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May 1999

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NEW VLZ PRO

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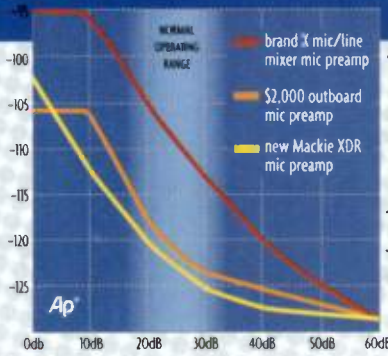
Two years in the making, XDR™ Extended Dynamic Range the pristine sonics and awesome specs of high-end ou



A new standard for low noise in the critical +20 to +30dB operating range.

If your hype alarm is going off, we can't really blame you.

The proof is in the listening. Visit your nearest Mackie dealer and audition the XDR™ preamp design in our new VLZ PRO Series compact mixers. Use the most expensive microphone they have. Compare XDR to ultra-expensive outboard mic preamps. Compare it to our compact mixer competition. Bring your golden-eared audiophile friends. We think you'll be amazed. We honestly believe that you've never before heard a mic preamp this good.

If money is no object, don't read any farther.

If you can afford $1000 a channel for outboard "audiophile" mic preamplifiers, DO IT! Because no matter how much you spend on a microphone, its ultimate performance depends on how it interacts with the preamp it's plugged into.

Yes. We openly admit it: Many high-end mic preamps can effortlessly amplify the slightest sonic nuance, creating an aural panorama that's breathtakingly realistic, excitingly vivid and truly 3-dimensional in scope. For years, they've provided fidelity that just hasn't been possible with the "stock" mic preamps built into mixing consoles.

Until now.

A massive R&D initiative.

We can confidently say that no other company in the world has spent the sheer number of engineering hours —and $250,000 in R&D costs that we just did on a single new microphone preamplifier design.

The XDR team started with blank paper, concerned only with matching or exceeding the performance of $500 to $2000-per-channel esoteric preamps. They went through hundreds of iterations and revs and spent countless hours subjectively listening (and arguing). They started all over again several times. They scoured the world for rare parts. Then they spent more time critically listening and evaluating the

NEW!

1604-VLZ PRO

16x4x2 · 16 XDR™ preamps

60mm faders • 16 mono chs.. • 4 sub buses • main L/R • 3-band EQ with sweepable midrange (12kHz & 80Hz shelving, 100Hz-8kHz mid) • 18dB/oct.@ 75Hz low cut • 6 aux sends per ch. • Constant Loudness pan controls • 4 stereo aux returns • RCA tape inputs & outputs • 16 channel inserts, 16 high-headroom line inputs • 8 direct outs • TRS balanced outputs • Switchable AFL/PFL Solo • Ctl Room/Phones matrix with Assign to Main Mix & separate outputs • Ctl Rm/Phone level control • 12-LED metering plus Level Set LED & RUDE Solo light • Aux 1 & 2 Pre/Post • Aux Send master section w/level controls • Solo buttons with LEDs • Stereo Aux Return assign section with EFX to Monitor & Main/Submix assign • built-in power supply • solid steel main chassis • BNC lamp socket • Rotatable I/O pod allows 5 different physical configurations

NEW!

1402-VLZ PRO

14x2x1 · 6 XDR™ preamps

60mm faders • 6 mono & 4 stereo chs. • 3-band EQ @ 12kHz, 2.5kHz & 80Hz • 18dB/oct.@ 75Hz low cut • 2 aux sends per ch. • Constant Loudness pan controls • 2 stereo aux returns • RCA tape inputs & outputs • 6 channel inserts, 6high-headroom line inputs • XLR & TRS balanced outputs • switchable +4/mic level output • ALT 3-4 stereo bus • Switchable AFL/PFL Solo • Ctl Room/Phone matrix with Assign to Main Mix & separate outputs • Ctl Rm/Phone level control • 12-LED metering plus Level Set LED & RUDE Solo light • Aux 1 Pre/Post • EFX to Monitor • sealed rotary controls • built-in power supply • solid steel chassis

NEW!

1202-VLZ PRO

12x2x1 · 4 XDR™ preamps

4 mono & 4 stereo chs. • 3-band EQ @ 12kHz, 2.5kHz & 80Hz • 18dB/oct.@ 75Hz low cut filter • 2 aux sends per ch. • Constant Loudness pan controls • 2 stereo aux returns • RCA tape inputs & outputs • 4 channel inserts, 4 high-headroom line inputs • XLR & TRS balanced outputs • switchable +4/mic level output • ALT 3-4 stereo bus • Ctl Room/Phones matrix with Assign to Main Mix & separate outputs • Ctl Rm/Phone level control • 12-LED metering plus RUDE Solo light • Aux 1 Pre/Post • EFX to Monitor • sealed rotary controls • built-in power supply • solid steel chassis

IVE ESOTERIC MIC PREAMP SOUND

mic preamp circuitry gives our new VLZ PRO™ Series oard microphone preamplifiers.

design with every high-end microphone you can think of. Then they brought in veteran recording and live sound engineers for more exhaustive listening tests.

What we ultimately ended up with is not just an awesome sounding design. XDR is also **a)** highly resistant to damage caused by "hot patching" (caused by routing a phantom powered mic through a patch bay); **b)** remarkably independent of cable-induced impedance variations; and **c)** able to reject extremely high RF levels without compromising high frequency response.

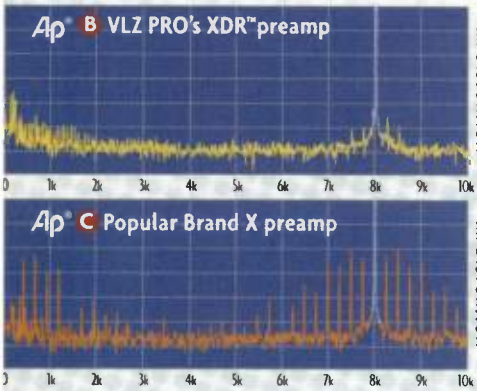
WARM, DETAILED SOUND
0.0007% THD
NEAR DC-TO-LIGHT BANDWIDTH

OVER 130dB DYNAMIC RANGE FOR 24-BIT, 196kHz SAMPLING RATE INPUTS
ULTRA-LOW IM DISTORTION & E.I.N. AT NORMAL OPERATING LEVELS
IMPEDANCE INDEPENDENT
BEST RF REJECTION OF ANY MIXER AVAILABLE

Rejecting RFI without tuning out sound quality.

Because a mic preamp must amplify faint one millivolt input signals up to a thousandfold (60dB), its rectification components can also pick up radio frequency interference (RFI) from AM and FM stations, cell phones and pager transmitters—even microwave ovens—and amplify them to audible levels.

We assaulted RFI on three fronts. First, we incorporate bifilar wound DC pulse transformers with high permeability cores that reject RFI but don't compromise audible high frequency response. Second, we carefully-matched high-precision components for critical areas of the XDR preamplifier. Third, we direct-coupled the circuit from input to output and used pole-zero-cancellation constant current biasing (which also avoids increased intermodulation distortion at high signal levels).



XDR vs. Brand X FFT analysis of mic preamp Intermodulation Distortion. Mixer trims at 30dB, 0dB at inserts. The white spike at 8kHz is the fundamental tone used to "generate" the surrounding distortion artifacts—which the Brand X mic preamp has far more of.

Bottom line for the non-technical: Our new VLZ PRO Series has the best RFI rejection of any compact mixers in the world. Period.

Controlled Interface Input Impedance.

If a mic preamp isn't designed right, it will actually sound different depending on the impedance of the microphone and the cable load!

XDR's Controlled Interface Input Impedance system accepts an enormous range of impedances without compromising frequency response. Whether the mic/cable load is 50 ohms, 150 ohms or 600 ohms, XDR mic preamp frequency response is down less than one tenth of a dB at 20Hz and 20kHz!

Ultra-low noise at "Real World" gain settings.

Many mixers that tout low E.I.N. (Equivalent Input Noise) specs can't deliver that performance at normal +20 to +30dB gain settings. Graph A on the other page charts E.I.N. versus gain level for our new VLZ PRO Series vs. a major competitor's mic/line mixer preamps and a "status" outboard mic preamp retailing for about $2,000. As you can see, our XDR design maintains lower noise levels in the critical +20 to +30 gain range than either competitor.

There's still more:

- **0.0007% Total Harmonic Distortion.** The lowest ever in any compact mixer.
- **Flat response.** Not only are XDR mic preamps flat within a tenth of a dB across the bandwidth of any known microphone, but are also only 3dB down at 10Hz and 192kHz!
- **116dB CMRR** 20Hz to 200kHz and above.
- **Super-low intermodulation distortion** at very high operating levels (charts B&C at left) thanks to instrumentation-style balanced differential architecture, linear biasing and use of DC-coupled pole-zero-cancellation constant current that frees the mic preamp from power supply fluxuations.

We could go on and on this way. But like we said at the start of this ad...

Hearing is believing.

Visit your nearest Mackie Dealer. Select a really high-quality condenser mic and try out the new 1604-VLZ PRO, 1402-VLZ PRO and 1202-VLZ PRO Think of them as expensive esoteric mic preamps... with really excellent compact mixers attached.

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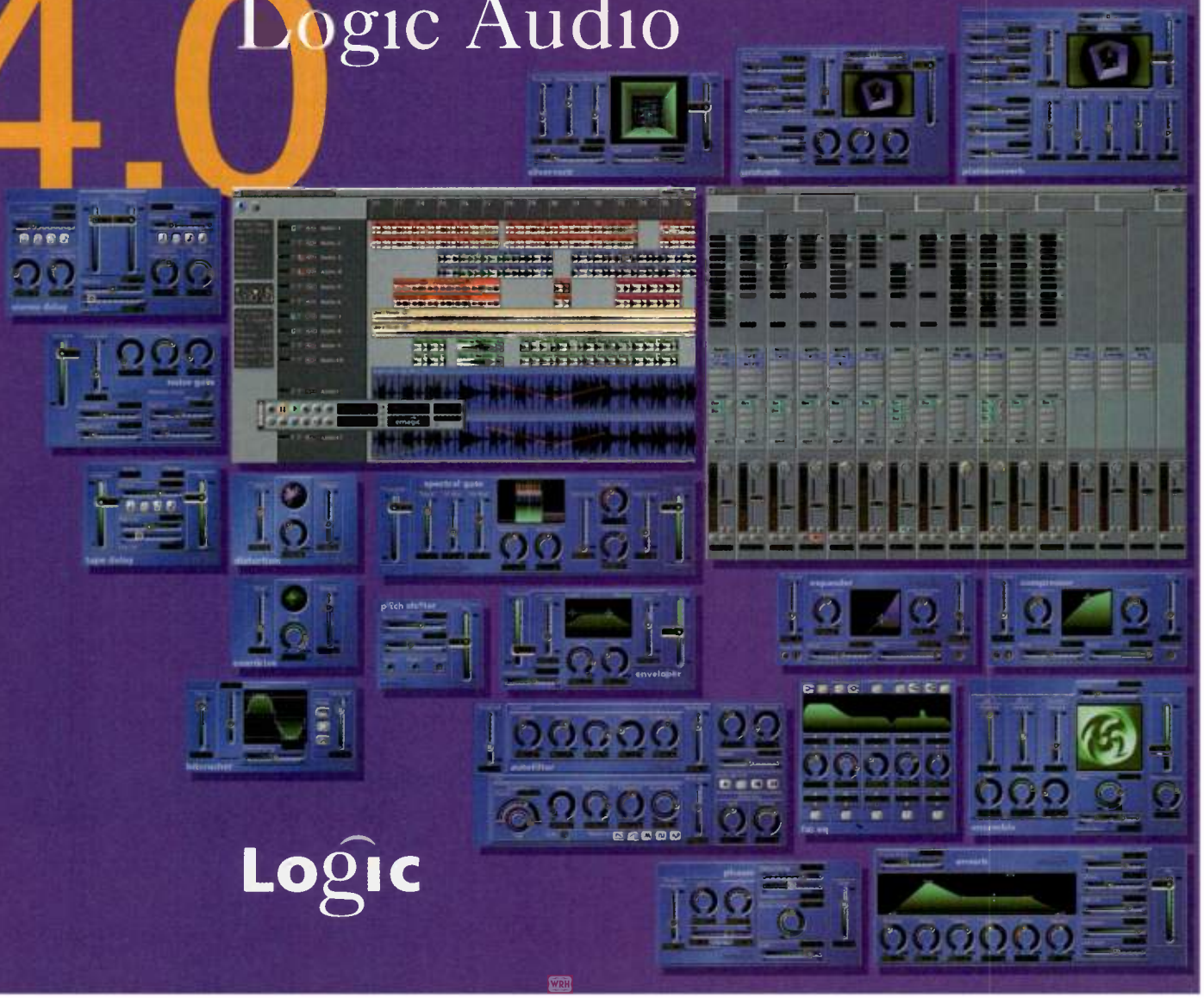

Logic

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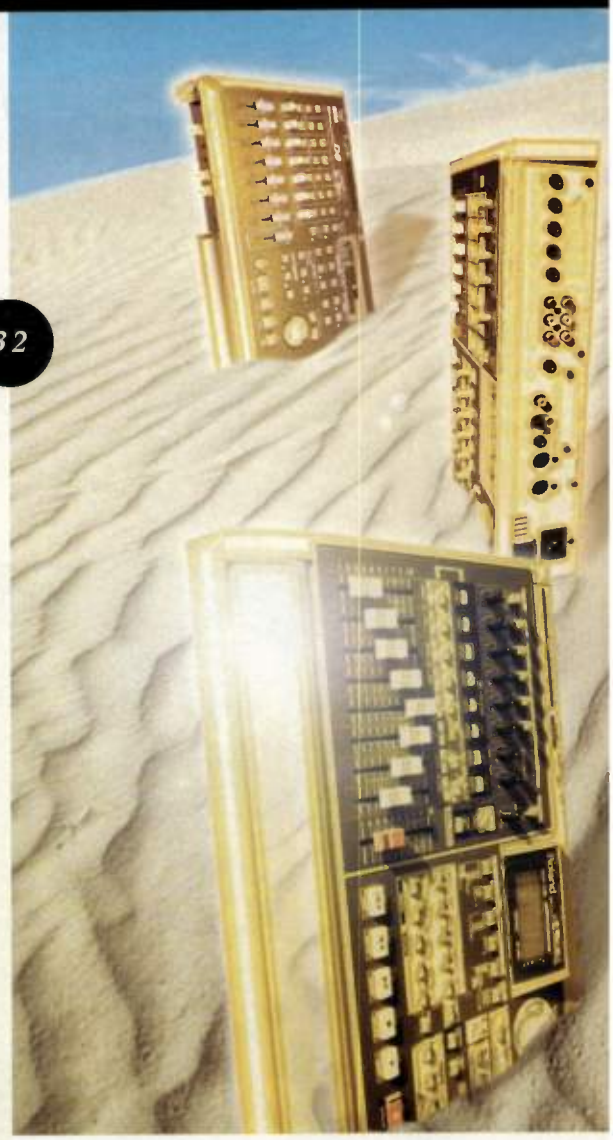
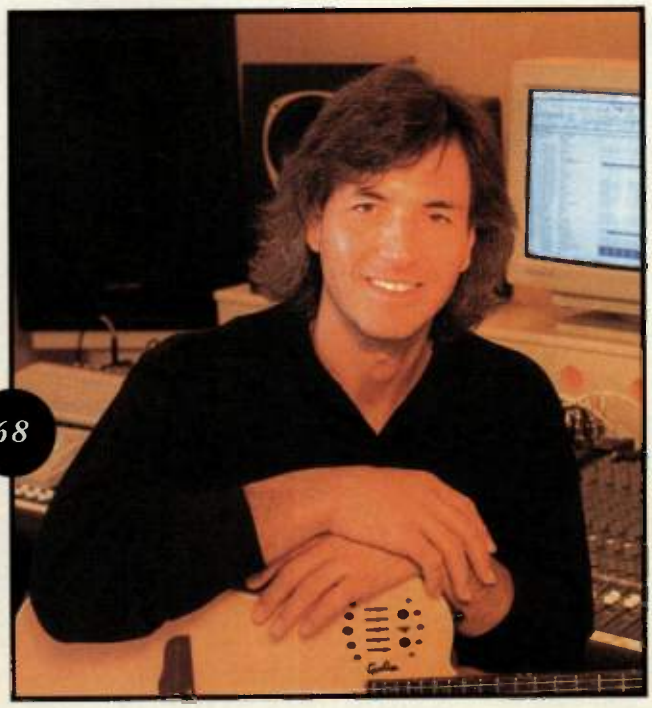
FEATURES





DEPARTMENTS

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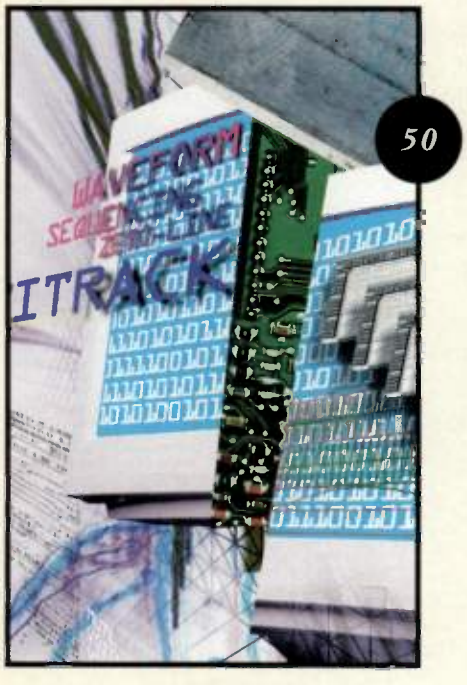
COLUMNS

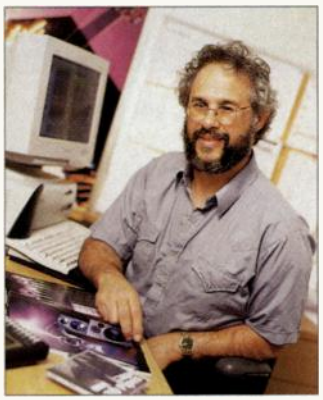


REVIEWS

Cover: Photo illustration by Chris Jarrin

In Search of Cibola

In July 1540, Spanish explorers led by Francisco Vasquez de Coronado conquered Hawikuh, a Zuni pueblo in present-day New Mexico. Fray Marcos de Niza, who had viewed the pueblo from a distance, had reported it to be "bigger than the city of Mexico." The legend went that Hawikuh was the smallest of seven cities in a region called Cibola, where "women wore strings of gold beads and men girdles of gold." Gold apparently was there for the taking, and Coronado, like most conquistadores, was enthusiastic about taking.



ANTHONY PIDGEON

Thus, he set out on what turned into a 600-mile, two-year search, at first for the seven golden cities of Cibola, and later, for the equally fabled Gran Quivira. Coronado found no gold, although his expedition did considerably extend the Spaniards' knowledge of southwestern North America. However, because he had found no gold and lost two-thirds of his men, his expedition was deemed a failure.

Nevertheless, with all that—and despite committing numerous atrocities along his route—Coronado went down in history as a great explorer. All of which proves that sometimes you can make heinous mistakes and fail in your quest, yet still achieve something lasting and meaningful—if you are willing to take some chances and work tirelessly.

Like Coronado, musicians sometimes believe the legends about gold to be had for the taking. It's easy to read about the gold gathered by the Pizarros and Cortéses of the music business (or the Presleys and McCartneys) and to dream of the hit records we will make if only we can gain access to the necessary tools. The problem, for many years, however, has been the prohibitive expense of outfitting the "expeditions." And although the price of exploration has dropped dramatically over recent years, outfitting an entire personal studio is still costly.

But with the arrival of portable digital studios—integrated hard-disk recorder/mixers that build upon the tradition of the cassette portastudio—would-be musical conquerors on a budget can outfit themselves with a complete rig that sounds practically as good as systems that many of the big "explorers" use. As of this writing, seven models are available (see "Seven Studios of Gold" on p. 32), and if you have the talent and the work ethic and are willing to take a few risks, the right one can help you achieve your dreams of musical success.

Of course, it takes a lot more than great tools to find musical gold. You have to write or interpret a great song, create a sparkling arrangement, deliver a compelling performance, construct a stellar mix, and—if your goal is commercial success—put forth a sterling marketing effort. Without these factors, and a lot of luck to boot, you could easily invest two years in your expedition and still come away with no gold.

Even if you don't find riches, though, many measures of success exist besides commercial achievement or public acclaim. Like Coronado, you can still accomplish something important and lasting. At the least, you can have fun along the way, make fascinating new discoveries, and come away feeling that the whole thing was eminently worthwhile, gold or no gold.

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LETTERS

A+ ON AM

The March 1999 "Square One" column ("Modulation Synthesis Methods") by John Duesenberry is one of the most thorough examinations of AM that I have ever seen outside of a textbook. He manages to concisely fit most of the basics of modulation synthesis into about 3½ pages, which, considering the history and examples he includes, is absolutely amazing! I haven't yet seen your FM article, but if it is as thorough, it will join this one as required reading for my new students. If they can read it in **EM**, perhaps it won't seem so bizarre when I draw it on a chalkboard.

I hope your readers will go out and listen to your Stockhausen example. I had the privilege of studying synthesis with a musicologist, so I was turned on to things like Morton Subotnick's "Silver Apples of the Moon." Because of that, I became a composer who believes that sound design should be an integral part of composition. I know that a lot of us are out there, but we just don't hear enough about tonal exploration. Maybe with the recent explosion of software-based synths, people will explore timbre more again. Today's software synths allow almost infinite combinations of synthesis methods, producing an almost infinite diversity of timbres—most people don't yet know the potential under the hood.

I love to watch new students' eyes the first time they hear what a particular form of synthesis sounds like—it restores that childlike wonder that compels you to turn that knob to see what it would sound like. Occasionally you do get a student who looks at you cross-eyed and says, "When would I ever use that sound?" If they have a hard time with abstract music like Stockhausen's, you might turn them on to Emerson, Lake, and Palmer's *Tarkus* or *Brain Salad Surgery*, or even walk them through examples in Pink Floyd's *Animals* or *Dark Side of the Moon*. Before you know it, they'll be showing you examples in the music *they* listen to and create!

Lawrence Benzmiller
thaumatus@aol.com

SOUNDHACK VERSION

After reading the review of *SoundHack* 0.888 in the March issue, I wanted to get my hands on it. It looks like the CalArts FTP site contains only version 0.881. A quick Web search also turned up bupkus on version 0.888. Has the habit of reviewing prerelease versions of software now spread to shareware as well?

John Zielinski
Frankfort, IL
jzielinski@pobox.com

John—While **EM** *does occasionally discuss prerelease versions of software in the context of a feature story, we do not review these versions. For example, we might do a special sidebar evaluating a prerelease version; in such cases we always state that we are dealing with a beta. But our main review tests are done with shipping software.*

Despite the version number, SoundHack *0.888 was not "prerelease" software. (As you may know,* SoundHack *has been around for many years.) Our reviewer began working with version 0.881, and midway through his review he was provided with version 0.888, which at the time was available only to registered shareware users but was uploaded to the Web site in mid-March. According to developer Tom Erbe, version 0.890 should be available for download by the end of April.—Steve O.*

KICKIN' THE LITTLE GUY

I picked up a copy of the February 1999 issue of **EM** because of "Kickin' It," the article on kick-drum mics. The article was informative—it's difficult to describe the sound of a microphone because it's so subjective and personal. But I was appalled by the authors' unfounded decision to level "the field somewhat by considering only those [mics] priced between $250 and $400, thereby eliminating the two lowest-priced models." Which two were left out?

Were the authors afraid that the two "cheapies" might compete strongly and, heaven forbid, beat out the expensive competition, or were they instructed to ignore the lower end of the market? Why not test all available mics, especially the low end (in terms of price) of the market? If there are some real bargains out there, let the readers know. Maybe the expensive manufacturers will get wind of it and adjust their prices accordingly. Hey, we are all working musicians trying to save money, yet get the results we want.

I still use $12.95 Superscope mics (I think they were a "bargain" line of Marantz years ago) for my cymbals and hi-hat, and they sound terrific. A major Ottawa recording studio discovered these gems by testing everything they could find, and these little electret condensers surprised and delighted even the pros.

Don Macdonald
Dartmouth, Nova Scotia

Don—I agree that it would be helpful to readers if we were to test all available mics to determine whether there are some real bargains out there, but that would be impractical. Compiling a microphone face-off is challenging. As you point out, it's difficult to describe the sound of a microphone, and that difficulty is compounded with each mic added to the test. It's hard to listen to, remember, and critically compare more than a half dozen very similar sounds. (Try it sometime—it doesn't take long before your ears get fatigued and confused by the subtle differences.) If we didn't limit the number of mics, it would be impossible to make accurate evaluations.

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Of course, we also want to make sure that we are comparing like products. To do this, we use multiple criteria, including type of mic, polar pattern, and designated use. Price is one of the criteria because it usually reflects, to some degree, the quality of materials, workmanship, and design. (If you built a Yugo, would you want it compared to a Mercedes?) We have been criticized—both by manufacturers and readers—for setting broad price ranges in previous microphone face-offs. So this time we narrowed the price range.

The two mics we left out were the CAD NDM 11 ($119) and the Samson Q3 ($224.99). Most of us agreed that it was a stretch to have the $119 CAD mic in the running. Initially we intended to include the Q3 (the price range would have started at $225, rather than $250); Samson, however, requested that the microphone be omitted, and because we were looking for ways to limit the number of mics, we happily complied.

By the way, I own an original Superscope cassette deck (the kind that has variable pitch control), and in some applications, the condenser mic in that unit holds its own quite well against some small-diaphragm studio condensers that cost way more—I know because I have compared them. Although I'm not familiar with the Superscope electret you mention, based on my experience with the built-in condenser in my tape deck, I'm not surprised by your raves.—Brian K.

IN SEARCH OF ASIO

I have been reading with interest that Steinberg is opening up the ASIO specification for other developers ("Tech Page: Kicking ASIO," January 1999). This is great, and I applaud **EM** for reporting it. I would like to know how one gets this spec.

In my vocabulary, "open specification" usually means that I can download the spec from a Web site. Steinberg's Web site has no mention of ASIO being an open spec. Is ASIO really an open spec, or is it one of those specs that only certain companies can get access to if they sign a licensing agreement?

Bruce Frazer
Seattle, WA

Bruce—ASIO is indeed an open spec; you must apply to become a Steinberg developer, but I'm told that this is relatively easy. You can request a software developer's kit (SDK) application by e-mailing asiodev@steinberg.net. The Steinberg developers' Web site (http://service.steinberg.de/webdoc.nsf/show/development_e) includes the SDK application and information for the VST and WaveLab plug-in architectures, but as of this writing Steinberg has posted no similar information regarding ASIO. (They're putting the finishing touches on version 2.0 of the spec.) However, it should appear on that site soon, perhaps by the time you read this.—Scott W.

SUSTAINED TRANSFER RATES

What is the typical sustained transfer rate for IDE Ultra DMA hard drives and Ultra SCSI drives? All of the printed rates are bursts—no one seems to want to print the sustained transfer rates.

Thomas H.
thuggins@telespectrum.com

Thomas—I found specs on Ultra SCSI drives without too much trouble. The sustained rate for IBM's Ultra SCSI-3 drives is, in most cases, around 5 megabytes per second; for Quantum's Atlas III Ultra/Ultra2 SCSI drive, it's 12 MBps; and Seagate's Medalist Pro Ultra2 SCSI drive is rated at 8.5 to 15 MBps. Seagate provides a very good product matrix on its Web site (www.seagate.com/disc/prodmatrix.shtml), listing sustained transfer rates for almost all Seagate drives.

On the other hand, the information I found on DMA drives was a little more cryptic. The only drive for which I found a spec (other than burst rate) was the IBM Deskstar 5, which won't be available until fall. I could not find a sustained transfer rate spec, per se, although IBM does list a minimum transfer rate of 5.4 MBps. My sources tell me that sustained rates on DMA drives generally range from 4.5 to 12.5 MBps, depending on the quality of the drive.—Jeff C.

WRITABLE DVD?

From your magazine ("Tech Page: CD? No, DVD!" July 1998), I have learned that audio cards and A/D converters, as well as the recording and editing software, are becoming compatible with DVD-Audio standards (24-bit, 96 kHz). Are there any DVD-Rs that can write and play back DVDs in DVD-Audio format?

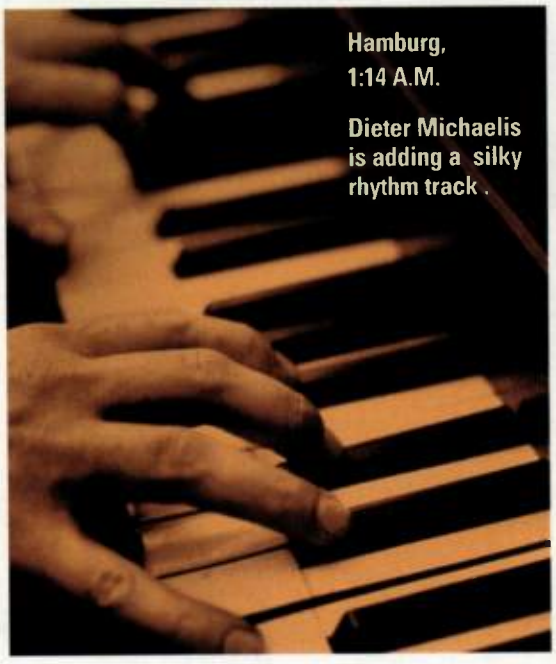
Roberto Ribeiro
Sao Paulo, Brazil
pedrinho@sti.com.br

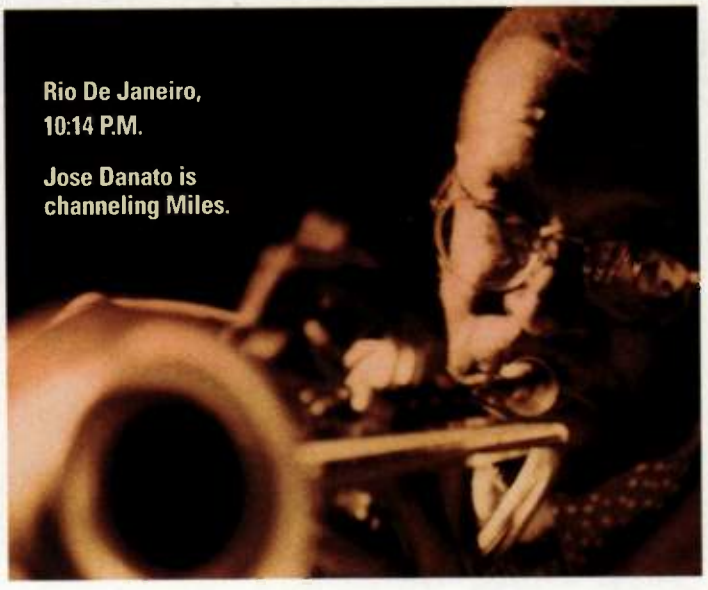
Roberto—The DVD-Audio spec is just now being finalized, so there is no production hardware or software available to the general public yet. In fact, there are no commercial DVD players capable of playing DVD-Audio discs as of this writing. Keep in mind that the "Tech Page" column profiles future technologies.

However, there is a variation of the DVD-Video disc called the Digital Audio Disc (DAD), which can store two channels of 24-bit, 96 kHz audio instead of video information. Some current DVD players can play these discs from their analog outputs (if they have 24/96 DACs), but I know of no production tools that are publicly available.

Regarding recordable DVD in general, there are two formats that are currently under development: DVD-RAM and DVD-RW. But affordable hardware and software needed to burn your own DVDs are not yet on the market.—Scott W.

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





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WHAT'S NEW

By the EM Staff

▲ NEUMANN M 147

Neumann's M 147 supercardioid microphone ($1,995) is designed to provide even attenuation of signals from the rear of the diaphragm. It's equipped with the K47 capsule, the same one found in Neumann's classic U 47 mic.

The M 147 uses a transformerless output circuit designed to provide an accurate, relatively uncolored signal, avoiding phase problems and low-level signal loss.

The microphone's frequency response is 20 Hz to 20 kHz, and it exhibits self-noise of less than 13 dB (A weighted). It can handle sound-pressure levels up to 114 dB; total harmonic distortion is rated at 0.5%. The M 147 ships with a sturdy aluminum flight case, standard mount, power supply, and cable. Neumann USA; tel. (860) 434-5220; fax (860) 434-3148; e-mail neumlit@neumannusa.com; Web www.neumannusa.com.

Circle #401 on Reader Service Card

▶ WAVE MECHANICS SOUNDBLENDER

Wave Mechanics' *SoundBlender* (TDM; $495) combines effects processing with synthlike effects, including two channels of pitch shifting, delay, filtering, and arpeggiation. The program features control over input and output levels and has a soft-clipping algorithm designed to provide analog-style saturation, adjustable at the output stage. A sidechain input is provided for ducking and other effects.

SoundBlender has three modulation sources that can be mixed and routed to 24 of the application's effects. There are 14 modulation types, including LFOs, triggered waveforms, envelope followers, and gates. *SoundBlender* has controls for modulation rate; wave type (sine, square, and triangle); trigger threshold; and modulation depth.

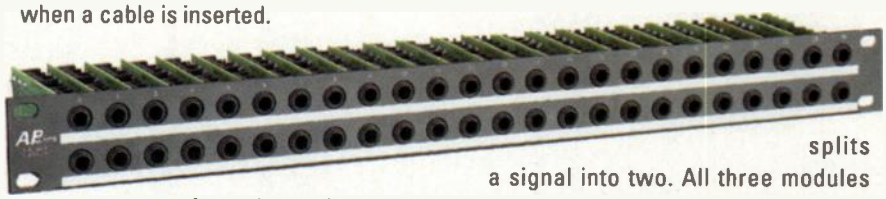
You get lowpass, highpass, bandpass, and notch filters with control over Q and center frequency. Two channels of pitch shifting feature pitch mappers that can create such unique effects as scale-related pitch shifting and diatonic arpeggiation. More than 250 presets are included, ranging from such common effects as harmonizers, autopan, tremolo, flange, stereo detuning, and chorus to more esoteric algorithms such as ducked delays and triggered "stutter" effects.

All of *SoundBlender*'s delay and modulation effects can be synchronized via a master tempo control, and all of the program's effects can be automated. The plug-in requires a Power Mac with a Digidesign Pro Tools TDM system. Wave Mechanics; tel. (973) 746-9417; fax (973) 746-0762; e-mail info@wavemechanics.com; Web www.wavemechanics.com.

Circle #402 on Reader Service Card

▼ AP MASTER PATCHING SYSTEM

AP Audio's Master Patching System ($129.95) offers a few new tricks that add pizzazz to the basic patchbay concept. The single-rackspace, 24-channel patch bay features insert points made from silver-plated brass. A single piece of steel makes up the bottom and lower rear panel of the bay—a design that is intended to relieve the gravitational stress on a connector when a cable is inserted.



Any channel can be configured as normaled, half-normaled, or denormaled by rotating the module, without the need for soldering or switching. When denormaled, the insert point shows gray rather than black, for easy identification.

The highlight of the Master Patching System, however, is its removable modules, which make it easy for you to customize the unit to accommodate your needs. Each channel is a separate module that you can quickly remove and replace with any of AP Audio's modules. These include the Combiner ($24.95), a passive module that combines two balanced, low-impedance signals; the Direct Box ($29.95), which accepts high-impedance signals and outputs a low-impedance signal; and the Splitter ($29.95), which splits a signal into two. All three modules feature a ground-lift switch. Also available is the Cable Tester ($29.95), which can be used for either TS or TRS ¼-inch connectors.

The patch bay ships with an extra replacement module. AP Audio; tel. (800) 950-1095 or (415) 492-9600; fax (415) 492-5959; e-mail u.s.sales@aceproducts.com; Web www.aceproducts.com.

Circle #403 on Reader Service Card

▶ PEAVEY/CAKEWALK STUDIOMIX

Peavey and Cakewalk have collaborated to bring out StudioMix ($899), a system that combines audio-editing software for Windows and an automated hardware mixing surface. The system interfaces with any Windows-compatible sound card (not included).

The focal point of the system is the hardware mixing surface, which has nine motorized faders that send MIDI messages to control any combination of eight audio and MIDI channels and one audio L/R master. The unit also houses mic and line preamps for use with a sound card.

Each channel has two rotary knobs; all knobs and faders are assignable to various audio-track parameters, including volume, pan, and track send. Each channel also has an assignable button that can control audio-track arm, mute, solo, or aux-send enable. Five additional assignable buttons control your choice of software editing commands and macros.

The master section has standard transport controls (rewind, fast-forward, play, stop, and record), a jog/shuttle

wheel, and rotary controls for mic gain, line gain, mix out, and monitor level.

The unit has RCA stereo I/O for tape signals and sound-card interfacing; stereo RCA line inputs; stereo/mono RCA monitor outputs; an XLR mic input; and MIDI In, Out, and Thru ports.

The upgradable multitracking software from Cakewalk supports DirectX plug-ins and allows you to record and play back up to eight audio tracks simultaneously (up to 256 virtual tracks) at sample rates up to 48 kHz. StudioMix can sync with MIDI tracks. Several audio-editing functions are provided, including cut, copy, paste, normalize, fade/envelope and crossfade, and reverse. You can edit MIDI, as well, with several views available to suit your work style, such as a keyboard-controller view, a System Exclusive view, and an event list. A notation display supports up to 24 staves per page, with guitar-chord grids, percussion notation, lyrics, pedal markings, and more.

The StudioMix system can work with any Windows-compatible sound card and a Pentium/120 or faster processor with Windows 95 and at least 16 MB RAM, or with Windows NT 4.0 and 32 MB RAM. All necessary cables and adapters are included with the system. Cakewalk Music Software; tel. (888) CAKEWALK or (617) 441-7870; fax (617) 441-7887; e-mail sales@cakewalk.com; Web www.cakewalk.com. Peavey Electronics; tel. (800) 821-2279 or (601) 483-5365; fax (601) 486-1278; e-mail peavey@peavey.com; Web www.peavey.com.

Circle #404 on Reader Service Card

▼ TC WORKS SPARK

TC Works boasts an easy-to-use interface in *Spark,* its new digital audio editor for Macintosh ($499). *Spark* provides 24-bit/96 kHz digital audio recording and editing with 32-bit internal processing; and it supports QuickTime, AIFF, SDII, and WAV file formats and VST plug-ins.

Spark's Browser displays your file database, audio editor, and playlist, all in one customizable window. From here, you can save and recall your work as Project files. From the File view, you can use the transport control to preview files while the editing window simultaneously displays the corresponding waveform.

In the Wave Editor, you can edit waveforms, set markers and regions, and apply VST plug-in effects. The program allows you to open multiple waveform windows simultaneously. Markers can be set on the fly during recording or playback for easy reference later. A drawing tool allows you to edit files down to the sample level. *Spark* includes many digital signal processing functions, including normalizing, reverse, fades and crossfades, sample-rate conversion, real-time time stretching, and time correction.

The Master view includes master controls and the FXmachine, a flexible effects-routing matrix that allows you to process, in real time, four parallel audio streams, using up to five DSP plug-ins per stream. Also in this window are peak program meters, a phase correlation meter, and CPU and hard-disk performance meters.

TC is known for quality dynamics processing, so it's no surprise that *Spark* is endowed with a single-band compressor/limiter, in the form of the Native CL, for your mastering needs. Native CL functions as a VST plug-in, so you can also use it with other VST-compatible software.

Spark can run on any Macintosh running Mac OS 7.0 or higher. TC Works; tel. (805) 373-1828; fax (805) 379-2648; e-mail us@tcworks.de; Web www.tcworks.de.

Circle #405 on Reader Service Card

TALK OF THE TOWN ▲ ▲ ▲ ▲

One of the biggest splashes at the 1999 Winter NAMM show in February was made by a line of full-featured digital mixing systems from Roland. A complete system comprises either of two mixing surfaces and either of two central processing units, which include converters and I/O. The VM-C7200 V-Mixing Console ($3,695), Roland's flagship V-Mixer model, can handle up to 94 channels of automated digital mixing. Another 94-channel mixer, the VM-C7100 ($2,995), is similar to the VM-C7200 but features just 12 channel faders and a master fader.

The VM-C7200's 24 channel faders and single master fader are motorized, and all parameters, including input gain, can be recalled in Scene memory. The mixer's FlexBus can save up to 12 bus settings, and an EZ Routing feature lets you save and recall common settings. With EZ Routing, you can set up and name templates for favorite signal routings, including external effects inserts. The EZ Routing function even displays the name of the instrument connected to each channel.

But the "big deal" about these mixing systems is that both the VM-C7200 and its little sibling are simply control surfaces for the rack-mountable VM-7200 48-channel V-Mixing processor ($2,795) and a 38-channel version, the VM-7100 ($1,995). These processors are the workhorses of the system. The VM-7200 houses 40 analog input channels (20 balanced ¼-inch TRS and 20 balanced XLR connectors per processor, with phantom power on each channel); 8 channels of assignable analog output on balanced ¼-inch TRS connectors; and 2 channels of AES/EBU digital I/O on XLRs. The system has 24-bit ADCs and DACs, and each channel features dynamics processing and 4-band parametric digital EQ. You get two assignable stereo effects processors and one stereo master effects processor.

The VM-7100 has 10 balanced XLR and 10 balanced ¼-inch TRS analog inputs. Analog output is on eight assignable balanced ¼-inch TRS jacks. The unit also has one stereo AES/EBU digital I/O pair on XLR connectors.

The VM processors are controlled by a VM-Link, which sends data from the mixing consoles through standard AES/EBU cables. Only four channels of audio are sent between the mixer and processor: the mixing console has two mic/line inputs (on balanced ¼-inch TRS jacks); a talkback mic; and a balanced XLR input. These audio signals are sent through the same link that carries controller data, eliminating the need for multichannel audio cables. Using the VL-Link, the mixing console can control the processor at distances of up to 220 yards.

