jammer* compose some basic tracks in these measures, after which I recorded my parts on top of them. Finally, I added more measures and repeated the cycle.

HIGH STYLES

When the entire band is playing just the way you want, it's time to save all the settings to a Band Style (not to be confused with the individual Composer Styles). A Band Style consists of the song's tempo and feel from the main window, all the settings for each Composer, and the Action and Player settings in the Tracks Window. You can also save all the drum settings separately as a Drum Style.

When saving a Band Style, you specify all the important information about your Styles, such as its genre (blues, jazz, etc.), tempo range, part type (such as break, intro, or ending), rhythmic feel, instrumentation, and melody description. When you're looking for a Style later on, *The Jammer* presents all this information in the Load Style dialog box (see **Fig. 5**).

If you don't want to mess with the Composer controls, you don't have to; *The Jammer* ships with over 200 Band Styles and 50 Drum Styles. These figures are misleading, however, because many Styles are variations on the same theme. I counted thirteen distinct Band Styles and four Drum Styles. The rest are based on these Styles with different instrumentation or are intended for different parts of the song (e.g., groove versus break). You can purchase additional Styles from Soundtrek.

All of the predefined Styles are good, but I want a few more variations of each genre. Nevertheless, the spectrum of modern music is well represented in this program. Among others, the program ships with Styles for bluegrass, Latin, country, and funk. I particularly like the swing-jazz Styles (both slow and fast versions). I also like the blues Styles.

If you write in something other than 4/4 time, you might find *The Jammer*'s Styles a bit lacking. Of all the Styles that ship with the program, only the waltz Styles seem to be intended for something other than common time.

When playing around with the predefined Styles, I was disappointed in one aspect of the program's design: the entire composition can include only one tempo. For example, you can start in a slow blues Style followed by an upbeat pop Style later in the song, but you must choose between the tempos of these Styles for the entire song. The single-tempo limitation is in conflict with the "every section stands alone" philosophy of the program. I have the same argument with the Feel setting.

FEATURE JAM

The Jammer doesn't have to be the only one that fills your tracks with music; you can, too. The program supports MIDI recording on any track, using the same punch points as the Composers. Some handy recording features are close at hand, such as a metronome and automatic channel remapping of your MIDI input to the currently selected track.

The Jammer also provides comprehensive support for Standard MIDI Files (SMFs). When you import an SMF, you can map its tracks to any *Jammer* track and filter out any type of MIDI events you don't want. For programs that support it, you can also move MIDI files to and from *The Jammer* using the Windows clipboard. However, I felt one more importing feature was needed: *The Jammer* requires each percussion instrument to be on its own track, but I don't usually record my drum tracks that way. I wish there was

Product Summary

PRODUCT:
The Jammer Professional 2.08 algorithmic composer
PRICE:
$199
SYSTEM REQUIREMENTS:
80386 or better PC running Windows 3.1; 4 MB RAM; 7 MB disk space; Windows-compatible sound card or MIDI interface
MANUFACTURER:
Soundtrek
tel. (800) 778-6859
or (770) 623-1338
fax (770) 623-3054
e-mail sales@soundtrek.com
Web www.soundtrek.com
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EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ●
EASE OF USE	● ● ● ●
DOCUMENTATION	● ● ◖
VALUE	● ● ◖

Never before has a synth been this much fun, sounded this good and been this affordable.

CS1x Main Features

The CS1x is designed with an intuitive, interactive user interface through lots of dedicated panel controls—knobs— and sound editing features which can easily be manipulated in realtime during performance. The main features include:

- 6 Sound Control Knobs for direct access to key parameters of the currently selected voice as you play, and 2 Scene memories for instant recall of specified Sound Control Knob positions. The Modulation Wheel or a connected Foot Controller can be used for continuous morphing changes between Scene 1 and Scene 2 parameter values.
- 480 GM- and XG-compatible AWM2 instrument voices and 11 drum voices, or kits, in Multi Play mode. Over 1000 voices are available for both Performance mode and Multi-Play mode.
- Performance mode with complete configurations of Layers (4 voices either stacked or in sophisticated keyboard and velocity splits), digital effects and other parameters. There are a total of 128 Preset Performances and 128 User Performances.
- Multi Play mode for multitimbral play of up to 16 different Parts (access 16 MIDI channels; when using an external sequencer), with 32-note polyphony.
- TO HOST terminal and HOST SELECT switch allow direct interface with IBM PC/AT or Apple Macintosh computers.
- 3 Independent DSP digital effect units which can be used simultaneously - Reverb (11 types), Chorus (11 types) and Variation (43 types).
- Arpeggiator with 30 types of arpeggiated chords and 10 timing subdivisions. The Arpeggiator's tempo can also be controlled by an external MIDI clock.
- Computer editor for Macintosh available.

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some automated assistance to help split each instrument to its own track.

Once the tracks are in place, *The Jammer* provides limited editing capabilities. You can scale Velocities, create fade-ins and fade-outs, transpose tracks or portions of tracks, scale durations, and shift events in time. However, *The Jammer* isn't designed to be a full-fledged MIDI editing environment. I fantasized about how cool it would be to have *The Jammer*'s Composers built directly into a high-powered sequencer.

Rounding out *The Jammer*'s bag of tricks are its printing capabilities. You can print any range of measures, and the printout looks similar to what you see in the Measures window: chord changes, lyrics, measure numbers, and drum-fill markings all appear. You can include a song title and subtitle, instructions, author, and copyright information. However, you can't notate a melody. You won't get true lead sheets here.

JAMMIN' OUT

Overall, *The Jammer* is a solid program. By allowing both you and the Composers to record tracks, *The Jammer* provides an environment that is highly conducive to song building. Once you grasp its basic concepts, the program is easy to use. The documentation and online help are good, although they need to give a more thorough explanation of the program's fundamental design. The help function also does not follow the standard Windows convention of appearing when you press the F1 key.

By the time you read this, Soundtrek will have released *Jammer Professional* 3.0. Among other things, the new version will include memory-map Styles, drag-and-drop Style arranging, SMPTE support, automatic chord recognition, support for Windows 95 extended file names, and support for multiport MIDI interfaces. The other great news is that Soundtrek will offer the new version for just $129, which is a real bargain.

The Jammer makes great-sounding music, and it's intuitive to use. In fact, of all the algorithmic-composition programs I've tried (PG Music's *Band-in-a-Box*, Yamaha's *Visual Arranger*, Cool Shoes' *Sound Globs*, and Blue Ribbon's *SuperJam!*), *The Jammer* is best suited to how I like to compose. If you want creative assistance, check this program out.

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

Empirical Labs EL8 Distressor

By Rob Shrock

Solid-state emulation of vintage tube compression and tape saturation.

I will cut to the chase: Empirical Labs' EL8 Distressor is one of the coolest pieces of gear I've come across in a long time. Imagine that you own a vintage compressor such as a Teletronix LA-2a that you could instantly turn into a Fairchild, Joe Meek, UREI 1176LN, or DeMaria compressor by flicking a few switches and turning a few knobs. Now imagine it could also make your digital multitrack sound like analog tape recorded at slamming levels with all of its glorious second- and third-harmonic distortion. Further imagine all of this being under precise and consistent digital control. If you woke from this fantasy to someone tossing an EL8 Distressor in your lap, your dream would be very close to coming true.

The name "Empirical Labs" may not be familiar, but the man behind the name has been around the audio neighborhood for a long time. Founder Dave Derr was a former design engineer for Eventide and an integral part of the development of the H3000 and DSP4000 Ultra-Harmonizers.

IF YOU WANT IT DONE RIGHT

Derr had a problem. He needed a solid-state, classic-knee, single-channel, analog compressor incorporating second- and third-order harmonic distortion to emulate the tube-like warmth and sonic characteristics of classic boxes from the 1960s and '70s. But he also needed analog tape–saturation emulation for use with digital recorders. No single product then on the market satisfied both needs, so Derr decided to design something that would fit the bill. Though he built the Distressor for his own use, it soon became obvious that the unit also had potential as a commercial product.