Either VM processor can be used with either console, and the processors can be cascaded together. In addition, one VM processor can be controlled by two cascaded mixing consoles, expanding the number of physical faders. Both the VM-7100 and VM-7200 are completely MIDI-controllable. If you prefer, you can also control and automate either from a Mac or PC-based software sequencer. Also included is a real-time spectrum analyzer, which is designed to check room acoustics using the analyzer's noise generator and oscillator.

Each VM processor comes with a built-in VS8F-2 stereo effects expansion board, which generates various multi-effects as well as Roland's VG-8 guitar modeling, COSM mic simulation, and new speaker modeling technology. Three additional VS8F-2 boards ($395 each) can be user installed for up to 8 stereo or 16 mono effects, and up to 16 stereo or 32 mono if two VM processors are linked. Roland Corporation U.S.; tel. (323) 685-5141; fax (323) 721-4875; Web www.rolandus.com.

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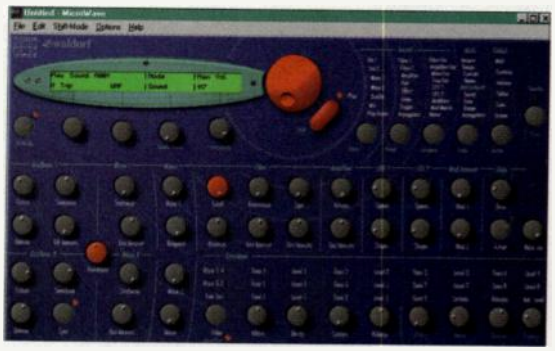
ALESIS

▶ TERRATEC MICROWAVE PC

TerraTec has joined forces with Waldorf to create the MicroWave PC EWS synthesizer module (Win; $799). The MicroWave PC is a front-panel extension module for TerraTec's AudioSystem EWS64L and EWS64XL ISA audio cards. It houses a wavetable synthesizer containing all the sounds and parameters found on the Waldorf MicroWave XT. The module's software interface emulates the front-panel controls of its hardware counterpart.



The synth is 8-part multitimbral and 10-note polyphonic. Each voice features two wavetable oscillators, a noise generator, ring modulation, frequency modulation, and oscillator sync. The wavetable oscillators draw from 64 ROM and 32 RAM wavetables, which contain up to 64 waves each. The MicroWave PC also offers two LFOs per voice, which can generate sine, square, triangle, or sawtooth waves. LFO 2 can be synchronized to LFO 1, or both can be synchronized to MIDI Clock. A programmable arpeggiator also syncs to MIDI Clock. You can use up to four envelope generators on each voice; all can be set to Single or Retrigger mode.

Each voice has two multimode filters connected in series. One filter operates as lowpass or highpass with a 12 or 24 dB/octave slope, or as bandpass with a 12 dB/octave slope. It can also operate as a parallel 12 dB lowpass/bandpass filter, 12 dB lowpass filter with frequency modulation, sine-wave shaper with 12 dB lowpass filter, or with sample-and-hold in front of a 12 dB lowpass filter. The other filter can be lowpass or highpass, with a slope of 6 dB/octave. Three additional filters include 24 dB and 12 dB notch filters and a band-reject filter with controllable bandwidth.

Each sound includes a chorus effect, and one additional effect can be applied to three sounds. In Multi mode, you can use up to eight sounds per Instrument simultaneously. You can control the synth's parameters in real time using a MIDI controller.

Other features include S/PDIF coaxial and optical inputs; two independent, 20-bit S/PDIF coax outputs; two independent sets of MIDI In and Out ports; a stereo ¼-inch headphone jack; and a WaveBlaster-compatible daughterboard connector. TerraTec ProMedia USA; tel. (800) 960-9440 or (949) 487-3774; fax (949) 487-3776; e-mail info@terratec-us.com; Web www.terratec.net.

Circle #407 on Reader Service Card

▼ NEXT REMIX GEAR

Five new remixing products from Next have hit the street, including the DJS-24 digital sampler ($450), the SpaceBass 3.3 analog synth ($359), the more advanced SpaceBass 4.4 ($459), the Rez-30 resonator ($399), and the Vox-11 vocoder ($689).

The DJS-24 sampler is capable of sampling rates from 22.05 kHz to 44.1 kHz, with 24-bit resolution. The unit ships with 2 MB of memory, which can be upgraded to 8 MB with user-installable RAM cards. Samples can be recorded with or without data compression and in mono or stereo. The unit accommodates up to 32 samples, or up to 6½ minutes, with the full 8 MB RAM installed. Samples can also be stored on and retrieved from a PC, using the included software for Windows NT/3.x or higher.

The DJS-24 features nondestructive editing and such functions as looping, scratching, pitch control, and reverse mode. It can play back individual samples or several samples in sequence.

The SpaceBass 3.3 and SpaceBass 4.4 both emulate the classic Roland TB-303 bass synth. They are completely analog and offer a 4-octave oscillator that generates sawtooth, square, or mixed waveforms; a VCA; and an envelope generator with a variable decay time from 200 ms to 2.5s.

The 4.4 offers a 24 dB/octave lowpass filter with variable cutoff frequency (20 Hz to 20 kHz), resonance, and envelope modulation; the 3.3's lowpass filter has a cutoff slope of 18 dB/octave.

The 3.3 has a MIDI Out port only; the 4.4 has full MIDI implementation and includes such MIDI-controllable onboard effects as Accent, Autoslide (portamento), and distortion. Either unit can be purchased alone or bundled with a 37-key MIDI keyboard controller, Cakewalk *Express* 3.0, and a MIDI cable (SpaceBass 3.3 bundle $439; SpaceBass 4.4 bundle $559).

The Rez-30 processor provides three bandpass resonance filters to create rich tones. Each band can be modulated by a built-in LFO or envelope follower, or by an external control voltage. For more funky signal processing, the Vox-11 vocoder can be used to create robotic voices from synth sounds or drum loops. You can tweak your sounds with the internal noise generator or an external synth through the line input. Eleven onboard filters are provided for creating assorted effects. Tracoman, Inc. (distributor); tel. (954) 929-8999; fax (954) 929-0333; e-mail info@tracoman.com; Web www.tracoman.com.

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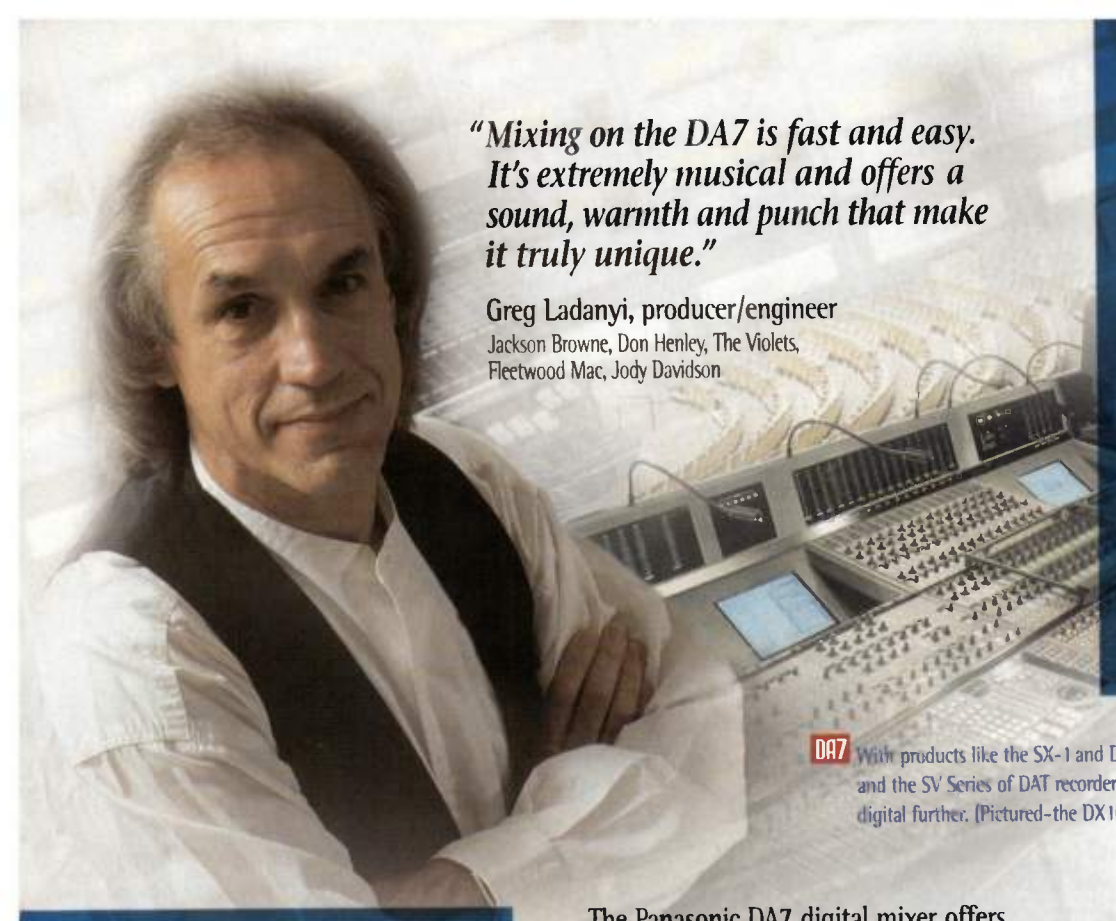

"Mixing on the DA7 is fast and easy. It's extremely musical and offers a sound, warmth and punch that make it truly unique."

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Jackson Browne, Don Henley, The Violets, Fleetwood Mac, Jody Davidson

IF THE DA7 LET YOU WORK ANY FASTER...

DA7 With products like the SX-1 and DX1000 (the DA7's big brothers), and the SV Series of DAT recorders, Panasonic is truly taking digital further. (Pictured-the DX1000 digital console.)

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WRH

▶ SEASOUND SOLO

SeaSound's new Solo digital audio recording system ($599) combines a PCI digital audio interface card and a breakout box with 24-bit analog and digital I/O; stereo mic and line preamps; effects inserts; a monitor mixer; a MIDI interface; and switchable, global, 48V phantom power. The sampling rate is variable from 8 to 96 kHz.

The Solo's PCI card has S/PDIF I/O on RCA connectors and connects to the interface box via standard cable with a 25-pin DIN connector. The card's 5-pin DIN transport-control jack connects to SeaSound's optional footswitch controller.

Each of the interface box's two preamps has low-impedance XLR and high-impedance ¼-inch TRS analog inputs on the front panel; ¼-inch insert jacks on the rear; a signal/clipping LED; and trim (0 to +65 dB), pan, and input-level knobs.

A separate stereo pair of ¼-inch line inputs on the rear panel bypasses the preamps. These channels have level and pan knobs and signal/clipping indicators.

Two 12-segment LED ladders show either recording or playback levels and can be switched between peak-hold and peak-average display modes. The monitor mixer section has level controls for the L/R input channels and the L/R returns from the computer. You also get master volume, monitor level, and headphone volume controls.

All the inputs are mixed to stereo analog outputs on ¼-inch connectors. MIDI In, Out, and Thru ports are on the back, as are unbalanced ¼-inch left and right monitor outputs. Two headphone jacks are located on the front.

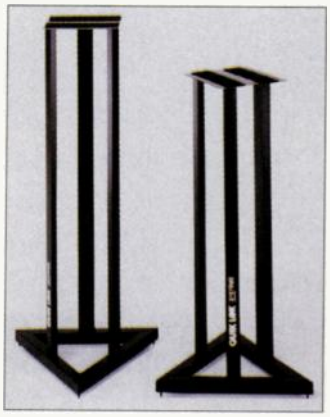
The Solo's signal-to-noise ratio is rated at >95 dB (A weighted), its dynamic range is >105 dB, and crosstalk is <-95 dB. It operates at a -10 dB output level. SeaSound; tel. (415) 331-4970; fax (415) 331-4979; e-mail sales@seasound.com; Web www.seasound.com.

Circle #409 on Reader Service Card

▶ QUIK-LOK SPEAKER STANDS

When you have high-quality near-field monitors, you want to put them on something safe and sturdy. Two new choices are the BS-336 ($149.95/pr.) and BS-342 ($159.95/pr.) near-field monitor stands from Quik-Lok.

The BS-336 stands are 36 inches high, and the BS-342s are 42 inches high; otherwise, they are identical. Both have sturdy steel 11 x 11–inch monitor platforms solidly fastened to the supports to prevent wobbling and vibration. To further dampen vibration, the front posts can be sand loaded, and Quik-Lok includes self-adhesive rubber padding to cushion the platforms.



Each stand has three steel support bars configured in an equilateral triangle, 17.7 inches apart. The wide spacing of these posts provides a strong foundation so that the stands can hold speakers weighing up to 125 pounds and withstand bumps without toppling. One of the stand's support bars has space for channeling speaker cable.

With rubber feet and retractable carpet spikes at each corner of their triangular bases, the BS-336 and BS-342 are made to stay put on any type of floor surface. As with all of Quik-Lok's products, both of these stands carry a limited lifetime warranty. Music Industries Corp. (distributor); tel. (800) 431-6699 or (516) 352-4110; fax (516) 352-0754; e-mail mic@musicindustries.com; Web www.musicindustries.com.

Circle #410 on Reader Service Card

▼ IVL ELECTRIX

Three new processors have been released by Electrix, a new division of IVL Technologies. All three single-rackspace units, each of which boasts real-time control over its parameters, are designed for live use by DJs and remixers, though they can be used in studio settings, as well. You make all parameter adjustments for each processor with front-panel knobs or buttons; these units have no presets or menus.

Each processor can send your real-time parameter adjustments as MIDI events and can sync to external MIDI Clock.

The MO-FX has four simultaneously available stereo digital effects, including distortion, flange, autopan/tremolo, and delay. A tap-tempo button lets you synchronize any of the four effects. High-pass, lowpass, or bandpass filtering is available for each effect block.

The Filter Factory is a digitally controlled analog filter. It features tap-tempo control for synching the unit's LFO; distortion; selectable LFO waveforms, including sine, square, saw and random waves; and a wet/dry mix knob.

The Warp Factory is a vocoder with both balanced XLR mic-level and ¼-inch line-level inputs for manipulating the formants. It gives you control over onboard noise and wave generators.

Each of the three units features MIDI In, Out, and Thru; a rear-panel MIDI channel-select knob; stereo input and output on both balanced ¼-inch TRS and unbalanced RCA connectors; and a ¼-inch footswitch jack for bypass control. All three can operate at either +4 dBu or -10 dBV. Electrix/IVL Technologies; tel. (250) 544-4901; fax (250) 544-4091; e-mail electrixinfo@ivl.com; Web www.electrixpro.com.

Circle #411 on Reader Service Card

FREE TO BE USB ▲ ▲ ▲ ▲

With the advent of USB-equipped PCs, as well as the Apple iMac and new "Yosemite" Power Mac G3s, computer-related music-equipment manufacturers everywhere have worked feverishly to adapt their product lines to the new bus. The result is a whole slew of USB-related audio products: there are new MIDI interfaces, audio and combination audio/MIDI interfaces with onboard ADCs and DACs, and even USB speakers. Some are updates of familiar boxes, while others are brand-new devices.

Most of these devices are cross-platform, and all are hot-swappable; you can unplug any USB device and plug it back in without shutting down the computer. Also, the units with onboard converters are said to provide a lower audio noise floor than a sound card's converters because they are outside the computer's audio-hostile electrical environment.

One of the biggest product categories to be revised for USB is the MIDI interface. Some are nearly identical to their serial- and parallel port–equipped predecessors. For instance, MOTU released new versions of the MIDI Timepiece AV ($595), MIDI Express XT ($395), Micro Express ($295), and FastLane ($59). The MIDI Timepiece AV and Express XT each can handle 128 channels of MIDI, while the Micro Express and FastLane handle 96 and 32 channels, respectively. Opcode has three new interfaces: the 2-in/2-out MIDIport 32 ($129) is capable of handling 32 channels of MIDI, and the 4-in/6-out MIDIport 64 and 8-in/10-out MIDIport 128 (capable of 64 and 128 channels, respectively) will ship later this spring. Emagic is now shipping the 8x8 AMT8 ($499), which can function as a stand-alone MIDI interface or be used as an add-on to the parallel port–equipped Unitor8, allowing the Unitor8 to be used with USB devices. Roland's SMPU-64 ($225) is a 4-in/4-out, 64-channel MIDI interface. Midiman also has a new interface, the 2x2 Midisport ($129.95), which gives you 64-channel MIDI operation and a MIDI Thru button that lets you use the interface even when the computer is turned off.

USB digital audio devices are becoming available, as well. In addition to Opcode's DATport ($249) (covered in the January 1999 "What's New" column), the company has also released three other USB audio products. The SONICport ($299) is essentially a DATport that also provides two channels of S/PDIF digital I/O by way of RCA connectors and two channels of analog I/O on ⅛-inch TS connectors. The ADCs and DACs are 20-bit. The unit supports 16-, 20-, and 24-bit audio at sample rates of 32, 44.1, and 48 kHz. The SONICport Optical ($299) replaces the other model's coaxial (RCA) S/PDIF I/O with Toslink optical S/PDIF. Finally, the STUDIOport AMX (price tba) is designed as a one-stop solution for both audio and MIDI needs. Its front panel features two channels of analog input on balanced ¼-inch TRS connectors, each with its own gain pot. On the rear panel are four analog outputs, also on balanced ¼-inch TRS jacks. ADCs and DACs are 20-bit. There are four MIDI Ins and four MIDI Outs, so you can send and receive 64 channels. The STUDIOport can also convert SMPTE time code to MTC.

Edirol unleashed its own audio/MIDI box, the feature-packed, PC-compatible UA-100 ($499). The unit has two channels of line-level analog I/O on rear-panel RCA jacks; two instrument-level inputs on unbalanced ¼-inch connectors; 20-bit ADCs and DACs; and two MIDI In and two MIDI Out connectors. One of the instrument-level inputs lets you plug your guitar in directly and features an amp simulator. The unit has more than 70 digital effects with 24-bit internal processing, including compression, reverb, and delay. You also get a pitch corrector and mic emulation.

Edirol has also released the MA-150U ($179/pair) monitors. These powered speakers give you 15 watts per channel and are shielded for use near computer monitors. They have a USB connection to receive digital audio from your PC and use 20-bit D/A converters. Line-level, ⅛-inch TRS and RCA connectors admit the analog signals. The speakers have a frequency response rated at 75 Hz to 18 kHz, and sensitivity is rated at 87 dB. At least a 166 MHz Pentium PC with 32 MB RAM is required. ●

Digital Control With the Human Touch

The Spirit 328 represents a **new way of thinking** in digital console design, bringing all the functionality and sonic excellence of digital mixing to all audiences. With its unique **console-based interface**, the Digital 328 finally bridges the gap between analog and digital mixers, retaining the **spontaneity and ease of use** of an analog console yet providing all the advantages of digital, such as instant Total Recall of all digital parameters, Moving Fader Automation and Onboard Lexicon Effects.

Simply put, the Spirit **Digital 328** is the most advanced analog 8-bus you have ever seen combined with the easiest digital console you have ever used.

328's E-Strip may be configured as...

...a horizontal input channel with full EQ, Aux and Pan facilities..

...or a row of 16 Auxes or FX Sends for the 16 faders below the E-Strip...

...or a set of rotary level controls for the Tape Returns.

All the Digital I/Os you need as standard

Most digital mixers don't include digital multitrack I/Os, which means that to get digital recording and mixdown you have to buy extra, expensive I/O options. In contrast, Digital 328 includes **two Tascam TDIF™ and two Alesis ADAT™ optical interfaces as standard**, allowing you to record 16 tracks entirely in the digital domain, straight out of the box. As you would expect, we've also included a pair of **AES/EBU and SP/DIF interfaces** assignable to a wide range of inputs and outputs, including group and auxiliary outs. In addition, a third optical output may be used as a digital FX Send or as eight Digital Group Outs. All in all, there are 28 Digital Outs on 328 plus 20 Digital Returns, providing enough flexibility for the most demanding applications.

2 Onboard Lexicon Effects Units

Only 328 can offer the world's premier name in studio effects onboard - Lexicon. Two separate effects units are included, offering a full range of reverbs, choruses, delays and flanges, all with fully editable program and parameter settings.

42 Input/8 Bus Configuration

For a mixer with such a small footprint, Digital 328 packs an extraordinary number of inputs. Sixteen full spec. analog mono mic/line channels – each with its own balanced XLR connector, dedicated insert point and access to phantom power – come as standard, along with five stereo inputs.

With the 16 digital tape returns on 328's TDIF™ and ADAT™ optical interfaces, there's a maximum of 42 inputs. Every input is fully routable to any of the 8 groups and has access to the full complement of 328's parametric EQ, signal processing, onboard effects and auxiliaries.

As easy to use as your current analog console

Although most digital mixers offer an amazing array of functions, it can often be a nightmare to access them.

In contrast, we've designed Spirit 328 to operate like your old analog 8-bus console, and not like a computer with faders. You can practically take it out of its box and get started without even opening the manual! Unlike other digital mixers, there's instant access to any channel, group or master feature with one button press, and you can see that feature's status from the front panel without having to rely on an LCD display. Access is so immediate that you could even use 328 as a live console.

The key to it all is Spirit 328's unique "E-strip", the lighter-colored bank of encoders and switches that runs across the center of the console. Simply select a channel and the E-strip immediately becomes a "horizontal input channel" with instant access to all that channel's EQ, aux sends, channel pan and routing. Alternatively, press any button in the rotaries section above the E-strip and the encoders change to become a channel pan, auxiliary send or Lexicon effects send for each channel.

Select a fader bank to display mic/line input faders, tape returns faders or group and master faders and that's it; no delving through level after level of LCD menus to find the function you want, no delays in making alterations and no need to study complicated EQ curves. With 328, everything you need is immediately accessible from the front panel of the console - giving you the freedom to let your ears decide.

If you want the functionality of a digital console but the usability of your old analog 8-bus, then Spirit 328 is for you.

Onboard Dynamics

Digital 328 includes two mono or stereo signal processors which can be assigned to any input, output or groups of ins or outs. Each processor provides a choice of compression, limiting and gating, as well as combinations of these effects.

digital

three two eight

Comprehensive EQ

All of 328's mic/line, tape return and stereo inputs have access to three bands of fully parametric EQ, designed by British EQ guru and co-founder of Soundcraft, Graham Blyth. A man with over five million channels of his EQ designs in the field, Graham has brought 25 years of Soundcraft analog EQ circuit experience to bear on Digital 328. If you want the warm, musical sound of real British analog EQ, with proper low, mid and high frequency bands (rather than the low resolution 20Hz - 20kHz bands found on some consoles), look no further.

Unparalleled Sonic Spec

Garbage in, garbage out! It doesn't matter whether the console is digital or analog - if you have poor mic preamps, your sound will be compromised. That's why 328 includes Spirit's acclaimed UltraMic+™ podless preamps, giving your input signals the cleanest, quietest start of any digital mixer on the market. With 66dB of gain range and a massive +28dBU of headroom, they offer an extremely low noise floor and are virtually transparent. Spirit 328 is 24-bit throughout, with 56-bit internal processing; your signal hits the digital domain through state-of-the-art 24-bit ADCs with 128 times oversampling, guaranteeing that it maintains its clarity, while 24-bit DACs on all main outputs equal this sonic integrity should you wish to return your signal to the analog world.

Moving Fader Automation

All of Digital 328's 100mm faders (including the master) are motorized to allow current channel, tape return, group and aux master levels to be viewed at a glance.

All Parameters Instantly Recallable

In addition to level automation, every other digital parameter of 328 is instantly recallable, allowing snapshots of the entire console's status to be taken. Up to 100 of these "scenes" may be stored internally and recalled either manually, against MIDI clock, or against MTC or SMPTE. Alternatively, every console function has been assigned its own MIDI message allowing dynamic automation via sequencer software.

Easy to Edit - Direct from the Control Surface

The majority of 328's input and routing parameters may be edited from the control surface without resorting to the console's LCD. Settings and levels may be copied and pasted from one channel to another with just two button presses and, using 328s query mode, the routing or assignment status of every channel on the console may be viewed instantly simply by selecting the function (such as Group 1 or Phase Reverse) you want to question. In addition, with 328's Undo/Redo function located in the master section, editing is entirely non-destructive, allowing you to A/B test new settings with previous ones.

Grows with your needs

Two Digital 328s may be digitally cascaded, giving you up to 84 inputs at mixdown and 32-track digital recording capability.

Full Metering & Monitoring Options

All of the mic/line inputs, tape return inputs, group and master levels may be monitored per bank via Digital 328's 16 10-segment bargraph meters. Additionally, 328's onboard dynamics processors may be monitored using the console's master meters. Any input may be solo'd using AFL, PFL or Solo-in-Place.

Timecode & Machine Control

Digital 328 reads and writes MTC and reads all SMPTE frame rates, with a large display instantly indicating current song position. Store and locate points are accessible from the console's front panel, with 328's transport bar controlling a wide range of devices including Tascam and Alesis digital recorders.

Software Upgradeable

328's open architecture means that any functional improvements and software upgrades can be made easily available off Spirit's website. 328 Mixer Maps for popular sequencing software packages are also available free of charge.

Add-On Module Options

To meet the needs of a variety of users, there are three module options:

8 Channel Analog I/O Interface

Connecting to the TDIF ports, 16 phono connectors provide eight analog group or direct outs and eight analog inputs for tape returns 17-32. Two interfaces may be connected, allowing 16 track analog recording or access to 16 more sequenced keyboard or sampler inputs.

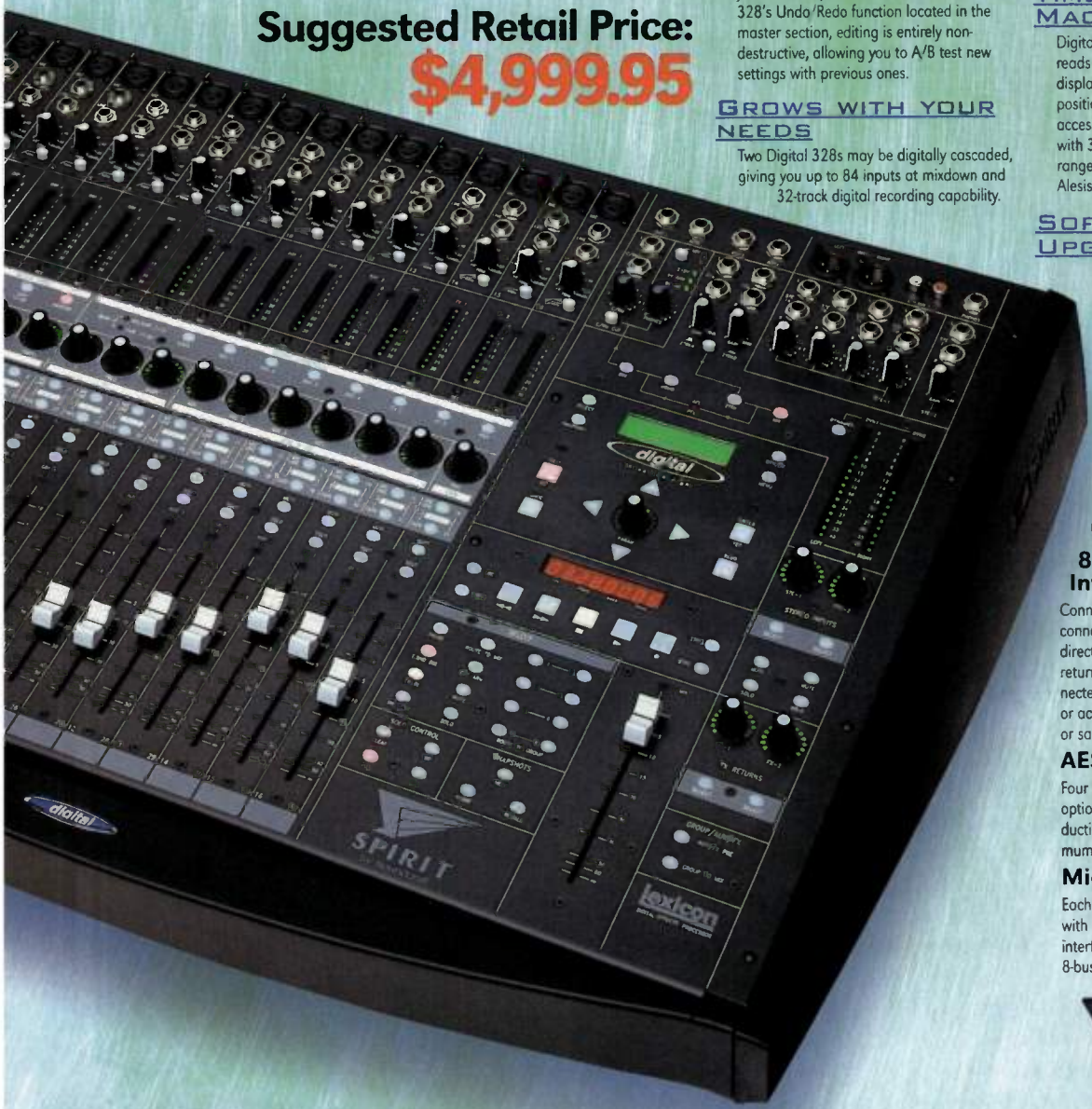
AES/EBU interface

Four pairs of AES/EBU connectors allow optional digital interfacing to hard disk production systems such as Pro Tools. A maximum of two interfaces may be connected.

Mic Pre-Amp Interface

Each interface provides eight XLR mic ins with UltraMic+ preamps. Connecting two interfaces turns 328 into a 32 mic input, 8-bus mixer for PA or theatre applications.

Suggested Retail Price:
$4,999.95



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PRO FILE

The Shaking Ray Levis

Testifyin' the old-timey avant-garde.

By Gino Robair

"There are two avant-garde styles," explains Dennis Palmer of the Shaking Ray Levis. "The old-timey avant-garde is purely heartfelt with thoughtfully humorous intentions, whereas the new-fangled art sports a full-loaded diaper with cynical, high-minded coldness."

Hailing from Chattanooga, Tennessee, the Shaking Ray Levis comprise the duo of synthesist Palmer and percussionist Bob Stagner. Together, they bring the joy of collective music making to schools throughout the South, as well as travel the world preaching the word of free improvisation.

On their latest release, *Boss Witch* (named after the H.R. Pufnstuf character Witchiepoo), the Levis have amassed a collection of live and studio recordings that fit in no other category than their own. A typical Levis performance mixes prog-rock chording with bubbling post-jazz rhythms and phrases, which are occasionally interrupted by Palmer's game-show-host-meets-Southern-evangelist stage patter.

Palmer mixes his recordings through an Electro-Harmonix 16-second delay, using a custom pedal switch designed by EM contributor Alan Gary Campbell. "The keyboards and electronic drums go directly into my Mackie 1202, and then into the 16-second delay. It turns into that wonderful bowl of red hippie-wig or what-have-you."

Using the delay, Palmer builds elaborate loops to create a third sound source that the duo calls "the dissimilar twin," which Palmer and Stagner play against. During the course of a piece, the twin gets slowed down, sped up, and reversed in such a way that it's hard to tell which is the twin and which is live. On "Princess Warrior Bendy" and "Switch Dance," the Levis' ELP-influenced keyboard and drum exchanges collide and tangle with their mirror images. "It's kind of like having a hidden hillbilly in the group," Palmer adds.

Besides the Electro-Harmonix delay, the core of Palmer's setup is a Casio CZ-101, a Korg 707, and a Casio RapMan. Stagner uses an Alesis D4 module that is triggered by Roland pads, augmented by acoustic drums and a collection of stuff the Levis call *floor pie*. "We call it floor pie because Bobby plays it on the floor. We got the term from Homer Simpson. 'Mmmmm. Floor Pie.'"

Since the Levis' first release, *False Prophets or Damn Good Guessers*, Palmer has added some goodies to his setup, including a Yamaha SU10 sampler, a Roland MS-1 phrase sampler, and a "homemade synthesizer that was built by somebody's daddy from a kit," Palmer says. "All the knobs are reversed: to increase something, you turn the knob to the left. It also has a built-in speaker."

The Levis' archival machines include an Alesis "blackface" ADAT, a Panasonic SV-3700, a Tascam 244 4-track cassette recorder, and their perennial favorite, the Technics RSB 28R stereo cassette deck. But as improvisers, the Levis are more interested in documenting an inspired performance than in getting the perfect sound, so virtually any recording is fair game for a CD.

"The old-timey stuff is dense. It's rough around the edges. It's noisy," Palmer explains. "But we're inviting people to connect with the experience of creating an invigorating sonic celebration in the moment. That's one of the best aspects of free improvisation."

For more information, contact The Shaking Ray Levis Society: e-mail shakingray@chattanooga.net; Web www.virtualchattanooga.net/srs.

Bob Stagner and Dennis Palmer are the Shaking Ray Levis.

Up the value of your mic locker without dropping another nickel into it.

Pit an amateur with $10,000 worth of microphones against the pro with a $1,000 mic and the better recording will emerge from the latter corner, pretty much every time. How? Quite simply, pros use their ears.

The best engineers lean hard and often on their monitors to listen critically and tweak accordingly — placing mics, setting gains, adjusting eq — getting everything dialed in before the first take.

Furthermore, a detailed, accurate monitoring system is what patches flesh and blood into the electrical system and provides a clear window to the sound at every step of the recording process. This is precisely why the best in the business agree that their monitors are the single most critical piece of hardware in the studio.

All of which is supported by the thinking behind NHTPro active studio monitoring systems. From exactly tailored near and mid-field radiation characteristics to totally new and innovative driver control circuitry, NHTPro systems embody all we know about high performance sound reproduction. Which, as anyone who has had the pleasure of hearing them will attest, is considerable.

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Monitors:
Response: 40Hz - 20kHz.
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TECH PAGE

The Global Studio

Collaborate with anyone in the world.

By Scott Wilkinson

One of the most interesting demos I saw at NAMM this year was presented in the Steinberg booth. Steinberg is one of the first developers to incorporate a new Internet-collaboration technology from Rocket Network (formerly Res Rocket) into its software. During the demo, musicians in London, Hamburg, New Orleans, Los Angeles, and San Francisco jammed with a musician in the booth, sharing digital audio files to create an arrangement on the spot.

The jam wasn't quite in real time, but it was close. The musicians logged onto a special server using Rocket Network's *RocketControl* client software and entered a "virtual studio" (see **Fig. 1**). Then, they ran a prototype version of *Cubase* fueled with RocketPower. (Music software that includes Rocket Network's application programming interface, or API, is said to have "RocketPower.")

Each musician created a digital audio track in their own physical studio. Once the musicians were happy with their part, they uploaded it to the server, which then downloaded it to the other musicians in the virtual studio. All shared tracks appeared and played in each participant's music software. During the NAMM demo, one participant was acting as the producer/engineer, mixing the tracks, adding effects, and so on.

The client software incorporates a chat window, which lets participants communicate during the collaboration. It also includes a plug-in architecture that allows various forms of compression to be used. So far, Rocket Network has written plug-ins for MP3 and QDesign's *Music Codec*, and it has plans to implement many more. This allows digital audio files to be shared with minimal delays.

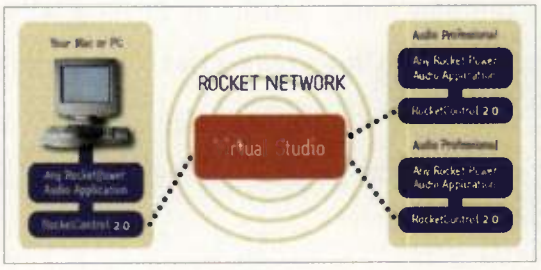
The NAMM demo didn't include the final step of the process. Once the tune is finished, the participants can upload the final tracks in uncompressed form, which takes longer but provides the best possible sound quality. The producer/engineer can then apply the mix parameters established during the collaboration process to the uncompressed tracks and create a master DAT or CD-R.

Reportedly, beta testers have found that this process greatly reduces the time it takes to finish a project. Everyone is able to work simultaneously at 100 percent efficiency; the participants are situated in their own, familiar studios, and they can lay their parts down without having to wait for anyone else. An engineer can produce and mix the tracks as people are working on them. Altogether, this cuts the total time of going from concept to master down to 25 percent of what it would normally take in a regular studio.

For now, Rocket Network intends to manage the servers that house the virtual studios, which can be public (free access) or private (restricted). However, these virtual studios will be hosted by software developers that add RocketPower to their programs, including Emagic, Sonic Foundry, Steinberg, and Mixman. In addition, broadcasters, Web production firms, and post-production studios will be able to buy their own sets of virtual studios for internal use.

The *RocketControl* client software will be available in two versions: a free version and a "pro" version that will cost a whopping $29.95. The free version cannot access private virtual studios, but otherwise, the two versions are essentially identical, providing all the necessary networking, communications, and compression functions.

The value of this concept has been proven on Rocket Network's demo site (www.resrocket.com) using version 1.4 of the client software. However, this system is limited to MIDI data only; version 2.0 will include digital audio. For additional information, be sure to visit the company's other site (www.rocketnetwork.com). This is a fascinating approach to remote collaboration, and I look forward to tracking its continuing development.



COURTESY ROCKET NETWORK

FIG. 1: Rocket Network lets you collaborate with other musicians on the Internet in a virtual studio, sharing digital audio files to create a complete arrangement.

Didn't your mother tell you?

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AES/EBU
S/PDIF

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What does all this mean? Well, for the first time you can take a signal direct from any mic, apply industry standard dbx processing, warm it with the sound of vintage tube overdrive, convert to digital using new patent-pending technology, bypass your inferior A/D convertors and record directly to your DAT machine, computer, digital audio workstation, or a modular digital multitrack, like an ADAT or DA-88. How's that for "killer app"?

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704X/504X

704X

Digital Output System

"The most pristine pathway to a 96kHz/24 bit signal"

THIS CARD GOES IN THESE BOXES

The 704X is the first 96kHz digital output system that offers a 48 bit internal signal processing path, and 24 bit digital output in either AES/EBU or S/PDIF formats. The 704X brings the world of super high-end digital conversion to the already premium dbx Blue Series processors. That means that now the 786 Precision Preamp has the ability to offer the industry's most precise method of getting from a microphone to a 96kHz/24 bit digital signal. And the 160SL is now the most comprehensive analog compression system available that incorporates 96kHz/24 bit digital output.

Now you can record "direct-to-disk", just like you would record direct-to-tape, with the confidence of having industry-standard dbx dynamics processing coupled with the most innovative and clean A/D conversion system around. The 704X uses the patent-pending TYPE IV™ Conversion System to convert your analog signals to digital in a way that preserves the analog "feel", yet gives the clarity and precision offered by the digital domain.

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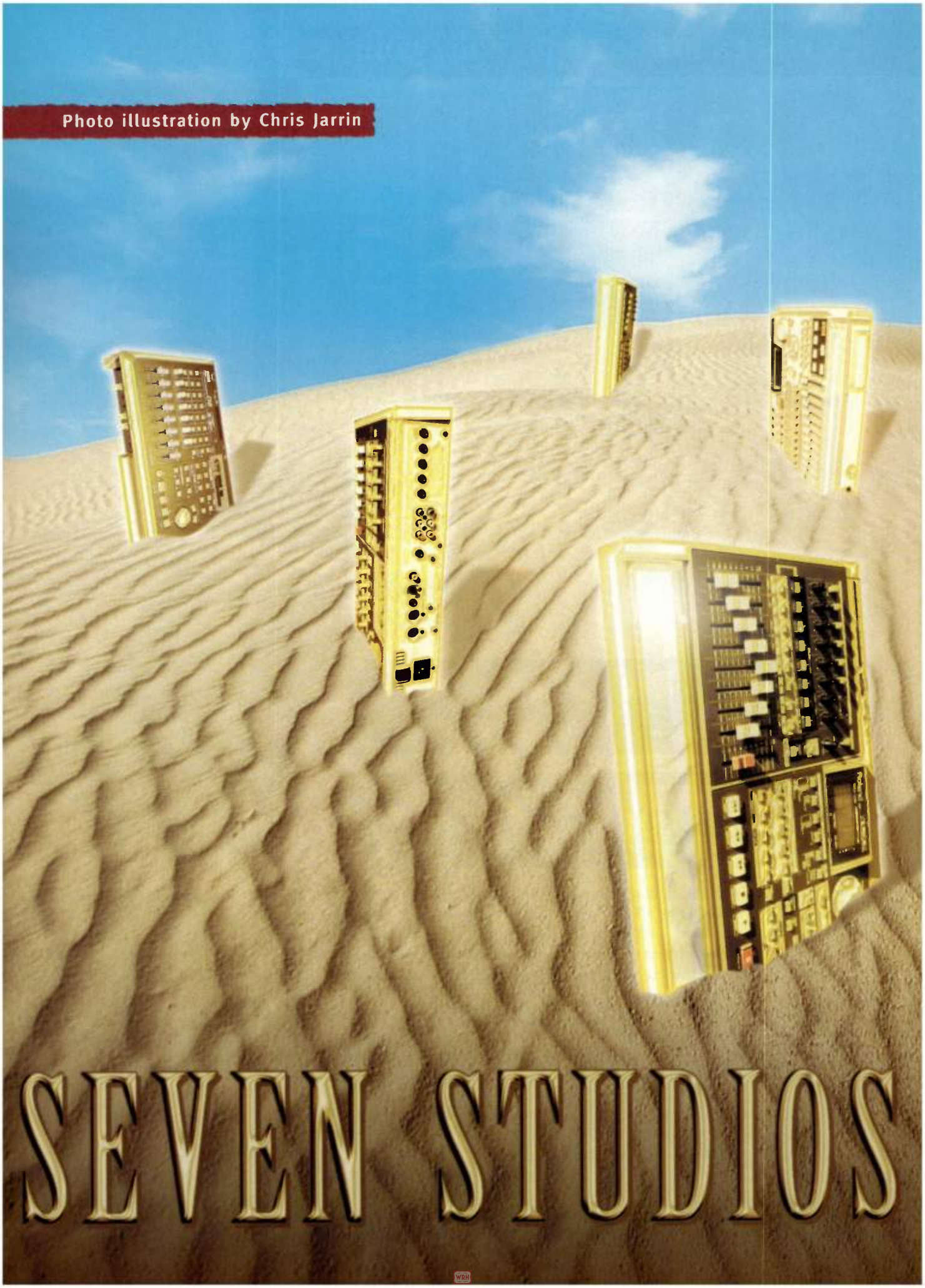
Photo illustration by Chris Jarrin
SEVEN STUDIOS

Portable digital studios could help you make your dreams come true.