The 1U rack-mount Distressor creates an amazingly wide range of tonal coloration, all with only four buttons and four knobs. No wading through menus on a tiny LCD display here, folks. The front panel is well thought out, with a look reminiscent of vintage devices. The owner's manual (a 10-page pamphlet) accurately provides knob and button settings for emulating several classic tube, opto-VCA, and solid-state compressors, including those mentioned before.

Just about all the emulation settings, most of which are distinctly different from each other, sound very good and authentic. This unit can handle almost anything you can throw at it, and it sounds great at practically any setting. In fact, by adding a few parameter tweaks to the suggested emulations, you can even overcome some of the inherent limitations found in the original vintage devices.

The EL8 Distressor is definitely a professional unit, designed for exacting engineers and recordists. It even offers balanced XLR as well as unbalanced ¼-inch audio I/O connectors, and it has an internal power supply and nondetachable power cord.

INTERFACE

Four large, white knobs provide control over the Input, Attack, Release, and Output settings. Each knob is arbitrarily numbered 0 to 10, with hash marks further dividing each unit into ten smaller units for accurately documenting settings. Each knob is painstakingly calibrated at the factory and feels very sturdy and precise. Short of having a microprocessor digitally store settings, or being limited by a preset-only design, this is about as accurate as you can get with analog controls. It's easy to reproduce settings from a previous session; as I recorded through the EL8, I simply jotted down the settings on the track sheets along with the instrument names.

In addition to a hardwired Bypass button, the EL8 front panel has three sections, each controlled by buttons. (Battery-backed memory retains the button settings when the unit is powered down.) The Ratio section sets the compression ratio, and the Detector section acts as a combination EQ sidechain and stereo link. The Audio section is used to engage subtle distortion that is characteristic of analog-tape saturation and many vintage tube devices.

Eight different compression ratios are available: 1:1 (no compression, just low-level distortion for warmth), 2:1, 3:1, 4:1, 6:1, 10:1 (Opto), 20:1, and Nuke. Each setting has a corresponding LED. The lower ratios are soft-knee, gradually increasing to hard-knee through the higher ratios. Each ratio sounds completely different, so it takes a little time to become familiar with the Distressor's response.

The Nuke setting is a brickwall limiter. When employed (as the manual claims with a wink), a nuclear blast couldn't cause the output level to budge. That is usually way too much compression for me, but I imagine some great squashed-room sounds for a drum kit could be created with it. The Opto mode simulates electro-optical

The amazing Empirical Labs EL8 Distressor combines virtually dead-on emulation of several classic tube compressors with equally accurate tape-saturation emulation.

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tube compressors such as the LA2, LA4, DeMaria, and Joe Meek units.

The Detector section allows you to sidechain a built-in highpass and/or bandpass filter (centered at 6 kHz) to the input signal, which determines what frequencies cause the compressor to trigger. For example, you could engage the highpass filter sidechain to prevent loud, very low-frequency *p* pops in a vocal performance from overtriggering the compressor and causing the sound to pump. I used the bandpass filter on a distorted guitar solo to make the compressor more sensitive to the upper midrange, which tended to jump out more than the lower notes. The highpass and bandpass filters can be used simultaneously.

If you have two EL8s, you can link them in stereo operation, also using various combinations of the two sidechain filters. Stereo linking is accomplished by using two ¼-inch cables connected to the back-panel Stereo Link In and Out jacks of both units. The Stereo Link In and Out also doubles as the sidechain I/O, so you must choose between the two applications.

SWEET DISTORTION

The Audio button cycles between various combinations of two Distortion modes and a highpass filter (not the same as the sidechain filter, this one is for processing the output signal), each with its own LED indicator. The highpass filter rolls off frequencies below 80 Hz, cutting them about 3 dB down at 60 Hz and by 12 dB at 30 Hz. This works especially well for recording vocals and filtering out a lot of those grungy subfrequencies that muddy up mixes.

▼

The Distressor creates an amazingly wide range of tonal coloration.

When the Audio button is not engaged (no LEDs lit), the Distressor is operating in standard compression mode, with no added distortion and at full-frequency range. The unit is already glorious sounding in this straight compressor mode, and when you engage one of the two distortion circuits, things start to get even better. (The type of distortion we are talking about is mild "coloration" distortion, so don't go pawning off your 1962 Fender Deluxe Reverb amp.)

Distortion 2 produces what Empirical Labs calls "Class A" warmth. This is mainly second-order harmonic distortion generated when the Distressor is compressing, and the sound is extremely similar to tube distortion. (Tube distortion increases the second harmonic.) The effect is subtle, and unless you've recorded a lot with tube devices, you may not get it at first. But once you do, you're hooked.

Remember how Dee Murray's bass on old Elton John records sounded really huge, and it was occasionally difficult to tell exactly what octave he was playing in? That's because there was a ton of second-harmonic distortion being added by tube processing somewhere in the recording chain (probably

from compressors and possibly even tube consoles) alongside extremely hot recording levels. It's hard to get that sound in these digital days, but the EL8 can get you part way there. (Here's another Elton anecdote: do you know how he got that bright, edgy piano sound on those old records? His engineer recorded the piano with Dolby A but intentionally did not decode it on playback. That's also a lot of the reason why the piano tracks are noisy.)

Distortion 3 mode adds some third-order harmonic distortion along with the second harmonic. When analog tape is oversaturated, it produces third harmonics on top of the second-order harmonics. The manual details how to effectively emulate tube distortion and tape saturation. These settings work really well, especially on monophonic instruments such as bass, sax, and vocals. Each of the two distortion modes can also be combined with the highpass filter for further coloration, providing six different settings altogether.

TASTY RESULTS

I had only one EL8 for evaluation so I mainly used it for processing mono recorded tracks, but I tried it out on some stereo material, too. I transferred some DAT mixes to two ADAT tracks and then individually bounced each channel of the stereo mix through the Distressor, using the same setting for each side. I repeated this whole process with three different Distressor settings, creating three unique mixes.

For the most part, the resulting mixes were clearly superior to the originals. The overall timbre was richer, rounder, and more up front in all cases. I could hear some pumping on the first pass (2:1, Distortion 3) due to my blind guessing of the settings. (There was already some stereo-bus compression on the original mix that was probably being emphasized.) Backing off the input to the EL8 and tweaking the ratio and threshold solved the pumping problem on the second pass (2:1, no distortion) and third pass (10:1, Distortion 2). I would imagine a pair of stereo-linked Distressors would work well on the stereo bus in a final mix or possibly even in a mastering situation.

I concluded that Distortion 3 is much more noticeable on full program material than when used on combined individual tracks. Unless you want your mix to sound like an old Motown record, Distortion 2 would be better suited for full mixes, even though Distortion 3 is designed to be more reminiscent of analog-tape saturation. However, I did not get to thoroughly audition the Distressor in a stereo application, so this is speculation.

The EL8 shines as a compressor for tracking vocals. It is a piece of cake to get a good vocal sound with just about any of the milder ratios as long as you have a decent microphone, preamp, and singer. You can clobber the Distressor with level, and it usually still sounds great. Even when you hear it drastically kicking in, it's drastic in that cool way you recognize from classic recordings. Once you get a handle on the attack and release response of the EL8, your vocal tracking will improve tenfold. I would love to own a pair of Distressors to track through all the time, especially for vocals.

Want a fat bass or kick-drum tone? Throw in one of the distortion modes and you're there. If I could use the EL8

EL8 Distressor Specifications

Frequency Response	5 Hz–160 kHz (clean mode +0, -3 dB)
Dynamic Range	110 dB in 1:1 mode; >100 dB in Distortion 3 mode
Attack Time	50 ms to 30 ms
Release Time	0.05 seconds to 3.5 seconds (normal mode); up to 20 seconds in 10:1 Opto mode
THD (Clean mode)	0.025%–0.3%
THD (Distortion 2 mode)	0.05%–3%, emphasized second harmonic
THD (Distortion 3 mode)	0.1%–20%, increased third harmonic
I/O	XLR balanced and ¼" unbalanced, transformerless
Dimensions	1U x 14" (D)
Weight	12 lbs.

on only four tracks, I'd use it for kick, snare, bass, and lead vocal. Just properly processing these tracks would drastically improve most pop recordings. In fact, I lucked upon a great application for the Distressor.