BY BOB O'DONNELL

If you wish hard enough, dreams really can come true. I know that now. For years, I, like countless other musicians, dreamed of the day I could own something that would put all the essential capabilities of a professional recording studio into one affordable and transportable box. That day has finally arrived.

The latest generation of integrated hard-disk recorder/mixers, or portable digital studios—including the Akai DPS12V2, Fostex FD-4 and FD-8, Korg D8, and Roland VS-840, VS-880EX, and VS-1680—brings together the kind of features that we could only dream about even just a few years back. High-quality digital multitrack recording, random-access editing, digital mixing, multiple digital effects, MIDI synchronization, software-upgradable feature sets, and more are now available in devices that cost no more than a good synthesizer. Best of all, the integrated design of many of these devices allows you to enjoy these capabilities without the mess of cables, patch bays, and other hassles associated with component-based studios, and without the crashes that computer-based systems often suffer.

The seven machines I tested have a wide range of capabilities, and their prices are similarly varied, from $599 for the budget FD-4 to $3,195 for the higher-end VS-1680. You should have no problem finding one that fits your needs and budget.

Portable digital studios are the culmination of the evolution of several different product lines, and in many ways they represent the fulfillment of the personal-studio concept. Although their most obvious ancestors are cassette-based multitrack recorder/mixers, they go well beyond that paradigm and bring together in a single unit most of the recording-related capabilities that most musicians want. Furthermore, they do so in a way that makes high-quality recording an affordable reality. In other words, you can't blame the equipment if you can't produce a pro-quality product.

STUDIOS OF GOLD

VIEWED FROM AFAR

If you're interested in a portable digital studio, the good news is that you can't really go wrong. Any one of the seven devices I tested offers extremely good audio fidelity and the basic features you need both to record and mix multitrack recordings and sync them up with any MIDI sequencer.

All of the units I reviewed are based around a familiar cassette or MiniDisc ministudio-type layout, with basic transport controls on the right and mixer controls on the left. In all cases, you can simply plug devices in, set your levels, record-enable a track, and start recording. In addition, all the devices offer an undo function in case you don't like what you record, although the levels of undo vary from one unit to the next. All provide both manual and automated punch-in and -out to fix minor mistakes.

Because they're all hard-disk-based, they all have the standard cut, copy, paste, insert, and erase editing functions, although only a few of them let you view your edits via a waveform display. The Roland VS-1680 offers the most complete, in-depth editing of the bunch. It lets you do nondestructive edits from the bar and beat level all the way down to the waveform level. It also has a Song Arrange function for quickly rearranging sections and versions of a song. At the other extreme, the Fostex FD-4 and FD-8 let you edit only one track at a time, except for erasing.

Part of the editing power of these devices resides with the support for locate points and/or markers, which allow you to navigate through a sound file in a hurry. Akai offers 12 quick locate points that can be assigned to Channel Select keys and 100 regular locate points that are stored in a software list. Roland offers more locate points than you will ever use. Korg and Fostex are not quite as generous in this regard.

The Korg D8 is a great little songwriting tool, particularly for guitarists, thanks to its built-in drum patterns, tap-tempo feature, and guitar-oriented effects.

Finally, unlike tape-based systems, portable digital studios don't require wasting a track on a sync signal for locking to a MIDI sequencer; these units maintain a separate sync track and can sync to a computer-based or hardware sequencer.

That's not to say that all portable digital studios are equal, however. They clearly are not. For one thing, they cover a wide price spectrum, and for the most part, the less expensive products give you fewer features than the higher-end products do. You might find that only one or two products fit within your price range.

In addition, each of these products is targeted at a slightly different user. Depending on your needs and the equipment you already own, you're likely to find that only one or two are optimal for you.

The critical distinguishing factors between the various portable digital studios are the number of tracks they support, the size and type of the mixer, and the number and type of digital effects. In addition, you should look at the number and types of inputs and outputs that each device offers and the size and type of data storage included. Finally, in products as sophisticated as these, it's crucial to investigate the user interface.

The 4-track Fostex FD-4 is the least expensive hard-disk recorder/mixer you can find, although you need to factor the price of a hard drive or removable drive into its total cost. Its 3-band, sweepable-mid channel EQ gives you great flexibility in shaping the sound of your tracks.

MAKING TRACKS

The most obvious difference between the portable digital studios is the number of tracks they support. The Fostex FD-4 is a 4-track device; the Fostex FD-8, Korg D8, and Roland VS-840 and VS-880EX are 8-track units; the Akai DPS12V2 is a 12-track recorder; and the Roland VS-1680 has 16 tracks.

There are also important differences in the number of tracks the machines can record simultaneously. The FD-4 and D8, for example, can record only two tracks at a time, and the FD-8 can go beyond two only if you record using both the analog and digital inputs. The VS-840 can record a maximum of four tracks at once, the DPS12V2 and VS-880EX can do eight via six analog inputs and one pair of stereo digital inputs, and the VS-1680 can record any combination of eight inputs. If you're working by yourself in a home studio, the number of simultaneous tracks you can record might not be a problem. But if you want to record multiple parts—such as your whole band—at once, this could be an issue.

In addition, all units except the D8 support what are generally known as "virtual tracks." What this means is that you can record more tracks than the recorder's regular track specs would indicate, and at playback time, you can use a limited combination of those tracks.

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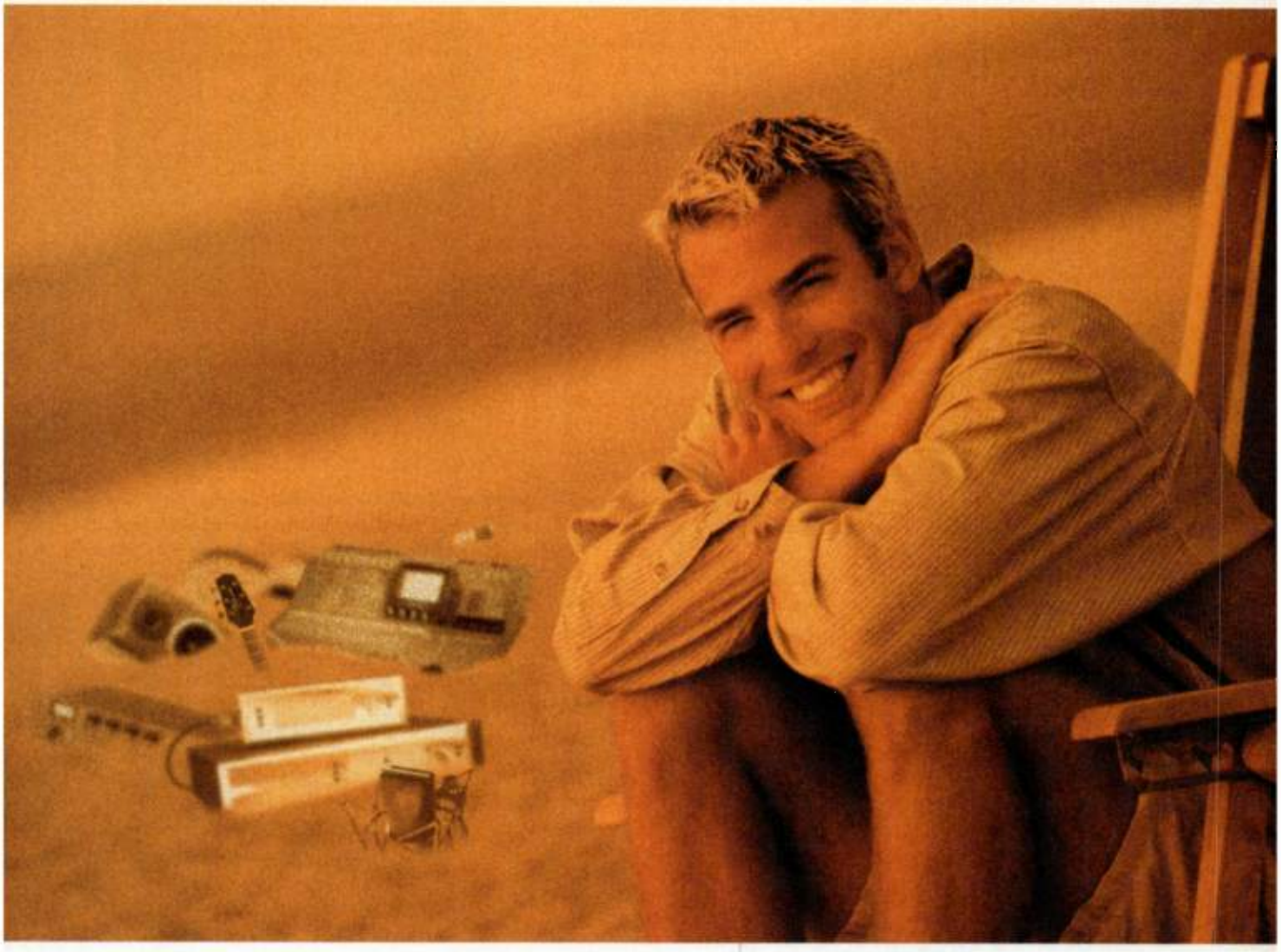

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STUDIOS OF GOLD

Each manufacturer implements virtual tracks differently. Akai's approach is simple and generous: you get 250 virtual tracks, which can be freely assigned to any of the 12 physical (playback) tracks. Roland's VS series devices use a different approach: you can record 8 virtual tracks for each regular track on the VS-840 and 16 virtual tracks per physical track on the VS-880EX and VS-1680. For example, with the VS-880EX, this gives you a total of 128 virtual tracks. At mixdown, you can play back one of the virtual tracks for each physical track. The FD-4 gives you a total of 2 virtual tracks, which can be used globally to bounce or submix in the digital domain, and the FD-8 gives you 16 virtual tracks. Although the D8 does not support virtual tracks, a recent update allows you to mix all 8 tracks onto 2 existing tracks, although this overwrites whatever original tracks were there.

By creatively mixing and editing the virtual tracks, you can make composite tracks, submixes, and so on, using data from all of the virtual tracks. (For a host of advanced VS-880 tips and techniques, including how to get a practically unlimited number of virtual tracks, see "Master Class: Secrets of the Virtual Studio" in the February 1998 issue of **EM**.) Virtual tracks have many uses, including recording multiple takes of a solo, submixing a vocal backup section, and trying out different mixes of your song.

The Roland VS-880EX is the latest iteration of the product that really kicked this whole phenomenon into high gear. It includes a slanted, backlit display; EZ-Routing features; lots of virtual tracks; onboard automation; and a great-sounding effects processor.

THE NUMBERS GAME

Other considerations are the sampling rates, bit resolutions, and recording modes that each device supports. All of the devices I tested support 16-bit recording at 44.1 kHz. The Akai DPS12V2, Fostex FD-4, and all three Roland products also support recording at 32 kHz, and the DPS12V2, VS-880EX, and VS-1680 support 48 kHz recording as well.

Eight tracks of 16-bit, 44.1 kHz digital audio take up approximately 40 MB of disk space per minute, which is enough to fill up even large drives pretty quickly. (Keep in mind that unused track time does not usually take up disk space, so the 40 MB figure assumes you have continuous data throughout all eight tracks for the entire minute.) In order to save disk space, five of the seven units I tested—all except the DPS12V2 and D8—offer several types of data compression. However, all but the Roland VS-840 can also record without data compression, albeit in the case of the VS-880EX, defeating data compression cuts the number of playable tracks to six.

Note that data compression is not the same thing as audio dynamics-processing compression. We're talking about specialized algorithms that do for audio files what Zip or StuffIt compression does for most computer data files.

The types of data compression used in these machines are lossy; that is, in order to reduce the file size, some data is discarded. These compression algorithms are designed to save the most critical data and sacrifice only data that is less likely to affect the sound in a noticeable way. The compression ratio (and hence, the sound quality and file size) varies according to the recording mode you select. Because of the additional recording time you get when

The Fostex FD-8's optical port can be switched between stereo S/PDIF and 8-channel ADAT Lightpipe formats. It lacks built-in effects, but its analog mixer is controlled by familiar knobs that are a welcome relief for those who tire of page and parameter buttons.

For manufacturer information, please see Contact Sheet, p. 171.

IMAGINE
THE POSSIBILITIES


A


B


C


D


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A: Z-726 double tier "Z" stand with **Z-728** boom and **Z-732** music holder **B:** ZM-WS44* mixer workstation – 44" wide (*available in 34" width) and **QL-400** locator stand **C:** **QL-746** super heavy-duty "X" stand with **QLX-2** second tier, **QLX-3** third tier, **QLX-4** boom and, **QLX-5** music holder **D:** Z-WS71L keyboard workstation with **Z-730** locator option (holding mixer) **E:** **RS-954** 20 space rack stand **F:** **BS-317** low amp stand

STUDIOS OF GOLD

using data compression, most of the devices that offer compression use it in their default recording mode.

Although audio quality is compromised to some extent by these compression schemes, in listening to the default recording modes of these devices in a typical personal studio, I couldn't hear any significant loss. (However, I didn't do extensive track bouncing, and that could make a noticeable difference.) The best of these algorithms provides audio quality that is good enough for most professional applications.

PORTABLE DIGITAL STUDIOS IN REVIEW

All of the products discussed in this article have been reviewed in the pages of **EM** except for the Fostex FD-8, which is essentially an expanded FD-4 with ADAT Lightpipe I/O, and the Roland VS-880EX, which is an upgraded version of the VS-880. If you want more detailed evaluations of these products, check out the following back issues, or visit the Article Archives on EM's Web site at www.emusician.com.

Akai DPS12	**July 1998**
Fostex FD-4	**October 1998**
Korg D8	**August 1998**
Roland VS-840	**February 1999**
Roland VS-880	**September 1996**
Roland VS-1680	**April 1999**

The VS-1680 is the only portable digital studio that can record and play back 24-bit files. In MTP (Multi-Track Pro) mode, which uses the machine's best compression algorithm, it can import 24- or 16-bit audio via its S/PDIF ports or 20-bit digital audio via the analog inputs and can record 24-bit or 16-bit files. (However, the unit's mixer processes internally at 24 bits, which means it has no headroom when processing 24-bit audio. As a result, I'm not positive that the output is really 24-bit.) Although it certainly can't compare to a high-end workstation, in MTP mode, the VS-1680 can indeed deliver professional sound quality.

Akai's DPS12V2 features a useful graphic display, optional effects processing, and 12 physical tracks at mixdown. The company's version 2.0 firmware adds support for mastering directly to a CD-R drive.

HOARDING YOUR GOLD

All three Roland devices, as well as the Korg D8, come with some type of internal data storage, either a hard disk or a removable medium. (You can have an internal IDE drive added at the factory to either Fostex unit.) Consequently, these four machines default to recording to internal storage. In addition, all units except the VS-840 come standard with a SCSI port, which allows them to record to any attached external SCSI devices as well.

You can add SCSI as a $195 user-installable option to the VS-840 or buy the VS-840S ($1,595), which has preinstalled SCSI. However, you still cannot record directly to external SCSI devices. You are limited to one SCSI device, which can be used for backup only.

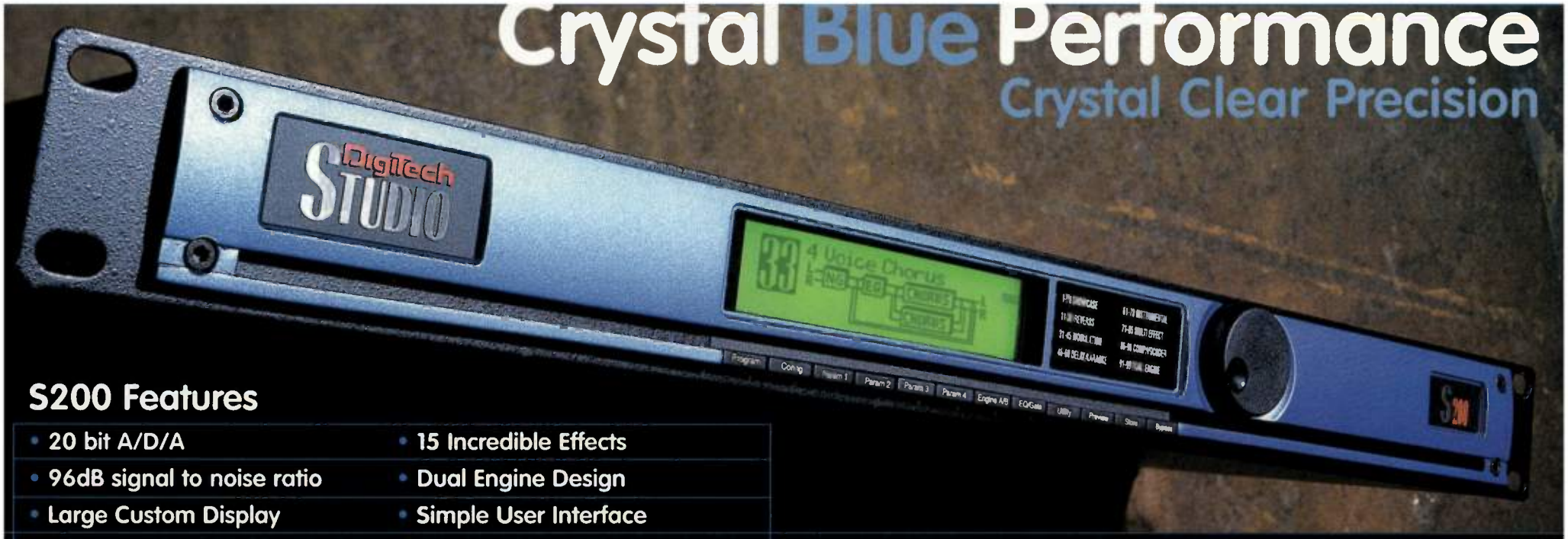
Several other machines do not support a full SCSI chain and limit you to only one or two external devices. The FD-4 supports only one external SCSI device, and the FD-8 supports two (one for recording and one for backup).

OLD-FASHIONED PORTS

One of the more important differences between the various portable digital studios is the number and type of analog and digital inputs and outputs that each unit provides. In general, these

Crystal Blue Performance

Crystal Clear Precision



S200 Features

- 20 bit A/D/A
- 96dB signal to noise ratio
- Large Custom Display
- True Stereo Operation
- 15 Incredible Effects
- Dual Engine Design
- Simple User Interface
- 99 User and 99 Factory Presets

Each menu in the S200 features simple graphics for effortless operation. The easy-to-use interface doesn't overwhelm you with confusing screens of endless parameters. The S200 lets you get right to the business of making music, not wasting time programming.

Behind the cool blue exterior of the Digitech S200 lies the impressive clarity of an honest 20 bit A/D D/A conversion, coupled with an ultra-quiet -96dB signal to noise ratio, allowing you to run discreet, crystal clear signal paths. The powerful dual engine processor of the S200 enables you to use any one of the five different effect configurations capable of placing effects in any order. The large custom LCD interface makes any effect or parameter easily accessible. Whether you are in the studio or on the stage, The Digitech S200 has just the right color for any situation.

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S100

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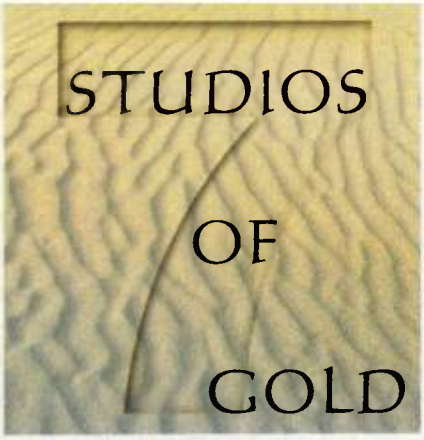


devices have balanced, tip-ring-sleeve (TRS), ¼-inch analog inputs. However, the Fostex FD series and the Roland VS-1680 also include two XLR inputs for microphones. Only the VS-1680 provides +48V phantom power for condenser mics, which is a bit disappointing given all the recent interest in low-cost, high-quality condenser mics for personal-studio recording.

Most of the devices provide you with rotary trim controls and input-level peak LEDs for each channel input. However, the FD-4 and FD-8 offer 3-way trim switches on only two inputs, and neither the Fostex nor the Korg machines have peak LEDs, which makes gain structuring a bit more difficult.

In addition to the standard analog inputs, several units have inputs that can function either as effects returns or as additional inputs for mixdown. The Fostex FD-4 and FD-8 have two sets of ¼-inch stereo returns (four inputs total), and the Korg D8 has one stereo pair of RCA returns. The Fostex units also have stereo direct-recorder inputs (using RCA jacks) that route an external signal directly to the recorder, bypassing the mixer (see **Fig. 1**).

All of the devices provide analog outputs, mostly on RCA jacks. In addition to the master stereo outputs, the Fostex FD-4 and FD-8 and the Roland VS-840 and VS-1680 include separate RCA monitor outputs.

All units also have aux sends for use with external effects processors. The Akai DPS12V2 and Fostex FD-4 and FD-8 have two ¼-inch aux-send jacks, the Korg D8 has a single RCA aux send, the Roland VS-840 and VS-880EX have two RCA aux sends, and the VS-1680 has two sets of stereo aux sends (four outputs total) on RCA jacks. In the case of the VS-840, the jacks can be used as either aux sends or separate monitor outputs, but not both at the same time. The Fostex machines include ¼-inch TRS (send/return) insert jacks for channels 7 and 8. These allow you to route the signal to and from an external processor (such as a compressor) before the channel fader and EQ.

NEWFANGLED PORTS

All of these devices include stereo S/PDIF digital outputs, and all except the VS-840 have stereo S/PDIF digital inputs. But the implementations vary considerably. Akai and Fostex use optical connectors for the inputs and outputs; oddly, Korg provides optical inputs but the digital outputs are on RCA coaxial connectors.

The three Roland units have coaxial and optical S/PDIF outputs. In the case of the VS-840, the two output pairs carry the same signal, whereas the Roland VS-880EX and VS-1680 offer independent optical and RCA digital outputs. The VS-880EX and VS-1680 have coax and optical inputs, which

PORTABLE DIGITAL STUDIO FEATURES

Product	Akai DPS12V2	Fostex FD-4	Fostex FD-8
Price	$1,499	$599	$899
Physical/Virtual Tracks	12/250	4/2	8/16
Simultaneous Record Tracks	6 analog; 2 digital	2	2 analog; 2 digital (8 digital via Lightpipe)
Data Compression	none	selectable	selectable
Built-In Storage	none (see options)	none	none
Record/Back Up to External Device	yes/yes	yes/yes	yes/yes
Number of Markers/Locators	100/12	6/6	6/6
Levels of Undo	250	1	1
CD-R Support	yes	no	no
Mixer Type	digital	analog	analog
Mixer Channels	20	12	20
Faders	(12) channel; (1) master	(4) channel; (1) master	(8) channel; (1) master
Channel EQ	12 ch. 2-band (high & low shelf) or 6 ch. 3-band (w/parametric mid)	3-band (high & low shelf, sweepable mid)	3-band (high & low shelf, sweepable mid)
Solo	yes	no	no
Onboard Automation	scene, MIDI (partial)	none	none
Scenes per Song	24	0	0
Phantom Power	no	no	no
Stereo Effects Processors	2 (optional)	0	0
MTC	send/receive	send/receive	send/receive
MMC	send/receive	send/receive	send/receive
Tempo Map/Tap Tempo	yes/no	yes/no	yes/no
LCD Display/Backlit	248 x 60 pixels; graphic/yes	3" x 1.3"; predefined messages + 9 characters/yes	3" x 1.3"; predefined messages + 9 characters/yes
Waveform Display	yes (1 track)	no	no
Options	EB2M; internal 2 GB hard drive or 1 GB Jaz	none	none

* Requires Roland CD-RW drive.

carry the same signal. However, the VS-1680 is capable of recording and playing back 24-bit digital audio, whereas the VS-880EX is limited to 16-bit digital transfers. As noted, the VS-840 does not have digital inputs.

The FD-8's optical connectors are unique among these units because they can be set in software as either S/PDIF or ADAT Optical (Lightpipe) I/O. When in the latter mode, you can transfer all eight tracks of digital audio between the FD-8's disk drive and an ADAT or other Lightpipe-equipped device, which means the FD-8 can record eight tracks at once. (For more information on the ADAT Optical format and Lightpipe-equipped devices, see "Digital Pipelines" in the April 1999 issue of **EM**.)

In addition, the Akai DPS12V2 (with the new version 2.0 firmware, which is available free from Akai's Web site) and Roland's VS-880EX and VS-1680 support recording directly to a CD recorder for making your own CD-R submasters and backups. The Akai unit works with several CD-R and CD-RW drives from Phillips, Plextor, and Ricoh, among others; check with Akai for a current list of compatible drives. The Roland products require the optional Roland CD-RW drive ($750).

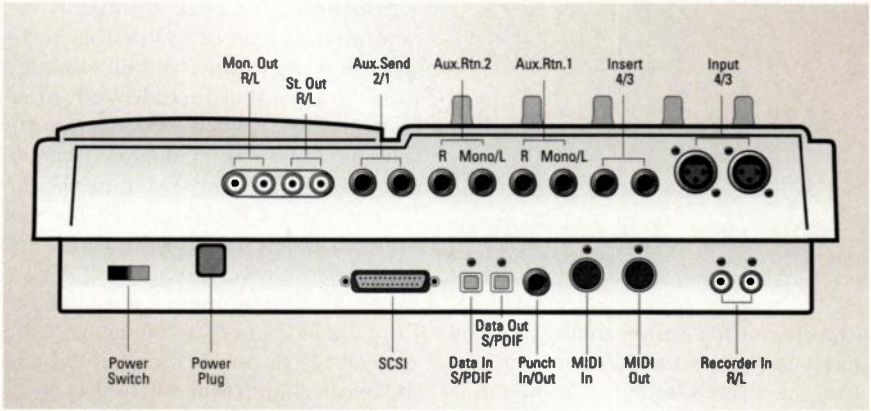
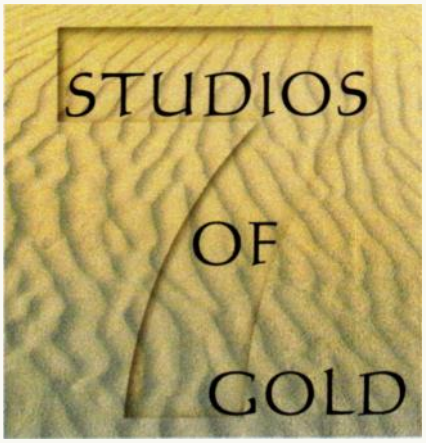


FIG. 1: Because its mixer is analog, the Fostex FD-4's insert jacks and aux sends do not require A/D and D/A conversion. (The same is true of the FD-8.) The RCA stereo direct-recorder inputs, however, go straight to the recorder via A/D converters, bypassing the mixer.

THE HEART OF THE MATTER

The mixers vary greatly among portable digital studios. On the Fostex units, for example, the mixer is analog, whereas all the other units have digital mixers. This difference is significant, but the Fostex analog mixer sounds very good, so audio quality is not the issue. (You can bounce tracks down digitally, without going through the mixer, so you don't have to subject the signal to repeated A/D/A conversions.) The

Korg D8	Roland VS-840	Roland VS-880EX	Roland VS-1680
$1,250	$1,395	$2,195	$3,195
8/0	8/64	8/128	16/256
2	4	6 analog; 2 digital	8
none	yes	selectable	selectable
1.4 GB hard drive	100 MB Zip drive	2 GB hard drive	2 GB hard drive
yes/yes	no/optional	yes/yes	yes/yes
100/3	1,000/8	1,000/32	1,000/64
1	999	999	999
no	no	yes*	yes*
digital	digital	digital	digital
12	12	16	26
(7) channel; (1) master	(7) channel; (1) master	(8) channel; (1) master	(12) channel; (1) master
2-band (high & low shelf)	3-band (high & low shelf, parametric mid)	3-band (high & low shelf, parametric mid)	3-band (high & low shelf, parametric mid)
no	yes	yes	yes
scene	scene	dynamic, scene, MIDI	dynamic, scene, MIDI
20	8	8	8
no	no	no	yes
1	1	2	4 (optional)
send	send	send/receive	send/receive
receive	send/receive	send/receive	send/receive
yes/yes	yes/no	yes/no	yes/no
4" x 0.9"; predefined messages + 10 characters/no	2.7" x 1"; graphic/yes	2.8" x 1"; predefined messages + 16 characters/yes	320 x 240 pixels; graphic/yes
no	yes (limited)	yes (limited)	yes
none	SCSI	CD-RW	VS8F-2 effects board (up to 2); CD-RW



downside of the Fostex analog mixer is that it can't be automated, nor can you store the mixer's settings. On the other hand, having dedicated knobs for all mixer features can be a godsend.

The mixers on these portable digital studios differ in other ways as well. The number of mixer channels varies, and it is not necessarily the same as the number of tracks in the recorder section. For example, the Roland VS-1680 has 16 tracks and 26 full-featured mixer channels available at mixdown. The number of channels can be especially important if you want to sync up a sequencer and record several synths at mixdown.

The number of independent level faders varies, too. The Akai and Fostex units, as well as the Roland VS-880EX, offer dedicated faders for each input channel, but the Korg D8 and the Roland VS-840 and VS-1680 all include one or more faders that are preassigned to stereo inputs. With the VS-1680, however, you can unlink the paired tracks, which means you can use the fader to control either channel level. And as noted in the features chart, the VS-1680 has more channels than faders.

Another difference to note is the amount and type of EQ that each device offers per mixer channel. Although those devices that include built-in effects all have special EQ programs as well, the EQ I'm referring to is not considered an effect per se, but rather the EQ controls you'd expect to see on each input strip of a traditional mixer. Most of the units offer 3-band EQ with a sweepable mid-frequency, although the Korg D8 is limited to 2-band EQ, the Akai DPS12V2 can provide only 3-band EQ on six channels or 2-band EQ on 12 channels, and the Roland units also have limits if you choose the 3-band EQ over the default 2-band.

MIXDOWN ALCHEMY

If you're interested in automating your mixdown—an extremely powerful and useful capability—you can get any or all of three types: scene, onboard dynamic, or dynamic MIDI. Scene, or snapshot, automation lets you store the instantaneous values of all or a selection of mixer (and, in some cases, effects) parameters. All of the products except the Fostex units offer some degree of scene automation.

Dynamic automation gives you real-time, continuous control of the parameters, which is slick. Only the Roland VS-880EX and VS-1680 have onboard dynamic automation, which means they can be fully automated without using an external device. They and the Akai DPS12V2 also have dynamic MIDI automation, which means their parameters can be controlled from an external sequencer. The Akai does not allow MIDI control of the effects or EQ; according to the manufacturer, however, MIDI control of the EQ will be added in a future software upgrade.

You can sync and control the transports of all of these machines (including the Fostex units) via MIDI Machine Control (MMC) and MIDI Time Code (MTC). The Korg D8 sends MTC but cannot receive it, and it receives MMC but cannot send it. Conversely, the VS-840 can send MTC but not receive it; however, it can both send and receive MMC. All of the other units can both send and receive MTC and MMC.

POLISHING GOLD

Even if you have outboard signal-processing gear, it's convenient to have built-in effects. Using built-in effects helps keep your recording clean, and in some cases you can store a specific effects preset with a particular recording project. If you have onboard digital effects and a digital mixer, you can keep your audio in the digital domain, so you avoid the extra A/D/A conversion required with outboard gear.

Neither Fostex unit offers built-in effects. In addition, although the FD-4 and FD-8 provide two independent effects sends, each channel can only be sent to one effects send or the other. The design of these systems prevents you from sending a single channel to more than one attached effects processor, which is a significant limitation.

The Roland VS-840 comes with a single stereo effects processor as standard equipment, and the Roland VS-880EX comes with two independent stereo

PORTABLE DIGITAL STUDIO SPECIFICATIONS

Product	Akai DPS12V2	Fostex FD-4	Fostex FD-8
Analog Inputs	(6) ¼" TRS	(4) unbal. ¼" mic/line; (2) bal. XLR mic/line; (2) RCA direct record	(8) unbal. ¼" mic/line; (2) bal. XLR mic/line; (2) RCA direct record
Aux Returns (stereo)	0	(2) pr. unbal. ¼"	(2) pr. unbal. ¼"
Aux Sends/Inserts	(2) bal. ¼"/0	(2) unbal. ¼"/(2) ¼" TRS	(2) unbal. ¼"/(2) ¼" TRS
Analog Mix Outs/Headphone Out	(2) RCA/(1) ¼" stereo	(4) RCA/(1) ¼" stereo	(4) RCA/(1) ¼" stereo
Digital Inputs (stereo S/PDIF)	1 optical	1 optical	1 optical (S/PDIF or 8-ch. ADAT)
Digital Outputs (stereo S/PDIF)	1 optical	1 optical	1 optical (S/PDIF or 8-ch. ADAT)
Other Ports	MIDI In, Out/Thru; (1) ¼" footswitch; (1) DB25 SCSI	MIDI In, Out; (1) ¼" footswitch; (1) DB25 SCSI	MIDI In, Out; (1) ¼" footswitch; (1) DB25 SCSI
ADCs/DACs	18-bit/20-bit	16-bit/16-bit	20-bit/20-bit
Record Resolution	16-bit	16-bit	16-bit
Sampling Rates (kHz)	32, 44.1, 48	32, 44.1	32, 44.1
Dimensions	17.5" (W) x 13.15" (D) x 3.86" (H)	15.83" (W) x 14" (D) x 4.33" (H)	21.75" (W) x 14" (D) x 4.33" (H)
Weight	9.5 lbs.	8.8 lbs.	11 lbs.

effects processors. (With the original VS-880, you had to add an optional effects board, but effects are included in the EX version.)

The VS-1680 doesn't come with effects, but you can add one or two VS8F-2 effects boards ($395 each). Each VS8F-2 board includes two independent stereo effects processors, so the VS-1680 can have up to four stereo processors. (Incidentally, the effects in the VS-880EX are the equivalent of a single VS8F-2 board, and those in the VS-840 are equivalent to half of a VS8F-2.) The Akai DPS12V2 can be augmented with the optional EB2M board ($299), which features two stereo effects processors.

All of the effects processors can generate guitar-oriented effects such as distortion, except for the Akai's EB2M effects board. All can deliver reverb, delay effects, EQ, dynamics processing, and pitch shifting.

The D8 ships with a stereo multieffects processor. To its credit, the D8 delivers 58 different types of effects. But the Roland units are clearly the cream of this crop. In addition to the aforementioned conventional effects, they offer a variety of sophisticated physical-modeling effects, such as microphone emulation, which can do things like make an inexpensive dynamic mic sound more like a high-quality condenser; a guitar-amp simulator, which can re-create the sound of different types of guitar amps; and lots more. The Roland units offer an impressive array of algorithms and sophisticated levels of control for each of those algorithms. Even the VS-840, which doesn't have as much effects-processing horsepower as the other VS units, offers an excellent collection of effects.

The Roland VS-840 offers a great blend of features, ease of use, and value. The recording time is limited on this machine but will be improved on the upcoming VS-840EX, which will also include a 250 MB Iomega Zip drive.

Each manufacturer claims different numbers of effects that its devices are capable of producing at once, but quantifying these effects in a meaningful way can be difficult because some effects algorithms or programs include multiple effects. In addition, some effects are dual mono and treat the two input channels independently, whereas others are stereo effects that treat each channel identically.

Korg D8	Roland VS-840	Roland VS-880EX	Roland VS-1680
(2) bal. ¼" mic/line/instr.	(4) unbal. ¼" mic/line; (1) unbal. ¼", high-Z gtr.; (2) RCA line	(6) bal. ¼" TRS mic/line	(2) XLR mic/line; (6) bal. ¼" TRS mic/line; (1) unbal. ¼", high-Z gtr.
(1) pr. RCA	0	0	0
(1) RCA/0	(2) RCA/0	(2) RCA/0	(4) RCA/0
(2) bal. ¼"/(1) ¼" stereo	(2) RCA/(1) ¼" stereo	(2) RCA/(1) ¼" stereo	(8) RCA/(1) ¼" stereo
1 optical	0	1 coax or 1 optical	1 coax or 1 optical
1 coax	1 coax or 1 optical	1 coax & 1 optical (independent)	1 coax & 1 optical (independent)
MIDI In, Out; DB25 SCSI	MIDI In, Out/Thru; (1) ¼" footswitch; (1) DB25 SCSI (VS-840S only)	MIDI In, Out/Thru; (1) ¼" footswitch; (1) DB25 SCSI	MIDI In, Out/Thru; (1) ¼" footswitch; (1) DB25 SCSI
18-bit/18-bit	20-bit/20-bit	20-bit/20-bit	20-bit/20-bit
16-bit	16-bit	16-bit	16- & 24-bit
44.1	32, 44.1	32, 44.1, 48	32, 44.1, 48
15.2" (W) x 9.8" (D) x 3.3" (H)	16.2" (W) x 12.13" (D) x 3.5" (H)	17.13" (W) x 12.5" (D) x 3.5" (H)	21.8" (W) x 13.25" (D) x 4.3" (H)
5.7 lbs.	9.9 lbs.	10.1 lbs.	13.9 lbs.

Of course, the more onboard effects you have, the more options you have at mixdown, and the more channels you can treat independently. All of the machines I tested allow you to insert and record effects on individual tracks, which frees up the effects processors for reuse during later tracking or at mixdown.

DISPLAYS OF POWER

One of the first things you're bound to notice about these devices is that despite their capabilities and the complex nature of multitrack recording and mixing, they have few controls. The exceptions are the analog mixers on the FD-4 and FD-8, which offer dedicated knobs and switches for all of their functions, making them easy to use.

Instead of dedicated controls, most portable digital studios rely on the familiar but often painful approach in which you call up pages on the unit's display and move the cursor over to make parameter changes. That type of interface can be confusing on any device, and it can be particularly difficult with portable digital studios because there are so many parameters. The devices I tested deal with this in various ways, but the reality is that there's no avoiding the problem.

The one possible exception is Roland's VS-1680, whose huge, 320 × 240–pixel display eases the task of viewing and adjusting lots of settings at once. Even with a large display, there are so many possible parameters and so many pages to adjust that you can still get lost. In addition, a nice, big display does not come cheap; the VS-1680 is the most expensive device of the bunch.

Some products have displays with predefined areas and small characters, such as the Fostex units, the Korg D8, and the Roland VS-880EX. With these machines,

OTHER PATHS

In addition to portable digital studios, you have plenty of other digital recording options, including multitrack MiniDisc, MDMs (such as the Alesis ADAT and Tascam DA series), modular hard-disk recorders (such as the Akai DR16 Plus), and computer-based and stand-alone digital audio workstations. If you are considering these options and can't decide which way to go, check out "Dream Dates" in the April 1997 **EM**.

For a comparison of the most important modular hard-disk recorders, take a look at "The Magnificent Seven" in the November 1996 **EM**. Although this scene has changed quite a bit, some of the machines evaluated in the article are still available, and you'll find a lot of useful information there. **EM** faced off three multitrack MiniDisc recorders in "Mad for the Mini!" in the July 1997 issue.

All of these articles are available on **EM**'s Web site at www.emusician.com in the Article Archives.—*Steve Oppenheimer*

For manufacturer information, please see Contact Sheet, p. 171.

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the problem is particularly acute. Having to scroll through 20 or more different pages to get to the parameter you need can be painful and frustrating, but it's not unheard of with these devices. For this reason, I much prefer the display on Roland's entry-priced VS-840 to that on the mid-priced VS-880EX.

The DPS12V2 display, although not as elegant as the VS-1680's, is a step up from the displays on the other machines. It lets you do precise edits and jog and scrub one track at a time while viewing the waveform. Overall, the user interface on this machine is simple, easy to use, and reasonably powerful.

Eventually, you will start to learn some tricks and shortcuts that help reduce the time you spend tweaking parameters. But you're going to have to go through a learning process with most of these devices. You'll probably depend a lot on the printed documentation at first. Unfortunately, much of the documentation amounts to fairly terse explanations of buttons and parameters, but all of the Roland units and the Fostex FD-8 come with a handy "quick start" guide.

The one noteworthy exception is the printed documentation for the VS-840, which is outstanding: it's well written, well organized, and does not exhibit the translation problems that seem to plague so many foreign equipment manuals. Another tip of the hat to Roland is also due for the extremely helpful video manual that is bundled with the VS-1680.

SOUND JUDGMENT

As I said earlier, all of the portable digital studios offer excellent audio quality, even those that record with data compression. They all have good specs, including frequency responses from 20 Hz to 20 kHz (when recording at 44.1 kHz). Although the manufacturers' claimed distortion and dynamic-range specs vary some, the difference isn't much, which is why I haven't quoted them in the specifications table.

I noticed the most audible difference between these units in the mic preamps and effects processors. Although line-level signals sound fine on all units, plugging in a mic (or other low-level source) meant having to crank up the trim control, leading to noticeable hiss on some of the less expensive units, especially the Korg D8 and Fostex FD-4 and FD-8. Of course, that's not surprising; in this price range, you can't expect great mic preamps.

The effects on the DPS12V2 were mediocre in both quality and editing depth. The guitar effects on the VS-840 were rather noisy, as were some of the effects on the D8. Conversely, the

Each of these products is targeted at a different user.

ROLAND VS-SERIES UPGRADES

By the time you read this, several enhancements should be available for Roland's VS line of portable digital studios. First of all, the VS-840EX will replace the original VS-840 at the same list price, and an upgrade kit that turns any existing VS-840 into a VS-840EX should also be available. The VS-840EX offers more recording time because it has a 250 MB Iomega Zip drive in place of the 100 MB Zip drive in the original VS-840. (The upgrade kit includes the new drive.)

In addition, several important software enhancements have been made, which VS-840 users can get for free with a software upgrade to version 2.0. These enhancements include new COSM vocal effects algorithms, bass guitar and acoustic guitar simulators, more guitar effects, bass guitar multi-effects, a built-in guitar tuner, a tap-tempo feature, and a Quick Record mode. In addition, with the optional SCSI board, you can load and back up individual tracks to any SCSI device, not just to another Zip drive, although you still can't record directly to an external SCSI device.

The VS-880EX and VS-1680 software upgrades, like the VS-840 software upgrade, can be downloaded free from Roland's Web site. Both of them include support for new speaker-modeling effects that, according to Roland, allow you to emulate a wide variety of different speaker types with a single pair of monitors. (Although this feature allegedly works with any sonically transparent, flat studio monitor, it is especially intended for use with Roland's new DS-90 powered digital speakers.)

In addition, the VS-880EX and VS-1680 add new mastering effects, including a multiband compressor. The VS-1680 upgrade includes some user interface enhancements, including the ability to internally mix all 16 tracks down to 2 tracks, 18-track playback, scrolling waveforms in real time, automation editing, faster CD archiving and burning, list modes for viewing songs and/or archives, and easier access to some pan settings.

Finally, starting around May, Roland will bundle Emagic *Logic VS* with the VS-880EX and VS-1680. Current VS-880 owners can get a free copy as well. This special version of Emagic's digital audio sequencer for Macintosh and PC includes integrated editing of VS audio data. The program lets you view the playlists and waveforms of digital audio recorded on the VS. The audio remains on the VS, and any edits that you make are sent to the VS in the form of MIDI commands; the actual number crunching is done on the VS.

The program also lets you edit the effects, EQ, and automation data, and it lets you store the waveform files along with the *Logic VS* sequence. Roland will also bundle a free version of Liquid Audio's *Liquifier* Internet audio-streaming software and will let VS users publish one song for free on the Roland VS users Web site. For $99 more, the user can extend that arrangement for another six months and add the ability to sell their song on the Web, with the transactions handled by Liquid Audio.

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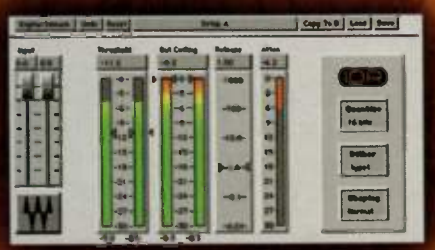

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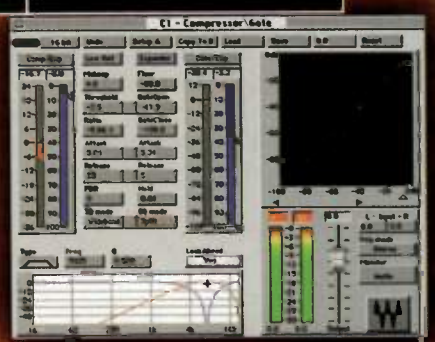

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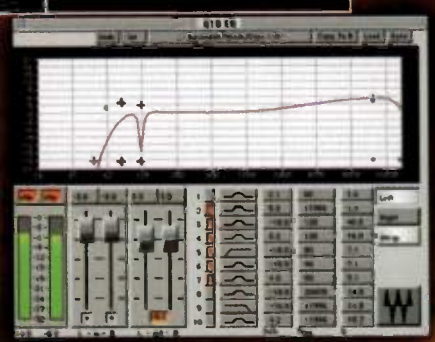

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WAVES

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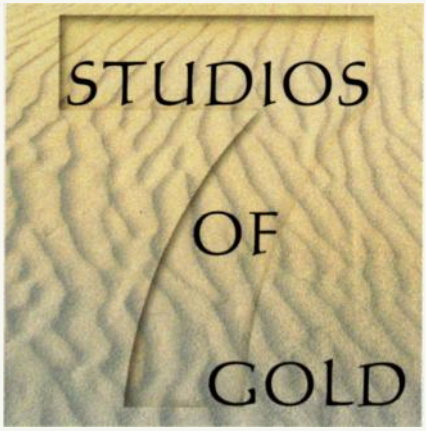

guitar effects presets on the VS-880EX and VS-1680 were some of the quietest when I wasn't playing, yet offered plenty of "bite" when I was playing. In terms of overall audio quality and depth of parameters, the effects on the VS-880EX and VS-1680 are my hands-down favorites. They are smooth and rich, with lots of different variations, and they have a professional feel.

SUIT YOURSELF

Trying to figure out which of these devices is best suited to your needs is a challenge. In addition to sonic issues, you have to carefully consider the features you think you're going to want (see the tables "Portable Digital Studio Features" and "Portable Digital Studio Specifications").

Of course, you can't tell everything from a spec sheet. For example, the table won't tell you that the D8's built-in drum patterns help turn Korg's machine into a great songwriting tool. A chart also can't tell you which features in these seven units live up to the marketing claims and which fall short. Although I have tried to supply some of this information, you really should read **EM**'s in-depth reviews of these products (see the sidebar "Portable Digital Studios in Review"). In addition, street prices vary widely, and some of these products are marked down a lot more than others. We give only list prices, but you should price-shop carefully.

If money is no object and you want the most advanced portable digital studio available, then Roland's VS-1680 is unquestionably a great choice. The VS-1680 offers a friendly user interface, support for 24-bit recording, a wide range of inputs and outputs, great sound, and an extensive feature set, including sophisticated automation. Don't forget to buy two of the great-sounding VS8F-2 effects boards, even though that will jack the price up.

If your budget is more modest—which is often the situation—the choices are much more difficult. If you want lots of tracks at mixdown, are interested in automating your mix via your sequencer, and do not have the patience to learn a complex user interface (be honest, now), you might really like the Akai DPS12V2. If you want the effects quality, extensive virtual tracks, and automation features of the VS-1680 and don't mind a somewhat confusing interface, go with the VS-880EX.

Guitarists and songwriters on a moderate budget would be well served by either the D8 or the VS-840. Of these two, I prefer the VS-840's user interface, and for the most part, it has a deeper feature set than the D8. Note that the D8 has a 1.4 GB internal hard drive, whereas the VS-840 has a 100 MB Zip drive, so the Korg unit allows you to record more music before having to buy additional media, but the Roland unit offers the advantages of removable media.

The Fostex FD-4 and FD-8 are special cases in several respects. Although their analog mixers (which cannot be automated) and lack of effects may be a turnoff to some people, these machines have a lot going for them, including flexible I/O. In fact, because the mixers are analog, it's not a problem for Fostex to include two insert points in both models. The FD-4, like the D8, can record only two tracks at a time, but if you are a singer/songwriter or solo guitarist, that might be all you need. It's also a good choice if you just want to sync up a MIDI sequencer and a few tracks of hard-disk-based audio. Furthermore, the FD-4 is the least expensive portable digital studio on the market, and you definitely get your money's worth.

The FD-8 is the only machine in this group that can record as many as eight tracks at a time digitally via the ADAT Optical port. This, along with its insert points, makes it a good choice if you already own some good-quality multieffects processors or want to transfer tracks to and from an ADAT Lightpipe-equipped device. Of course, it also handles all the same jobs as the FD-4, but with more tracks.

No matter which portable digital studio you choose, you'll end up with a great addition to your equipment arsenal that can easily serve as the foundation for any home or project studio. Who knows, maybe it'll even help make some of your other musical dreams come true.

The current cream of the portable digital studio crop is the 16-track Roland VS-1680, with its huge graphic display, tremendous selection of built-in effects, advanced features, and flexible array of inputs and outputs. It has everything the VS-880EX offers and much more.

Former **EM** *editor* **Bob O'Donnell** *is the author of* Personal Computer Secrets *from IDG Books and is the host of* O'Donnell on Computers, *which you can hear on the Web at www.everythingcomputers.com.*

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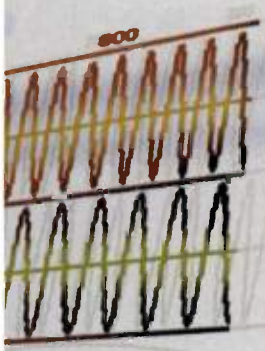
RAZOR'S EDGE

Sound editing has moved from the chopping block to the hard drive.



BY JEFF CASEY

Imagine, if you will, an exhausted man sitting on a folding metal chair in a small, bright room. He is hunched over a large mechanical device with ominous spinning wheels that looks entirely capable of claiming a finger or two. His hands are covered with bandages, and hundreds of used razor blades litter the floor. No, this isn't a scene from the latest David Lynch flick. The poor fellow was me, who, like many other people, learned the craft of editing audio the old-fashioned way—with analog tape, an editing block, and a few thousand finger cuts.

Fortunately, audio-editing software has replaced the antiquated chopping block of yesteryear, and musicians starting out today will never have to endure the medieval torture that I went through. Software editors not only facilitate simple cut-and-paste operations but also bring new features into the equation, opening the door to countless creative possibilities. However, as with editing analog tape, performing even the most routine edits on a software editor takes practice. This month EM looks at some of the aspects of desktop editing and provides a tutorial to help you get up and running. We offer tips and tricks for beginning and intermediate users, and even some ideas that advanced musicians will appreciate.

RAZOR'S EDGE

BLOCKHEADS AND SURFERS

First, a distinction needs to be drawn between *block editors* and *waveform editors*. Although these two programs seem similar, the ways in which they edit audio differ greatly.

Waveform editors process samples of audio, making changes directly to the files on disk. In other words, when you cut a section from the end of a track and paste it in the middle of that track, you have really moved that section within the file. (Changes are usually temporary until the file is saved.) Therefore, waveform editing is most often *destructive*, although some programs do offer a *nondestructive* environment.

Block editors, conversely, manipulate the start and end points of virtual segments within an audio file without changing the content of that file on disk. For example, when you cut and paste that same segment of audio with a block editor, you are instructing the software to play the section located at the end of the track when the edit point in the middle is reached. Block editing is generally nondestructive.

The differences between waveform and block editors, though, go beyond how the programs save information.

Block editing is typically associated with multitrack digital audio workstations (DAWs) and digital audio sequencers. It gets its name because all segments of audio related to a particular track appear on the edit screen as blocks of information. (Sometimes a graphic waveform is displayed within the block; however, it's important not to confuse this with a true waveform editor.) You can divide blocks to create new ones, move them around within a track and between tracks, or create fades into, out of, and between blocks—all without making a single change to the file on your hard drive. Block editing is an efficient way of manipulating audio in a multitrack environment.

The flip side to block editing is that the software usually offers fewer features and less editing control than a waveform editor does. A block editor's tools include the standard cut, copy, paste, delete, and insert/delete silence functions, in addition to fade capabilities. Depending on the program, you might also find a variety of DSP effects, such as normalizing, gain changing, polarity inversion, sample rate conversion, time compression and expansion, and pitch shifting.

The more sophisticated audio-editing duties are reserved for waveform editors, which are most often 2-track tools packaged as stand-alone software. (Certain multitrack programs, however, such as Digidesign's *Pro Tools* and Syntrillium's *Cool Edit Pro*, allow you to perform detailed waveform editing

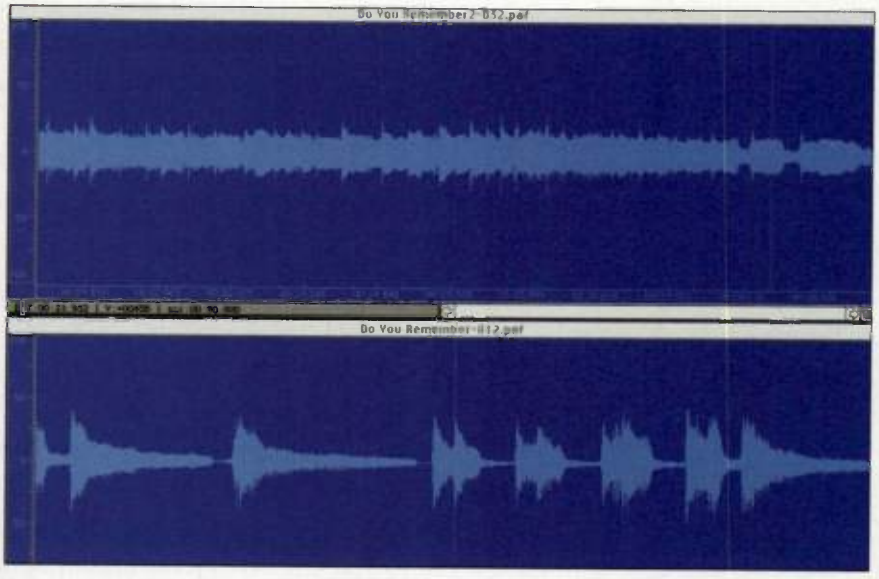


FIG. 1: Editing a percussive sound, such as a snare drum (bottom), is easier than editing a sustained sound, such as a guitar (top), because percussives usually have distinct breaks in the material.

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- Check or money order for $30.00 per song (U.S. currency only) payable to John Lennon Songwriting Contest. If paying by credit card, $30.00 per song will be charged to your account.

Entries must be postmarked no later than August 31, 1999.

1. Each song submitted must be contestant's original work. Songs may not exceed five (5) minutes in length. No song previously recorded and released through national distribution in any country will be eligible. Songs may have multiple co-writers, but please designate one name only on the application. **Contestant may submit as many songs in as many categories as he/she wishes, but each entry requires a separate cassette, entry form, lyric sheet, and entrance fee. One check or money order for multiple entries/categories is permitted.** (Entrance fee is non-refundable. JLSC is not responsible for late, lost, damaged, misdirected, postage due, stolen, or misappropriated entries.)
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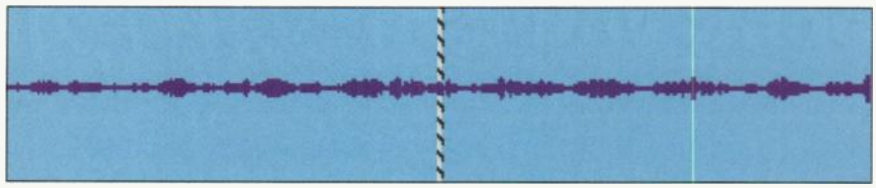

FIG. 3: After making an edit, you can smooth over the transition with a quick crossfade. The fade shown here is about 0.03 seconds long. The vertical line represents the actual edit point.

of each track. Audio sequencers and DAWs that offer only block-editing features often come bundled with 2-track waveform editors—the theory being that, should you need to perform detailed editing on a track, you can export the file to the waveform program.

Waveform editors, therefore, provide a more in-depth editing environment than do block editors, allowing you to make surgical edits to samples, and offering a wider array of tools. A typical feature set might include elaborate customizable fade parameters, gain envelope controls, reverse functions, and looping capabilities. (For a comparison of eight hot waveform editors, see "Shaping Better Waveforms" in the March 1999 issue of **EM**.)

One of two things can happen when you perform an edit. When audio is cut from a track, you can delete the segment and leave blank space in its place, or you can close the gap, moving subsequent audio backward in time. Similarly, in a paste operation, the new segment can be placed on top of the old one, replacing the original content, or the old segment can be pushed forward in time, making room for the new one.

If you're doing multitrack editing, you'll probably want to maintain integrity in the time line of a track—after all, you wouldn't want a guitar track pushed out of sync every time you edit it. On the other hand, if you are using a 2-track waveform editor to edit a dialog track independent of anything else, you'll want the software to close any gaps automatically. Sync-sensitive editing, therefore, is commonly found in multitrack block editors, while "cut-and-close" editing is most often associated with 2-track waveform editors. Some software packages, however, offer both types of editing.

TIME IS MONEY

For proficiency in desktop editing, I recommend that you thoroughly learn the keyboard shortcuts. You can execute most editing functions from the keyboard, and some programs even let you define your own keystroke commands.

I work with two programs in my personal studio, Ensoniq *PARIS* and BIAS *Peak LE* (a fantastic 2-track editor); I'll be referencing both throughout this article. (PC users, don't go away—all the tips covered here will apply to your audio software, as well.) Editing with these programs is second nature for me: my right hand is in charge of the mouse and the jog wheel, while my left hand executes the edit functions on the keyboard. Picking up all the shortcuts takes some time, but once you've learned them, you'll wonder how you ever worked without them.

In general, the commands for cutting, copying, pasting, and deleting are universal on the Mac and PC. While most programs recognize the spacebar as the Play/Stop keystroke, some start playback from the beginning of a track, others from the last selected marker, and still others from the beginning of any highlighted section (my personal preference). Some programs even let *you* decide which method to use.

Good programs also allow you to use the keyboard to nudge and slip the start and end points of an audio segment and to move the segment left and right in time on the edit field. This is a cool feature, but a jog wheel is even better. If you have one and your audio-editing software supports it, take advantage of it—I can't imagine how I ever worked without one.

POINT-TO-POINT

Editing is all about points—specifically the start and end points of audio segments—and *good* editing is all about making sure those points are positioned in the right places. Much as with good dynamics processing, the end result of editing should be completely transparent to the listener. If edits are positioned in the wrong places, they'll be noticeable.

For the purposes of this article, I am dividing editing into two categories: cut-and-paste edits, in which large segments of audio (longer than a second) are manipulated; and microedits, tiny operations usually performed at the single-waveform level to remove noise and unwanted artifacts or to refine edit points. Cut-and-paste edits can generally be performed with either a block or waveform editor, but microedits usually demand the precise editing environment of a waveform package.

SCISSORS AND GLUE

There are many reasons for making cut-and-paste edits. Among these are to fix problems (for example, to replace a bad bass-guitar fill with a good one), to build a composite track (say, to create a dialog track from several different takes), to make changes for creative purposes (for example, to copy vocals from one section and add them to another), and to rearrange tracks completely (say, to create a radio edit of a final mix). And, of course, the insertion of silence at the end of a track is also considered a cut-and-paste operation.

Ideally, you should place cut-and-paste edit points in sections where there's a distinct break in material. That way, potential problems such as clicks will be contained in noncritical sections. However, such placement may not be possible, depending on the type of sound you're working with.

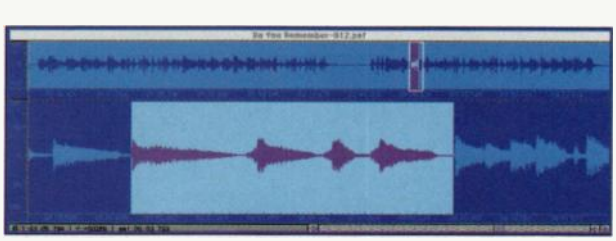

FIG. 2: It is a good idea to edit in phrases, from the beginning of one attack to the beginning of another. This screen shot shows a bass-guitar fill that's ready for editing.

Percussive sounds (for example, kick and snare drums, certain pianos, the voice) have short decay times and distinct phrasing with little or no sustain. These types of tracks have plenty of silent sections, which are ideal places to drop in edit points (see **Fig 1**). Conversely, sustained sounds—say, guitars and synthesizers—have rather long decays and phrasing that is less well defined than percussive sounds. Finding distinct breaks in material on these tracks is rare, so cut-and-paste edits must often be made in areas where audio is present.

Regardless of the sound you're working with, I suggest you create edit points *immediately before* the attack of a phrase or note. This approach has two advantages. First, it provides a "ready-to-go" segment to work with. For example, when I drop a copied voice-over segment onto a track in a new location, I know that the voice-over begins right at the top of that segment, not a second or two later. Therefore, the point at which I make the paste is where the audio will be (give or take a few milliseconds).

Second, when working with sustained sounds, the point right before each attack is generally where the level of the previous sound's decay is the lowest. For example, if a keyboard player is holding a note on a string patch, there will be a slight break before the attack of the next note, when the player's fingers rise off the keys. Although putting an edit in this place may not be as ideal as in the silent space before a kick-drum hit, it's still better than dropping the point in the middle of the note.

I prefer to edit in complete phrases, starting right before the beginning of one attack and ending just before the beginning of another (see **Fig. 2**). This approach keeps everything fairly uniform and natural sounding—which is a major consideration, especially when editing dialog (more on this later).

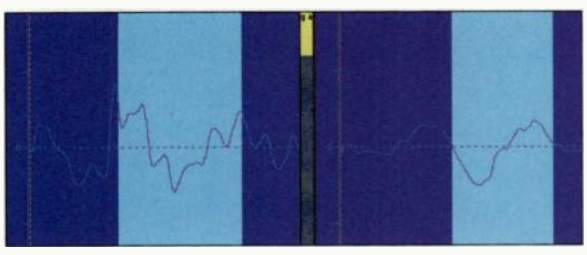

FIG. 4: The view on the left shows an edit ready to be performed at a point above the zero line, while the one on the right illustrates a zero-line edit. The edit on the left needed to be redone because of a click.

Be consistent about where you create your edit points in relation to each phrase. If, for example, you cut a segment 10 ms before the start of a phrase, don't paste that segment 50 ms before the start of the phrase you want to replace—paste it 10 ms before the start. You may have to get down to the single-waveform level to accomplish this, but more often than not, maintaining consistency is worth the effort.

Most audio-editing software uses a "now point," represented as a vertical linear cursor that scrolls across the blocks or waveforms to indicate the current position of the transport. I often use this feature on *PARIS*'s block-edit screen as a marker to keep my spacing even. For example, when I'm working at the second-smallest zoom view, I always create edit points two jog-wheel steps to the left of where each phrase begins. You can also use the time line at the bottom of the screen as a reference; I know that the two jog-wheel steps I use equal roughly 10 ms.

After you find an edit point, set a now point for it immediately. Even if you plan on making the edit right away, dropping the marker and keeping a written log of each one will allow you to recall any edit in a project quickly and precisely.

When you finish your edit, smoothing it over with a short crossfade is usually a good idea (see **Fig. 3**). This practice helps ensure that your transition will be flawless. The crossfade should be quick (much less than a second) and linear (a standard "X-style" fade).

MULTITRACK MOVES

Now suppose you are moving segments within a single track, as well as between two tracks in a multitrack session. This approach is commonly used for creating composite tracks from several takes (such as the "perfect" guitar solo) or for conserving track space. For example, you might want to move a tambourine part onto a shaker track to open up some room for the guiro (assuming that the shaker and the tambourine are not playing at the same time).

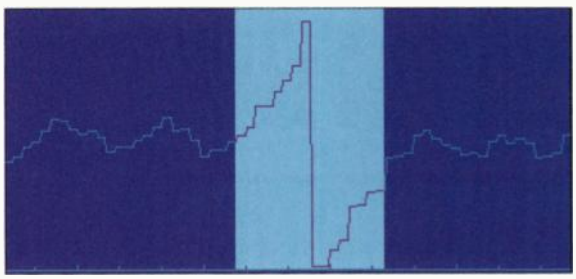

FIG. 5: This figure shows a transient peak caused by a digital click. By removing the peak with a quick zero-line edit, the click will go away.

Most multitrack editing software provides some sort of "move-in-time" tool, which allows you to slip an object between tracks but not forward or backward in time. If your editing program doesn't support this feature, here's another approach you can use: zoom in so that your view is enlarged as much as possible, then line up the cursor at the beginning of the segment you want to move and create a marker. Next, select the segment and cut it. Go to the destination track, recall the marker, and paste it onto that track.

How about editing multiple tracks at once, such as six tracks of a drum kit? If you're lucky, your software will allow you to perform multiple simultaneous edits. If not, you're left with a challenge. Again, the best way to tackle this operation is to use markers (or to define "regions," if that's what your software offers).

Pick one track to be your guide track, and use it to find the edit points. As you locate each one, drop in a marker and note what it is (for example, cut point A, cut point B, paste point A, paste point B). This way you can recall each position when you edit the other tracks. After you've marked your points, perform the edit on each track that you want to move. This method is a little time-consuming, but it works.

DOWN TO THE WIRE

Microedits are most often used to fix problems. You can usually eliminate digital clicks, vocalists' mouth noise, and general sonic garbage with skillful microediting using a waveform editor. And surgical tweaks to a cut-and-paste edit can make a seamless transition.

Clean microediting comes down to following a simple principle. When you view a waveform on screen, you're looking

at a representation of the amplitude vs. time ratio of that sound. Like an acoustic sound, the digitized sound wave is cyclical, with positive and negative phases on opposite sides of the zero line. When the waveform crosses the zero line, there is, in essence, no volume. Audible clicks are usually caused by edits performed when the waveform is either above or below the zero line. So ideally, if you can edit in places where the waveform crosses the zero line, you'll avoid any problems with clicks or pops.

A common misconception about waveform editing is that as long as you connect the waveform so that both sides meet at *some* point along the amplitude graph (which is what most waveform editors do automatically in "cut-and-close" mode), your edit will come out fine. This approach *might* work, but you won't know until you listen to it. I equate this method to unplugging a mic cord without muting the channel: you never know for sure if it is going to pop, but because the volume is up, you know that it might.

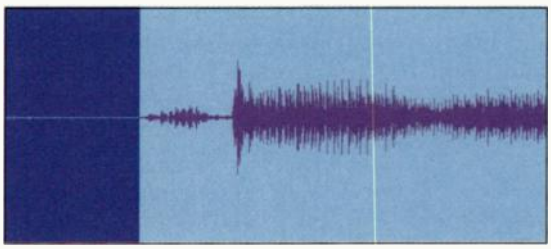

FIG. 6: When editing dialog, it's best to capture the speaker's breath along with the phrase or sentence you wish to edit. The small waveform just before the larger one is the breath; the highlighted section is the part to be cut.

In **Figure 4**, the example on the left shows a waveform that is about to be edited at a point above the zero line. (The highlighted section represents the segment to be cut.) The example on the right shows a zero-line edit. Although both edits look as if they will work, the edit on the left produced a slight click when played back, while the one on the right was silent. The click was quiet enough to be passed off on a music track, but if it had been for a narration track, the edit would have been unacceptable. Again, it's always a good idea to generate a crossfade across the edit points of a track.

Using the above principle, you can accomplish a number of things at the single-waveform level. One common application is removing a pop or other transient noise. **Figure 5** shows a typical digital clip with a pronounced transient peak. By deleting this obvious peak, the click will disappear. Simply define your edit points at the zero line on either side of the peak, and remove the offending waveform. This practice is commonly used to remove "mouthy" sounds from voice-over tracks. Mouth noise, like a digital clip, is represented graphically as a small transient spike.

Now suppose you have a multitrack block editor and a separate 2-track

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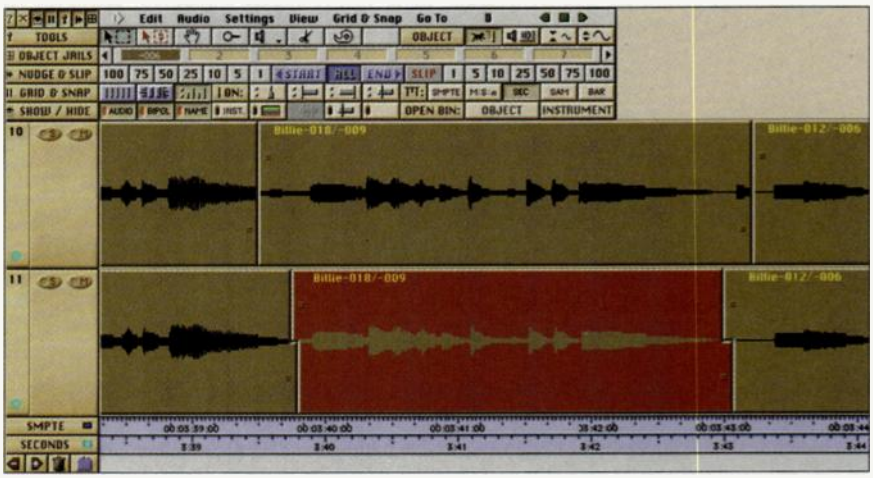

FIG. 8: A block-editing environment allows you to tighten up punches that were performed on the fly. Here, notice how the punch-in has cut off the end of the phrase on the original track (top). In the bottom example, the original track has been extended slightly, and a crossfade was done to provide a smoother transition.

waveform editor. How do you get your vocal track flown out to remove that digital clip you noticed in verse 2? It isn't that difficult, and once again, markers come to the rescue.

On your multitrack edit screen, zoom in to the largest view possible, line up the cursor at the beginning of the audio file in question, and drop in a marker. Then, making sure you know the disk name of the file you want to fix (for example, "lead vocal/take 2"), load your waveform editor and open the file. Make your edit—refrain from massive cut-and-paste editing, or you'll corrupt the track's timing with the other tracks when it's flown back into the project—and then save the edited track as a separate file ("lead vocal/take 2/edit"). Saving under a new name is a good idea, in case you ever want to revert to the original file. Go back to your multitrack editor and add the new file to your project. Then recall the marker, select the proper track, and paste the new track on top of the old one.

MAKING BELIEVABLE

Successful audio editing involves more than lining up some waveforms in a "technically correct" fashion: you also need to be tasteful and display good judgment. For example, you may be able to copy and paste a bass-guitar fill onto a track so that it falls completely in the pocket and shows no sonic evidence of being edited. But if the fill doesn't gel with the one that the drummer is playing, what good is the edit?

Perfecting an edit so that it is seamless is a waste of time if the initial idea behind the edit isn't believable. Tastefulness is paramount when you're editing dialog. Although editing the human voice—especially spoken-word pieces for radio, TV, or audio books—might seem deceptively simple, goofing things up is fairly easy. Narration, unlike a vocal track that's part of a music production, generally occurs by itself and demands the complete focus of the listener's attention. Any break in that focus—be it a rushed phrase or the lack of a breath—will kill the illusion of a natural performance.

When people talk, you expect to hear them breathe. This reality must carry through on a voice track, even if that track has been severely edited. Again, I usually edit dialog in a phrase-oriented fashion. I drop in my edit points a second or two before the phrase begins, rather than immediately before the speaker begins talking. This captures the natural breath that the performer takes before he or she begins speaking (see Fig. 6).

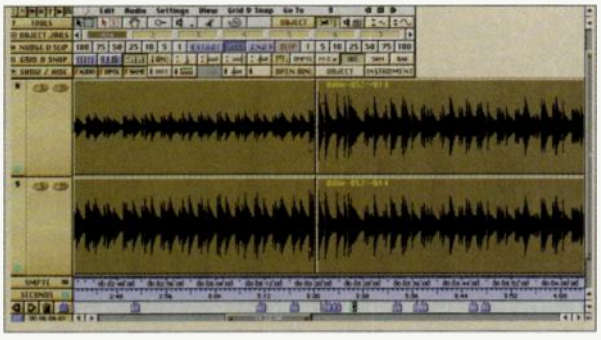

FIG. 7: If two segments are of differing amplitude, a gain-change operation can be performed to adjust the levels. In this example, the top two waveforms show a guitar track before a gain change was done; the bottom two illustrate the track's state after a 6 dB increase was made to the waveform on the left.

Another way to make a dialog track believable is to use room noise correctly. This is especially important for voice-over tracks that won't be accompanied by a music bed or sound effects. Room noise—ambient sound from the room in which the voice-over was recorded, minus any movement from the performer—is placed between sentences where audible noise is generated by the speaker's movements. Why not simply fill these areas with silence? Because every room has *some* amount of ambient noise, and inserting nothing between sentences makes the track sound fake.

To grab a clip of room noise, locate a clean, one-second period of silence from the recording, preferably one that was made while the vocal booth was empty. Copy this one-second segment onto the clipboard so that it's ready when you need it (which, believe me, will be often). In noisy sections between sentences, highlight the existing audio and perform a paste; the room noise will replace the offending section. If you need a two-second clip (for dramatic pauses), paste the one-second clip twice, or three times for a three-second clip.

You should go back and listen to your work frequently to make sure that it sounds natural. I usually work on no more than 15 seconds of speech before I back up and listen to my edits. If you aren't convinced that your edit sounds authentic, the audience won't be, either.

CONSISTENT CONTENT

Another big part of creating a believable composite track is making sure that all the audio segments within that track have similar sonic characteristics. This issue is not so crucial if the two

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segments in question are located three minutes apart in the project. But if they are edited back to back, it becomes of critical importance.

Your first concern regarding sonic characteristics should be with their levels. If a blatant change in volume occurs across an edit point, the illusion of a linear performance will be lost. Fortunately, most audio-editing software provides a gain-adjustment feature so that you don't have to ride the fader in the mix. Gain-adjustment processing permanently alters audio files by increasing or decreasing their gain, usually in 0.1 dB or larger increments. Thankfully, most editors prompt you before a permanent change is made, and often you have the option of using the Save As function.

I adjust gain in increments of 3 dB, the smallest change in level that the human ear can perceive. **Figure 7** shows a passage before and after a gain change was made. Notice how the amplitudes of the two segments in the top waveform are mismatched. The bottom example shows those same segments after a 6 dB increase was applied to the left-hand segment.

Normalizing is another handy feature. When you normalize a piece of audio, the program searches the entire file for the peak levels and then raises the overall level of the file toward the peaks using either a preset or user-defined ratio. Normalize things you want to stand out, such as a vocal or voice-over track.

In addition to level, maintaining consistency in the tonality of segments is another important element to consider. The segments that often constitute a composite track are not always recorded at the same time, or even with the same equipment. I run across this problem frequently when I edit tracks of books read on tape. The narration is typically recorded over a week or two. No matter how much care is taken to preserve sonic characteristics from one session to another, discrepancies inevitably occur.

So how do you compensate? If the difference is noticeable when two sessions are put side by side, I often go back and equalize or dynamically process the audio from one session so that it matches the other *before* I start to do the edits. This way I have two matched sessions. You could also use this strategy if the gain of one session is lower than the other: before you edit, perform a gain-change operation.

CLEANUP CREW

One very effective job you can do with a multitrack editor—either block or waveform—is to clean up a session before you mix. Your mixes will become much easier to manage and won't require as much mixdown automation.

I begin by deleting sections of tracks in which no audio is present. I'm not talking about removing every bit of space between snare drum hits—simply cleaning up the large portions of inactivity on tracks. I generally end my cuts about a second ahead of where the audio begins, which leaves me space to perform a small fade.

The degree to which you clean up a track depends on the project. Heavily produced music and post-production projects should be cleaned up thoroughly. Certain other types of music productions, however, warrant a raw, unfinished sound. For example, if you want to hear the intimacy of the singer's breath and mouth noise, you wouldn't want to delete passages from the vocal track, except perhaps to remove offensive environmental noise.

Using this approach to mute tracks assumes that you won't have much outboard gear connected to the channel. Such equipment is notorious for generating hiss and usually requires that the fader of that channel, not just the audio itself, be muted when the track is not in use. I use a combination of audio editing and mute automation to handle tracks that implement a heavy amount of outboard gear.

I also like to perform fades on the edit screen rather than with automation. Audio fades are more precise than riding the fader manually to record moves, and they are generally smoother than fades generated by a graphic automation editor.

But fade-ins and fade-outs aren't just for effect. I always create a fade for any audio object on the edit screen, at both its start and end points. Remember: even though there may be a second or two between the edge of the audio segment and the audio itself, some ambient noise is still in that space. When a track goes from having no noise to having *some* noise (or vice versa), there is a chance that a pop or click will occur, simply because the waveform of the segment might not be crossing the zero line at the edit point. Using fades reduces that possibility, and they generally smooth out the whole mix.

This is also a great time to tighten up punches. Because they work nondestructively, most block editors enable you to revert to older takes. For example, in *PARIS*'s Constrained mode, when an overdub is recorded, the new block is

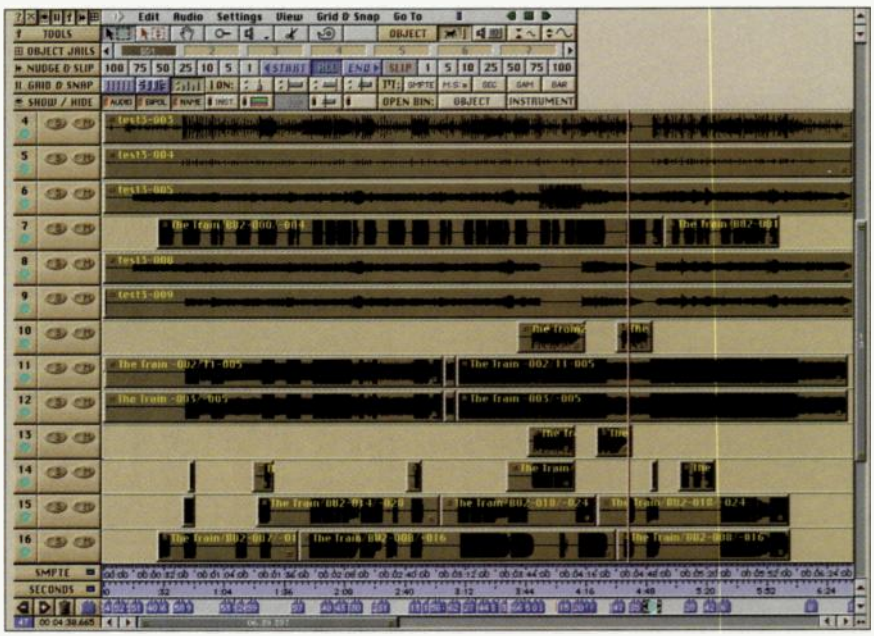

FIG. 9: The state of a multitrack project before any cleanup was performed.

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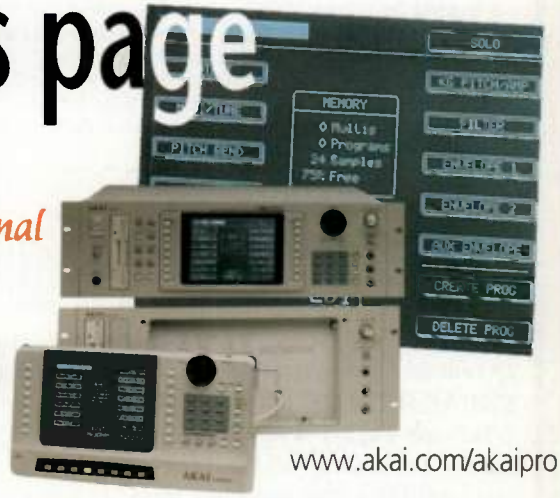

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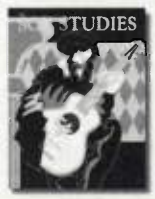

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placed on top of the original. But by using the Drag tool, you can extend the original file over the new one to refine the edit points (see **Fig. 8**).

I cut my teeth in this business working with analog tape decks, and I've worked at some top-notch studios in New York. So I feel confident of my ability to perform punch-ins on the fly. However, when I record projects these days on a DAW and then analyze the punch-ins, the punches are so far off from where they should be that I have to wonder if I was listening to the same song the artist was hearing! Yet amazingly, before digital-editing technology existed, punch-ins like these were considered acceptable. The moral of this story is that whether you realize it or not, tracks with punch-ins require a lot of cleaning up.

To illustrate this point, **Figure 9** shows a multitrack session before any cleanup edits have been performed. **Figure 10** shows that same session after silent passages were deleted, punches were cross-faded and refined, and fades going in and out of each audio segment were created. On mixdown, this project required no mute automation.

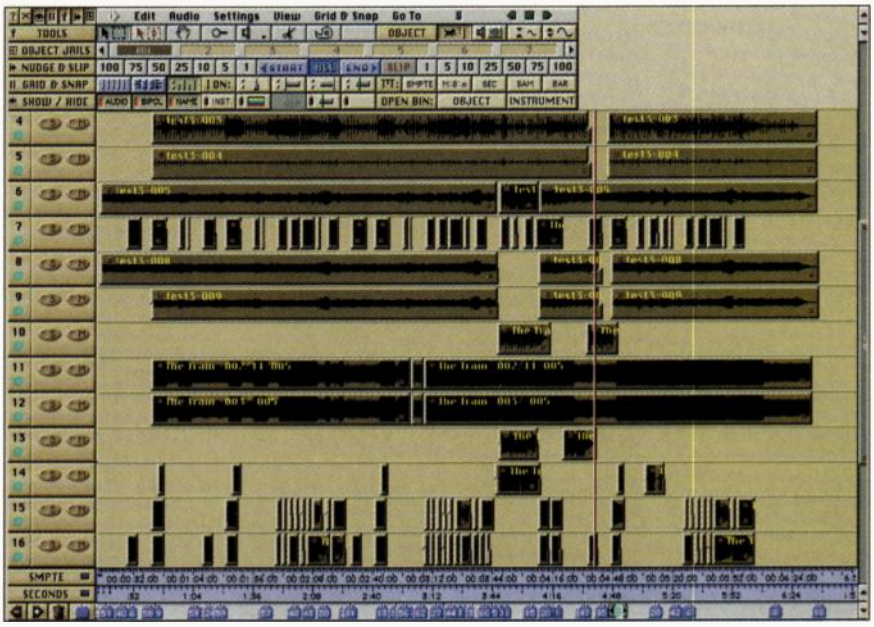

FIG. 10: The same multitrack project pictured in Figure 9 is shown here after silence was removed, punches were tightened, and fades were applied to all segments.

FINAL ASSEMBLY

With a final 2-track mix, you should have no sonic artifacts left to clean up. (If you do have some, I suggest assessing why they are there, correcting the problem, and remixing the track.) Most edits of final mixes are made in a cut-and-paste style and are done to rearrange a song's structure, to create a shorter version of the song (perhaps for radio airplay), or to extend the song for a fade-out.

Editing a final mix is more challenging than working with a single audio track. Because many instruments are usually playing, there are few breaks in the material for easy edits. Believe it or not, your best bet is to trust your ears. Using a scrub tool, locate the general area where you want to place your edit points, then zoom in on the waveform and make the edit using the zero-line technique.

Although songs and projects can be rearranged while in multitrack form, editing is almost always easier after the mix has been done. But sometimes you may run into an unusual situation, as I recently did. I was working on a song that was still in multitrack form and not yet mixed. It ended with a "hard" stop that was really hokey. So the associate producer and I decided to edit the end so that it faded out with a guitar solo playing over an instrumental verse.