I had tracked a singer's background parts and then comped them to stereo before receiving the Distressor for review. Later, we tracked the lead vocal through the EL8 at 3:1, using the Distortion 2 setting. Magically, the lead vocal stood out from the rest of the mix, particularly contrasting with the background vocals. Because the same singer had sung all the parts with the same microphone and mic preamp, there was a risk of the lead not sounding special enough when combined with the backgrounds. That's not a problem now. The Distressor made the lead vocal bigger and warmer than the prerecorded background parts. The background vocals had also been tracked with more distance between the singer and the microphone, and the result was a nice, musical contrast between the two elements. The moral of this story? Don't use everything on everything.

OPTO MODE

Some of the classic limiters of the 1960s and '70s were designed with electro-optical VCAs. These units were light-controlled and had a distinctive sound. This was true of the Teletronix LA2, LA3, and LA4, and it's also true of

Product Summary

PRODUCT:
EL8 Distressor compressor/tape-saturation emulator
PRICE:
$1,395
MANUFACTURER:
Empirical Labs, Inc.
tel. (201) 728-2425
fax (201) 728-2931
e-mail nextwave@haven.ios.com
Web haven.ios.com/~nextwave
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EASE OF USE	● ● ● ●
AUDIO QUALITY	● ● ● ● ◖
VALUE	● ● ● ●

some of the modern DeMaria and Joe Meek compressors.

The EL8 has a special Opto mode that emulates these devices. By setting the ratio to 10:1, attack to 10, and release to 0, you engage the Opto emulation, and the Input and Output knobs do all the work, just like on the classic units. (The Opto settings are silkscreened on the front panel.) The Opto mode is characterized by an extremely long attack time and an extremely short release time, and the hard-knee slope gives the Opto mode a very different feel from the other settings.

I tried the Opto mode in several applications and found it to be hit and miss. Sometimes it sounded phenomenal, and other times it didn't work well at all. I liked it most when compressing individual instruments, such as bass or guitar, rather than complex material. When I found the right combination of settings and source, the Opto mode was great. Expect to spend some time in "trial and error" mode to get a handle on it.

CONCLUSION

I love this box. I hope to scrape up the cash to buy it; however, it's a bit on the expensive side. Owning two units or a stereo EL8S ($2,695) for stereo applications would be heavenly, but that's really getting into serious dough. However, the Distressor is serious gear.

Considering the importance of compression in getting that big studio sound, I can't imagine every studio not having at least one state-of-the-art compressor. The Distressor is not only a phenomenal compressor/limiter in its own right, but it also accurately imitates *several* phenomenal compressors of the past.

The tube and tape-saturation emulations are pretty much right on the money. That alone means it can work wonders in the primarily digital recording environment of most project studios these days. By adding second- and third-order harmonic distortion to a signal, you can really make the track jump and demand attention in a mix. My advice is to put the EL8 Distressor on your 1997 short list.

Composer-producer **Rob Shrock** *is the keyboardist-arranger for Dionne Warwick and Burt Bacharach. He is currently buried in manuscript paper writing orchestrations for his upcoming solo release.*

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Yamaha P50-m

By Jeff Burger

A great big piano stuffed into a tiny little box.

The ultimate sampled or synthesized piano sound is one of the Holy Grails of electronic music. Yamaha has been one of the companies who have pioneered this genre, spurred by its long-term involvement in both electronic and acoustic instruments.

In the wake of such admirable Yamaha efforts as the Clavinova keyboard line, many people have longed for a module version sans ivories. Yamaha has answered this demand with the P50-m. Does it answer your prayers for a killer digital piano module? Maybe so—let's see.

ARCHITECTURE

The P50-m's raw wave data is the same as the samples in Yamaha's P150 keyboard, but the data has been reformatted so as to fit into an XG-style tone-module chip. However, the envelopes have been modified from the standard XG fare in order to more closely simulate the dynamic character of a real piano. The XG effects and control architecture are in place, the latter allowing continuous control over parameters such as attack, release, brightness, harmonic content, effects depth, and portamento. You also get control over Channel Mode, SysEx, and System Realtime messages. In fact, you get far more control than most users will need.

The P50-m is a half-rackspace device, allowing two units to fit side by side in a single rackspace. Unfortunately, the unit ships with no mounting hardware, but Yamaha offers the optional RK101 rack shelf ($42.95), which will hold two modules. The idea of combining two modules is a good one because the two can be ganged to double the polyphony. A single unit offers 32-note polyphony in mono presets and sixteen notes in stereo presets. Twice that can be handy if you are a sustain-pedal freak.

In a 2-unit setup, one unit is set to receive odd note numbers and the other to receive even note numbers. However, there is no master/slave communication between two P50-m modules; any changes you make to one must be manually matched on the other. Given this need for manual mirroring of adjustments, the odd/even scheme is far superior to a MIDI overflow approach. (Imagine having to get through 16 to 32 voices just to audition the second instrument!)

The P50-m also has a mode that allows the unit to filter data on its receive channel so the data won't be mirrored at the MIDI Out. This allows it to perform the piano parts that would normally be handled by a piano timbre on an XG or other GM module connected in series.

The front panel has a small data knob and seven parameter buttons that control Voice (i.e., instrument sound), Bright (filter cutoff), Reverb Send level, Master Tune (415 to 466 Hz), Note Shift (alias Transpose, ±1 octave), Touch Sensitivity (Velocity curve), and MIDI Channel. Several functions, such as setting MIDI Output mode and resetting to factory defaults, are accomplished by holding one or more of these buttons down while powering up the unit.

The 3-character LED provides only rudimentary visual feedback, forcing you to look up patch numbers, reverb settings, Velocity curves, and so forth. This information is screened on the top of the unit and/or printed in the manual. Curiously, the volume knob is much shallower than the data knob—so much so that it's a bit hard for all but small fingers to get a good grip. Other front-panel elements include a headphone jack and the sliders for a 3-band graphic EQ. This, of course, is much more welcome and functional than accessing these controls via parameter look-up and data wheel.

On the rear panel are the obligatory MIDI In and Out jacks, with the latter doubling as a Thru. One of the stereo audio outs doubles as a mono out. That's it, save for the DC adapter jack.

SOUNDS

The P50-m has a total of 28 presets: nine grands, a honky-tonk piano, a dance piano, one chorused piano, two CP80s, three DX electrics, seven Rhodes, a Wurlitzer, and two Clavinets. The unit is not multitimbral, so you can't multitrack with different sounds simultaneously or layer two sounds. This isn't much of a drawback for a low-cost, piano-only module.

Because this module is so single-purposed, I'll evaluate the character of the individual presets in depth. Admittedly, such an evaluation is largely subjective. After all, a piano is a thing to be felt and experienced rather than discussed in terms of technology. When I played the P50-m for most people, the response was typically a wide-eyed "Wow, that's coming from that little box?" At least, that's their reaction the first time. When I explored various performance nuances, the reality usually set in that this wasn't the same as a real piano. When I asked several friends to play it, the love affair was typically reduced to friendship. Although the same might

Yamaha's P50-m piano module has 28 preset piano and electric piano sounds, most of which are quite impressive. A nice bonus is the 3-band EQ, controlled by front-panel sliders.

be said of any digital-piano experience, there are a few particulars worth mentioning.

The envelopes in the piano presets all seem to exhibit an initial transient that drops off to a sustain/release loop. That initial attack stage is accompanied by a breathing that may be more noticeable to some players than to others. In many patches, the perceived decay-rate/sustain-level parameters seem too abrupt, bottoming out a bit too low a tad too fast. You can hear something like a step in the level drop. Although the initial transients are very good, the final stage of the envelope winds up sounding lifeless by comparison and almost organ-like in the quality and length of its decay/release. This is particularly bothersome when soloing using the pure grand piano patches. This perception was readily pointed out by all the folks who played it.

Despite these issues, the P50-m's piano presets are still pretty scary. The sounds are modeled after concert grands. As such, they are simultaneously bright and full timbred. The low ends are strong and have a nice ring. The high ends are percussive, complete with hammer noise, and true to form, the top octave and a half doesn't respond to the sustain pedal. You can hear some of the break points between sample ranges if you really search for them, but in normal playing you'd never know they were there.