This presented a small dilemma: to extend the song and incorporate the not-yet-recorded guitar solo into the multitrack project, I would have to make a complex edit of 24 individual tracks. Another option, however, was to finish mixing the song and do an additional instrumental mix of the first verse, perform a 2-track final-mix edit to add the extra verse at the end, and then lay the guitar solo on top of the mix—which would have been much easier for me to do. In the end, though, we decided that making the extra 24 edits was a small price to pay to get the guitar solo to blend with the rest of the track in a superior way.

If you're pressing a CD yourself, you'll want to prepare each track for playlist assembly after making all the final edits. Determine how you want each song to start and end, either hard or with a fade. For a fade-out, a simple linear fade is often inappropriate, so you might want to experiment with some bell-shaped curves. Of course, this all depends on the nature of the song.

For selections that start and end hard, you still need to perform short fades, much like those discussed previously for cleaning up a multitrack session. I suggest one second at most for a fade-in, and four seconds for fade-outs on songs with hard endings.

On music CDs, three seconds of silence is standard between songs. Although some CD-recording software allows you to specify this information before the disc is pressed, many do not, so I usually stripe the silence at the end of each track. Likewise, many assembly programs let you adjust the gain of each song before the CD is pressed, but if yours doesn't, you can make those adjustments using your editor's gain-change functions.

WHAT A CUT-UP

Audio editing has come a long way in the past decade. Learning the craft, however, can be challenging. No matter how much detail an article like this one offers, you can't pick up all the hands-on skills necessary to do complex edits by reading a magazine. Practice is what will bring about your eventual success. Just be thankful that you don't have to attend the school of analog editing—my hands still carry the scars.

Although **EM** *Associate Editor* **Jeff Casey** *lives by the beach, the only waves he sees with any regularity are the audio tracks on his Hitachi SuperScan monitor.*

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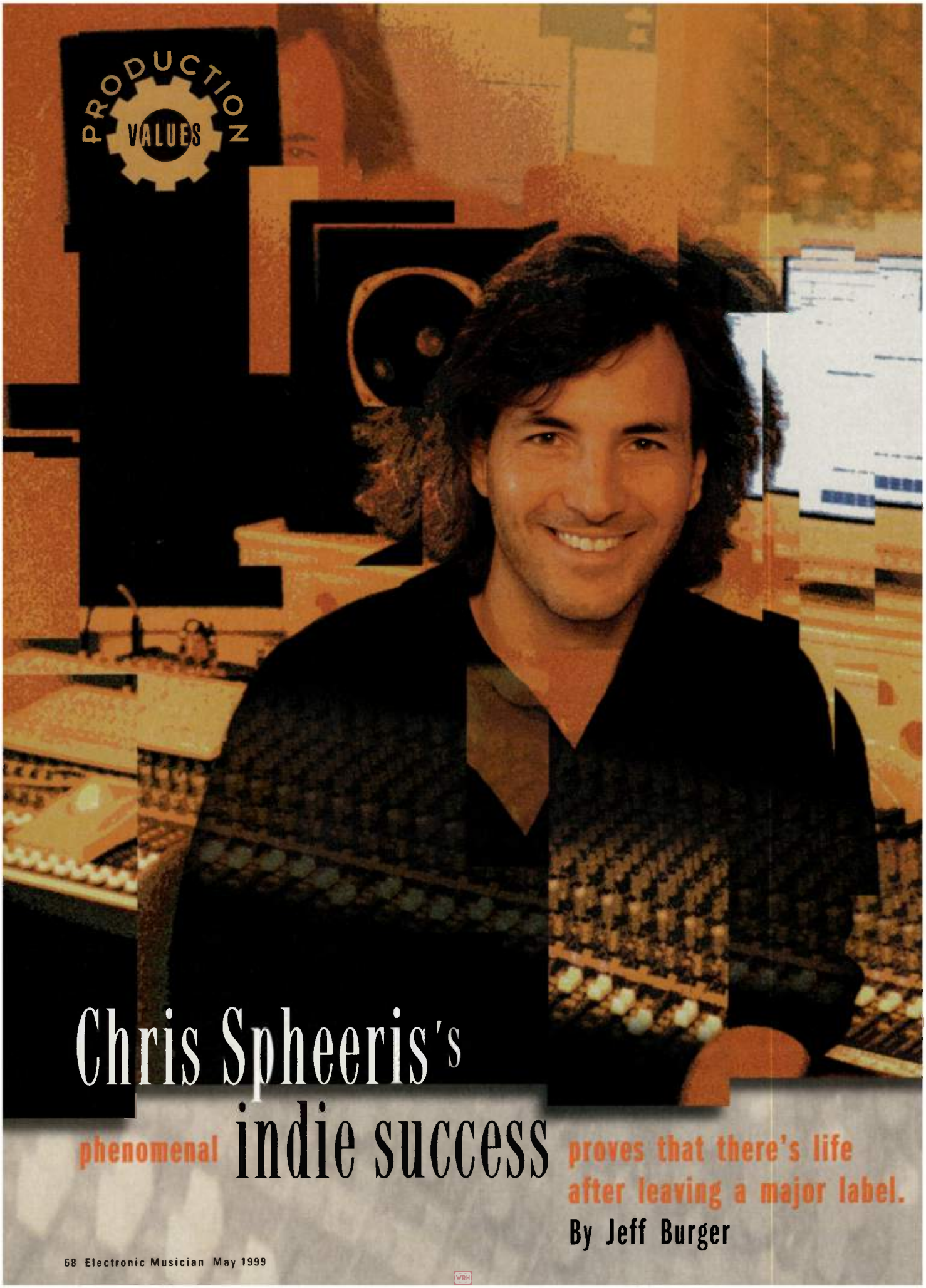

Chris Spheeris's phenomenal indie success

proves that there's life after leaving a major label.

By Jeff Burger

Seizing Control

PHOTO BY ROBERT CORY

Chris Spheeris may not be a household name or even a presence on MTV, but he's living comfortably from the sale of well over a million records—sales generated largely through self-promotion. Spheeris succeeded in taking his power back from the music machine, and his story dispels the myth that securing a deal with a major label is your magic carpet to the stars.

After making two records with Columbia in the mid-1980s, Spheeris has released seven recordings to date on Essence Records (www.essence-rec.com), his independent label based in Sedona, Arizona. He also has 50 documentary-film and television soundtracks to his credit, including the 13-part *Mystic Lands* series that aired last year on the Learning Channel.

Even though Spheeris is a new-age artist—one of the first signed to a major label—his instrumental style also integrates music from world cultures, as well as the melodic and structural qualities of pop music. More celebratory than meditative, his elegant music often incorporates a romantic sound influenced by his Greek-American heritage. Spheeris fuses acoustic and electronic sounds from around the world in his recordings, performing on guitar, bass, *bouzouki* (a Greek stringed instrument), keyboards, samplers, and a variety of percussion instruments. No Luddite, he's made virtually all of his recordings in the various incarnations of his personal studio; he's currently using MOTU's *Performer* slaved to a Pro Tools system.

Philosophically, the forty-something artist allows his spiritual influence to guide his music. "The purpose of my music is to evoke emotions and create a sense of connection between people's hearts," Spheeris relates, with his usual soft-spoken intensity. "I don't have intentions when I record, like doing a 'new-age pop album with a bit of Latin thrown in.' I create a recording of what's up for me right now."

With regard to his career, Spheeris thought he had stumbled onto what most musicians only dream of: a major label called him out of the blue and offered him a record deal. What followed was a crash course in the ugly side of music-industry economics. Through it all, he learned that you should never blindly hand over your career to a record label and trust that the label will take care of you and your music. Fortunately for Spheeris, he was able to rescue his music from major-label oblivion and go on to carve out a successful label and musical career on his own.

STRIKING GOLD

For Spheeris, the story began in 1982 when he built a 4-track studio in his mother's basement in Milwaukee and began composing original instrumentals. That process resulted in several collections, one of which a friend took to a new-age bookstore. "New age was just getting started then and the owner liked it," he recalls. "I borrowed some decks and made tapes, then finally had tapes manufactured in small quantities."

Around 1984, Spheeris's third offering, *Desires of the Heart*, got into the hands of a Columbia salesperson in Atlanta who brought it to the attention of A&R. "This A&R guy called me one day out of the blue and said he liked the music and was interested in signing me. There wasn't any pitch or anything. I was freaked!"

Spheeris's excitement was somewhat squelched by the prospect of going to New York and treading the unfamiliar turf of lawyers and contracts. Ironically, he also received an offer from Narada at the same time. Spheeris chose Columbia, largely because its contract wasn't as demanding as Narada's and didn't require him to sign over his publishing rights at that time. "The irony was that the Columbia contract was about 150 pages shorter than the Narada contract. The Narada contract felt like the signing of some kind of indentured servitude. It covered every aspect of your personal life, right down to your underwear! I just felt intuitively that I had more freedom with a major label than with an independent, which was an amazing concept to me."

Even in retrospect, Spheeris feels it was a good choice. Columbia asked whether he wanted to release the tape as is or remix it. Knowing he could rerecord it to make it sound even better, Spheeris convinced the company that an investment of around $12,000 for improvements to his home studio would cost Columbia one-third of what the pro studio time would cost. After it was mixed in a larger studio, the album was released with all parties satisfied.

ALL THAT GLITTERS...

The proverbial honeymoon ended all too quickly when the young artist realized that the label didn't have much of a marketing plan for his labor of love. "Because new age was a new genre at the time," Spheeris reflects, "they really didn't know how to market it. They were thinking about doing things like a Celestial Seasonings tour, but I just wanted to be in the studio recording a lot of records. Here I was at board meetings with the vice president of marketing and A&R, with all these people asking me what I wanted to do with my album. I was feeling a little lost."

Another downside to being with a major label was the "small fish in a big pond" syndrome. On his New York visits he would often find the office abuzz with major promotions for larger names like Bruce Springsteen, Billy Joel, and Kenny Loggins. Between the comparative size of the acts and the newness of his genre, Spheeris found it difficult to gain the mind share required to seriously catapult his career.

Ultimately, it was Spheeris's inexperience with the ins and outs of recording contracts, coupled with his unfamiliarity with his lawyer, that led to his biggest disappointment. "There were some points in my contract that I was not informed about," he relates, "one of them being that all the promotional money was recoupable. Columbia would send me around the country to do interviews and to go into record stores to promote. I didn't know that I was being charged for every dime I spent on food and hotel rooms. I can't even fathom how much money was being spent on promo tours. I was staying in hotels like the Four Seasons. I thought they were treating me really nice, but I was paying for it. It was really tragic. Had I known that was going to happen, I would have handled things


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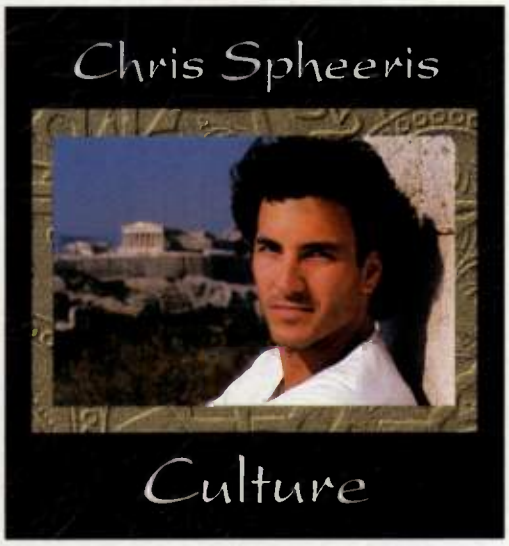
in a different way. I've never recouped my advances to this day. So I only made money on my mechanicals. I would have had to get other jobs on the side if I hadn't kept my publishing." For a new artist working in a new genre, the album did fairly well, though: Columbia sold between 175,000 and 250,000 copies of *Desires of the Heart,* mostly in the two years following its release.

As he began recording his second album with Columbia, Spheeris also realized how high the rate of turnover is in a large corporation. "The people who signed me, worked with me, and developed me weren't there anymore," he says. "Suddenly I was meeting with all these new people who didn't know me or care. They were just looking at the figures."

When it came time to make his third record, Spheeris presented Columbia with a budget. "They told me the second album didn't do as well as the first, so they weren't comfortable giving me as much money as I wanted. However, they said they were willing for me to put up my publishing as collateral against the advances in the budget for my next record. In other words, they wanted me to fund my next record, put up my publishing, and use my advance on publishing to pay for my advance on the record.

"Someone in a desperate position might have considered that deal," he continues, "but nobody in a straight frame of mind would ever do something like that, because you're basically giving away everything you have. I told Columbia I couldn't accept their deal, and they said that that was the way it had to be or they were going to drop me. I said, 'So drop me.' And that was the end of my big record deal. I was signed for five or six records, and they had their option after two. It was heartbreaking, but I had to go with my intuition. Staying with Columbia under those circumstances would have been like swallowing Drano."

The hypocrisy in the record industry is what led Spheeris to begin thinking about an independent label. "Here's the deal," he explains. "A record label, which is essentially a money-lending institution and a marketing device, will lend you money to make an album. It will then take a percentage of your royalties from its sales to recoup the money that it lent you. So if you get $1.50 in royalties per record, the label will take that off the top of however many CDs you sold. And when you're done paying back your advance, you still don't own the master. There's the rub. They lend you money to make the master, but when you pay them back they still own it. I believe that copyrights and masters should always belong to the artists—even if a label licenses it for five or ten years."



Although his music is defined as new age, Spheeris fuses electric and acoustic sounds from around the world. On *Culture,* released in 1993, Spheeris blends pop and world beat influences from Greece, Spain, India, Asia, and the Middle East.

SPHEERIS'S SPHERE

Chris Spheeris launched his solo career in 1982, after working with other artists for four years. All told, he either played on or self-released seven albums before signing with Columbia Records in 1986. Of those seven albums, he later rerecorded two: *Passage,* originally released in 1981, and *Desires of the Heart,* originally released in 1984. Below is his discography, starting with his first release for Columbia Records.

Desires of the Heart (1986, Columbia)
Pathways to Surrender (1988, Columbia)
Enchantment (1991, Essence)
Culture (1993, Essence)
Passage (1993, Essence)
Desires (1994, Essence)
Europa (1995, Essence)
Mystic Traveller (1996, Essence)
Eros (1997, Essence)

THIRD TIME IS A CHARM

After Columbia refused to sell or even license Spheeris's masters back to him, he rerecorded *Desires of the Heart* for the third time from scratch. The only reason he was able to do that was because he still owned the publishing and the compositions. He added one new song and took out a few that couldn't be duplicated because they were so specific to the original era. The album was retitled *Desires* to avoid any legal issues concerning the title.

Spheeris found himself motivated by frustration and anger, yet also by a sense of pride. "Recording the same songs for the third time is really painful," he says, shaking his head. "It's a lot of work and rather humiliating. I had to learn the parts again by listening to my own record, then do them in a way that is a little cleaner or closer to my current style. But I sold 50,000 to 60,000 additional copies of *Desires,* so that was worth my time. And now I own the master if I want to put any of it on a compilation."

Spheeris started contacting independent labels, such as Private Music and Windham Hill. The label that showed the strongest interest was Music West, which was doing well at the time with a roster that included Ray Lynch and Øystein Sevåg. Music West signed a three-album deal with Spheeris in

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which he again kept the publishing rights. He had barely begun writing his first solo record for Music West when he cut his hand severely. Spheeris asked former bandmate Paul Voudouris to collaborate, resulting in an album called *Enchantment.*

While initial sales of *Enchantment* were good, a number of unlucky things happened, not the least of which was Music West folding after the album had been out for only four months. "We found out that all the checks the label owner had written to us for this project were personal checks," says Spheeris. "He had financed *Enchantment* himself, so it wasn't subject to the bankruptcy. He owed us about $40,000 in back royalties, so we agreed to forgive the debt in exchange for the master."

Spheeris and Voudouris hired someone to research new-age distributors around the world, especially the ones familiar with their work. The two started in the United States because it was the path of least resistance, but it was fate that put them back on the map. "One day, a Spanish distributor somehow found us and asked if we knew where he could find *Enchantment* because it had been selling well for him," Spheeris recalls. "We said we would be rereleasing it ourselves in about two months, and he asked us to send him 15,000 copies."

Finding out where else to sell the records took a lot of research. Spheeris and Voudouris hired people who found a few connections and then asked those people for further leads. This work resulted in discovering 35 or 40 distributors in 20 different countries. Although the effort took a while, it was worth it: eight years later, *Enchantment* has sold more than half a million copies, the majority of which Spheeris and Voudouris sold themselves.

> "There's no mandate that says an artist has to sign over publishing."
>
> —Chris Spheeris

SOME FRIENDLY ADVICE

Spheeris admits that talent is important, but the equation for success involves lots of hard work. "It doesn't happen by accident or just by having connections," he points out. "I'm a tremendously hard worker. I've been doing this for 15 years, and it's a full-time job every day of the week. And I do it because I love it. You have to have a level head for business and be willing to put in the energy. If you're prepared to put up with a lot of stress and still retain your artistic perspective and maintain your creative flow, you can do it. You have to be willing to sacrifice everything."

Spheeris's advice to musicians facing their first release? "Go with your gut feelings," he says with the conviction of a man who has been there himself. "Look past the illusion of fame and money and what's being offered; you have to be reasonable and accept that you're going to have to give something up in order to get something back. It's early in artists' careers that they need to be most aware of what's important to keep, as well as to give away."

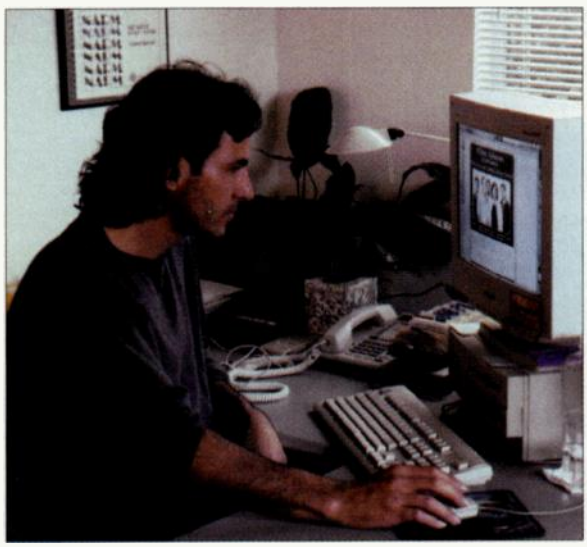
He further advises musicians to step back and assess what they want from life and from their music careers. "You want a two-year career? Fine—go for a short-term contract. Get a $100,000 contract, put it in your pocket, do what you want, and don't worry about what the records are going to do," he says. "But if you want a real career in the business, you have to look at things long term. How much of your time are you giving away? Try not to commit yourself to too many years. Artists' natures are based on growth and change. Realistically, how is an artist going to know what kind of music he or she will be doing in six years? Usually, three albums is a minimum with any label. Try to stick to that. To me, a six- or ten-album deal is ludicrous."

Spheeris also urges artists to minimize how much of their work and image a label owns. Again, his own experience has provided a good lesson in this regard. "I remember with the Narada contract, in addition to owning you on so many other levels, if you ever did any outside work—like for advertising or film scores—the company would automatically own a piece of that, too! Artists have to be able to make a living, even if the record company doesn't make it for them."

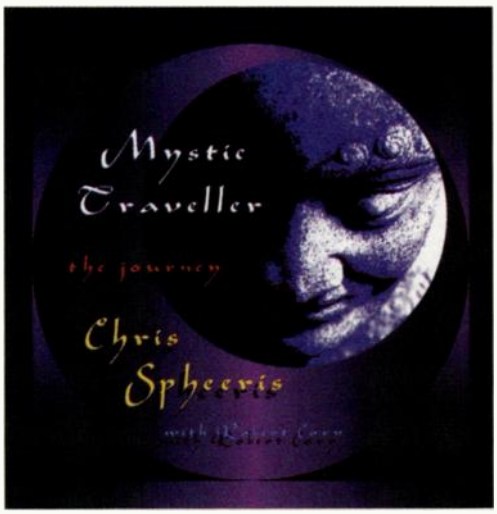
Spheeris is a fanatic about retaining publishing rights. "There's no mandate that says an artist has to sign over publishing," he explains. "Some labels insist on it, but it's not absolutely necessary for musicians to sign it over—even though the majority of labels will make it seem that way. If you can't maintain the rights to your master, at least hold on to your compositions. An artist's work is sacred property and should always belong to them."

GOING THE INDIE ROUTE

If Spheeris is any measure, there's also a lot to be said for releasing your labor of love yourself, even though starting an independent label is no mean feat. "In the old days, people who worked in record stores would really be into music and would take time to listen and research the styles. Today, however, most record clerks know only the top 30 or 40 bands. The other thing is that there's


ROBERT CORY

Spheeris at the helm of Essence Records, his Sedona, Arizona, record label.



The music on *Mystic Traveller* is taken from the exotic soundtrack Spheeris created for the 13-part Learning Channel series *Mystic Lands*, which explored spiritual practices around the world.

so much music out there. Even if you have the vehicle to get onto the shelves at Tower Records, how's the consumer going to know about your work? It used to be that the stores would put a really good album on the end caps; now you have to pay thousands to get it there! The figures for promotion are astronomical, and they are increasing exponentially every year. I talked to a small independent label recently, and they're budgeting $100,000 in advertising for every new release."

Spheeris believes the best all-around approach today for producing your work is to use home equipment to keep recording budgets down, then work in conjunction with a label for a subdistribution or licensing deal. "That way, you get advertising and distribution," he says. "If a label is established, they know where to invest their money wisely. You sacrifice a little of your return, but the upside is that you can actually create a presence in the market if you're dealing with a reputable company. They'll know the right buyers to approach so that you can at least get your stuff heard."

Spheeris is also a believer in targeting a promotional approach to the music in question. "If you think your music is radio friendly," Spheeris points out, "there are independent radio promoters you can hire for two or three months, for $2,000 to $3,000 a month. They will present your music to all the radio programmers in the format. They will send out your demos, and call once a week and ask the programmers if they've heard the demo yet, and if so, what they think of it. If they do their job right, the promoters give you a real opportunity to be heard." (For more on timing all the elements of your independent release, see "Working Musician: Timing Is Everything" in the June 1997 issue of **EM**.)

READY TO MOVE ON

While having his own label for the past seven years has served Spheeris well, he is now entertaining other options. "I've hit an intermediate plateau, and I pretty much know how that works," he relates. "I'm ready for another level—integrating with either an independent or major label in a qualified way. I'm looking for a vehicle in which I still keep my artistic freedom and the ownership of my masters, while the label handles the mechanics of advertising and getting a record out there to a larger audience. The monetary return per unit won't be as good as producing everything myself, but it has the potential to take me to the next level. I simply need bigger machinery!"

Ultimately, Spheeris believes that the concept of taking your power back plays out at every level. "Unless someone is familiar with how a mixing board and tape recorder works," he says, "they're going to risk losing some of their power along the way. I learned how to read a contract, and I've negotiated all my own contracts except the first one. I've also learned to design my own album covers and promo materials and advertising. I know how to run Pro Tools, how to edit, and how to master. If you don't know things from the ground up, you'll never really know how to keep your power."

In talking with Chris Spheeris, one realizes that he has indeed kept his power, which is deeper than creative talent, deeper than success. Those things are clearly facilitated by a sense of self and relationship to a spiritual universe—a personal power that no one, including a record company, can give or take away.

Jeff Burger *is a songwriter and multimedia producer based in Sedona, Arizona. He is currently working on a CD of his own.*

DESKTOP MUSICIAN

Music Sites for Web Surfers

Music resources abound on the Web—if you know where to look.

By Francis Preve

Whether you're already making music with your computer or just starting out, an Internet connection could be the best musical investment you make all year. The Net is a vast source of information, opinion, and software pertaining to music, as well as a great place to download sounds. During the three years that I've been building my Web site, I've unearthed quite a few online music resources. Here are some of my favorites.

THE WORLD WIDE WEB

With its massive collection of data and links, Harmony Central (www.harmony-central.com), is the mother of all musician-oriented Web sites. Of course, **EM**'s Web site (www.emusician.com), which has an archive of past magazine articles, is another great resource. And be sure to check out the impressive Electronic Music Interactive Web site (nmc.uoregon.edu/emi), which was created by Professor Jeff Stolet in collaboration with the University of Oregon's New Media Center. This virtual online textbook covers a wide range of topics, from MIDI and digital audio to synthesis techniques and uses graphics extensively throughout.

You can often uncover hidden treasures in many commercial sites provided by manufacturers. E-mu Systems' Web site (www.emu.com), for example, offers an extensive glossary of technical terms in its Support area.

Many Web sites cater to specific musical interests, from hardware and software to tips and techniques. Here are a few.

MIDI. Sporting clean design and plenty of tips, tools, and downloadable files, MIDI Farm (www.midifarm.com) and MidiWeb (www.midiweb.com; see **Fig. 1**) are two standout MIDI sites. If you're looking for a well-organized and thorough examination of all things MIDI, be sure to stop by Northwestern University's Exploring MIDI site (nuinfo.nwu.edu/musicschool/links/projects/midi/expmidiindex.html), created by Peter J. Raschke.

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FIG. 1: MidiWeb is one of several excellent sites where you can learn more about MIDI.

The MIDI Manufacturers Association (www.midi.org) is another important site. As guardian of the MIDI standard, the MMA has filled its Web site with copious technical information and details on upcoming conferences and events.

Synthesizers. The Big Three of synthesizer-related Web resources, Synth Site (www.synthsite.com), Synth Zone (www.synthzone.com; see **Fig. 2**), and Music Machines (www.hyperreal.org/music/machines) all feature areas organized by instrument and manufacturer. These sites also offer forums, FAQs (frequently asked questions), and areas where you can download files.

If you're just getting started in sound design, a great entry point is the Beginner's Synthesizer FAQ (tilt.largo.fl.us/faq/synthfaq.html). Its clear organization complements a remarkably well-written introduction to synthesizer programming.

Experienced programmers looking for the lowdown on analog techniques should check out What Is Analogue Synthesis? (www.warwick.ac.uk/%7Eesaag/analog.htm) and The Art of Analog Modular Synthesis by Voltage Control (ourworld.compuserve.com/homepages/the_analog_cottage/vcsynth.htm). Although the latter is geared a bit more toward the engineering side of music synthesis, propellerheads will relish its detailed technical descriptions. And don't forget to stop by the Web site of MIT's esteemed Computer Music Journal (mitpress.mit.edu/e-journals/Computer-Music-Journal/CMJ.html). It offers articles, examples, and information for research-oriented and advanced users.

Recording and pro audio. Pros and amateurs alike will find the Recording Website (recording.hostway.com) a handy resource that features reviews, FAQs, maintenance tips, and an online magazine. Advanced engineers should also visit Pro Audio.net (proaudio.net), AudioWeb (www.audioweb.com), and the World Wide Pro Audio Directory (www.audiodirectory.demon.nl).

Another great online place to find information on digital audio, mastering, and CD production is Bob Katz's Digital Domain (www.digido.com). The site, which is aimed mainly at recording engineers of all levels, includes numerous articles offering technical insights, how-to advice, a glossary, and links to related sites.

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"This product deserves its status as an industry standard, and is highly recommended."

—The Tapeless Studio

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FIG. 2: Synth Zone offers a wealth of information on many types of synthesizers and related software.

Shareware and freeware. If you're looking for an exotic sound-manipulation utility or the latest in software-synthesis tools, surf over to Shareware Music Machine (www.hitsquad.com/smm). Although its design is a bit homely, this site is an incredible source for music- and audio-related software. Remember that *Cool Edit, Sound Forge,* and *MetaSynth* all got their start as shareware, so this site is well worth checking out for cutting-edge toys.

If you like a program you've downloaded, send in your shareware fee! Most of these tools gain extra features when you register them. Besides, many shareware programmers work with little or no compensation, so show your support by paying what is often a negligible price for a very useful product. End of sermon.

Buying and selling. If you're shopping for instruments or recording equipment, you'll definitely want to check out the Harmony Central Buyer's Guide (www.harmony-central.com/MarketPlace/database.html), which lists retail prices along with links to reviews. Buying used? The automated Internet Used Gear Price List (www.midiwall.com/cgi-bin/w3-msql/usedgear/ug_mfg.shtml) has current high, low, and average prices for just about every synth or audio product ever made.

Once you've determined the market prices of the equipment that you've been lusting after, ProMusicFind.Com (www.promusicfind.com) and the Music Yellow Pages (www.musicyellowpages.com) are eager to help you find it. These sites catalog hundreds of wholesale, retail, and private sellers of everything from musical instruments to rare books, CDs, and videotapes.

If you're planning to purchase used equipment, you owe it to your conscience to double-check the serial numbers at the Hot List (www.empire.net/~wozmak/thelist.html), a resource for registering—and, one hopes, finding—stolen gear.

Electronica. Having been a remixer for many years, I have a soft spot for dance music and electronica. The two sites I turn to regularly for both technical data and the latest news are Dancetech (www.dancetech.com; see **Fig. 3**) and the pinnacle of rave information, Hyperreal Music Archive (www.hyperreal.org/music). Looper's Delight (www.annihilist.com/loop/loop.html) is another fine resource available to sampling musicians.

The rest of the band. An excellent starting point for guitarists is 1,000 Great Guitar Sites (avoca.vicnet.net.au/~guitar). Bassists should check out Bassically (www.bassically.odsys.net) and Bassmental (www.srowe.demon.co.uk/bassment). Drummers and percussionists will find lots to like online at sites such as CyberDrum (www.cyberdrum.com) and Drummer's Web (www.drummersweb.com).

USENET

The real resource for musicians communicating on the Internet is Usenet. Every topic you can imagine is being (or has been) discussed in some Usenet newsgroup. The best way to get your feet wet with newsgroups is through Deja News (www.dejanews.com). This impressive Web site collects Usenet postings and organizes them into searchable archives. Just type a few keywords into the Deja News search engine, and presto—every post containing those keywords appears. If the sheer number of matches overwhelms you, the Power Search page can help you to zero in on the information that you're looking for.

You can even create a Deja News–based e-mail account for posting and corresponding with others. This is a terrific way to protect yourself against the "spambots" that collect e-mail addresses from Usenet postings. It's always best, however, to follow a newsgroup for a little while before jumping in and posting your two cents' worth: frequently asked or inappropriate questions are sometimes met with impatience, outrage, or contempt.

Among the most relevant newsgroups for desktop music information are alt.binaries.sounds.midi, alt.music.4-track, alt.music.midi, comp.music, comp.music.audio, comp.music.midi, rec.audio.pro, rec.music.makers, and rec.music.makers.synth. Readers on the more adventurous side might also enjoy alt.sci.physics.acoustics and rec.audio.tubes. Used equipment and other audio bargains can be found at rec.music.makers.marketplace.

If you want to follow particular newsgroups closely, you may find that a news client—such as those built into Netscape *Communicator* and Microsoft *Outlook Express,* or the stand-alone Forté *Free Agent*—gives you more flexibility than the Deja News site. Among other features, news clients let you sort messages by *thread,* a series of posts on a specific topic. Contact your Internet service provider for details on how to set up a news client.

MAILING LISTS

If you enjoy having an e-mail inbox brimming with musical information, consider subscribing to a mailing list. These use a *listserv* (or similar mail-based system) to redirect subscribers' questions, answers, and announcements

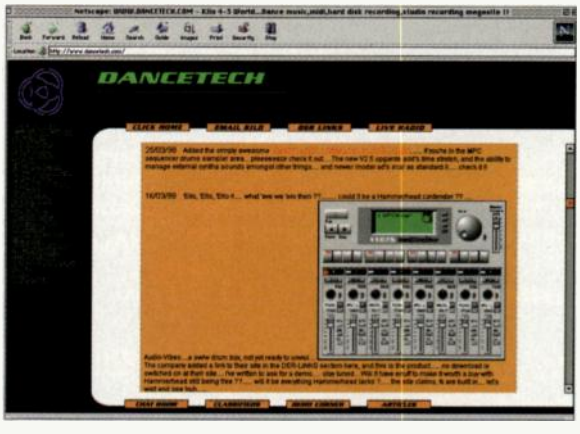

FIG. 3: The Dancetech Web site is packed with information and news for dance-music fans.

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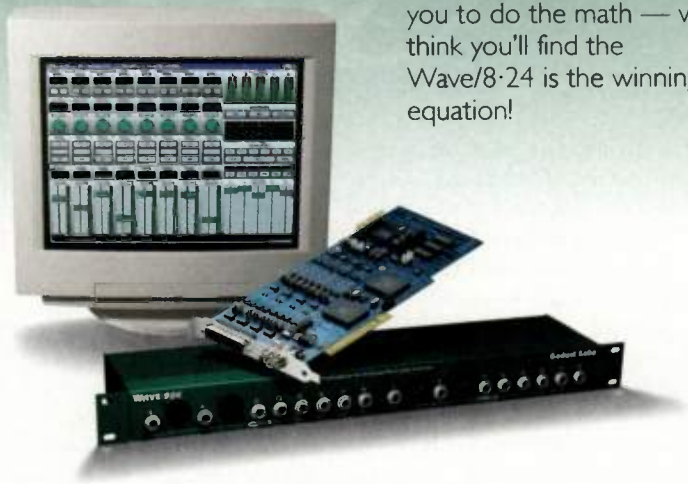

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to all other subscribers. Because anything you send to the listserv will be broadcast to *all* subscribers, the "signal-to-noise ratio" is often much higher here than on Usenet—which means that the discussions will be more technical, while the tolerance for inappropriate questions may be lower. Mailing lists are definitely oriented toward more advanced users with a bit of newsgroup experience. Of course, you are always free to lurk in one and soak in the accumulated wisdom.

The usual method of subscribing to a mailing list is to send the server a message containing your e-mail address in either the subject line or the message body. For example, to subscribe to American University's mailing list for synthesists, send mail to listserv@auvm.american.edu or listserv@auvm.bitnet; in the message body, type SUBS SYNTH-L [your e-mail address].

To subscribe to DAW-Mac, type subscribe in the body of an e-mail message and send it to daw-mac-request@lists.best.com. You can join the PC-DAW list by typing the message subscribe pc-daw-digest and sending the e-mail to majordomo@missionrec.com.

Modular Digital Multitrack is a mailing list for users of ADATs, DA-88s, and similar equipment; to subscribe, send mail to MDM-request@psc.edu. Subscribe to Pro-Audio, another mailing list devoted to recording, by sending a message to pro-audio-request@pgm.com with the word subscribe typed in the body.

The Listserv Page (orpheus.ucsd.edu/music/lists.html) is a useful guide to other music-oriented mailing lists. You can also try Liszt (www.liszt.com), a directory of mailing lists on general music topics.

FORUMS

Similar to Usenet but privately owned and administered, forums are another resource for meeting like-minded musicians and recordists online. Like mailing lists, forums tend to offer a very high percentage of useful information and are often moderated by experts.

Searchable and well indexed, the Gas Station (www.sonicstate.com/BBsonic/topics.dbm) is Synth Site's forum area. Topics run the gamut from mixing to sequencing to specific synthesizer models. Harmony Central's MIDI Forum (tremolo.harmony-central.com/HyperNews/get/MIDI.html) is an experimental area with hundreds of threads on the topic of MIDI. Because its discussions can run toward topics that are technical and exotic, this forum is a great place to go with your more obscure questions.

With its superfriendly user interface, America Online (www.aol.com) also features a few interesting forums and message boards for musicians and recordists. Doing a keyword search on "musical performance," for instance, yields results ranging from a glossary of musical terms to specialized areas devoted to flute, marching bands, and 4-track recording.

Much of the information available at America Online is intended for novices, but I still found a lot of handy tidbits about microphones and enjoyed visiting the PC Music & Sound forum. There's also a useful area devoted to Digidesign products.

LOG ON, TUNE UP

As new sites, forums, and newsgroups emerge daily on the Web, opportunities for musicians to collaborate and share information grow almost exponentially. In fact, you can now start a band whose members live on different continents: just cruise by the Res Rocket site (www.resrocket.com) and download the necessary software.

Someday we may even be able to troubleshoot our equipment online with a technician from a different time zone. For now, however, we'll have to be content in the knowledge that nearly all of our musical questions can be answered with an Internet connection, some good online resources, and a few mouse clicks.

CLICK HERE

Save yourself some typing; you can access all the links mentioned in this article in the "Special Additions" section of the Electronic Musician Web site (www.emusician.com).

Web designer/composer/remixer **Francis Preve** *(FAP7) is now also a multimedia developer. You can download his free Newton-based drum-machine software from www.bga.com/~fap7/synthesis.*

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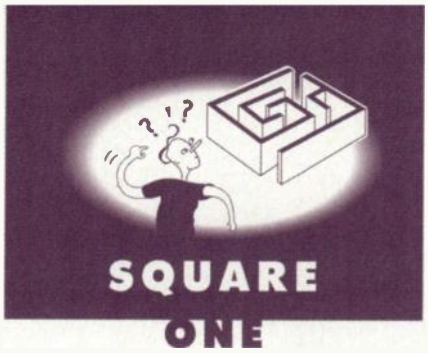


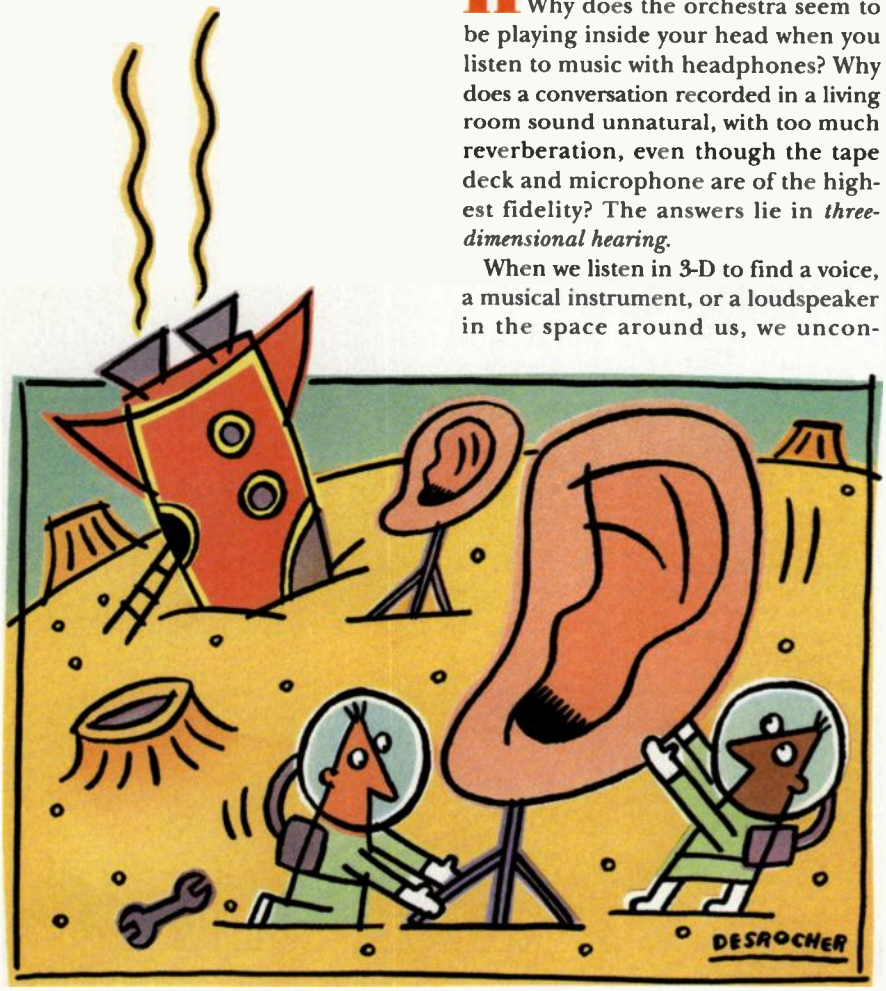
Lost in Space

The miracle of three-dimensional hearing.

By Hannes Müsch

How do we accurately locate a person speaking in the space around us, even with our eyes closed? Why does the orchestra seem to be playing inside your head when you listen to music with headphones? Why does a conversation recorded in a living room sound unnatural, with too much reverberation, even though the tape deck and microphone are of the highest fidelity? The answers lie in *three-dimensional hearing.*

When we listen in 3-D to find a voice, a musical instrument, or a loudspeaker in the space around us, we unconsciously estimate the direction of the incoming sound, as well as the distance of its source. What does it take to make an accurate estimate? Can we apply 3-D hearing to music generated by a computer? In this article, we'll explore all of these topics.



JACK DESROCHER

WHERE DID IT COME FROM?

One of the first investigators who attempted to discover how we determine the location of the sounds around us was the English physicist John William Rayleigh. In 1907, he advanced the *duplex theory* to explain sound localization; with some adaptations, the theory remains at the heart of our modern understanding of this process. Lord Rayleigh's theory illustrates quite well how we determine the direction of incoming sound in the horizontal plane—that is, whether a sound is coming from the left or right. According to the duplex theory, we extract two kinds of information, or *cues,* from a sound signal to help us determine its direction: the intensity difference between our two ears (*interaural intensity difference,* or IID), and the timing difference between the signals in the ears (*interaural time difference,* or ITD).

Level differences between the ears. Consider the interaural intensity difference: as you might expect, a sound coming from one side will be louder (of a higher intensity) in the ear facing the sound's source than in the ear

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Things are equally impressive round the back, where you'll find XLR balanced and RCA phono analogue inputs and outputs, coaxial and optical digital I/Os, plus an additional AES/EBU digital input. And peace of mind comes as standard with a full 12 month parts and labour warranty, and the build quality you'd expect from a world leader in CD-R.

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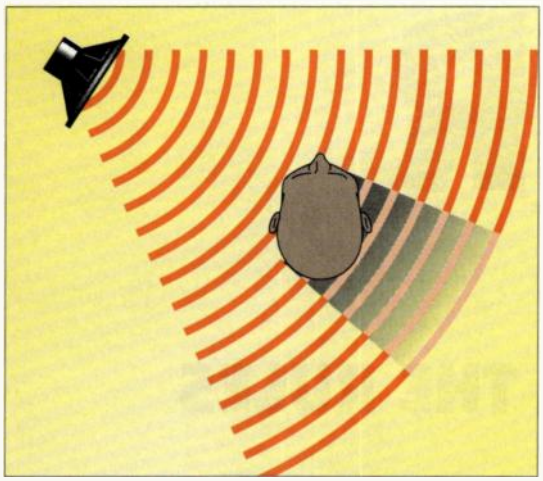


FIG. 1: One reason the brain can detect a sound's location is that the sound produces a higher intensity in the ear it reaches first. A sound source to the left of the listener will be slightly louder in the left ear than in the right because the head shields the right ear from the sound.

facing away, because your head shields the far ear from the sound (see **Fig. 1**). This difference is more pronounced the farther the source is off *center*, the point at which each ear is equally distant from the sound source—in other words, dead ahead of you or directly above, below, or behind you.

You can experience the effect of intensity difference in your mixer. By listening through headphones and selecting a monophonic signal, you can move the image in your head from left to right by adjusting the balance. Adjusting to the left or right means increasing the intensity in one ear over the other. You perceive the image to be in the center of your head when the sound intensity in both ears is identical. As the intensity in one ear increases, the image seems to move toward the side of your head where the sound is louder. You've probably experienced this phenomenon many times.

Timing differences between the ears. The second cue described by the duplex theory for locating sounds, the interaural time difference, is used in stereo recordings. The ITD, which is measured in millionths of a second, refers to the delay that occurs when a sound's source is farther from one ear than the other, so the signal reaches the nearest ear slightly earlier (see **Fig. 2**). The distances between the source and your two ears are equal only when the sound originates in the vertical center plane that separates your head into left and right hemispheres, as described earlier. You use this difference in arrival times—the ITD—to determine the location of a sound source. You perceive sound to be coming from the same direction as the ear it reaches first.

If there are two ways to figure out where a sound is coming from, is one of them more important than the other? In principal, each cue individually is enough to locate a sound's source; however, ITDs are more efficient when the sound contains low frequencies, while IIDs are better for high-frequency sounds. So what happens when the two cues conflict? This situation generally doesn't occur in real life, but you can easily create conflicts using many of the audio applications you probably already own.

For instance, what happens when you delay the sound in your right ear relative to your left ear, yet at the same time attenuate the signal in your left ear? Because the sound arrives at your left ear first, the ITD is consistent with a source on your left. You'd normally think the sound originated to your left, but in this case the attenuated sound in the left ear seems too weak to have come from a source on your left.

This dilemma is resolved by the auditory system in a very democratic way: if the ITD cue is stronger than the IID cue, you will locate the source that the ITD cue indicates. If the interaural delay is increased such that the source seems to move farther to your left, an appropriate amount of additional IID can bring it back. However, this trade-off has its limits. Once the ITDs become so large that they cannot possibly result from the delay of sound traveling around your head, you subconsciously tend to discount them as implausible.

WITH ONE EAR

Although the duplex theory explains the two major aspects of sound localization, it doesn't tell the full story. If intensity and timing differences between your ears were the only information used to determine the direction of incoming sound, you wouldn't be able to distinguish between sound sources at different elevations, because the timing and level differences between your ears are almost independent of elevation. You also would be unable to locate sound with one ear plugged.

Actually, you are capable of determining the approximate location of a sound source even when you stick a finger in one ear. When listening with only one ear, you use cues encoded in changes of the sound's frequency composition. Your head, torso, and uniquely shaped outer ears filter the sound, much as an equalizer does. Some frequencies are amplified, while others are attenuated. Your "equalizer settings" depend on the direction of the incoming sound. For example, sound reaching you from above is filtered differently than sound coming from the front. So when a sound source in front of you moves above your head, its timbre changes ever so slightly.

Whether or not you are aware of the mechanics of auditory perception, you still have learned unconsciously to interpret a change in timbre over time as an indication that the sound source has moved. But to decode the timbre change, you have to know what a tone is supposed to sound like. Unfamiliar sounds, or those with a very narrow spectrum (such as an electrically generated sine tone), are hard to locate when listening with only one ear. In such cases, using a strategy that does not require familiarity with the sound is helpful: by making small head movements to alter your ears' relative position to the source, you can interpret

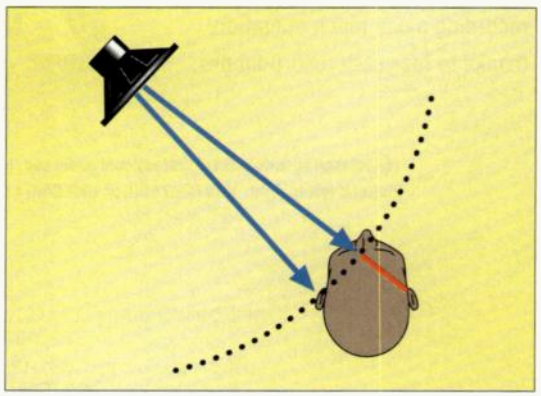
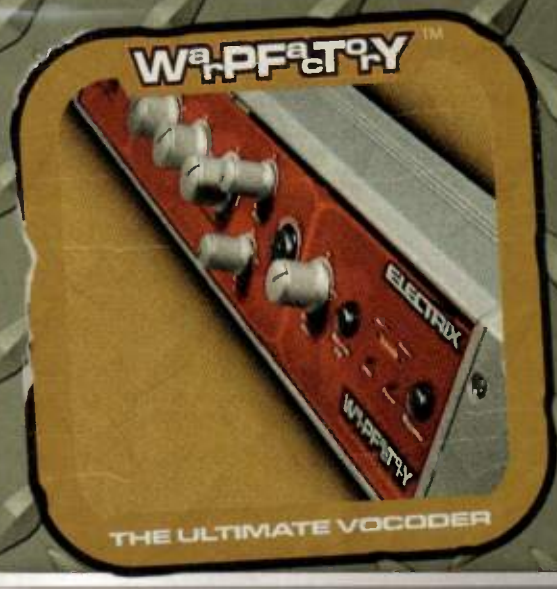


FIG. 2: The interaural time difference is the delay that occurs when a sound reaches one ear before the other. The sound shown here reaches the left ear first and has to travel slightly farther to reach the right ear.

THE FUTURE OF RE-MIX



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the resulting minute changes in timbre. Use this fact to your advantage—locating a squeaking noise in your car is much easier when you move your head a little! Many animals do it instinctively, moving their ears when they are alert.

Of course, when you listen to stereo recordings through headphones, your head, torso, and outer ear are all bypassed. As a result, your body does not get a chance to do the filtering it is accustomed to. You notice the missing filtering as a lack of *externalization;* in other words, the sound source seems to be located inside your head. When the missing filtering is carefully added back through simulation, headphone presentations sound very natural, and the sound image once again seems to come from outside your head. (Binaural recordings that use mics placed near the ears of a dummy head are one attempt to modify the signal so that the sound image is externalized.) In virtual-reality applications, the filtering is simulated by a computer. A sensor in the headphones determines the head's position, and the computer filters the signal so that it seems to originate from the desired location.

IS THAT CAR HORN CLOSE?

Once you know where a sound is coming from, the question remains: how far away is the source? Our bodies are poorly equipped to judge an object's distance solely through listening. What we base our judgment on is not clear, either. You might expect that loudness is important—louder sounds should seem close, and softer sounds far away. However, a sound's loudness is a reliable cue only if you know the source's loudness at some reference distance. Fortunately, this is often the case. For instance, you expect conversational speech to have a certain level of loudness. By observing the deviation from this expectation, you can infer the speaking person's distance from you.

Another possible cue is the timbre of a sound source at various distances. When traveling through air, high-frequency sounds are attenuated more than low-frequency sounds. Consequently, sounds that originated far away are more muffled than sounds from nearby sources. The perfect example is thunder. The sound of nearby thunder is clear and sharp, whereas distant thunder has a rolling sound.

A third possible cue to the perception of an object's distance works correctly only in an enclosed area. In a room, the sound coming directly from the source is supplemented by *reverberation*—sound bouncing off the walls, floor, and ceiling. When the source is close, the sound coming directly from it is stronger than the reflected sound. As the distance between you and the source increases, the ratio of direct sound to reverberant sound diminishes. Subconsciously, you use this ratio to judge the source's distance.

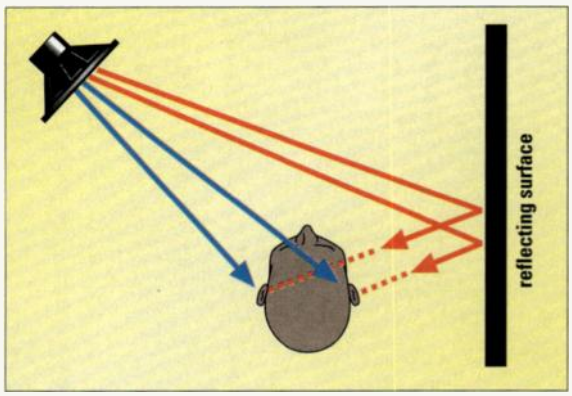

FIG. 3: The direct sound (shown in blue) will reach the listener before the sound that is reflected (shown in red). Because of its early arrival, the direct sound takes precedence over the reflected sound, and the source is therefore localized correctly.

WHERE ARE YOU? ...YOU?...YOU?

You may wonder if the duplex theory holds true in the case of a reverberant sound field where there is not just one signal but also many copies. Little echoes reach you from various directions with different intensities and delays. Although we are aware of these reflections—they manifest themselves in a feeling of spaciousness—we normally don't notice them individually, but rather fuse them into a single auditory event.

Usually, we disregard the reflections when judging the location of a speaker or musician. This is due to the *precedence effect.* As you know, a straight line is the shortest connection between two points, such as a speaker's mouth and your head. Sound bouncing off walls must travel a longer distance than the direct sound, so it arrives a little later (see **Fig. 3**). The sound arriving first takes precedence over the later echoes when you localize the sound source.

This effect is used to our advantage in sound-reinforcement systems. These systems are used to help an audience perceive a speaker at the podium, or a musician on the stage, as the source of the speech or music, even when most of the acoustic energy that ensures intelligibility comes from loudspeakers distributed throughout the room. This phenomenon can be achieved by delaying the amplifier's signal so that the amplified speech reaches the audience only after the weak direct sound from the speaker or musician has already arrived. Because of the precedence effect, the audience fuses the weak direct sound with the delayed amplified sound into a single event and perceives the person on stage as the source. With delays and level ratios adjusted properly, the audience is unaware of the presence of nearby loudspeakers.

Spatial hearing is a prerequisite for the precedence effect. You are so accustomed to spatial hearing that you will be aware of it only when it's missing. As mentioned earlier, you are subjected to both direct and reflected (reverberant) sounds when conversing indoors. Because of the precedence effect, you experience only a single, fused auditory event. However, if you tape the conversation with a microphone placed in the middle of the room, the spatial cues will be obliterated by the monophonic recording. (This also occurs when the person on the other end of a telephone line is talking on a speakerphone.) In these cases you won't experience the precedence effect, and you will suddenly become aware of the reverberation. That is why these recordings sound so unnatural.

As a desktop musician, you probably own tools that help add spatial qualities to your music. So don't just concentrate on that perfect chord progression, or finding the right phrase for your horn player. Try adding a spatial quality to your music and see how much it can enhance your work. You might find yourself lost in space.

Hannes Müsch *is a graduate research associate in the Communication Research Lab at Northeastern University in Boston.* *Thanks to Bridget Allen for editorial help.*

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the new legend

Managing Your Project

How to stay focused, move forward, and finish your CD.

By Lory Kohn

Affordable, pro-quality personal studios offer ample firepower for ambitious musicians to tackle every facet of the CD creation process. Why shouldn't those of us motivated to write, perform, arrange, produce, engineer, and master our own CDs do it all?

The answer is *time*. Doing everything yourself requires massive amounts of that precious commodity. Even if you are able to find time, being able to use it effectively separates those who have successfully recorded their own CDs from those who have studios full of equipment but nothing to show for it.

BARABARA POLLAK

DELUSIONS OF GRANDEUR

I recently hauled my personal studio off to an adobe hut in the wilds of New Mexico. Taking four months off from the "real world," I felt ready to delve into recording my CD. I was, however, laboring under several delusions. I believed that the wondrous gear that I had the brilliant foresight to buy would basically write and record my songs for me; that my fabulous talent would be on call to help out my equipment; and that nothing could stop me from immediately carving out my chunk of recording history. Wrong, wrong, and wrong!

First, no matter how much you have obsessed about getting your project studio up and running, you're still at the starting gate in terms of producing your CD. Second, talent without direction and perseverance will get you nowhere. And third, even if you're a certified genius and card-carrying technogeek, it's unreasonable to expect satisfying results until you've thoroughly familiarized yourself with your rig, which means your many mistakes will be an important part of your education.

Arriving at my adobe hut, I hadn't made those realizations yet. Sad to say, after six weeks, I hadn't completed so much as a single track that I would dare play for anyone.

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BE A TASKMASTER

My first mistake was flitting about from experiment to experiment: checking out the editor/librarian, doing a little synth programming, trying out vocal reverbs, learning how to edit waveforms, adding verses to songs, and so on. If you go about your project this way, hours will have been deleted from your life before you know it. Granted, that time wasn't a complete waste. I made some valuable discoveries about how my equipment operated, but I could have done so more productively.

At that point, I had to reassess my time management. I began by listing all the tasks a singer-songwriter needs to address while self-recording a CD (see the table "Tempus Fugit"). Seeing these tasks on paper was a real eye-opener. No wonder I was having trouble juggling them all.

It became obvious that the more tasks I tried to accomplish each session, the less likely I was to complete any of them. Vacillating between creative and technical tasks was unconstructive. I found it difficult to be creative while trying to assimilate all the technical data. I also felt guilty about being technical because I wasn't being creative enough. In other words, I was stuck. Sound familiar? Here are a couple of ways to avoid turning your personal studio into a productivity abyss.

Focus on each task. I used my list to preplan productive sessions. For example, for a five-hour session, you can allot the first hour to familiarizing yourself with your MIDI sequencer (Tech Time); the second hour to trying out vocal harmonies for your latest smash (Arranging Time); the third hour to practicing the vocal parts you just arranged (Rehearsal Time); and the remaining two hours to recording the first takes (Recording Time).

By using a task-oriented approach, you give each of your experiments in the studio a specific purpose, and every minute of your session propels you toward your goal of finishing your CD. Furthermore, you can expand your musicianship and technical ability while working through takes until you've chalked up, one by one, all the tracks of your CD.

Script every session. It would be astounding if a football coach assembled his squad and announced, "Men, since Saturn is trine with Neptune in the third house, perhaps we'll practice our goal line stand for, I dunno, 20 minutes or so." In reality, successful coaches carefully script every practice session and organize game plans for game day. Talent being equal, the most organized team with the best game plan would win.

Appoint yourself coach in charge of studio time management. Script every session. Pick a few tasks that you're confident you can accomplish and concentrate on getting them done.

Tempus Fugit

Here are some ways to divide your time during your recording project.

Creative Time	Writing lyrics
	Writing music
	Jamming on new ideas
	Figuring out parts
Research Time	Posting questions to Internet users' groups
	Investigating gear
	Comparing prices
	Calling tech support
Assembly Time	Compiling realistic drum parts
	Compiling sound libraries
	Mixing
	Mastering
	Burning CDs
Arranging Time	Arranging vocals
	Arranging music
	Choosing instrumentation
	Constructing songs
Rehearsal Time	Practicing vocals
	Getting parts studio-ready
	Faking instruments
	Working out parts with guest performers
Tech Time	Exploring synths and samplers
	Exploring effects devices and plug-ins
	Expanding engineering skills
	Coming to grips with operating system(s)
	Manipulating waveforms
	Resolving sync and word-clock issues
	Mastering mastering tools
Housekeeping Time	Maintaining tape decks
	Managing hard disks
	Backing up
	Installing upgrades
	Troubleshooting software and hardware problems
Recording Time	Recording voices
	Recording acoustic instruments
	Recording electronic instruments
	MIDI sequencing
Obsession Time	Fantasizing about your studio
	Hearing and seeing your finished product in your mind
	Deciding what you need and can afford
	Critically reviewing what you've done so far
Shopping Time	Going out and getting what you fantasized about during Obsession Time

STUDIO SCHIZOPHRENIA

Scripting each session got my project moving slowly, but inexorably, forward. Even though I was successfully focusing on one thing at a time, tackling many tasks over a 10- to 12-hour workday was still overwhelming. In a moment of weakness, I wished I could round up the usual studio crew—musicians, engineers, a producer—to help me. That thought led me to the concept of virtual recording personalities.

It's a challenge for the self-recording musician to alternate between sober engineer and wildly creative artist. Try developing virtual engineer and performer personalities to enact these dual personas. It's natural for the performer to get frustrated when the engineer encounters technical difficulties. When this occurs, pretend that "Performer You" is doing whatever else you'd be doing at a commercial facility while awaiting your turn to perform. Relax and resist the tendency to get stale while you wait. If your performer persona stays fresh mentally, you can still carry out your script in spite of delays.

You can even add a producer persona to these virtual personalities. Your producer persona should be decisive and keep things moving by knowing whether to go for absolute perfection or to accept the best you can do at a particular juncture. Sometimes "Producer You" has to compromise for the sake of continuity. After all, if you don't get the take done, you don't finish the track or, ultimately, the CD.

For my project, farming out tasks to virtual personalities brought a sense of order to the proceedings. Things started to run like clockwork, and the good takes kept adding up. Best of all, the real me—the creative force—could relax a little and concentrate on managing the entire project.

PRIORITIZE YOUR TIME

Persuade "Engineer You" to complete mundane tasks early in a session so that you can make hay in Creative Time and Recording Time. For example, thumb through manuals during Tech Time, and search for string sounds during arranging time. Defragmenting a hard disk belongs in Housekeeping Time, and sampling sounds off a CD should happen in Assembly Time.

Reserve Creative Time for developing your vision. Use Recording Time to make that vision a reality. Do everything you can to free the real you for Creative Time and Recording Time. Prioritize Recording Time with tasks that will take relatively predictable amounts of time. Doubling an already existing lead vocal, for example, is a finite task; recording realistic MIDI drum parts for a whole song could gobble up unknown amounts of time. It might help to shift the drum work to Assembly Time.

SESSION STOPPERS

Time-management blunders can be ruinous to sessions or even so catastrophic that your entire production has to shut down. Always be alert for anything that could stop you in your tracks.

Are you studio-ready? Expensive mics and preamps have a habit of revealing the difference between performers who are live-ready and those who are studio-ready. The four-minute fingerpicking excursion I attempted as "Take 1, Song 1" was a perfect example of a performance that was live-ready only. It seemed polished enough when I played it sitting on a rock outside my hut, but when I played the same part through headphones, I realized that it contained thousands of notes. If you miss even five or six of those notes, or clang metal picks near the guitar's sound hole, another four-minute take looms before you. Furthermore, if you perform a part haltingly, you eat up Recording Time with endless punch-ins.

One way to find out whether you're studio-ready is to lay down a dry run, recording one verse and one chorus with your instrument. That should be enough to tell you whether you need to schedule some more Practice Time before proceeding to Recording Time.

Is your song really done? If you've wrestled with the demons of song construction, you know that framing a song can take an unlimited amount of time to finish. Song construction belongs in Creative Time or Assembly Time.

In the same vein, unless you're a lyric-writing machine, like a young Bob Dylan, nothing bogs down Recording Time like those instances when your lyrics just aren't working. These situations always seem to occur when you're singing really well and you're thrilled with your recorded sound. Even if you have a tremendous aptitude for creating lyrics and can sometimes conjure them up immediately, there are those inevitable times when single-handedly you keep the legal-pad manufacturers in business. Of course, Bob Dylan wasn't doing double duty behind a console when he wrote "A Hard Rain's A-Gonna Fall"—a lyrical tour de force that aptly contains the line "I'll know my song well before I start singing." Take his advice. Get happy with your lyrics before you roll tape.

Freeze your setup. As you develop a process of working with your system, you'll soon identify areas of weakness you want to beef up. Say you have just one mono mic preamp, and you absolutely must record in stereo. You could spend weeks auditioning all the fine mic preamps out there and easily fall prey to overanalysis paralysis in deciding whether you want to add another mono preamp or spring for a dual-channel model. If you're on a hot streak and are well into your CD, stay on track by renting or borrowing gear rather than letting things grind to a halt while you decide what to buy.

Hired hands are permissible. Computer problems are de rigueur in the age of the desktop studio. When your PC gives it up due to human error, incompatibility, or whatever, don't stand on your head for days trying to untangle a knotty IRQ conundrum. Take your PC to a professional who can tame the misbehaving box in an hour. I'm always shocked when newbie electronic musicians choose the DIY route and shun the PC shop. Isn't it worth 50 bucks to save 72 hours of drudgery? Wait until the day after your CD-release party to start spelunking in the bowels of your operating system.

Buy what you know works. The biggest time waster of all is buying stuff that you aren't 100 percent certain will work with the rest of your system. I can't tell you how many people write to Internet users' groups because they purchased gear that was *(a)* compatible with their other gear theoretically, but not in actuality, or *(b)* supposed be compatible after an imminent software release, which was delayed indefinitely.

With all the other hurdles you must clear to self-record a CD, the last thing you want is a system that doesn't work. You can avert catastrophic wastes of time by acknowledging that incompatibility is rampant in computer land, and by refusing to design your system around vaporware.

Never believe that self-recording a CD is easy. Don't be brainwashed into thinking that self-recording a CD should be easy; this misconception is a major contributing factor to personal-studio inertia. When you think something should be easy but it isn't, you get frustrated. When you get frustrated, you don't think clearly and you can't be creative. Lack of creativity equals huge time delays in the production of your album.

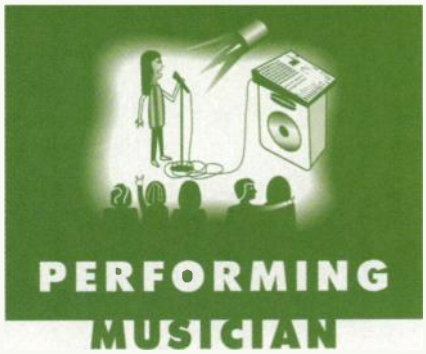
Don't let anyone convince you that producing your own CD isn't "real work." In addition to mastering technology and studio techniques, you are creating art. Few people successfully accomplish that sort of multitasking.

FINIS

I'm not going to try and kid you that producing and engineering your own project is the paramount way to record. I could have happily gone through life without knowing what a decibel is. But when I consider that today's $15,000 studio competes with the past decade's $500,000 studio, I say, "Let me at the knobs!"

So have at it, and remember never to lose sight of your goal. Spend some quality Obsession Time visualizing your CD in your hands and the record-store racks. Once you've mastered studio time-management skills, you'll finish your second CD in half the time it took you to make your first.

Lory Kohn *prays that landing a song in* Revenge of the Nerds, Part II, *was not the high point of his life.*



Controlling Live Ambience

Check out these tips for taming onstage reverb and delay.

By Michael Ross

Have you ever done a sound check in an empty room only to find that your sound is too dry once the audience shows up? Or conversely, the delay and reverb patches that worked in last night's club are far too washy for tonight's gymnasium? Congratulations—you have just discovered the wonderful world of *ambience,* which literally means "surrounding."

If you play live, it's important to be prepared for any acoustic challenge you will face. Ambient effects, such as reverb and delay, not only allow you to define the image around your sound but can also be used to correct problems that occur in a room and help you maintain a consistent sound no matter where you're playing. What separates the pros from the amateurs is how they control their sound as they're battling the adverse conditions of live performance. Here are a few tips on taming your effects.

Reverb and delay effects should blend in as part of your sound rather than stand out as something separate. Having easy access to your effects parameters helps you maintain a consistent sound, no matter where you're playing.

STEVE JENNINGS

FINDING YOUR SPACE

Many considerations come into play when determining the balance and level of effects. At any given venue, there are the obvious acoustic factors to consider, such as the size and shape of the venue, the number and placement of people there, and the surrounding air itself. Your musical style and instrumentation are also important to the way you use ambient processing. For example, a guitarist playing in a power trio can get away with more delay and reverb than one who shares the sonic space with two keyboards, a horn section, and a female chorus.

If your instrument is portable and you're going wireless or have a long cord, try playing from in front of the stage to see how you fit into the mix. This approach can be helpful both in rehearsal and at sound check. If you're using sound reinforcement, ask the sound person how your effects are

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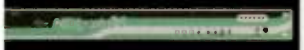

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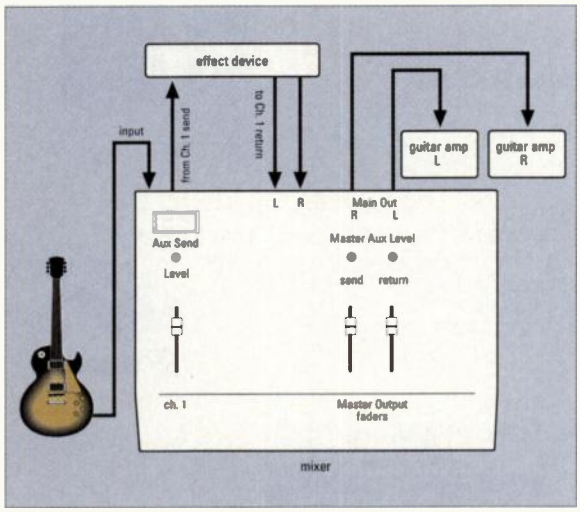

FIG. 1: Using the aux send and return of a mixer is a simple way of getting hands-on control of your effects processor. With the mix on the effect device set to 100 percent effect, only the processed sound is returning to your mixer.

coming across. If you trust the sound person, consider asking him or her to add ambient effects at the board rather than doing it yourself on stage. If your effects needs are simple, delegating them to the sound engineer makes good sense.

PRE-PREPARATION

The trickiest part of preconcert preparation is estimating how your effects will sound on stage. When you practice by yourself, washes of delay and reverb fill in for the missing players. But once you begin playing in a room with drums, cymbals, and strumming acoustic guitars, too much processing will bury you in the mix.

Conversely, if you're using minimal amounts of processing, you may find that the perfect blend you had when practicing by yourself disappears once you're on stage with the band. Let's look at some setups that allow you to adjust your effects mix for any venue and playing situation.

CHOOSE YOUR WEAPON

The cheapest and easiest way to add ambient effects is to use individual stomp boxes. In their most simple form, floor pedals enable you to adjust the ratio of "wet" (processed) signal to "dry" (unprocessed), while giving you the option of having the effect on or off. If you can get by all night with one type of delay and one type of reverb, this method may work well for you.

However, if you require several different delays and reverbs, you will want a more sophisticated, programmable unit. These kinds of processors usually sound better than stomp boxes, have stereo outputs, and are MIDI controllable. But they also require more preparation and additional gear.

You can control these processors live in a number of ways. One method is to use a mixer. In the following examples, we are sending a mono signal from the mixer to the effects processor and returning with a pair (stereo or dual mono) of processed signals. Before we get started, set the mix in your processor to 100 percent wet, so that there is no direct signal.

Aux send. The first method requires the use of the aux send on the mixer. Run a cable from the aux send to the input of your processor, and run a pair of cables from the processor to the aux return on the mixer. Because you have the effects mix in your processor set to 100 percent, only the processed sound is returning to your mixer.

Use the aux-level pot on the mixer to adjust the amount of effect you want to add to the original dry signal (see **Fig. 1**). Many portable mixers have two aux sends, so you can use two processors simultaneously—one for delay and one for reverb—if you want separate control of the effects.

Direct out. The second method is used with mixing consoles that have a direct output on each channel. Send the dry signal from the direct out to the processor input, and run the processor's outputs into two additional mixer channels (see **Fig. 2**). Even though you are taking a line from the direct-out jack, the original dry signal is still going to the stereo bus. Bringing the effects into their own mixer channels will give you three separate signals going to the stereo bus: the dry instrument signal and a pair of processed signals.

The drawback of the direct-out method is that you will add noise to your signal because of the extra electronics in the signal path when you use two more channels. But this method gives you a little more flexibility in panning and equalizing the processed signals.

Obviously, using a mixer and an effects unit requires additional gear and rack space. But it may be worth it for the extra flexibility and greater fidelity that you gain over stomp boxes. These mixer methods let you adjust the volume of your reverb and delay without having to reprogram each effect individually. However, the mixer methods won't work if your effects processing includes distortion, chorus, or other effects that you don't want to change globally.

BANK IT

If you're using other effects besides ambient processing, you may want to dedicate groups of programs to different levels of ambience. Rarely would you use the average effects processor's full program capacity, so you can use the extra storage space for the following.

Program your favorite 30 settings into three groups of 10 (1 through 30). Then, duplicate them in the next three groups (31 through 60), but raise the volume of the ambient effects a couple of notches in each of the programs. Finally, duplicate the first set again in the next three groups (61 through 90), lowering the ambient effects' levels by a couple of notches. This should cover all your playing needs.

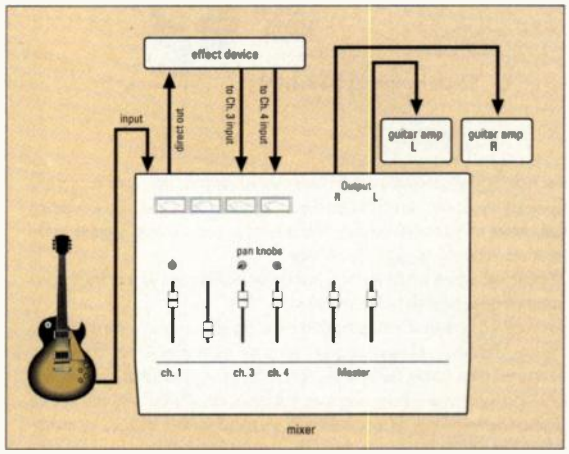

FIG. 2: Using a mixer's direct outputs gives you greater flexibility in panning and equalizing the processed signals. However, as you add channels, you are potentially adding noise to your signal.

MIDI ACCESS

If your processor is of recent vintage, it will probably accept MIDI Control Change messages. Depending on whether you want foot or hand control, you have a couple of controller options.

One option is to use a MIDI footswitch with a built-in pedal controller (similar to a volume pedal) or a footswitch that allows such a pedal to be added. This method enables you to instantly adjust whatever parameters you assign to it, but it has some drawbacks. For starters, the pedal is dedicated to ambient effects levels, leaving you without a pedal for MIDI control of wah-wah and whammy effects or overall volume. In addition, you have to avoid accidentally nudging the pedal during the gig. Because we're striving for a "set it and forget it" procedure (at least for each performance), relying on a pedal might be too precarious if you move around a lot on stage.

▼

Less is more. If you notice the effect, it's too much.

The other option is to use a MIDI fader box, such as Peavey's PC 1600 or the JLCooper FaderMaster. Each fader can be assigned to a different parameter of your effects processor, giving you control over the wet/dry mix and effect level, as well as other useful delay and reverb parameters such as depth and EQ.

OPEN SESAME

Now that you have control over your ambient effects, here are some secrets on how to use them like a pro. The first secret is that less is more. If you notice the effect, it's too much. Few things are as annoying as an exciting flurry of notes being stepped on by a bunch of delay trails, or a beautiful melodic line getting drowned in reverb. Effects should blend in as part of your sound, making it bigger, wider, or longer, without being discernible as something separate.

Another secret is to use EQ to retain your presence when using ambient effects. When you yell in a canyon, the answering echoes don't have the crispness of your original yell. Rolling the high end off of the delay or reverb helps make the effect sound more natural, so the original signal stands out. It also allows you to use more of the effect without obscuring the original sound. Set the EQ when you program the patch, or adjust it globally on the mixer if the effects are being sent to their own channels.

The last secret is to use compression. Putting a compressor before your effects processor will reduce your instrument's attack transients, allowing you to use more of the effect without calling attention to it.

Delay and reverb offer a certain amount of control over your acoustic environment as well as a large potential palette of colors for your music. Once you have control over them, you will have the ability to create and maintain your own musical atmosphere in almost any situation.

Michael Ross *is a freelance writer living in New York. He contributes to many magazines with "guitar" in the title and is the author of* Getting Great Guitar Sounds *(Hal Leonard Publishing).*

REVIEWS

MARK OF THE UNICORN

2408

We really can all get along in the world of digital audio.

By Rob Shrock

So many companies make audio cards and digital audio workstations that you can no longer tell who the players are, even if you have a scorecard. Each system seems to offer a different combination of connections and capabilities, and choosing the right one has become increasingly difficult. Logically enough, the more types of audio I/O you need—ADAT Optical, Tascam TDIF, AES/EBU, S/PDIF, and analog—the more money you probably expect to pay.

At least, you expected to pay more until Mark of the Unicorn simultaneously raised the stakes and lowered the price of admission by introducing its 2408 hard-disk recording system. Now you can get a computer audio interface with a wealth of I/O options, sync abilities, and useful features, bundled with high-quality software, all for a reasonable price. In fact, the price is so reasonable that some people may wonder what is wrong. This system couldn't cost less than a grand, deliver all those features, sound good, and work as advertised, could it?

Actually, yes, it can. Furthermore, it is incredibly easy to install and use. If you have been a doubter, keep reading; I have great news for you.

THE SYSTEM

The 2408 core system consists of the I/O audio interface and one PCI-324 card. The interface has three sets of 8-channel ADAT Optical ports, three sets of 8-channel Tascam TDIF ports, eight channels of analog I/O, one S/PDIF input, and two S/PDIF outputs, and it can handle 24 input and output channels at a time (see **Fig. 1**).

Mark of the Unicorn's basic 2408 hard-disk recording system comprises a PCI card and an audio I/O interface, which also serves as a stand-alone digital audio format converter. Meters show analog I/O activity, clock source, bounce settings, and more.

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FIG 1 The 2408 audio interface offers a plethora of I/O. Up to three I/O boxes can connect to one PCI-324 card via a FireWire-style cable. Word-clock connectors are on the I/O box; ADAT 9-pin and MOTU Digital Timepiece sync ports are on the PCI card.

This setup allows you to assign any combination of I/O ports to each of the interface's three 8-channel banks (A, B, and C). For example, bank A could be assigned to an ADAT, bank B to a DA-88, and bank C to the eight channels of analog I/O. Audio can be transferred between banks and simultaneously routed to and from the computer, which is like getting a free format converter thrown in with the deal. A front-panel headphone output and a pair of ¼-inch TRS main outputs, designed primarily as monitor outs, duplicate the signal at analog outputs 1 and 2.

Up to three 2408 audio interfaces (additional interfaces are $695 each) can be driven from one PCI-324 card for a total of 72 possible channels of simultaneous I/O. If you lack the computing power to handle that many tracks, you can use the extra analog I/O for sends and returns. Add outboard converters for the digital I/O, and you can integrate all of your outboard gear into your digital studio. Furthermore, an increasing number of products have ADAT Optical and TDIF I/O (see "Digital Pipelines" in the April 1999 issue of EM), and the 2408's expandability means that you can easily incorporate them.

The PCI-324 card connects to the 2408 I/O interface via a 15-foot, FireWire-style cable; the card has three connectors for use with up to three I/O interfaces. (The system uses a proprietary data-transfer protocol rather than FireWire/IEEE 1394.) The manual mistakenly says that the maximum cable length is 30 feet, but the provided 15-foot cable is actually the maximum length allowed per interface. As a result, if you set up your computer in a remote location, such as an equipment closet, and you want to mount the 2408 I/O interface conveniently near the patch bays and console, you may have to relocate some gear.

The I/O interface has BNC word-clock connectors, and the PCI-324 card provides ADAT 9-pin and MOTU Digital Timepiece sync. This means that the 2408 will perform sample-accurate data transfers with ADATs right out of the box. DA-88 users will need a Digital Timepiece or similar synchronizer for sample-accurate sync.

UP AND RUNNING

I always hold my breath when incorporating new pieces of sophisticated gear into my studio. Although I enjoy staying current on the technology front, I can't suffer misbehaving hardware that disrupts my professional projects or software that crashes my

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SR24•4/32•4

Few bands have the bucks for a separate studio mixer. So instead of cutting corners, we made the SR24•4 a "downsized" Mackie 8•Bus with much of its circuitry and many of the same cool features–the sweet preamps, VLZ® low-noise design and musical EQ.

Flexible, creativity-enhancing equalization. Mono mic/line channel's swept midrange has a super-wide 100Hz-8kHz sweep range (and a broad, natural-sounding 1.5-octave wide curve). You also get a sharp, 18dB per octave **low-cut filter** that lets you use the Low shelving EQ without boosting unwanted mic thumps, or stage noise.

Six aux sends per channel.

Inserts on all mono channels–plus submix and main stereo mix inserts.

Double tape outputs eliminate repatching during tracking. The SR24•4's "double-bussing" feature is a great solution–and a big timesaver.

Trim control has a 10dB "virtual pad" that tames ultra-hot line inputs; 60dB total gain range lets you boost timid vocalists.

100% genuine name brand electronic parts throughout. 'Nuff said.

Dual headphone outputs pushing enough amperage to dust two pairs of eardrums.

All inputs and outputs are balanced* to eliminate hum and allow extra-long cable runs (they can also be used with unbalanced connectors). *except RCAs and channel inserts

Low-noise, high-headroom discrete mic preamps. Preamps are a critical part of any mixer; they must be accurate and free from coloration–yet be able to handle screaming vocalists and close-miked kick drums without overloading.

Large, high-current internal power supply allows us to use VLZ® (Very Low Impedance) circuitry at critical points in the SR24•4 and SR32•4. Live or in the studio, you'll hear the difference.

Super-twitchy Signal Present and Overload LED's on every channel. Subtly senses signals, blinking boldly bright.

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Special pan controls maintain the same apparent loudness even when you pan a channel hard right or hard left.

Solid steel chassis, gold-plated internal interconnects and sealed rotary controls keep the SR24•4 working through dust, smoke, moisture and road abuse.

Ultra-high "AIR" EQ on submix buses centered at 16kHz. As one magazine review put it, *"The AIR controls turned out to be effective in adding top end clarity... it's almost an 'exciter' kind of effect, except without the harshness."*

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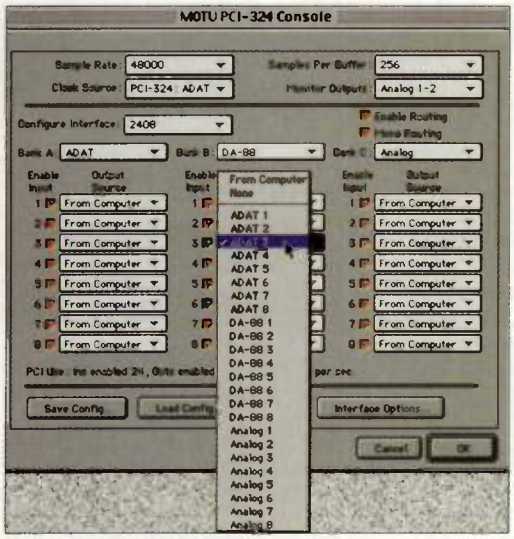


FIG. 2: In MOTU's cross-platform *PCI-324 Console*, you can make bank and output assignments, enable inputs, set the clock source and sample rate, and adjust the recording buffer. Lowering the buffer reduces latency but increases the load on your CPU.

computers, possibly leading to a missed deadline or inferior work. I was delighted to discover that my normal caution was unnecessary in this case.

Even though the 2408 incorporates a potentially nightmarish combination of hardware and software, digital and analog I/O, and synchronization options, it has been one of the best-behaved pieces of equipment I've ever installed in my studio. (I tested the 2408 system on a Power Mac G3/233 with 192 MB RAM.)

After you install the PCI-324 card into an available PCI slot, reboot the computer, and install the software from the CD-ROM, a Setup Wizard questions you about the gear that will be connected to the 2408 interface. (For the PC, it is recommended that you install the software *before* installing the PCI-324 card.) The Setup Wizard then automatically configures the software and takes you step by step through the process of getting everything connected properly.

The CD-ROM provides excellent graphics and multimedia-rich instructions for the installation, and the well-written, thorough manual contains the same information as the disc. I especially appreciated the fact that (unlike with the MIDI Timepiece AV) you don't have to install MOTU's FreeMIDI system extension just to configure the hardware from the computer; the 2408 did not mind that my MIDI system runs under OMS. All in all, this setup was one of the most painless that I have ever experienced.

COMPATIBLE ALL THE WAY

MOTU should be commended for supporting a wide array of drivers for many commonly used Mac and Windows applications. The 2408 supports ASIO for Mac and Windows, MOTU Audio System (MAS), Sound Manager, and Wave drivers. This flexibility means the 2408 can be run with MOTU *Digital Performer* 2.42 and higher (a free update from 2.40 or 2.41 is provided) under MAS (Mac); Steinberg *Cubase VST*, Emagic *Logic Audio*, BIAS *Peak*, and Opcode *Studio Vision Pro* and *Vision DSP* via ASIO; Digidesign *Pro Tools* through Sound Manager (Mac); and any program that uses Windows Wave drivers.

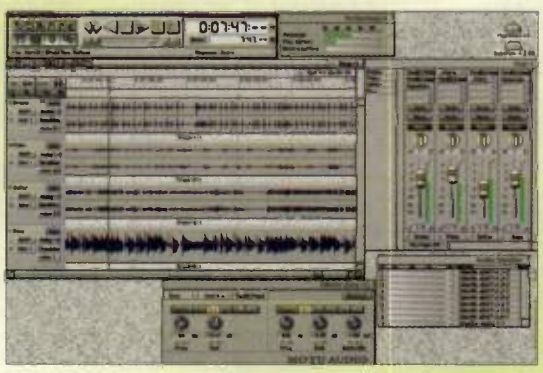
The 2408 ships with the *PCI-324 Console* (see **Fig. 2**) for Mac and Windows. This software allows you to determine

AUDIODESK FOR MACINTOSH

Included on the 2408's installation CD-ROM is *AudioDesk* 1.0, an advanced Mac program for recording, editing, mixing, processing, and mastering multitrack audio projects. If it looks and feels familiar, that's because it is basically the audio part of *Digital Performer* 2.4 (with a few features from v. 2.5) without the MIDI features. You can easily transfer audio files between *AudioDesk* and *Digital Performer* 2.5 (but not 2.4), with sample accuracy. *AudioDesk* supports 24-bit recording and can export OMF files for compatibility with Pro Tools sessions.