The four "Bright Piano" presets are just that and seem to be modeled after real Yamaha grands. The variations are mono/stereo and just/stretched tuning, in various combinations. The "Bright Pianos" definitely have the biggest, boldest timbres of the lot. They also seem to have a bit of chorus-like effect compared to the others, which is especially prominent in the low end.

The four similar permutations of grand pianos are decidedly darker, with much more abrupt decays. I found them to be the least useful. The lone stereo "Dark Piano" split the difference, offering less animation while retaining brightness and longer decays. This is most likely the piano preset of choice for those who find Asian pianos categorically too brittle sounding.

The "Dance Piano" is brittle with a relatively choppy decay that has "club" and "remix" written all over it. The bright "Honkytonk" variant is disappointing as such because its uniform chorus/detuning gives it a fake, processed persona atypical of the real thing. However, it passed the ever-popular Toto "Hold the Line" test with flying colors. The two "CP80" patches (straight and chorused) brought back memories that I'm not sure were welcome! It actually turned into a pleasant experience: given the fact that it stayed in tune, it had percussive quality that sort of crossed a nylon-string guitar with a piano.

The "DX Pad" preset is very murky and washed in thick chorus, serving its namesake function nicely. The two "DX EP" presets—one with and one without chorus—are very bright and percussive. The chorus struck me as plain and predictable. Both "DX EP" presets had a quality that sounded as much digital (in the additive-synthesis sense) as pure FM. They're not bad, but they aren't the most awesome and quintessential DX pianos I've ever heard.

The Rhodes knockoffs (which Yamaha calls "Roads") are very tasty. There's a stock Rhodes with and without chorus; a softer, less percussive version; and an overly percussive Rhodes that really barks when you lay into it. They're very expressive. There are also three nice "Dyno" versions that sport those extra glassy harmonics on top. Unfortunately, all the Rhodes presets are mono. Although many real Rhodes pianos were mono, many players processed them through stereo chorus units. That same solution is admittedly available here, but it would have been nice to get a dry stereo Rhodes, too. Another glaring omission is the stereo tremolo found in the console versions. Max Middleton would likely not approve.

Like the "CP80" presets, the Wurlitzer clone brought back memories (mostly of filing and soldering those stupid reeds). Once past that, I found it close enough to cut through the years in style. As with the Rhodes, however, tremolo is missing.

Finally, the straight Clav has a fine, stringy bark. The "Clavi with Wah" version mimics the classic, Mutron-processed sound, which may have truly outlived its usefulness fifteen years ago. Key Velocity is mapped to filter brightness in this preset. I would have preferred a different version of a straight funky or muted version.

BEYOND THE PRESETS

You can effect several changes to the presets. The global 3-band EQ makes for nice, quick adjustments—and again, kudos to Yamaha for providing sliders. The other main options are controlled by means of parameter look-up and data knob, and they are remembered for each preset, even when the unit is powered off.

Each preset has a default setting for a hidden lowpass filter's cutoff frequency. The Bright control actually applies an offset value to this default setting. As a result, depending on the preset's default setting, the effective sonic range on some presets can appear to be less than the numeric control range. In general, you can achieve a reasonable amount of variation.

Of greater importance, the eight Velocity-sensitivity curves have much to do with your playing experience. Their value became very apparent when a group of friends, ranging from mousy to heavy-handed, took their turns. Although most master keyboard controllers have control over the Velocity curves they transmit, having a selection

P50-m Specifications

Tone Generation Method	AWM2 sample playback
Polyphony	32 notes
Multitimbral Parts	1
Presets	28 (7 stereo, 21 mono)
Effects Types	11 reverbs, 8 choruses, 3 flangers, 3-band graphic EQ
Velocity Curves	8
Audio Outputs	2 (¼")
Display	three 7-segment LEDs
Dimensions	½ rackspace x 8¼" (D)
Weight	2 lbs. 10 oz.

of Velocity curves onboard can be handy, especially when the P50-m is one of several stacked layers of sound.

If your master keyboard offers a selection of Velocity curves, you might be wise to adjust either the keyboard or the module and stick with that decision. Despite having a choice of Velocity curve options on both ends, the friend with the most gentle touch said that she had to force each note out rather than enjoying the experience of a piano almost playing itself. How much of that is attributable to the P50-m and how much is on the part of my Peavey DPM-C8 weighted controller, I honestly couldn't tell you.

There's also a Reverb Send control, which defaults to a modest level of 48 on a scale of 0 to 127. The good news is that there are twelve reverb types, from Room to Tunnel, plus various choruses (including four LFO-swept choruses called "Celestes" for some unfathomable reason) and flangers, all with detailed parameter controls. The bad news is that they are only accessible via MIDI System Exclusive messages. For an instrument with such a simple essence, I question whether many people will go to the hassle of wrangling effects settings in that manner. (Of course, the fact that those settings aren't accessible from the front panel accounts for some of that simple essence.)

Speaking of SysEx, its implementation is much more thorough than most people are likely to need on this type of unit. Because there is a possibility of ganging two P50-ms, you can set each unit for a different device ID or to respond to messages corresponding to all device IDs.

CONCLUSIONS

The Yamaha P50-m does a fine job of bringing the venerable piano to the digital domain for a modest price. The other classic keyboard sounds are a welcome bonus, and for the most part I found them convincing. I was actually relieved not to have to deal with yet another round of seemingly obligatory strings and bass patches. Of course, my personal studio has stacks of that stuff. Someone looking for an all-in-one box and/or GM should look elsewhere.

As a piano, the P50-m is by no means perfect, but I have yet to meet an electronic piano that is. Did you expect to replace a $25,000 concert grand with a $499 box? For that matter, the first-hand playing experience of hearing any digital piano producing sound out of speakers instead of having the sound seemingly come through your fingers and permeate the room via a resonating soundboard is an issue that might never be completely resolved. One thing's for certain: having an 88-note weighted-action controller is absolutely essential in approaching *any* realistic piano performance experience.

The perception of almost organ-like sustain after the abrupt level drop of the initial transient is the unit's weakest point as a dedicated piano module. You'll probably never notice it among other tracks or players, but the P50-m probably won't cut it for that solo piano album you've been wanting to do.

The closest dedicated piano module to this one that I've tried is the Kurzweil KMP-1 Micro Piano, which retails for about $50 more. The differences in sonic character and responsiveness fall largely in the category of personal taste, just as different players might prefer a Young Chang grand or a Yamaha grand. So next time you're in the neighborhood of your local Yamaha dealer, stop in and give the P50-m a try. I think you'll like it.

The multimedia producer formerly known as **Jeff Burger** *may now be referred to only as the symbol @. His most recent book is* Multimedia Studio for Windows *(Random House).*

Product Summary

PRODUCT:
P50-m piano module
PRICE:
$499.95
MANUFACTURER:
Yamaha Corporation of America
tel. (714) 522-9011
fax (714) 739-2680
e-mail info@yamaha.com
Web www.yamaha.com
CIRCLE #441 ON READER SERVICE CARD

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

Zefiro Acoustics ZA2 (Win)

By Zack Price

Remain in the digital domain without financial pain.

When it comes to digital audio work, one concept is easy to understand: once you've captured audio in the digital domain, keep it there to avoid signal loss and noise. That's often easier said than done because the connections for transferring digital audio data between any two devices may not be compatible. For instance, your DAT deck might support S/PDIF transfers using coaxial (RCA), or it might use Toslink (optical) ports instead. Then again, it might have an AES/EBU interface with XLR connectors. When you start connecting more than one device with digital I/O, the chances of a mismatch obviously increase.

Your computer is not only a production tool for recording, editing, and mastering audio, it is also a junction where all digital audio signals can enter and exit. Therefore, it can pay large benefits to equip your PC with a sound card that has multiple digital I/O options. In many cases, this saves you from having to buy converter boxes and digital audio patch bay/switchers.

Fortunately, you don't need to spend a lot of money to get a sound card that works with a variety of digital audio connections. For $495, the Zefiro Acoustics ZA2 sound card provides three types of digital I/O options and also includes highly useful driver software and utilities.

THE RIGHT CONNECTIONS

The ZA2 is a half-length ISA card with RCA and optical S/PDIF I/O on its faceplate. The optical port cannot be used as an ADAT Lightpipe interface. Also on the card's faceplate is a 15-pin D-sub port that connects to a breakout cable containing a pair of AES/EBU (XLR) I/O jacks and a pair of RCA jacks for analog stereo output monitoring or mixdown. The ZA2 is a 2-channel card, and the different types of inputs are not simultaneously available. As we'll see, the card can route the same two channels of audio to all three sets of digital outputs and the analog outputs.

This is a full-duplex card, meaning you can record and play back at the same time. Like many Windows sound cards, the ZA2 uses two 16-bit DMA channels (one for recording and one for playback) to accomplish this. Even though there are only three possible 16-bit DMA channels available, you can easily use two ZA2 cards in a single system. The driver software dynamically allocates DMA channels so that if one card is operating at full duplex, the other card will automatically function in half-duplex mode (record or playback, but not both). That means you can have a 4-in, 2-out or 2-in, 4-out system at the most.

You can also manually set each card's DMA settings in the Properties window of the Windows 95 Device Manager. In this section, each card can be set to half duplex (one DMA channel), which allows you to use three ZA2s. I can't think of any reason for using that many half-duplex cards, but the feature is there should you need it.

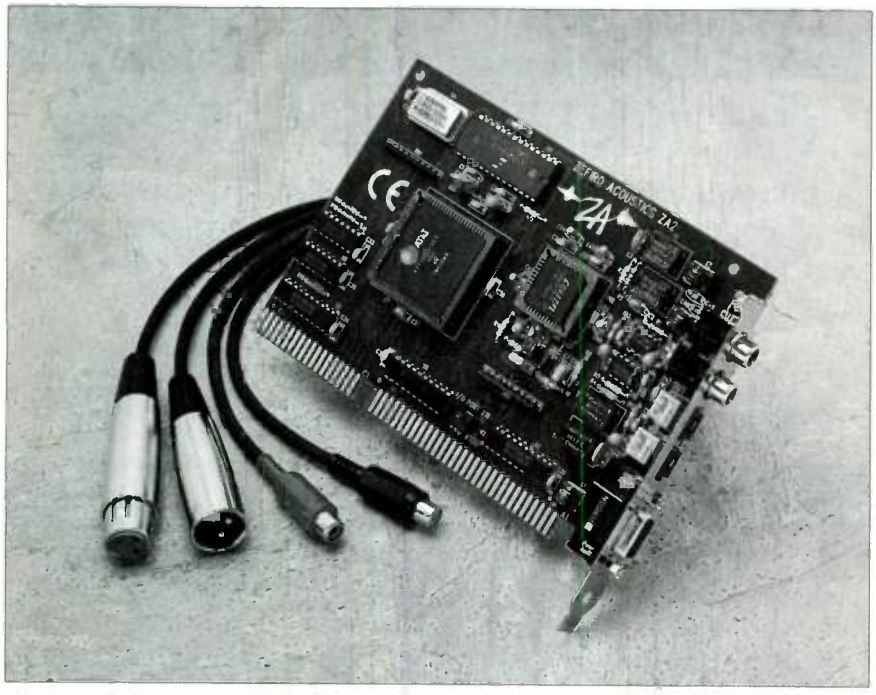
One obvious use for the ZA2 card is to transfer prerecorded digital audio into the computer from devices with different types of digital connectors. However, you can also use the ZA2 as the primary sound card for recording live tracks into digital audio sequencers, stereo sound editors, and multitrack recording programs. Of course, you will need to use a DAT deck or A/D converter as a front end to perform this task.

One of the ZA2's cooler features is Copy Digital Audio. When you select this option from the Control menu (see **Fig. 2**), you can dub digital audio directly through the card without using any digital audio software or recording data to the hard drive. This is great for making DAT-to-DAT or CD-to-DAT dubs between devices that use different types of digital audio connectors.

DRIVING ALONG

The ZA2 card currently comes with drivers for MS-DOS, Windows 3.1, and Windows 95. Windows NT drivers should be available by the time you read this. The driver software's main job is to configure the ZA2's programmable logic device (Xilinx 3030) and 24-bit DSP chip (Crystal 4920) so that the card will function. Because the card is configurable in software, updates in features and functions can be easily implemented.

The ZA2 needs the UPBIT driver software for the Xilinx 3030 and the



Zefiro Acoustics' ZA2 is a full-duplex ISA card that has coaxial and optical S/PDIF I/O jacks on its faceplate and a 15-pin port that connects to a breakout cable containing AES/EBU (XLR) jacks and RCA analog outputs.

UPSIM driver for the Crystal 4920. These must be installed manually in Windows 3.1 and DOS. The AUTOEXEC .BAT file must be altered to start these programs upon boot-up or the card will not turn on.

Fortunately, loading the Windows 95 driver is more streamlined. UPBIT and UPSIM load and run transparently in Windows 95, so there is no need to perform any of the cybergymnastics required with the Windows 3.1 and DOS drivers.

The only difficulty I encountered with the drivers occurred while using a dual-boot system, i.e., one with both Windows 3.1 and Windows 95 operating systems installed. The card worked just fine in Windows 95 but froze up right after the opening fanfare in Windows 3.1.

To be fair, the DOS installation program warned me not to install Windows 3.1/DOS drivers in a dual-boot system; I did it anyway to see what would happen. However, the two driver versions should have worked because they reside in different operating systems. Neither Greg Hanssen at Zefiro nor I could determine the reason why it didn't work.

Fortunately, this problem isn't as serious as it may seem. Many dual-boot users maintain both operating systems just to run Innovative Quality Software's *SAW Plus* in its natural Windows 3.1 environment. However, when the ZA2 card is used, *SAW Plus* runs absolutely glitch free in Windows 95. In fact, I was so impressed with their combined performance that I scrapped Windows 3.1 from my computer.

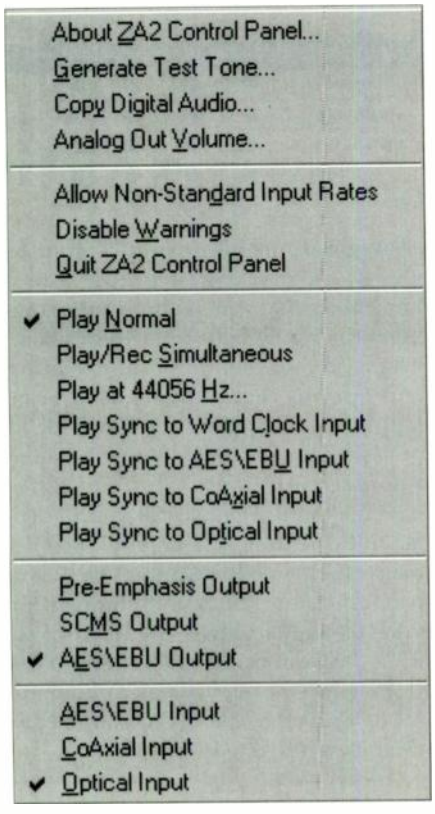


FIG 1: The ZA2 can be controlled easily via the menu accessed from the Windows 95 taskbar.

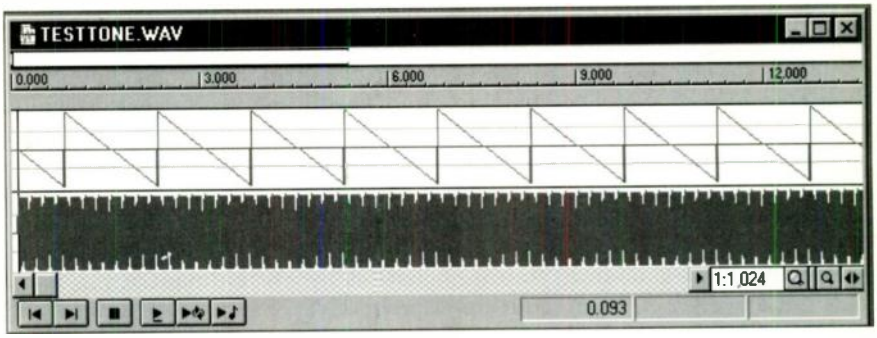


FIG. 2: Graphic display of the test-tone output. At this resolution, the sawtooth shape of the click pulse can be seen easily. Increasing the view resolution would make the 500 Hz tone's sinesoidal waveshape apparent.