AudioDesk supports both the Adobe Premiere and MOTU Audio System (MAS) plug-in architectures and ships with the same 32-bit MAS plug-ins that come with *Digital Performer* 2.42. The program incorporates many handy features, including adjustable crossfades and fade curves; a context-sensitive cursor that changes tools depending on its location; Clipping Windows (clipboards that can hold audio, MIDI, and text data); flexible busing; automation; synchronization with QuickTime movies; and mixer configurations that can be stored and recalled.

Although *AudioDesk* is a capable and stable program for audio projects, you still might want to add *Digital Performer* to your software arsenal. As noted, *AudioDesk* doesn't record MIDI, but you can slave it to MMC and assign MIDI controllers to faders. *AudioDesk*'s automation is rudimentary, controlling only track volume and pan; it cannot control plug-ins or sends. The program has no bars:beat:ticks display, nor does it have tempo maps, window sets, sampler support (transferring audio files to a sampler), or advanced search-engine features, all of which are found in *Digital Performer*.



Mark of the Unicorn *AudioDesk* 1.0

The performance of *AudioDesk* depends on the power of your computer, but overall the program is efficient. I had no problem running 20 tracks of audio on a Power Mac G3/233, even with one or two MAS plug-ins engaged on most of the tracks. Screen redraws and graphic meter representations weren't always smooth, depending on the demands placed on the CPU, but the audio playback (which receives priority) was fine. A Performance meter shows the playback and record buffers and the load on the CPU. For Mac users, *AudioDesk* is a great addition to the 2408 package.

For manufacturer information, please see Contact Sheet, p. 171.

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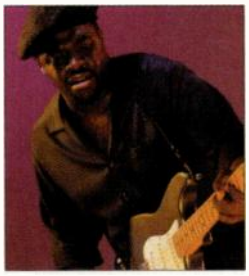
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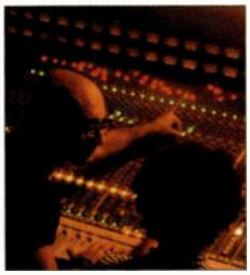
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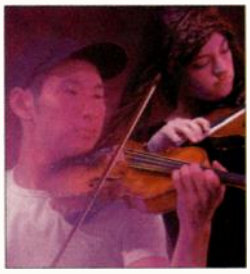
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2408
Minimum System Requirements
Mac: Power Mac 604e/200 (G3 recommended); 32 MB RAM (64 MB recommended); Mac OS 7.6.1; one free PCI slot
PC: Pentium/200 (Pentium II recommended); RAM requirement depends on host application used; Windows 95/98; one free PCI slot; host software with Wave or ASIO drivers

bank and output assignments, enable inputs, set the clock source and sample rate, and adjust the I/O buffer. Many of these features can also be adjusted from the I/O interface's front panel. In fact, the 2408 can operate in stand-alone mode, although it takes a lot of button pushing to work this way, and you'll need the manual to direct you through the process. The *Console* software is definitely the way to go.

In any hard-disk recording system, it takes a certain amount of time to route and process the signal from the audio input to the computer and then to the audio output. This delay time is known as ***latency*** and is particularly noticeable when you are monitoring live audio through the system. MOTU has provided two ways to reduce patch-through latency with the 2408. Of course, both approaches involve trade-offs.

The first method of reducing latency is to lower the buffer size. The compromise with this approach is that it increases the load on your CPU. The other method is to use the included *324 Cue Mix Console* cross-platform application (see **Fig. 3**) to enable Cue Mix mode, a low-level patch-through in the 324 driver in which live audio coming in at the 2408 inputs is routed directly to the outputs and mixed with tracks playing back from disk. This approach reduces latency without further loading down your CPU. The trade-off is that you cannot apply real-time effects processing to live material using the host application. I was easily able to reduce the latency in *Cue Mix* to under 5 ms by adjusting the buffers and number of enabled tracks. (MOTU claims that *324 Cue Mix* can achieve latency as low as 1 or 2 ms with the newest desktop G3 Power Macs.)

You probably wouldn't go this route for mixing, but it can work fine for tracking. If you are recording vocals or guitar and need a splash of reverb or delay while recording, you can route the live signal to one or more 2408 outputs and apply external effects at your mixer.

Mac users also get *AudioDesk*, a program for recording, editing, and mixing 24-bit multitrack projects (see the sidebar "AudioDesk for Macintosh"). *AudioDesk* is basically the audio portion of *Digital Performer* without the MIDI capabilities, and MOTU has graciously included many of the same real-time, 32-bit MAS plug-ins that ship with *Digital Performer*. The *AudioDesk* program provides sample-accurate synchronization with ADAT and (with a Digital Timepiece) Tascam MDM recorders. Unfortunately, PC users must provide their own host application.

Sections of the 2408's user manual are thoroughly devoted to setting up the system to operate with *Digital Performer, Cubase VST,* Cakewalk *Pro Audio,* and *AudioDesk*. There are also instructions for configuring the Sound Manager and Wave drivers to work with other host applications. As of this writing, no comparable application-specific instructions are available for *Studio Vision Pro, Logic Audio,* or SEK'D *Samplitude 2496;* however, MOTU intends to print an updated manual and post the information on its Web site in the future. (Incidentally, the MOTU Web site offers extensive 2408 support.)

SAMPLE-ACCURATE SYNC

Synchronization and clocking issues are of paramount importance when transferring digital audio between devices, and MOTU has really done its homework in this department. One of the most compelling aspects of the 2408 is its ability to execute sample-accurate transfers of data between a computer and digital recording devices. Few systems can do this, much less do it while converting between multiple formats. Some software is now supporting sample location points within transport and edit windows. (*AudioDesk* and *Digital Performer* 2.5 can display timing locations as samples, in addition to hours:minutes:seconds and SMPTE time.)

The master sync source can be set to internal PCI-324 clock, ADAT 9-pin sync, ADAT Optical, MOTU Digital Timepiece Control Track, S/PDIF, or word clock. An Alesis ADAT's 9-pin Sync Out can connect directly to the PCI-324 card's ADAT Sync In, providing sample-accurate transfers between the two. The "transport" must be controlled from the ADAT in this setup.

If you want transport control of everything from the computer, including the ADAT tape transport, you will need an additional interface (such as BRC, MIDI Timepiece AV, or Digital Timepiece). This will give you MIDI Machine Control of tape decks from the computer and ensure consistent clocking and data transfers.

Achieving sample-accurate transfers with Tascam MDM recorders requires a Digital Timepiece. However, you can sync Tascam machines with quarter-frame resolution (the accuracy of MTC) without a Digital Timepiece—which is good enough for most practical applications. (At 30 fps and a 44.1 kHz sampling rate, the timing will be within 1/120 of a second, or 367 samples. Running the synchronizer under its own clock tightens the timing even more.)

To accomplish this type of synchronization, the 2408 provides word-clock I/O (which determines the clock speed only) that can be connected directly to a sync-card-equipped DA-88. In this case, location information must come from another source, such as linear time code (LTC). You can

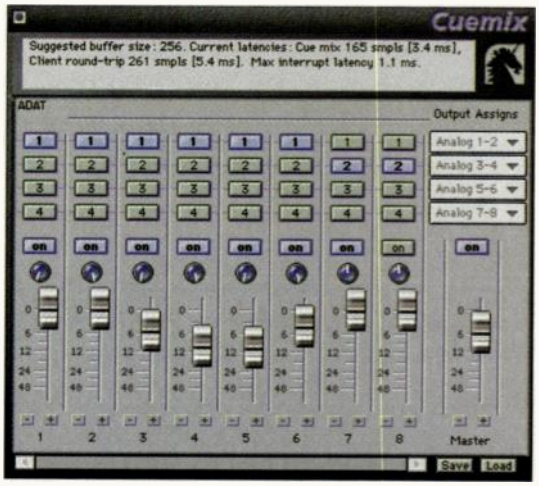

FIG. 3: MOTU's *324 Cue Mix Console* for Mac or Windows allows you to route audio from the inputs directly to the outputs and mix it with tracks playing back from disk. This capability reduces latency to a few milliseconds without loading down the CPU, but you can't apply real-time effects in the host application.

achieve word-clock/LTC–based sync with any synchronizer that supports these features, such as a MIDI Timepiece AV.

As long as tracks that need to maintain phase accuracy (such as drum overheads and stereo acoustic guitar) are moved to and from the computer together in the same pass, using MTC for location information should pose no problems. Audio will not drift once data starts flowing, as long as the clocking is properly set up. In my rig, the 2408 operated perfectly when serving as either the master or slave in a synchronization setup.

The 2408 manual devotes a lot of detail to synchronization issues between various units and is a must-read for all users. Several specific setups of hardware are illustrated and explained thoroughly. You can find further information about synchronization on the MOTU Web site.

SUPER SONICS

It stands to reason that the digital transfer of audio through the 2408 will maintain the sonic purity of the original recording. As for the analog section, MOTU employs 20-bit converters on both inputs and outputs, and they sound great. They are extremely quiet, and I would definitely use them on a professional project.

MARK OF THE UNICORN
2408 hard-disk recording system
$995

FEATURES ■■■■
EASE OF USE ■■■■■
AUDIO QUALITY ■■■■
VALUE ■■■■■
1 2 3 4 5

PROS: Easy to install. Provides simultaneous digital transfers and conversions between various formats (ADAT, TDIF, S/PDIF). Supports sample-accurate synchronization of digital audio. Expandable system. Provides word-clock I/O. Supports many commonly used drivers and software applications.

CONS: Unbalanced RCA I/O on analog bank. Operates only at -10 dBu.

CIRCLE #437 ON READER SERVICE CARD

The only questionable aspect is the use of unbalanced -10 dBu RCA connectors for the eight channels of analog I/O. If you can't—or won't—deal with RCA connectors, you can always use outboard converters, especially if you would like to maintain a balanced +4 dBV operating level throughout your studio. Sonically, the converters are transparent; they will not be the weak link in your analog signal chain.

The 2408 expansion interfaces are exactly the same as the 2408 I/O interface shipped with the core system. I'd like to see MOTU add expansion interfaces with different I/O configurations, perhaps with balanced TRS ¼-inch connectors, AES/EBU, and more S/PDIF for connecting the ever-growing number of effects processors with digital I/O.

I'd also like to be able to switch between -10 dBu and +4 dBV operation and would appreciate having a software switch that would allow the headphone-volume knob to control the TRS ¼-inch monitor output level (which currently is controlled only through software).

In addition to using the analog inputs and outputs for recording and playback, you can use them for effects sends and returns. For example, you could use one set of S/PDIF I/O and several channels of analog I/O for external reverb and delay sends/returns, while mixing the audio entirely within the host application (using whatever plug-ins the host supports) and eliminating the need for an external mixer. The entire mix can be sent out either on two available analog channels or through the second S/PDIF output. It's a sweet setup.

IN THE FIELD

My first professional project with the 2408 was producing two cuts of a dance record, which I had initially sequenced. The singer cut a scratch vocal for both songs on an ADAT, accompanied by a basic MIDI instrumental sequence that was synched to the tape deck. I wanted to transfer the vocal tracks into the computer so I could monitor them while further fleshing out the sequences. As noted earlier, an ADAT locks to the PCI-324 card with sample accuracy, and I was able to transfer the vocal from ADAT to computer on the first pass without a hitch.

After a couple of days of sequencing, I was ready to dump the MIDI tracks to tape to send to the singer's engineer for vocal, guitar, and percussion overdubs and mixing. I elected to first record the MIDI tracks as audio tracks in the sequencer; this let me further process the tracks with plug-ins, all the while using the guide vocal as a reference. The project demanded that I limit my track count to 16, and I knew I could transfer the tracks in one pass to two ADATs through the 2408, thanks to the interface's multiple Lightpipe I/O.

I referred to the manual to make sure I had the proper settings in the *PCI-324 Console* window. The Clock Source needed to be set to ADAT, and I confirmed that banks A and B were set to ADAT 1 and ADAT 2, respectively, to match my wiring scheme. My track layout was the same as the one I used in the sequencer, with one exception: I wanted to swap percussion pairs 5/6 and 7/8 of ADAT 1 while performing the transfer. Drop-down menus in the *Console* software allowed me to easily change track assignments or duplicate them over multiple tracks. (This a handy feature that also works when performing tape-to-tape backups or format conversions.)

I don't use a BRC, so the master ADAT served as the master sync device. The 2408 followed on cue and flawlessly transferred the 16 tracks on the second try. (It would have worked the first time, but I stopped the process after a few seconds to verify that it was working.) The transfer was perfect, and the tracks sounded exactly the same on tape as they did on the computer.

Throughout the review period, the system proved extremely reliable. With the exception of one computer lockup in *AudioDesk*, all interfacing problems or crashes were caused either by pilot error or by a problem in another device or application. I wish everything in my studio were this well behaved.

FINAL THOUGHTS

The 2408 does everything MOTU says it can do, and it does it extremely well. Manufacturers are rarely able to substantiate claims that their products do this much without making you jump through unproductive hoops or wait for an update of bug fixes. MOTU has come through on a big promise to deliver an extremely flexible, efficient, and affordable recording system that is easy to use and sounds great. If you've been waiting to make the jump to hard-disk recording, there's never been a better time to do it.

2408 Specifications

Analog I/O	(8) RCA inputs (-10 dBu); (8) RCA outputs (-10 dBu); (2) balanced TRS, ¼" outputs (-10 dBu); (1) stereo, ¼" headphone out w/volume control (front panel)
A/D Converters	20-bit, 64x oversampling; 44.1 or 48 kHz
D/A Converters	20-bit, 128x oversampling; 44.1 or 48 kHz
Digital I/O	(3 pr.) ADAT Optical I/O; (3 pr.) TDIF I/O; (1) stereo S/PDIF input; (2) stereo S/PDIF outputs
Digital Transfer Resolution/Sampling Rate	up to 24-bit/44.1 or 48 kHz
Sync	BNC word-clock I/O; ADAT 9-pin Sync In; Digital Timepiece Control Track
Drivers	Mac: Sound Manager, MAS, ASIO; PC: Wave, ASIO
Card Type	PCI
Frequency Response (analog I/O)	20 Hz–20 kHz (±0.2 dB)
S/N Ratio (analog in to analog out)	>98 dB
THD (analog in to analog out)	<0.0035%
Weight (I/O interface)	3 lbs., 12 oz.
Dimensions (I/O interface)	1U rack-mount x 5.5" (D)

Producer and songwriter **Rob Shrock** *is the musical director for Burt Bacharach. He has also worked with Elvis Costello, Dionne Warwick, LeAnn Rimes, Stevie Wonder, and a host of other artists. He can be contacted at avatarprod@aol.com.*

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KRK SYSTEMS

V8

Biamplified studio monitors that can bring new life to your mixes.

By Rob Shrock

The dependable performance and exceptional portability of near-field monitors have resulted in a burgeoning marketplace for compact speaker systems. KRK has been part of this market from the start, and the newest product in the company's lineup, the V8, boasts professional performance at a competitive price. (You can also purchase the V8 as part of a V8 Orbital System, which consists of five V8s and a Rok Bottom subwoofer for 5.1 surround-sound monitoring.)

THE BASICS

The V8s are easy to incorporate into a system: back-panel Neutrik Combo connectors accommodate both XLR and ¼-inch inputs, and the input gain can be trimmed between -30 dB and +6 dB. A front-panel LED lights when the units are on. The V8s automatically mute the output whenever they are powered on or off, eliminating the chances of nasty pops and thuds. (Kudos to KRK president and designer Keith Klawitter and assistant designer Larry Altman for this design feature.)

Each V8 offers a pair of 3-position toggle switches for making subtle changes to the low- and high-frequency response. The low-frequency shelving filter can be set to roll off frequencies below 45, 50, or 65 Hz. The high-frequency shelving filter can be set flat, or it can boost or cut frequencies above 1.66 kHz by 1 dB. I found the default factory setting—LF rolloff at 45 Hz, HF set flat—to be ideal for my monitoring environment. (You'll need to set the LF rolloff at either 50 or 60 Hz if the V8s are to be accompanied by a Rok Bottom subwoofer, which has a fixed 60 Hz crossover.)

FIRST IMPRESSIONS

I began testing the V8s by listening to a variety of CDs. The first thing I noticed was the extended top-end response of the monitors. Initially, I felt that the V8s sounded a little too bright, until I compared them with several other reference monitors. Most of the models I listened to sounded veiled, boxy, and unnatural when contrasted with the V8s, which sounded more open, natural, and clear.

On CDs such as the Indigo Girls' *Shaming of the Sun*, the stereo imaging of the drums and percussion instruments was wide and stable; the low end was punchy and full without being tubby; and the guitars were clearly defined. The vocals sounded natural and full and weren't at all strident. These fine first impressions were further confirmed as I listened to other CDs that I was more familiar with.

Even on classical CDs of chamber music and full orchestras, the V8s sounded natural and transparent. By comparison, my other monitors had an electronic quality, and I was acutely aware of their involvement in the reproduction process. When listening to the V8s, however, this awareness disappeared, and the music seemed to be right in the room with me. Whether the source material was good or bad, the V8s left no sonic footprint on it. I loved the results.

As I continued to listen while moving around in the studio, I noticed that wherever I stood the frequency response and stereo imaging of the V8s sounded similar. I tested this phenomenon further by moving well out of the "sweet spot" into various corners of the room. I moved up close, far away, off angle—and I even turned sideways (perpendicular) to the projection of the monitors. Of course, the sound changed a bit in all cases, but not by much. In fact, I would say that the V8s really don't have a sweet spot: they sound great from any listening position. The high-frequency dispersion of the tweeters is very wide, yet the stereo imaging remains stable.

TRACKING

My first project using the V8s was to track two songs for a techno/dance album. Although I didn't mix the project, I was responsible for printing effects along with the basic tracks

The biamplified KRK V8s offer a wide frequency response and excellent stereo imaging.

KRK
V8 near-field monitors
$1,249/pair

AUDIO QUALITY ■■■■■
VALUE ■■■■■
1 2 3 4 5

PROS: Neutral, flat frequency response. Extended high and low end. Excellent stereo imaging and stability. Very wide sweet spot. Accepts both XLR and ¼-inch inputs. Low-frequency and high-frequency roll-off controls.

CONS: The monitors seem a bit too bright at first.

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V8 Specifications

High-Frequency Driver	shielded 25 mm fabric soft dome
Low-Frequency Driver	shielded 8" woven Kevlar, high-sensitivity voice coil
Power Rating	130W LF amplifier, 60W HF amplifier
Frequency Response	47 Hz–23 kHz, ±2 dB
Signal-to-Noise Ratio	>90 dB
Total Harmonic Distortion	<0.07% at full output (1 kHz)
Gain	36 dB variable (-30 to +6 dB)
Crossover Frequency	1.66 kHz
Crossover Slope	18–12 dB/octave (Butterworth)
Subsonic Filter	12 dB/octave (-3 dB at 31 Hz)
High-Frequency Adjust	+1, 0, or -1 dB shelving above 1.66 kHz
Low-Frequency Adjust	-3 dB shelving below 45, 50, or 65 Hz
Dimensions	11" (W) x 16" (H) x 12" (D)
Weight	38 lbs. (each)

before shipping the Tascam DA-88 tapes to the artist's engineer. The artist was present during most of the sessions.

Most of the time I used the V8s for monitoring, and they were a joy to work with during the sequencing and sound-design stages. I actually had a much easier time sorting through drum samples and loops than I had expected. The success of most synth-oriented electronic projects depends on how well the various timbres are chosen and combined, so accurate monitoring is critical at every stage of the process. I was sequencing some heavy filter modulation on lots of keyboard and percussion parts, and I relied on the V8s to ensure that the frequency content of different timbres, EQ, filter modulations, and ambient effects all fit together into a complete and well-balanced sonic landscape. Several synth sounds weren't blending well on one of the songs, and the only monitors that clearly revealed—and ultimately aided in correcting—the timbre problems were the V8s.

In fact, the artist's engineer called a few days later to say that when he pulled up the tracks it sounded like a finished mix without the vocals. Although I graciously accepted the compliment, I silently thanked KRK.

MIXING

During the time I was evaluating the V8s, I had no professional mixing projects scheduled; I did, however, remix a few song demos using the V8s. In each case, the new mixes were distinctly better than the original ones.

I really liked how the V8s maintained their punchiness without becoming unnaturally hard sounding. The transient response of these monitors is unusually fast, which makes drums and other percussive elements sound more alive than on typical monitors. In addition, the low-frequency response of the V8s is very accurate, and I was able to precisely gauge the bass content of the mixes.

Initially, the high-frequency capabilities of the V8s caused me some confusion. Because I misinterpreted the airiness of the top end as an inherent boost in brightness from the speakers, I added more highs to the mix, thinking that the V8s were overemphasizing the high frequencies. Listening to the other monitors, however, confirmed that I was pushing too much top end. When I cleared my mind of my preconceptions about the V8 frequency response, I was able to trust the V8s as I had while working on the earlier dance project. After that, the mixes quickly came together.

FINAL THOUGHTS

A lot of respected professionals have used KRK speakers for the past decade, and the company's products are getting better each year. The market is inundated with good monitoring systems, and a few of them will inevitably become industry standards. The V8s are worthy of that distinction because they offer, among other things, the right combination of performance, price, and size. As a primary or supplementary monitoring system, the KRK V8s are definitely winners.

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SIBELIUS SOFTWARE

SIBELIUS FOR WINDOWS 1.1 (WIN)

This powerful music notation software really has some smarts.

By Brian Smithers

Never fire up a new music notation program in front of your children unless you want to show them the darkest corners of your vocabulary. Those first few hours, even with well-designed software, could make a preacher swear.

Sibelius for Windows is no exception in that regard, but it is, nonetheless, an exceptional program. At $599, it's priced to compete directly with Coda's *Finale,* and its feature set makes it worthy of comparison. Version 1.1 is a bit quirky, but the few shortcomings are easy to overlook if you like the user interface, as I do. While it may not quite live up to its hype as "the fastest, smartest, easiest score writer in the world," it certainly is intelligent, powerful, and user-friendly.

How does a program come to have such a mature interface and feature set in its first incarnation? The answer is that *Sibelius* has actually been around for years—but not for the PC. It was developed in 1987 by twin brothers Jonathan and Ben Finn for the Acorn computer, a RISC-processor platform that is more common in Europe than in the United States. It gained wide acceptance in the Old World and evolved to its present form. Now *Sibelius* has been adapted for the PC platform, and a Macintosh version may be ready by the time you read this.

SMART STUFF

Sibelius is a smart program indeed; it automatically sets up many aspects of your score with intelligent defaults. You can override these settings on a case-by-case basis, or you can change the default settings to suit your own preferences (see **Fig. 1**).

When you open a new score, *Sibelius* presents you with a dialog box from which you can select your "manuscript paper." This virtual paper comes in a variety of shades and textures and in a number of formats, including such perennial favorites as "piano grand staff" and "SATB choir," and other useful setups like "R & B Band" and "Film Orchestra." Alternatively, you can select blank paper of a given size, in which case a dialog box allows you to choose predefined instruments for your score; the program offers an unlimited number of staves.

Sibelius lays out the instruments you choose with proper names, clefs, and transpositions, and even arranges them in proper score order if you wish. This last feature is particularly helpful for those of us who aren't quite sure where to put a sitar in a full score, for example. (According to *Sibelius,* it goes after panpipes and oboe d'amore but before harmonium and Ondes Martenot.) By default, *Sibelius* creates nontransposing scores, but you can toggle between nontransposing and transposing by using a hot key or a button on the tool bar.

Sibelius employs a sophisticated note-spacing algorithm that is always in effect, not applied after the fact as in some notation programs. You can grab any note or other object and move it freely; subsequent objects respace themselves in response to your adjustment. This took me some getting used to but was extremely helpful in most situations. For example, if you try to move one of several eighth notes left or right, all the notes that follow the selected note move as well, maintaining their spacing relative to the note you're moving. This is a one-sided adjustment; in other words, you are changing only the selected note's distance from the note immediately preceding it.

If you're used to other notation programs, seeing notes and objects move this way may be disconcerting, but it definitely has its advantages. In many programs, even expensive high-end packages, moving notes apart to eliminate collisions with accidentals, for instance, is a multistep process involving some degree of trial and error. In *Sibelius,* if you had to move a note away from an overlapping accidental, all the notes that follow the selected note would retain their spacing, allowing you to make the adjustment in a single step. (Of course, *Sibelius* doesn't let accidentals collide with noteheads in the first place.)

Another example of the intelligence built into *Sibelius* is its playback capability. Nearly everything you can put in a score affects playback meaningfully. All defined instruments have a General MIDI patch assigned to them. Dynamics, articulations, tempo markings, trills, and even expression text such as pizzicato and legato, have specific

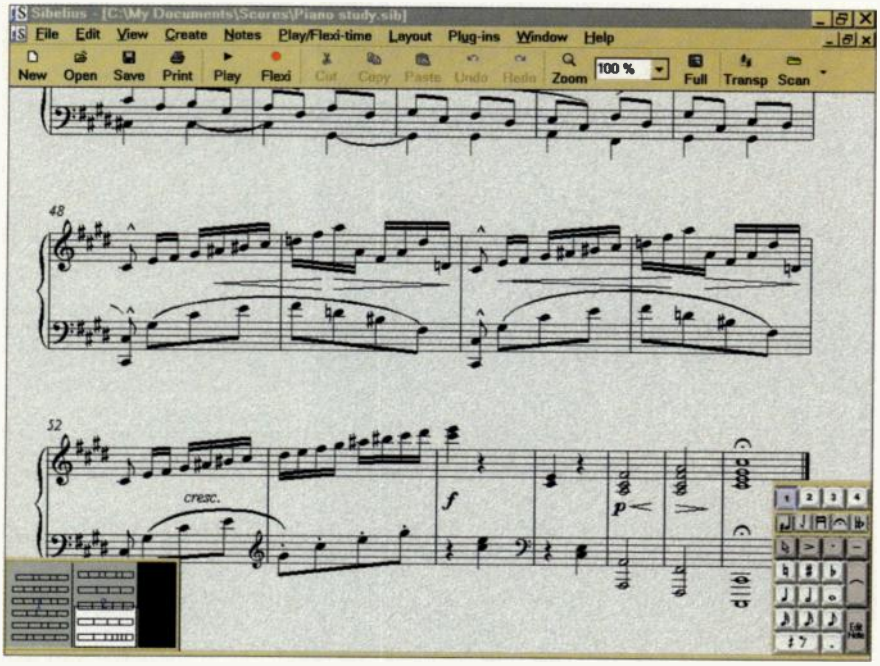

FIG. 1: The uncluttered look of *Sibelius*'s editing window features the main rhythm and articulation palette (lower right) and the overview-like "navigator" (lower left), which replaces traditional scroll bars, for changing the viewed area of the score.

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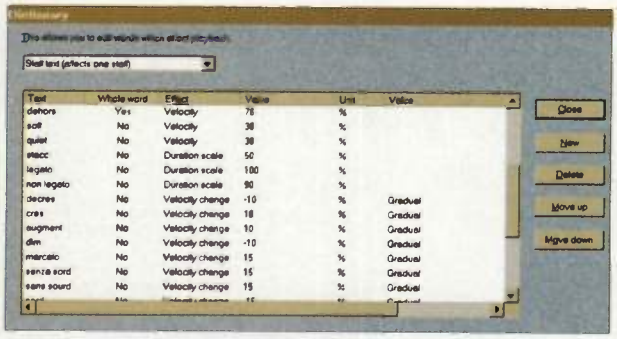


FIG. 2: *Sibelius*'s MIDI playback dictionary allows you to modify how the program interprets musical text and symbols during playback. You can also add new words and phrases to the list.

MIDI definitions. You can also insert other MIDI-specific markings into the score and make them invisible so they don't clutter the page, and you can edit the playback meaning of any expression in *Sibelius*'s "playback dictionary" (see Fig. 2).

Sibelius includes two other options that affect playback. Swing lets you choose among five different degrees of jazz-style rhythms. With Swing engaged, all written 8th notes play back with a lilt that varies from nearly straight rhythm to dotted-8th and 16th patterns. The other option, the unique Espressivo function, provides a way for you to breathe life into potentially sterile-sounding playback. It, too, has five different settings; the lowest setting plays everything literally, but each higher level adds further expressive enhancements that progress from minor variations in volume (for humanizing playback) to regular accents on beginnings of bars and beam groupings. The most sophisticated option uses a complex algorithm that analyzes the contours of the music and adds appropriate emphasis on a voice-by-voice basis.

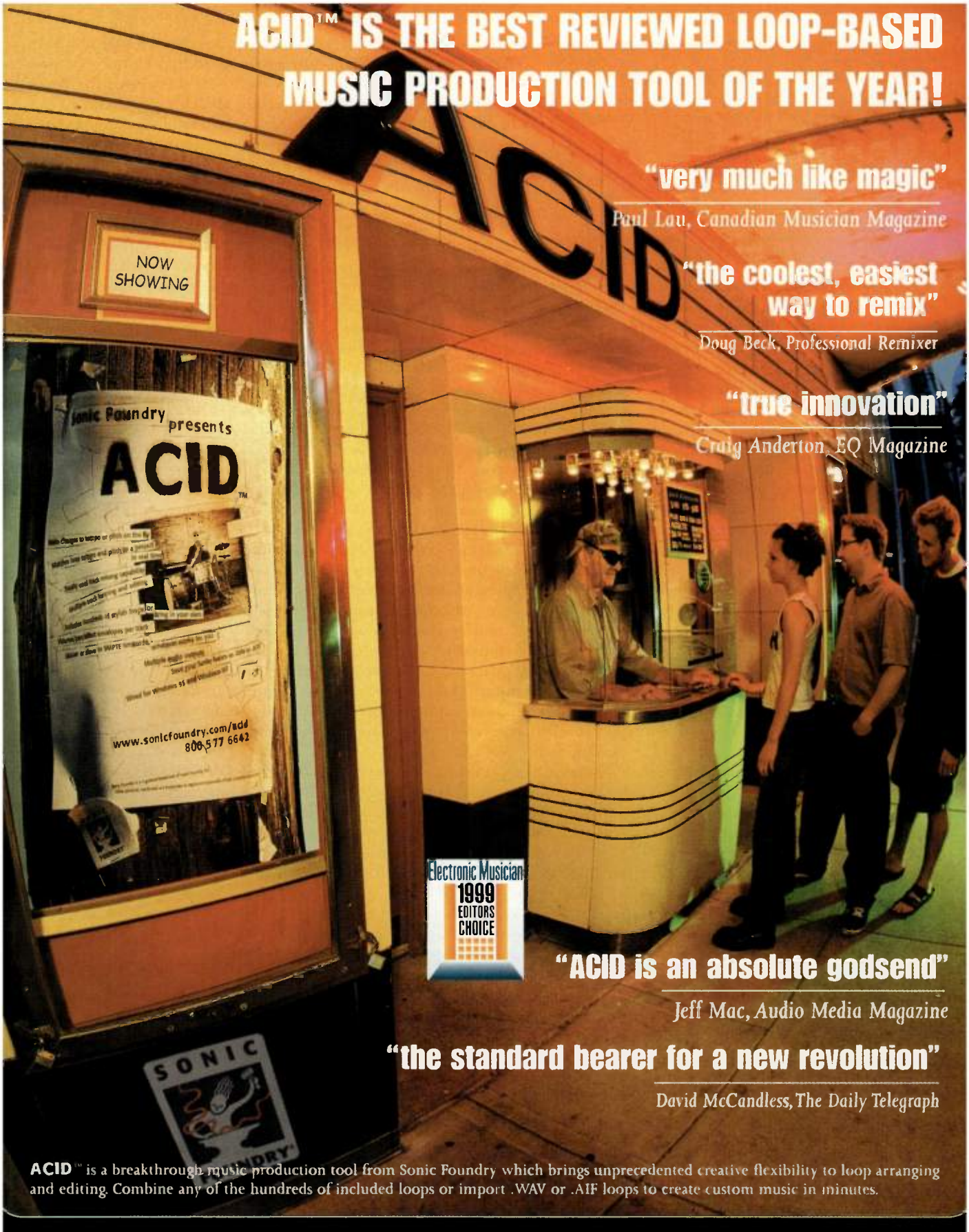
LAYING IT ALL OUT

Sibelius handles most layout issues automatically, and it's hard to argue with the results. In special cases, though, you may want to adjust things yourself. One particularly handy feature is the program's ability to expand or contract a bar while maintaining its relative internal spacing. To do this, you simply select the bar and press Alt + Left Arrow to contract or Alt + Right Arrow to expand.

As you would expect, there are commands to make a selected passage into its own system or its own page, and to align selected objects horizontally or vertically. You can also redefine the spacing rules that *Sibelius* uses. One layout device that it lacks is the ability to divide a selected passage evenly into a series of systems with a given number of bars. With *Sibelius*, if you think that part of a piece should be formatted, say, with four bars to a system (perhaps to accommodate page turns or improve legibility), you have to define this setup four bars at a time.

The House Styles feature lets you save different sets of preferences for different situations. For example, I set up a House Style for some horn charts using the included Inkpen font, because its thickened stems and bar lines make it

For manufacturer information, please see Contact Sheet, p. 171.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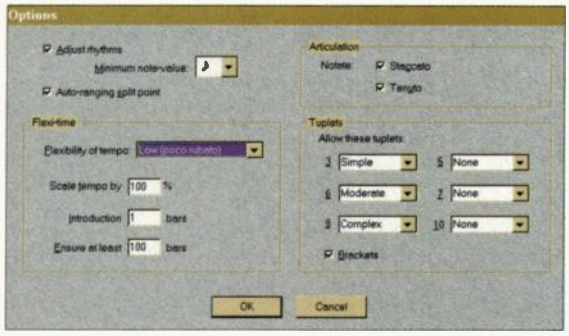

FIG. 3: *Sibelius*'s unique Flexi-time function offers intelligent real-time MIDI input that follows your tempo changes as you enter music. This dialog box allows you to set several parameters that affect how the program interprets your playing.

easy to read under stage lighting. For recording copy work, though, I prefer to stay with *Sibelius*'s engraver-style defaults. If I were subcontracting copy work for another copyist, I could have a completely different set of spacings, lines, fonts, and so forth to match his or her style. House Styles lets you define these preferences once, save them, and then import them as needed. You can even attach a House Style to "manuscript paper" and have a sophisticated template system for your most common applications.

Although the House Styles feature gives you control over a staggering number of details, it has one major shortcoming in that it doesn't offer a way to make global text-font changes. To do this, you still have to go through the Create/Text/Edit Text Styles menus and individually change the various text categories, such as Expression and Technique.

INPUT WITH ATTITUDE

I knew I was going to like *Sibelius* when I read in the manual, "Mice and other rodents can spread life-threatening diseases, so avoid touching your mouse." It goes on to recommend that you "put your mouse somewhere really inconvenient, such as on the floor, so that it annoys you to use it." The idea is that if you take the time to learn the program's keyboard shortcuts, you will be able to work much faster. I found that to be quite true. There are precious few commands in *Sibelius* that require the mouse, but it's still available for those who want to use it.

It didn't take me long to get reasonably fast at step entry. With my right hand selecting note values on the numeric keypad and my left hand inputting notes on the alphabetic keys or a MIDI keyboard, it was easy to type parts into the score. You can specify articulation symbols such as staccato and accent marks as you enter the notes, or you can go back and add articulations later. I found that adding them afterward was the easiest approach. To do that, my right hand remained on the numeric keypad and selected from a palette of articulation marks as my left hand used the arrow keys to move from note to note.

The numeric keypad can function with four different palettes, which are selected by pressing F9 through F12. The default palette contains note values from whole note through 32nd note, single accidentals, and rests, as well as tie, dot, accent, staccato, and legato. Most of the time, this is all you'll need. Less common choices are found in the other palettes, which are devoted to articulations, additional note values, beams, tremolos, and other accidentals (including quarter tones). *Sibelius* provides unlimited undo capability, and you can access the undo history to jump back to a previous edit or stage of development.

Aside from depositing notes directly on the staff, you can, as mentioned earlier, select pitches with the computer's alphabetic keys A through G or from a MIDI keyboard. When you use the alphabetic keys, *Sibelius* takes the shortest distance up or down to the next note—a reasonable assumption. When this assumption is wrong, you can change the octave of the new note by pressing Control + Up Arrow or Control + Down Arrow. And if you somehow manage to enter a note off by a step or two, you can use the arrow keys alone to move the new note diatonically up or down a step at a time.

Sibelius has a powerful real-time MIDI-input transcription mode called Flexi-time, which incorporates a smart metronome that senses when you change tempo and follows you (see **Fig. 3**). I was skeptical at first, but I found that I really could speed up to enter easy passages and then slow down for more technically challenging parts. You can disable Flexi-time or change its sensitivity, select a minimum note value to limit your margin of error, and specify exactly which "tuplets" should be allowed. All three methods of note entry—alphabetic step entry, MIDI step entry, and Flexi-time—are available at all times, and you can switch freely between them without palettes or tool icons getting in the way.

Sibelius does an exceptional job of importing MIDI files. As you'd expect, it lets you select a quantization level and decide whether you want to allow tuplets. It also lets you arrange the resulting score according to the MIDI file's track order or to standard score order. The most helpful feature, though, is *Sibelius*'s ability to recognize staccato and tenuto performances and notate them properly, instead of as complex rhythms. Without this feature, a line of staccato 8th notes, for example, would come out as 16th or 32nd notes with rests in between. If you've ever tried to correct that sort of thing in another notation program, you know how valuable this ability is. Staccato and tenuto are available when entering in Flexi-time as well, so you don't have to play quite so literally.

OUTPUT OPTIONS

You would expect a music notation program in this price range to have high-quality output, and *Sibelius* doesn't disappoint. Its default music font, Opus, looks professional in any size

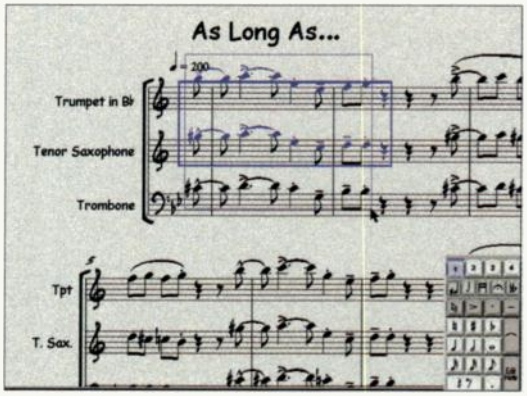

FIG. 4: In *Sibelius*, selecting multiple objects with the mouse creates two enclosures, which represent the actual area dragged (the thin blue box) and the resulting logical area within which objects are selected (the thick blue box). This example uses the Inkpen font.

and has natural and readable default spacings. Even with an inkjet printer, the output is clear and refined. The handwritten-style font called Inkpen is great for commercial or jazz music where the "published" look seems inappropriate. It would be even better if Inkpen included matching text characters for titles and written instructions, but I was able to find a complementary text font without much trouble. *Sibelius* is also compatible with other music fonts if the need should arise.

Extracting parts is a straightforward process in *Sibelius*. You can abandon or preserve any special formatting you applied to the score, choose a different paper size, or change the staff size. You can even extract multiple instruments for creating reduced scores or combination parts, such as first and second violin, or flute and piccolo.

For inserting musical examples into a textbook or some other document, *Sibelius* lets you save a page in Enhanced Metafile format, an improved version of the Windows Metafile format. Alternatively, you can save a page as a bitmap file, although the print quality will suffer somewhat. A plug-in is currently being developed to save files in Encapsulated PostScript

GAINING RECOGNITION

Sibelius includes a plug-in from Neuratron Software called *PhotoScore Lite,* which is able to convert scanned images of sheet music into *Sibelius* documents. In many respects, *PhotoScore Lite* does a remarkable job. It identifies and groups staves consistently well, even when subjected to mediocre scans. It levels a scan automatically and lets you bend and skew its staff-identification overlays to accommodate irregular scans (see **Fig. A**). In simple passages, it transcribes notes, accidentals, and rhythms with a high degree of accuracy.

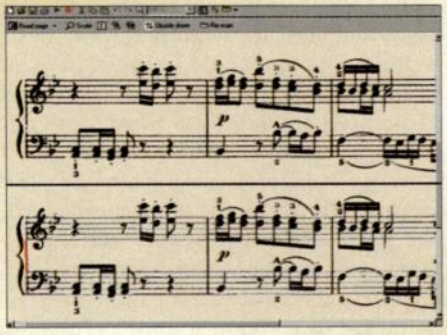

FIG. A: This before-and-after shot shows the first step in *PhotoScore Lite*'s recognition process. The plug-in automatically finds staff lines and displays an adjustable blue overlay. The vertical red bar shows that it recognizes the two staves as a grand staff.

Unfortunately, music is rarely simple, and Neuratron has disabled the recognition of two common items—tuplets and multiple layers—in the *Lite* version of the plug-in software. I had a difficult time finding music that lacked either of these elements, so *PhotoScore Lite* wasn't always accurate in these more complex pieces. It also did a poor job of interpreting key and time signatures.

Another shortcoming is that *PhotoScore Lite* doesn't recognize transposing scores; in other words, it assumes that the same key signature applies to all staves. This should be easy enough to fix in *Sibelius,* but in fact, the clean-up process is cumbersome. Amazingly, there is no undo function among *PhotoScore*'s tools.

Credit is certainly due to Neuratron for developing software that effectively recognizes scanned music (as long as it isn't overly complex). But although I marvel at that achievement and look forward to future full-featured versions, it takes me longer to scan a score using the current *PhotoScore Lite* and fix its errors than to enter it manually.

A full version of *PhotoScore* is in development and should be available soon through Sibelius Software. Among other things, the full version will run faster and read many more markings, such as slurs, hairpins, articulations, and text. It will also recognize two voices per staff and read scores with up to 32 staves. Check the Sibelius Software Web site (www.sibelius.com) for more information and a list of features.