UNDER CONTROL

You can control the ZA2's various functions from its menu in the Windows 95 taskbar (see **Fig. 1**). At the bottom of the menu, you can select a type of input (optical, coaxial, or XLR). Selecting one of the three inputs switches the ZA2 into a pass-through mode in which the digital input is monitored by all three sets of digital outputs. This lets you simultaneously record one source and dub it to three different devices in one pass. The next time the card plays back any audio from the computer, the pass-through mode switches off. This prevents digital looping errors from occurring when recording to a DAT.

If you check AES/EBU Output specifically, the ZA2 will encode the digital output stream with the AES/EBU subcodes that some DAT decks require. You can also select Pre-Emphasis Output to set the emphasis bit in the subcodes. However, you should only do this if the digital audio data was originally recorded with the preemphasis setting.

Checking SCMS Out will engage the Serial Copy-protection Management System. This ensures that when you record the card's output to DAT, no one will be able to make more than one digital copy of the DAT tape unless they use a deck or sound card that strips off the SCMS bits. However, because SCMS is an easily bypassed feature, this setting will likely be left unchecked.

Although the ZA2 is a digital I/O card, you can also control its analog output for monitoring or mixdown purposes. You just select Analog Out Volume or right-click on the ZA icon, and a volume slider for the analog signal appears onscreen. Digital input or output is not affected by changes to this control.

For level-setting and diagnostic purposes, the ZA2 also generates test tones. When Generate Test Tone is selected, a low-frequency sine wave is generated on the right channel while a steady, sawtooth-shaped click is generated on the left channel (see **Fig. 2**). Zefiro Acoustics recommends you make a DAT recording of this test signal for future diagnostic testing of the card and your DAT deck.

PLAY NICE

In Play Normal mode, the ZA2 can play any 8- or 16-bit WAV file at the file's original sampling rate, which can be from 5 kHz to 60 kHz. Most of the time, you will use this setting. In addition, the ZA2's DSP chip lets you automatically convert between any two sample rates while recording.

You can also force the ZA2 to play all WAV files at any sampling rate from 5 kHz to 60 kHz, regardless of the original sampling rate. The most common use for this feature is to pull down the sampling rate to 44.056 kHz for synching to video. Keep in mind, though, that forcing a change in playback rate will alter the pitch.

In the Play Normal mode, the card handles any sample-rate conversion for playback and recording at 5 kHz to

60 kHz, as well as mono-to-stereo and 8-bit to 16-bit conversion. Twenty-bit recording should also be available by the time you read this. The ability to do this on the recording side is an extremely important plus. Play Normal will also handle full-duplex recording provided that no sample-rate conversion is involved. You can force the card to be in full-duplex mode all the time with the Play/Rec Simultaneous option, but then the card must constantly receive a valid signal at its digital input.

You can also synchronize card playback to any of the three digital inputs. This option is used for chaining two ZA2 cards together for 4-channel output. Card 1 uses the Play Normal mode and acts as the master clock. Card 2 syncs to the output of the first card so that both will play at exactly the same speed. According to Zefiro Acoustics, this makes multitrack digital audio playback more precise inasmuch as many programs have a hard time dealing with clock drift from multiple card sources. In this mode, you will probably use the analog outputs for mixdown, although you can run the two cards' digital outputs to two D/A boxes for 4-channel output.

Lastly, the ZA2 card allows users to record digital audio at nonstandard sampling rates. Under normal circumstances, the ZA2 only detects sampling rates of 32, 44.056, 44.1, and 48 kHz. However, if you're one of those rare people who record at unusual sampling rates, this card will accommodate you. The vast majority of us will probably never use this feature.

TIME'S UP

The ZA2 is multitalented, multipurpose tool that allows you to record digital audio to and from seemingly incompatible sources. Its high-quality analog outputs allow you to monitor your work with confidence, so you'll know that what you hear is what's coming into or going out from your system. The card also includes useful utilities and options that belie its $495 price tag. Best of all, these functions all fit on a single card, which is a real system-resource saver.

As the owner/operator of a small digital audio editing service, this card fits many of my needs extremely well (too bad it doesn't have ADAT compatibility). If you also have (or frequently work) with multiple digital audio devices, and you need a way to communicate with all of them, ZA2 may be just the ticket for you.

Product Summary

PRODUCT:
ZA2 digital audio card
PRICE:
$495
MANUFACTURER:
Zefiro Acoustics
tel. (714) 551-5833
e-mail info@zefiro.com
Web www.zefiro.com
CIRCLE #442 ON READER SERVICE CARD

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

Zack Price *owns and operates Tin Ear Productions. Please address any inquiries to tinearpro@aol.com.*

Sound Werx Vortexual Amplitude

By Christopher Patton

A maelstrom of vintage synth sounds for the new industrial age.

The SWAT Team at Sound Werx Applied Technologies has gone back to the future with its audio-CD sample library *Vortexual Amplitude*, a collection of vintage ARP, Moog, Electrocomp, Sequential Circuits, Oberheim, and other analog-synth sounds. It's chock-full of filter sweeps, sample-and-hold effects, and all the other quirky little bleeps and bloops for which these machines were famous.

The disc is organized by instrument and contains single notes and 4-bar phrases. The sounds are sampled at C and include one to six samples spaced an octave apart. Many are also sampled at G. The booklet names the synth used for each sound, the key range, and, for phrase loops, the tempo in beats per minute.

Right away, you'll notice something unusual for this kind of sample disc: the tuning is 100 percent accurate. Almost every analog-synth sampling CD I have ever heard contains some samples that are out of tune. And unlike the samples on most discs I've used, all sounds on *Vortexual Amplitude* are long enough to make great loops.

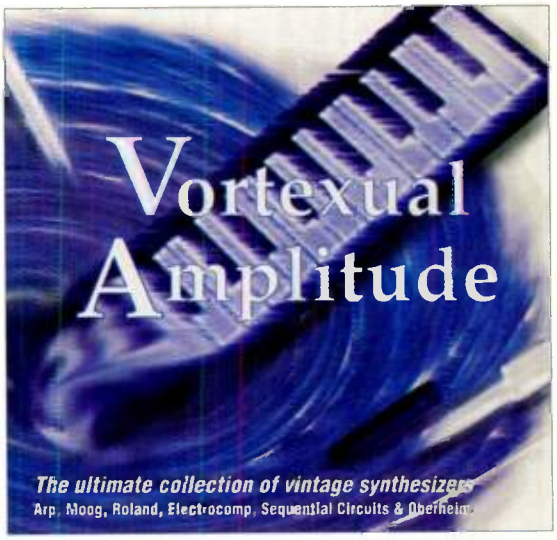
ARP FOR ARP'S SAKE

The first section features fourteen sounds from the ARP 2500, ranging from a regenerated growl effect to pulse-wave bass tones. The "Fat Azz" bass sound was quite effective when arpeggiated and imported into a techno dance groove I had previously sequenced in *Cakewalk*. After I decreased the speed of "SFX Loop" from 136 to 125 bpm, I was able to use this 4-bar sample-and-hold effects loop to syncopate the groove even more.

I only have one problem with the sounds in this section. Call me old-fashioned, but I really enjoy the string and woodwind sounds that can be created with the 2500, and I was a little disappointed that none of these samples were included. Although the disc was recorded with the industrial-music sound designer in mind, the cover calls it "the ultimate collection of vintage synthesizers." A few woodwinds and a few string sounds would have helped this compact disc live up to its billing. But Dave Frederick, Sound Werx Applied Technologies' president (and son of former ARP VP Dave Frederick, Sr.), tells me that another disc with more classic sounds from the ARP 2500 and 2600 is on the way. I can't wait!

The next section features three classic resonance, sync, and filter-sweep lead sounds from the ARP Odyssey. If you enjoyed the synth lead sounds made famous by George Duke, Herbie Hancock, and Larry Dunn of Earth, Wind & Fire, you'll be happy to add these sounds to your sample library.

But as much as these sounds reminded me of the early analog synths, they also reminded me of the limitation inherent in sampling: the inability to manipulate the sound in the same way as on the original instrument. I used to really enjoy tweaking the filter control on the Odyssey for expression



Sound Werx *Vortexual Amplitude* audio-CD sample library provides analog synth sounds aimed at the industrial-music sound designer.

while soloing, but a sample is a static snapshot of an analog-filtered signal. Of course, you can digitally process a sample, but it's not the same. And it sure would be nice to be able to clock the two sample-and-hold loops in this section to a sequence instead of having to clock the sequence to the loops. You can definitely feel a "one" beat in these loops, and unless you have some time-stretching program, such as Steinberg's *ReCycle*, be prepared to feel locked in.

CAT SCAN

What impressed me most about *Vortexual Amplitude* were the percussive leads, fat filter bass, and suboctave bass sounds from the CAT SRM synth. The disc's producers sampled the most usable sounds from this synth, with enough variety to complement many styles of music, such as rap, funk, and R&B. Straight off the disc, the bass sounds from this synth are *fat*. I mixed a tweaked sample of the "Sub Oct Perc Bass #2" using some flanger effect from an Ensoniq ASR-10 sampler and then layered it with "Lately Bass" from the Yamaha TX81Z, the most overused synth-bass patch in the rap world. I came up with a fat-bottomed bass sound that will cover any hard-core drone, and with enough attack to "bump" the hip-hoppers. This is now one of my favorite bass sounds.

The CAT section also contains more G-note sample ranges than any other. When sounds such as "Chirp Bass Patch" and "Perc Lead" are sampled across the keyboard, you get some percussive tones in the upper range. For example, these sounds morph into funky Clavinets when played staccato and into "moist" pads when played chordally in the upper range.

SAMPLE AND HOLD ON

By far the most generously represented synth on this disc is the Electrocomp EML 101. This synth supplies a dozen sample-and-hold loops at four tempos: 120, 140, 160, and 180 bpm. The cool thing about these sounds is that they are more musical than mechanical. The CD booklet gives each sample a suggested tonality, which made matching a loop tonally to an existing compositional key much easier. These loops can work well with just about any rhythmic style of music, including odd time signatures. I really found these loops to work best, however, with straight, 4/4 rock beats for a high-tech disco sound.

There are plenty of other sounds on this disc that deserve an honorable mention, such as "Bass Voice 8'" from the ARP Omni II, "5th Pad" from the Memorymoog, "Lead Patch" from the Roland SH-1, "Perc Fat Bass" from the Sequential Circuits Pro One, and "Perc Square" from the Oberheim OB-SX.

Despite all of these great sounds, I found myself wanting more; there are so many other synthesizers that I would have included in "the ultimate collection." But Sound Werx makes up for not including the ARP 2600, Minimoog, and other "classic" synthesizer sounds found on most vintage-synth CDs by developing sounds from synths to which most people didn't have access, such as the ARP 2500 and Electrocomp EML. Most vintage-synth CDs don't offer the pink and white noise, sample-and-hold effects, and ring-modulation sounds *Vortexual Amplitude* provides.

At $45, the price of this CD is just where it should be. If you're looking for unique, digitally tuned samples, backed by a company with top-notch producers and sound designers, you'll pay it gladly. So whether your thing is urban, industrial, techno, or acid jazz music, get some *Vortexual Amplitude*, and go make some noise!

Product Summary

PRODUCT:
Sound Werx *Vortexual Amplitude* sample CD
PRICE:
$45
DISTRIBUTOR:
Eye & I Productions/Voice Crystal
tel. (800) 726-7664
or (510) 625-7888
fax (510) 625-7999
e-mail sndwerx@epix.net
Web sndwerx.ptd.net
CIRCLE #443 ON READER SERVICE CARD

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

Christopher Patton *is president of Ars Nova Productions, offering artist management, publicity, and recording services in the San Francisco Bay Area.*

Budget compressors may sound fine on certain instruments, but they don't always offer enough features to address any application. It's smart to have at least one compressor in your arsenal that offers control of five basic parameters: compression ratio, threshold, attack, release, and output gain.

PERCUSSION

Congas and bongo drums generally benefit from high ratios (between 10:1 and 20:1), a relatively slow attack (40 to 60 ms), and a medium fast release (0.15 to 0.25 second). These settings bring out finger strokes and other low-level licks while maintaining the articulation of slaps and pops. Use a low threshold setting and a healthy dose of gain reduction; then crank up the output gain.

For triangle, try a moderate ratio (4:1), slow attack (50 to 60 ms), and fast release (0.01 to 0.05 second). The same settings with a slightly slower release (0.10 to 0.25 second), work well on syncopated Latin cowbell parts. For a tighter, ¼-note cowbell part, increase the ratio and slow down the release.

Finger snaps sound great with lots of compression. Try a high ratio (10:1 to 15:1) and fast attack (10 ms), but not so fast as to mute the impact of the snap. Then, depending on the tempo of the song, use as slow a release as possible to thicken the sound, but make it fast enough that no gain reduction catches the next snap.

I generally refrain from using compression on tambourines, shakers, or shekeres unless it's needed to smooth out a poor performance or a bad recording. A light ratio (2:1 or 3:1) is generally sufficient for the task, along with a medium attack (20 to 40 ms) that won't kill the accents. Use a very fast release (0.01 to 0.05 second) so as not to screw up the sustain of the beads, jingles, or whatever. In the case of a Brazilian pandeiro part, a higher compression ratio may be in order to bring out performance subtleties.

BASS GUITAR

You can add smoothness and sustain to "steady" bass-guitar parts with a mild ratio (2:1 to 4:1), a medium attack (20 to 40 ms), and a medium to slow release (0.3 to 1 second) depending on the tempo of the tune. If it's a slow ballad and the compressor offers a soft-knee control, engage that as well to further increase smoothness. For more sustain, use a slower release time.

Funk bass lines with slaps and pops sound good with higher compression ratios, from 5:1 to 20:1. Try slowing down the attack time (to let the percussive hits get through) and dialing in a relatively fast release (0.06 to 1 second). The faster the incoming sixteenth notes, the faster the release time you'll need to get out of their way. Dial up a threshold of -12 dB or -15 dB for a big gain change, and make up for the gain reduction with the output-level control. Listen carefully to the results: some compressors will "thin out" the sound.

ACOUSTIC GUITAR

I rarely go higher than a 5:1 ratio for acoustic guitar, typically keeping the

ratio around 2:1 or 3:1. For the average strummed part, a medium attack (20 to 30 ms) and medium release (0.15 to 0.25 second) works fine. If the part is faster and more percussive, use a faster release. For a finger-picked performance, keep the attack slow enough to let the pluck of the strings ring clearly. For bottleneck-slide solos, try a faster attack, say around 10 ms. But no matter what the style, keep gain reduction low (no greater than 6 dB or 8 dB) to maintain a natural sound.

ELECTRIC GUITAR

If you want gonzo sustain on that lead-guitar solo, here's your chance to use the maximum ratio, ∞:1. If your box doesn't offer the infinity setting, a 20:1 or 30:1 ratio should do the trick. Dial in a relatively slow attack (40 to 60 ms) and release (1 to 2 seconds) and allow the gain-reduction meters to hit the 12

▼

The relationship between threshold and ratio is critical.

or 15 dB mark. For less sustain and more bang, lower the ratio to 7:1 and speed up the release to somewhere between 0.05 and 0.15 second. For funky rhythm parts, try a medium ratio (4:1 to 7:1), a medium attack (20 to 30 ms), and a quick release (0.10 to 0.25 second).

COMPRESSION ROULETTE

Here's a little insider's secret: According to more than one manufacturer, pan pots on audio gear are allowed rather generous tolerances—as much as five or ten percent. In other words, the numbers won't necessarily translate *exactly* from one box to the next. On top of that, every compressor has its own sonic personality. Therefore, think of the settings offered here as guidelines, not hard rules. Use your ears and tweak the settings to taste. And by all means, if they don't work for your mix, throw 'em out!

Assistant Editor **Brian Knave** *is always one compressor short.*

sold hundreds of thousands of records, that managers, producers, lawyers, and the record label are all paid from the gross, leaving little or no royalties when the net profits are doled out.

options The contract periods beyond the initial period of an agreement. A typical recording contract may offer a one-album deal with an option for three more albums if the first album is successful. In these instances, the exercising of such an option is usually solely at the discretion of the record label. Record contracts often specify the number of options, who has the right to exercise the options, and what obligations the options are based on (e.g., a certain sales plateau or payment of an option advance).

per diems Daily payments, intended to cover living expenses while an artist travels to work on a project. Per diems usually are discussed, for example, when a musician is going on a tour or a producer is traveling to work on a project.

performing rights society Better known by their names (e.g., ASCAP, BMI, and SESAC), these organizations license, collect, and distribute performance royalties generated from various sources, including radio and television airplay, on behalf of songwriters and music publishers.

points This is short for *percentage points*, usually discussed when a party participates in the royalties of a deal. A great deal of confusion arises when the basis of the points is not clearly defined or understood by the parties involved. For example, if an agent shopping a record deal asks for "two points," does that mean she is entitled to 2 percent of the retail price of the record, or 2 percent of what the artist is making from the deal? Given a $15 record and a 10 percent artist royalty, this is the difference between the agent receiving 30 cents per record and three cents per record—a major swing when it comes to receiving royalties.

recoupable expenses All expenses an artist has to "pay back" before royalties begin to accrue. Once again, if these expenses are not clearly defined, creative accounting could keep an artist from receiving money for a substantial period of time, even if his or her album has healthy sales. Some typical recoupable expenses include artist advances, recording budgets, third-party advances, promotional expenses, and other reasonable costs associated with the project. Clearly, one of the drawbacks would be having differing views of what "reasonable costs" are.

reversion of rights The return of certain rights to an artist that have been granted to a third party. The reversion of rights usually happens with either the termination of a relationship or the occurrence or nonoccurrence of a certain event. For example, in publishing agreements, some writers negotiate the reversion of their copyrights in musical works if the publishing company is unable to secure uses for the songs within a specified time.

royalties Payments made to artists based on exploitation of their work. Different types of royalties apply to different types of exploitation. For example, artist royalties and mechanical royalties are based on record sales, whereas performance royalties are based on how often a particular song receives airplay.

work for hire When a copyrighted work is purchased by a commissioning party, the artist providing the work does so as a work for hire, thus he or she is no longer considered the author or copyright holder of the work. All rights to the copyright of the work are owned by the commissioning party as if that party had created the work. Many writers and producers inadvertently provide their services as a work for hire and find out too late that they have given up all of their right to ownership and, consequently, to royalties to a third party.

zero royalties What you'll earn if you don't fully understand the language of the music business and how all of these terms link together in the formation of business relationships and agreements. By memorizing this brief glossary and expanding your business vocabulary along with your musical vocabulary, you will be sure to secure what is yours and make sound music-business decisions.

San Francisco Bay Area entertainment lawyer **Michael A. Aczon** *has recently learned twenty Beatles songs on his Fender Strat and is contemplating his career options.*

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ACOUSTIC CONSULTING

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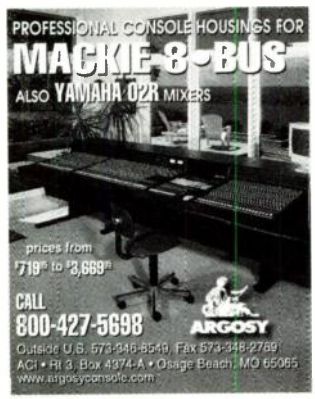

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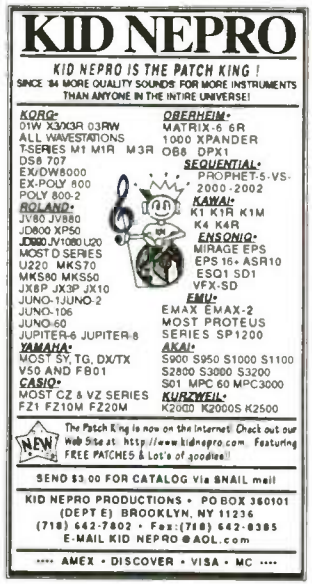

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TECH PAGE

The Next Speaker

A new technology promises truly flat speakers.

By Scott Wilkinson

As electronic musicians, we are accustomed to seeing new technologies replace older equipment at a dizzying pace. However, there is one type of hardware in which the underlying technology has remained essentially unchanged for eight decades: speakers. Most speakers produce sound with a cone or dome attached to a magnetic coil that vibrates in response to electrical signals from a power amp. A few alternative designs, such as electrostatic panels and "ribbon" speakers, have emerged in the past few decades, but the good ol' magnetic coil has remained the dominant type of speaker transducer since it was first introduced.

This could change if a British company called New Transducers Limited (tel. 44-1480-451777; fax 44-1480-437177; e-mail info@nxt.co.uk; Web www.nxt.co.uk) sees its vision to fruition. The company has been working for several years on a new type of speaker technology called NXT. Unlike magnetic-coil designs, which typically require a sealed or ported enclosure, the NXT system stimulates a free-standing flat panel to vibrate, which sends acoustic sound waves into the surrounding environment.

Others have tried to make flat-panel speakers for some time; electrostatic designs are popular among audiophiles. A traditional electrostatic speaker includes a lightweight, stretched panel that behaves like a pond hit by a pebble when it is excited by an impulse (see **Fig. 1**). This produces a coherent phase structure, which has been considered essential in accurately re-creating a sound. However, inducing a large diaphragm to vibrate in this manner also causes several problems, such as *beaming*, in which higher frequencies are radiated in a narrow beam due to destructive interference from different parts of the panel. This leads to an uneven distribution of frequencies in the space around the speaker.

The NXT system takes a different approach. The panel material is very stiff; so far, a carbon-fiber material seems to work best. A small electromagnetic or piezo transducer is attached to the panel at a mathematically determined location (not the center of the panel), which stimulates complex vibrational modes all over the panel's surface (see **Fig. 1**). This *distributed-mode* vibration radiates sound waves evenly from the entire surface, which essentially becomes a myriad of virtual point sources.

According to the company, this technology produces plane-wave dispersion and uniform directivity at most frequencies, with no hot spots. The panel acoustically couples to the entire room, and the radiated intensity decreases more or less linearly with distance rather than by the inverse-square law because of this plane-wave dispersion and the absence of an enclosure. In addition, the actual travel of the surface is microscopic, leading to highly linear operation and low distortion. The claimed frequency response is flat down to 100 Hz or so, which means that speakers intended for high-fidelity applications, such as studio monitoring, might include a conventional woofer element, as many electrostatic designs do.

Potential applications include a laptop computer with flat-panel speakers that slide out from behind the screen. For example, NEC will include small NXT panels in its new multimedia laptops, which should be in full production by June of this year. Another British company called Mission intends to launch a full range of NXT hi-fi and home-theater speakers in September, and other companies will be introducing NXT-based products next year. One of the most interesting possibilities is a video-projection screen that doubles as a center-channel speaker in a home-theater setup. NXT is a very cool idea that could have an enormous impact on how we listen to music.

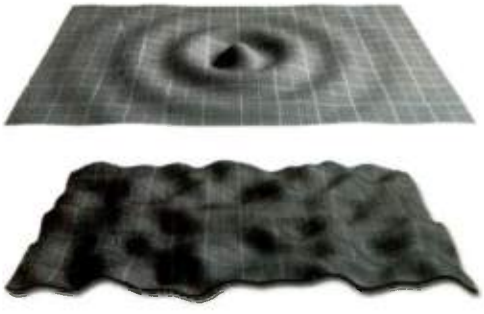

FIG. 1: A traditional electrostatic panel vibrates coherently (top) whereas an NXT panel distributes the vibrations over the entire surface (bottom).

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