(EPS) format. And, of course, you can save your score as a MIDI file.

PLUG-INS

Sibelius includes a number of plug-ins, although "macro" might be a better term for most of them. Other than *PhotoScore Lite* (see the sidebar "Gaining Recognition"), all of *Sibelius*'s plug-ins are essentially automated scripts. Some of these plug-ins are quite useful, including one that converts every MIDI file in a folder into a *Sibelius* document, and one that prints every *Sibelius* document in a folder. For academic users, there's a plug-in that checks for parallel fifths and octaves, and another writes note names above every note in a score. The macro language, which *Sibelius* calls ManuScript, is available for end users and third-party developers to write new functions.

The other true plug-in that ships with *Sibelius* doesn't plug into the program itself; it plugs into your Web browser so you can view *Sibelius* scores on the Internet. All you have to do is save your score as a Web page, then upload the resulting HTML document and corresponding SIB file to your Web site. Visitors can then view your score, play it, and even transpose it if they have the free *Sibelius* plug-in. (If they don't have the plug-in, they are provided with a link to the *Sibelius* Web site so they can get it.) You can edit the default HTML document to your heart's content, add contact information or program notes about the piece, or simply make it conform to the layout of the rest of your site. *Sibelius* makes the whole process push-button easy for you as well as for your visitors on the Web.

SIBELIUS SOFTWARE
Sibelius for Windows 1.1
music notation software
$599
academic/theological price $299

FEATURES ■■■■■
EASE OF USE ■■■■■
DOCUMENTATION ■■■■
VALUE ■■■■
1 2 3 4 5

PROS: Excellent output and playback. Efficient and flexible input methods. Intelligent spacing and layout. Web integration of scores. Unlimited undo capability. Unlimited number of staves. Good documentation.
CONS: Can't make global text-font changes. Cumbersome copy-protection scheme. Awkward and confusing selection-box implementation.
CIRCLE #439 ON READER SERVICE CARD

LITTLE BITS

I hate to quibble about details when a program performs as well as this, but little things start to get under your skin when you're working through the night on a copying deadline. For instance, the menu bar disappears when you select full-screen mode—a marvelous way to give you more desktop space. Unfortunately, instead of waiting for you to point to the top of the screen to make the menu bar reappear, it reappears whenever the cursor gets within a quarter inch of the top of the screen. As a result, if you try to point to the center of an icon on the tool bar, the menu bar appears and gets in the way. But, oddly enough, if you move the cursor to the top of the screen too quickly, the menu bar won't pop up at all.

As I pointed out earlier, *Sibelius* provides no way to make global changes to fonts. There's also no convenient way to write for different instruments on the same staff with proper MIDI playback, as you would for woodwind doublers, for example. (You can, however, change instrument sounds by inserting a Program Change message anywhere in the score or by adding a word or phrase that you have defined to trigger a Program Change.)

If you want to "lasso" a selection with the mouse, a simple drag won't do. (The simple drag is used for moving the page around onscreen.) Instead, you have to Shift-drag to enclose the selection. When you do this, two enclosures appear (see **Fig. 4**): a thin blue box corresponds to the actual area you enclosed with the mouse; a thicker blue box represents the logical selection area within which all items have been selected. The selected items within the thicker box are also displayed in blue to show that they are selected. When you release the mouse button, the thin box disappears, leaving the thick box to indicate that a block of objects has been selected. While this makes some sense, it seems unnecessarily confusing and clutters the desktop.

Sibelius for Windows
Minimum System Requirements
80486DX/100 (Pentium recommended); 8 MB RAM (16 MB or more recommended); Windows 95, 98, or NT4

Finally, *Sibelius* uses a hidden-file copy-protection scheme. When you first install the program, you must call the company to register the software by quoting a long code to the person on the other end of the phone. (You can also send the code in an e-mail message.) You then receive an equally long code to enter into your computer, which unlocks the Save function in the software. You can install additional copies of the program on other computers to print, but you won't be able to save files on those additional copies unless you prompt *Sibelius* to transfer the hidden authorization file to the other computer, thereby disabling the Save command on the first computer. It's an unnecessarily cumbersome method, although it's hard to criticize Sibelius Software for wanting to protect its product from piracy.

FINAL BITS

Sibelius is a strong program for producing music notation of the highest caliber. Its quirks are easy to overlook, and if it continues to improve as quickly as it did between version 1.003 (on which I started this review) and version 1.1 (on which I finished), it has a very bright future. I especially like the program's rodent-resistant interface and its many intelligent enhancements such as Flexi-time. I also appreciate the informative and well-written 323-page owner's manual.

Ultimately, however, your notation program's approach to creating scores has to fit your work style, so spend some time with the *Sibelius* demo version and compare it to the other programs that you're considering. If *Sibelius*'s methods and assumptions make sense to you, rest assured that its depth, quality, and feature set will serve you well.

Brian Smithers *is a conductor, arranger, and woodwind musician at Walt Disney World. His Web site (members.aol.com/notebooks1) is devoted to making music with notebook computers.*

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With its 4 voices of harmony, The Studio Vocalist EX is the flag ship of the line with an array of harmony, effects and editing features mounted in a sturdy 2U box. Features such as the 5 independent XLR outputs, 48V phantom power, genderbender (formant shifting) and the digital I/O option make the Studio Vocalist EX the best choice for the discerning professional.

...DEFINE YOUR VOICE

JOEMEEK

SC2.2

This unique compressor requires the use of precision instruments: your ears.

By Rob Shrock

The Joemeek SC2.2 is a moderately revised version of the company's original SC2 stereo compressor. It incorporates the same photoelectric compression circuitry, has a similar layout, and provides only a slightly modified feature set. But there is one big difference: the SC2.2 costs only half as much as its predecessor.

If you've ever wanted a cranky photoelectric compressor to add to your sound-sculpting palette—or you've just longed for one of those cool, green Joemeek boxes—here's your chance. The SC2.2 is just what you've been waiting for.

SPEED OF LIGHT

Photoelectric (also referred to as photo-optical or "opto") compressors were fairly common in the 1960s and '70s. The legendary Urei LA2 and LA3 models, for example, used photo-optics. But eventually the photoelectric compressor gave way to cheaper—and sonically more predictable—units governed by voltage-controlled amplifiers (VCAs).

VCA-based compressors typically allow higher "limiting" ratios than photo-optical units (compressing above 10:1 is generally considered limiting), but they can sound dull or flat due to the "stonewalling" of signals above a predetermined level. Photo-optical compressors, on the other hand, compress over a narrower range and tend to have a livelier, less static, and potentially more aggressive sound. Instead of a VCA, they use a photosensitive resistor that is controlled by light-emitting diodes triggered by the input signal.

Photoelectric compressors are generally more expensive, less flexible, and sometimes more difficult to use than their VCA-based counterparts, and their input level, compression ratio, threshold, and envelope settings are less precise. But photo-optical units typically exhibit less distortion and noise than VCA models. The relationship between the functions is more complex and interrelated in photo-optical compressors, making them all the more dependent on the judicious ear of the user for optimal results.

FAMILY RESEMBLANCE

Like its predecessor, the SC2.2 is (except for the color) a plain-looking box with a no-apologies vintage vibe. Everything about the unit says "retro": the big black knobs, the needle-style VU meter, the army-surplus rack handles.

Differences between the SC2 and SC2.2 are nominal, but for the most part the changes qualify as improvements. For instance, the output-gain knob and power switch are now located on the front rather than rear panel, which is handier. Also, whereas the SC2's VU meter showed gain reduction only, the SC2.2's meter can be switched to display either gain reduction or input level—a helpful enhancement. (Because the new model's controls are so dynamically linked to each other, I found myself constantly switching between the two meter functions while tweaking settings.)

Operationally, the SC2.2 provides five slope settings (the SC2 had four). The SC2.2 is also capable of a slightly faster attack time—0.5 ms, compared with the SC2's fastest setting of 1.5 ms.

The older model, however, has two advantages over the SC2.2: TRS ¼-inch I/O connectors as well as the XLR connectors, and the ability to operate at either 115 or 230 VAC (switchable). But otherwise the SC2.2 offers more features for a lot less money.

EASE OF USE

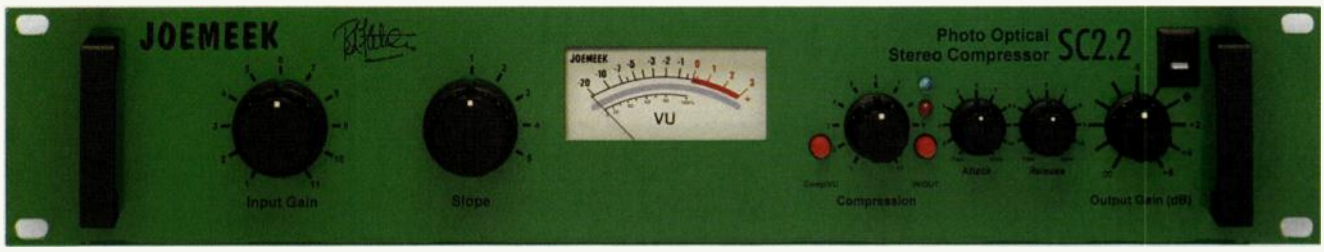
The SC2.2's front panel is clearly laid out with ease of use in mind. Both channels of the stereo signal are controlled by one set of knobs labeled Input Gain, Slope, Compression, Attack, Release, and Output Gain.

The Input Gain knob, adjustable from 1 to 11, provides approximately 20 dB of gain when set to its maximum. Unity (no gain) is set at 4, so the control also allows attenuation of overly hot signals. Approximate ratio settings are determined by the Slope knob, which offers five compression ratio settings from 2:1 to 10:1.

The Compression knob functions somewhat like a threshold, adjusting the amount of compression applied. It drives an internal sidechain stage derived equally from the left and right channels. (The SC2.2 can be used in mono by driving one side only.) There are no connectors for an external sidechain, though, so you'll have to look elsewhere if your compression applications require one.

The Attack and Release knobs control the compression envelope. Attack times range from 0.5 to 10 ms and release times from 200 ms to 2.5 seconds.

The Output Gain knob controls the SC2.2's overall output. Unfortunately, it's not a gain makeup; rather, it is active regardless of the position of the unit's In/Out (active/bypass) switch. This feature makes direct comparisons between compressed and uncompressed signals at the same level difficult, because any boost to the overall compressed signal—to make up for gain reduction—also boosts the uncompressed signal when the SC2.2 is bypassed.



An update of the Joemeek SC2 photoelectric stereo compressor, the SC2.2 adds an extra slope setting, a faster attack time, and a switchable dual-function meter—all for half the price of the original.

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The result is that compressed signals may initially sound inferior to uncompressed ones, due to the human tendency to perceive louder as better. Using the SC2.2, I constantly had to fight this tendency, finding myself preferring the uncompressed (louder) signal to the compressed (quieter) one.

TURN, TURN, TURN

The SC2.2 comes with an eight-page manual that explains, in homey and grammatically loose language, the basics of operation and provides some handy tips, too. But you may not even need to consult it, because using the unit is as simple as turning its knobs and listening to the results. Clearly, the philosophy of Ted Fletcher (the designer of all Joemeek products) is in keeping with the admonition of the late English producer Joe Meek: "If it sounds right, it is right!"

I mentioned earlier that the SC2.2 is cranky. Well, it really is. Think of an old-time blues or jazz musician who possesses experience and wisdom, a measure of compelling (if inconstant) charm, and a temper that can flare up unexpectedly and bite you on the butt. Sometimes you understand him; sometimes you don't. Yet he brings out something in you that keeps you coming back for more. That's what working with the Joemeek SC2.2 is like—you know, cranky in a *cool* way.

The SC2.2 rode the level beautifully throughout the tune.

Okay, so maybe I've over-romanticized its crankiness a bit, but that's the best way I can describe working with the SC2.2. Sometimes I found the unit difficult to deal with, but on other occasions it was a delight. This unpredictability—alternately maddening and sublime—is almost mystical. Like that old musician, when the SC2.2 is *on*, you know it.

I wrestled with the SC2.2 in a variety of applications—recording various instruments, compressing prerecorded tracks, processing stereo mixes—all with varying degrees of success. After about a month of solid use, I felt I had worked with the unit long enough to

For manufacturer information, please see Contact Sheet, p. 171.

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The New Gold Standard

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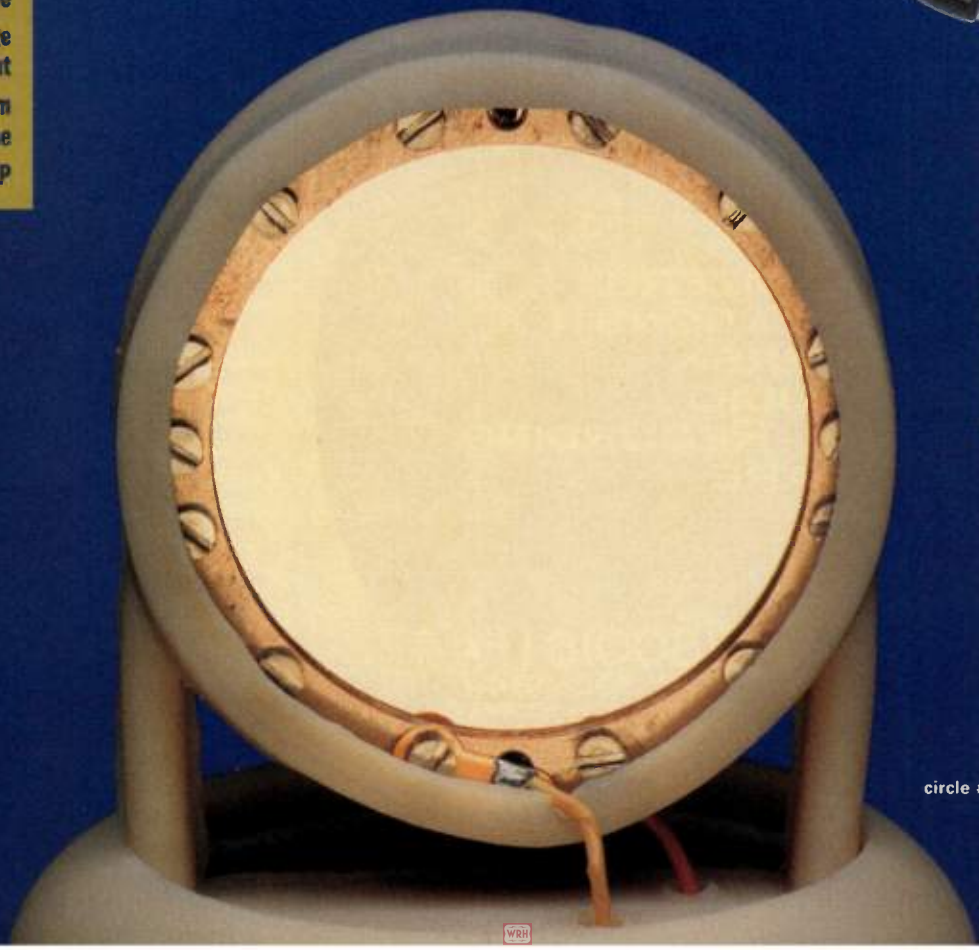

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judge when it would be a good choice for a particular application and when it would not. But I was wrong.

I finally realized that the only way to know whether the SC2.2 is appropriate for an application is to actually try it out. For example, I first tended to use Slope positions 1 through 3 on most instruments, thinking that positions 4 and 5 would be over the top. But then I created a killer snare-drum sound using Slope 5. The upshot: you'll need to spend some time getting to know the SC2.2's behavior.

SC2.2 Specifications

Input Connectors	(2) balanced XLR
Output Connectors	(2) balanced XLR
Maximum Input Level	+28 dBu
Maximum Output Level	+48 dBu
Dynamic Range	120 dB
Frequency Response	5 Hz–30 kHz
Crosstalk	-60 dB @ 10 kHz
Distortion	<0.004%, 100 Hz–10 kHz (at all levels)
Noise	-94 dB (20 Hz–20 kHz)
Attack Time	0.5–10 ms
Release Time	200 ms–2.5 sec.
Meter	VU; gain reduction or input level (selectable)
Power Supply	115 VAC 10W; detachable IEC
Dimensions	2U x 6" (D)
Weight	4 lbs.

GUITAR HEAVEN

The SC2.2 is a brilliant compressor for both acoustic and electric guitar; overall, I liked using it on guitars better than on other instruments. Not only does it make guitars jump up front in a track, but the top end doesn't get dull when you lay on the heavy compression. I was able to compress prerecorded acoustic and electric guitars, as well as some electric guitars on the way to tape, and produced great guitar sounds using both methods. Every now and then an acoustic-guitar passage would make the SC2.2 pump in a way I didn't like, but usually I was able to fix the problem with only a few adjustments.

The Attack and Release controls are critical to achieving a setting that fattens up an acoustic guitar track without killing the instrument's transient sparkle. Each knob provides a lot of range, and the relationship between the knobs is very interactive, so be careful. Also, don't assume that a position that sounds good on a different track—even if it is a similar instrument—will work the next time around. You'll have to use your ears all the time with the SC2.2; otherwise you're as likely to ruin a sound as improve it. Again, the trick is to ignore the settings and just listen as you turn the knobs.

The Input Gain and Compression controls are also very interactive. Cranking up the Input Gain and using only a little Compression, for instance, results in a very different sound from what you get when you reduce Input Gain and crank the Compression—despite equal gain-reduction readings on the VU meter. Even the envelope (Attack and Release) settings will have to be readjusted if you drastically alter the gain structure. However, when you get the sound dialed in just right, it's absolutely killer, especially on distorted electric guitars. (You'd better write down those final settings, though, because all it takes is a few knob turns and they're history.)

KEYS AND BASS

The SC2.2 didn't fare as well on keyboards and bass guitar. On acoustic piano in particular, this compressor pumps like crazy. Aside from some weird, '60s-style effects, I never got a piano sound I really liked with the SC2.2, nor could I create naturally aggressive piano that still sounded modern. Therefore, I would take keyboards off my list of

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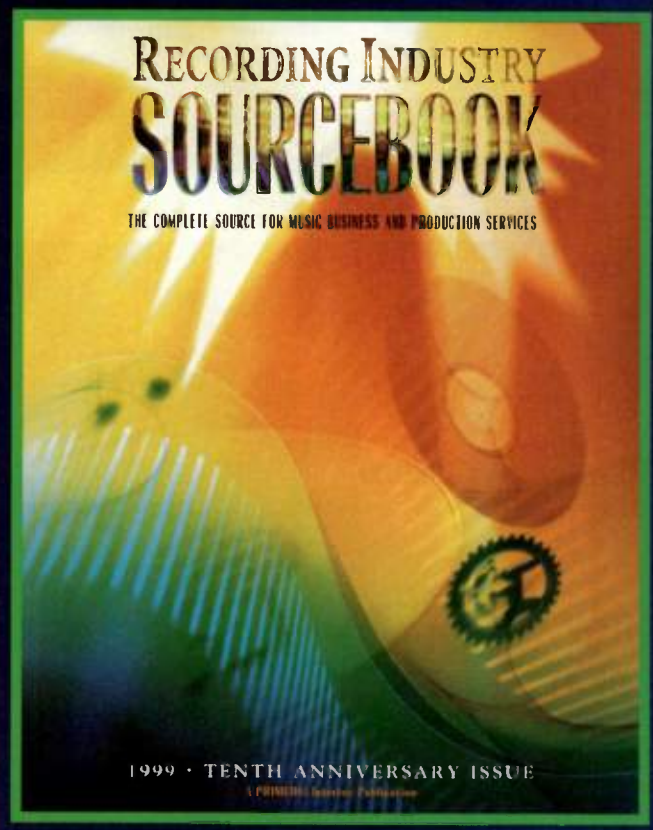

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applications appropriate for the SC2.2.

I got bass guitar to sound good through the SC2.2 after some wrangling and spending more time than I could afford. Even when I got it to respond properly to bass tracks, I never felt the sound was something I couldn't have achieved more easily with another method. Nevertheless, vintage-philes may enjoy the apparent second-order harmonic distortion that the unit imparts to bass sounds when you crank up the input gain.

VOCALS

No source shows off the interactivity of the SC2.2's controls more than vocal tracks. Sonic results, however, were inconsistent: sometimes vocals sounded great through the SC2.2, and other times they didn't. Too bad there isn't a way to know in advance what will work and what won't, but there isn't. Again, you just have to use your ears.

When the SC2.2 is right for the track, though, it is one of the best vocal compressors I've heard. After I spent about 15 minutes dialing in appropriate settings on a dynamic vocal performance, the SC2.2 rode the level beautifully throughout the tune, placing the voice perfectly against the track as if the fader level were automated. And I encountered none of the distortion, flatness of tone, and compromised upper harmonics that often accompany heavy vocal compression through VCA-based compressors.

With vocals, the Attack and Release settings again proved critical to getting a great sound. But despite how well the SC2.2 worked on certain prerecorded vocal tracks, I never felt comfortable enough to record vocals through it. After all, if Attack and Release aren't optimally set—a difficult proposition during a tracking session—a compressor can easily destroy the presence and immediacy of a performance.

STEREO MIXES

Although I've heard of people using Joemeek compressors on stereo material, I wasn't so fond of this particular application. The SC2.2's audio specs (see the table "SC2.2 Specifications") are clean enough to warrant using it as a stereo compressor, and I was pleased with the amount of sparkle that remained on a mix I compressed with the unit. However, I had a hard time dialing up settings to get a mix that didn't sound obviously compressed. (Once again, the Attack and Release settings are critical.)

Overall, the SC2.2 sounds best when used on specific instruments rather than on final mixes. A completed mix with compression is easy enough to bungle anyway, and the temperamental nature of the SC2.2 increases the odds of screwing up.

QUIRK FACTOR

In a world of comprehensive, well-behaved audio processors, the Joemeek SC2.2 stereo compressor is a welcome bundle of character, distinction, and unpredictability. Rather than attempt a Swiss Army–knife approach, this photoelectric compressor sets out to handle a narrower range of applications with aplomb and finesse. (Those of you who need limiting protection at the front end of a digital recorder or sound card should look elsewhere, because the SC2.2 simply isn't that kind of dynamics-control box.)

Specifically, the SC2.2 excels on electric and acoustic guitar and on vocals. Depending on the material, it can also be coaxed to work with other sources. *Coaxed* is the key word here: using the SC2.2 is more about listening and interacting than about setting dials to prescribed, optimized formulas. Not a set-and-forget box by any means, the SC2.2 often needs coddling, prodding, coercion, and sweet talk. Ultimately, though, that makes it more fun and satisfying to use than a run-of-the-mill VCA compressor.

Getting the most from the SC2.2 takes some time and effort. But it's worth the trouble because, when you get it right, the results that it can give are stunning. Plenty of other devices demand only that we read the manual and follow instructions. The Joemeek SC2.2 challenges us to return to a more primal state—that of using our ears.

ALL IN THE FAMILY

If you require digital interfacing, the Joemeek SC4 ($1,999.99) with the optional DC4 digital card ($299.99) adds a 24-bit D/A/D interface with AES/EBU XLR input/output to the same basic stereo compressor design used in the SC2 and SC2.2. Its other features include word-clock output (44.1 or 48 kHz), sample rate converter, M/S decoder, spatial image control, and Toslink optical I/O. XLR line inputs and outputs are provided (the internal photoelectric compression is still analog), with both digital and analog outputs simultaneously active. Also, the SC4's compression envelope section is more extensive than that of the SC2 or SC2.2 because it incorporates a sum-and-difference circuit, which maintains the stereo image between left and right channels at high-ratio compression levels.

JOEMEEK
SC2.2 stereo compressor
$999.99

FEATURES ■■▮
EASE OF USE ■■■
AUDIO QUALITY ■■■■
VALUE ■■■■
1 2 3 4 5

PROS: Very clean audio path. Simple interface. Squashed signals still maintain clarity. Large VU meter makes input level or compression amount easy to see. Creates cool effects not found in most other compressors.

CONS: Requires extensive trial-and-error knob dialing to find the right settings. No external sidechain. Output gain affects both compressed and bypassed signals, making direct comparisons difficult. Sound moves quickly from subtle to over the top. Unsuitable for many applications.

CIRCLE #440 ON READER SERVICE CARD

KAE LABS

VOCALWRITER 1.0 (MAC)

This ingenious software actually sings whatever you type into it.

By Scott Wilkinson

As audio synthesis becomes more sophisticated, an ever-increasing palette of instrumental sounds can be summoned from the electronic ether. However, one type of musical sound has defied synthetic re-creation because of its enormous complexity: the singing voice.

Most musical instruments have resonant structures that maintain a constant shape no matter what note is played. They also have only one source of excitation (reed, bow, and so on). Consequently, most instruments have a relatively narrow range of timbres, which makes them reasonably easy to synthesize.

In contrast, the human vocal tract changes shape dramatically depending on the notes and words being sung. In addition, the walls of the vocal tract change in stiffness, and several sound-altering structures(including the larynx, tongue, lips, and teeth) are often used simultaneously; for example, the sound of the letter z is created using the larynx, tongue, and teeth. This complexity allows for a wide range of timbres and makes it difficult to synthesize the singing voice.

THE CHALLENGE

KAE Labs has taken on the challenge of vocal synthesis with its *VocalWriter* for the Power Mac. This remarkable software tool uses a sophisticated physical-modeling technique called Resonant Articulatory Synthesis (RAS), which models the acoustics of the vocal tract to simulate the human singing voice. All you need to do is supply a monophonic melody within a MIDI sequence and type in any text you want to hear, and *VocalWriter* sings it using one of its many vocal models.

The package also includes a software-based General MIDI (GM) synthesizer. As you might expect, the polyphony of the vocal and GM synth engines depends on the speed of the computer and number of active extensions; on my 225 MHz 604e machine, with only a few extensions active, *VocalWriter* can play 3 vocal parts and 48 notes of instrumental polyphony.

Rounding out the software is a simple MIDI sequencer/editor, which offers up to 32 tracks and a resolution of 240 ppqn. This sequencer doesn't synchronize to other time-based devices because drastic changes to the programmed tempo could render the vocals unintelligible. The current version doesn't send MIDI Clock or other timing messages, either, but this feature is slated for inclusion in a future version of the program.

The software relies on Sound Manager, so you can use the Macintosh's built-in audio outputs or any Sound Manager–compatible audio card. A MIDI interface and OMS 2.3.3 or higher are required for MIDI I/O.

GETTING STARTED

Installation couldn't be easier. *VocalWriter* is distributed from KAE's Web site as a fully functional demo program that times out in 15 days. When you unstuff the *StuffIt* archive, a VocalWriter folder is installed on your hard disk. Nothing is installed in your System Folder or anywhere else.

The VocalWriter folder includes the *VocalWriter* application, a VocalTracks extension, a bank of standard GM sounds, and a special bank of speech models, along with a lexicon of American-English pronunciation. All these files must be kept in the VocalWriter folder (even the VocalTracks extension). Tutorial and demo files are also included.

When you launch *VocalWriter*, three windows appear (see **Fig. 1**). The Copyright window displays any copyright information in the file, and the Deck window provides sequencer-transport controls, a measure:beat indicator, and stereo output-level meters.

The Tracks window displays the tracks in the sequence, including instruments, drums, and vocals. The first track is the tempo track, in which you enter tempi for the song. You can also create a karaoke track, which includes the lyrics for display in the Karaoke window (see **Fig. 2**). The Tracks window displays a thumbnail graphic of the data in each track and shows measure numbers across the top. In the upper portion of the window, you'll find tempo, time signature, and measure:beat:tick indicators, along with a slider that controls the level of the currently selected track. Each track can be soloed, muted, and record-enabled or -disabled.

A number of other windows are available from the Windows menu. For example, the Karaoke window displays scrolling lyrics as the song plays, and Synth Stats shows CPU load and

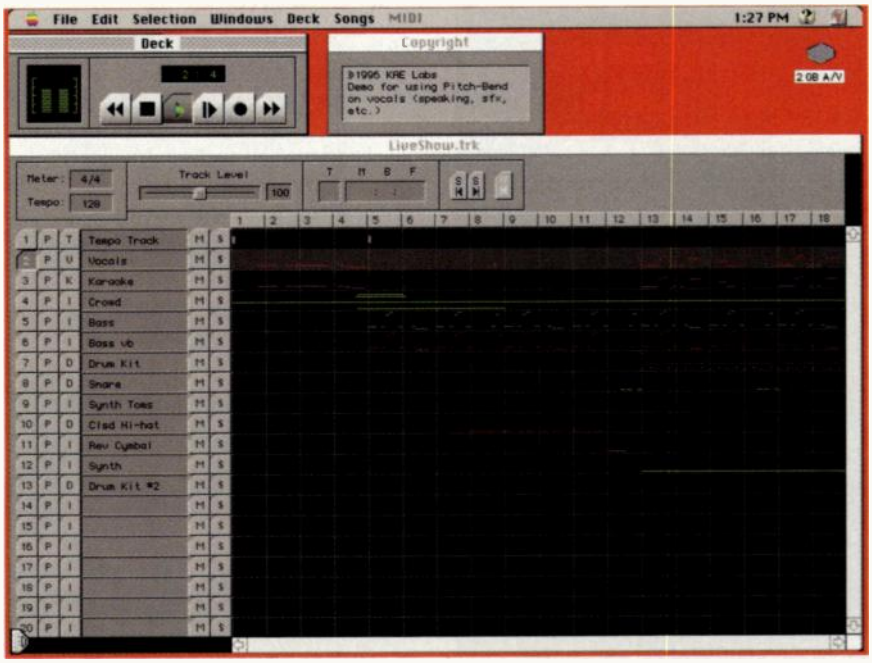

FIG. 1: When you launch *VocalWriter*, the Copyright, Deck, and Tracks windows appear.

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polyphony (as real-time bar graphs), in addition to displaying used memory and free memory. The Instrument Map lists all GM instruments, with the ones in the current song highlighted.

The Notes window is a familiar piano-roll display of the notes in the selected track (see Fig. 3). This window also includes a controller strip above the note grid, displaying various MIDI controllers, and shows the lyrics of a vocal track phonetically or as English text. This is where you type in the lyrics you want *VocalWriter* to "sing."

HITTING THE HIGH NOTES

VocalWriter lets you import Standard MIDI Files (SMFs) and record data into the sequencer from a MIDI controller in real time. The only form of step-time entry is found in the Notes window, where you can select a note duration and click the cursor on the desired pitch and rhythmic location. You can also enter notes of the currently selected duration by clicking on the onscreen keyboard.

The MIDI sequencer/editor is simple to use but surprisingly complete. In the Notes window, you can edit individual notes as with many sequencers, but there is no sound when you click on an existing note. The grid does not include note names along the left edge; it has only numbers that correspond to the octaves in the onscreen keyboard. Each octave is shaded slightly differently, and the grid is composed of dark and light lines that correspond to the black and white keys on a keyboard. The grid's appearance is unconventional, so it takes a bit of getting used to.

Editing functions include transposition, note quantization, event movement, and the ability to fix or scale durations, Velocities, and controller values. The Fix and Scale dialog boxes also indicate the minimum and maximum values of the appropriate data within the selected region, which is a nice touch.

Of course, the most important aspect of this software is its ability to "sing" any English lyrics you enter. You start with a monophonic track of MIDI data, either imported from an SMF or entered into the program's sequencer. Next, you select this track and designate it as a vocal track.

The MIDI sequencer/ editor is simple to use but complete.

When you open the vocal track's Notes window, the controller area above the piano roll automatically displays the default lyrics, which consist of the syllable *doo* on each note. To enter your lyrics, select the first *doo* and start typing. The Spacebar or Tab key moves you to the next syllable, which is very convenient.

Each note can have only one syllable. For polysyllabic words, type a hyphen at the end of each syllable; to extend a single syllable across several notes, type an equal sign and a hyphen ("=-") for each note after the first one.

VocalWriter is restricted to the English language. One demo includes an excerpt from "Angels We Have Heard on High," in which the Latin *"in excelsis deo"* is spelled "in egg sell cease day oh" in the vocal tracks. (It's spelled correctly in the karaoke track.) If you want to use other languages with *VocalWriter*,

For manufacturer information, please see Contact Sheet, p. 171.

VocalWriter
Minimum System Requirements
Power Macintosh 601/100; 16 MB RAM; Mac OS 7.5.3 or higher; 5 MB hard-disk space; external stereo sound system; MIDI interface and OMS 2.3.3 or higher required for MIDI I/O

you'll have to be creative in this manner.

You must select a vocal "instrument" for the vocal track. You make your selection in the controller area above the piano roll by choosing Instrument from the pop-up menu on the left. (You can also select instruments from the standard GM bank for the nonvocal tracks.) *VocalWriter* includes seven "natural" vocal instruments (five male and two female) and many synthetic-sounding vocal instruments. You can insert instrument changes anywhere in the track.

When you first play the vocal track with your lyrics, some of the words might sound a bit funny. You can improve their sound by using the Adjust Phonemes function, which provides several phonetic adjustments that can be enabled or disabled independently. These adjustments mimic some aspects of how spoken words vary in normal use; for example, the word *the* is sometimes pronounced *thee*. As another example, saying "did I" in a sentence is different from saying "did" and "I" as two separate words; try saying these words both ways to see what I mean.

KAE LABS
VocalWriter 1.0 software synthesizer
$99

FEATURES ■■■
EASE OF USE ■■■■
QUALITY OF SOUNDS ■■■
VALUE ■■■■▮
1 2 3 4 5

PROS: Easy to use. Fun to play with. Relatively inexpensive. Interesting technology. Excellent vowels.

CONS: No MIDI sync capabilities. Many consonants are distorted. Scrolling during playback is poorly implemented.

CIRCLE #441 ON READER SERVICE CARD

A couple of the demo files include spoken words, which is accomplished by careful application of Pitch Bend to the notes in the track. This seems to work reasonably well (perhaps a bit better than the Mac's internal voice synthesizer), but inserting the correct Pitch Bend values to obtain normal-sounding speech inflections can be extremely laborious.

To create a karaoke track, you copy a vocal track and paste it into the track designated as "karaoke." You must hold the Option key while pasting to include the lyrics in this track. However, you cannot use the keyboard equivalents of Command-V or F4 in this case; you must pull down the Edit menu and select Paste while holding the Option key. In addition, you must manually insert a slash ("/") at the beginning of each line of the lyrics so they display and scroll properly in the Karaoke window.

You can have many windows open simultaneously, but only one is active at a time. The Track, Notes, and Karaoke windows should all scroll together as music plays, but they don't. Many MIDI programs can scroll several windows at a time, even though only one is "active." Furthermore, the Notes window doesn't scroll even when it is active.

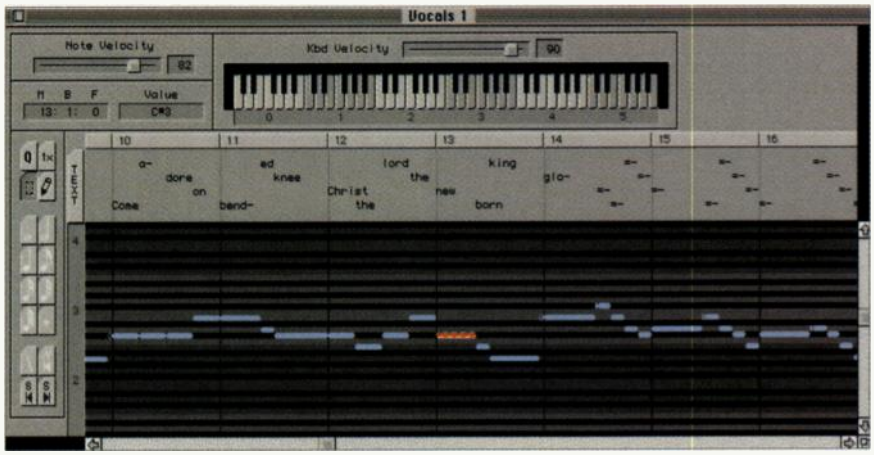

FIG. 3: The Notes window resembles the familiar piano-roll display of many sequencers. Notice the lyrics in the area above the notes.

VOICING AN OPINION

VocalWriter analyzes the phonetic structure of syllables according to the included English lexicon. Most syllables have several *phonemes*, or distinct sounds. One of these phonemes is called the *nucleus*, which is generally the vowel sound within the syllable. For example, the word *she* includes two phonemes: *sh* and *ee*. In this case, *ee* is the syllable nucleus. *VocalWriter* places the nucleus at the beginning of the note and places any preceding phonemes before the note's official start time, just as a real singer would.

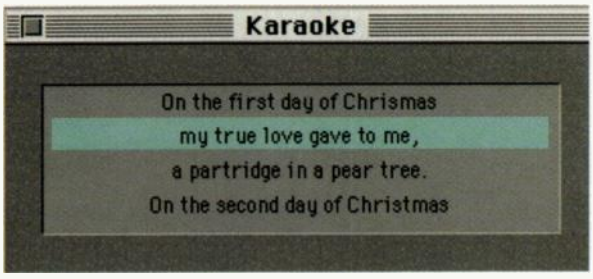

FIG. 2: The Karaoke window scrolls the lyrics as *VocalWriter* sings them.

One reason I was assigned to review this product is that I often collaborate with speech scientist (and fellow **EM** author) Joanna Cazden, who can professionally evaluate vocal quality and phonetic accuracy. In general, Cazden thinks *VocalWriter*'s vowels are accurate, but many of the consonants are distorted. In particular, the unvoiced plosives *(t, p, k)* and fricatives *(s, sh, f)* are difficult to distinguish, and the *ng* at the end of words such as "sing" and "king" is very distorted: it sounds more like *ay*.

After hearing some demo files, Cazden suggested a few torture tests, which I entered into the program, including lines from "Tea for Two" and "Satisfaction" (a tricky word, with the second *s* followed by *f* and a hard *c* followed by a *sh* sound). We also tried out "The Nightmare Song," by Gilbert and Sullivan, which is a real tongue twister: "In your shirt and your socks/ The black silk with gold clocks." Even humans have a hard time with that one!

The results of these tests confirmed our earlier impressions of the vocal quality with respect to unvoiced plosives and fricatives. On the positive side, the Adjust Phonemes function provides relatively natural-sounding transitions between words, and the program accommodates the altered pronunciation of unstressed vowels very well (for example, the last syllable in the word *satisfaction*).

SING IT, MAC

According to KAE Labs, *VocalWriter* provides just another synthetic instrument for the electronic musician's toolbox; it is not intended to replace human vocals. This perspective is appropriate, because the vocals generated by this program clearly sound synthesized. But the main problem is that the current version of the program is self-contained. It is unable to sync to anything else as master or slave, which limits its usefulness as a MIDI instrument within a larger system.

Nevertheless, I can think of a number of interesting ways to use *VocalWriter*. For one thing, this application is a great tool for choral composers and vocal arrangers who want to hear prototypes of their works in progress. In addition, *VocalWriter* is appropriate for electronica/techno projects (although you can't import new sampled sounds). The technology could also be used in interactive applications, such as games, that include singing. In this case, you wouldn't need a recorded vocal for each branching possibility; all you would need is the text for each branch, which would be used to synthesize the vocals as required.

VocalWriter is easy to use, fun to play with, and inexpensive for such sophisticated synthesis. It won't replace your live vocalist, but it doesn't pretend to. Once KAE adds sync capabilities, *VocalWriter* should find a home in many MIDI studios. And unlike the proverbial singer at the door, it always finds the key and knows when to come in.

Scott Wilkinson *thanks Joanna Cazden for her help with this article.*

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ROYER LABS

R-121

A new ribbon mic ups the ante on a classic design.

By Myles Boisen

At last year's AES convention held in September in San Francisco, there was quite a buzz around an unassuming, phone-booth-sized enclosure in the middle of the exhibit floor. Was it the latest vacuum-tube-heated foot massager? Or perhaps a 48-bit digital workstation that records onto a wax cylinder for the ultimate vintage sound? No, the structure was a listening room for an old-fashioned idea whose time has come—again. The booth belonged to Royer Labs, and the product causing all the buzz was the company's flagship offering, the R-121 ribbon mic.

PREMIUM STOGIE

The R-121 is a simple affair, based on the classic ribbon-mic design (see the sidebar "Ribbon Mics"), but with some significant changes, including a thicker, more resilient ribbon and a neodymium rather than alnico magnet. The mic's cylindrical, satin-nickel-finished body is six inches long by one inch wide. At a distance the R-121 could be mistaken for a small-diaphragm condenser, if not for the distinctive vents and vertical fins on the upper half of its casing. The mic's two-inch-long, side-address ribbon sits flush between these magnetic fins in a detachable transducer assembly. A Switchcraft XLR connector is recessed precisely in the cylinder's bottom end, and the stylish Royer emblem indicates the mic's on-axis front position.

The R-121 is easily held on a stand with the included spring clip; the mic's slim dimensions and light weight eliminate the need for bulky mounting hardware. The size of a premium stogie, the R-121 comes in a classy wooden box that looks as though it would hold a dozen fine cigars. Optional accessories include a windscreen and shock mount. A matte-black chrome finish is also available, and you can order the mic with a 200-ohm rather than 300-ohm transformer at no extra charge. (The 200-ohm version supplies about 3 dB less output, which some people may prefer.) Royer Labs confidently offers one free reribboning, as well as a lifetime warranty, to the original owner.

FIRE IT UP

The first test I performed on the R-121 was a ribbon-mic comparison in which I recorded music from CDs played through loudspeakers. (For the tests, I used Focusrite Green mic preamps and Monster Cable exclusively.) I consecutively set up five ribbon mics—the Altec 639b, beyerdynamic M 160, Coles 4038, RCA 44BX, and the R-121—about 14 inches from the front of a Tannoy PBM-8 speaker. I then recorded four songs to DAT and transferred the proceedings to a computer for evaluation.

As for self-noise, the Coles mic was quietest, followed closely by the Royer, and then the beyerdynamic. The R-121's clear, airy highs reproduced the music with the greatest fidelity, although here and throughout the testing period the mic seemed slightly prominent in the upper midrange (1 to 3 kHz) and a bit brash as compared with the Coles (which exhibited a low-end emphasis).

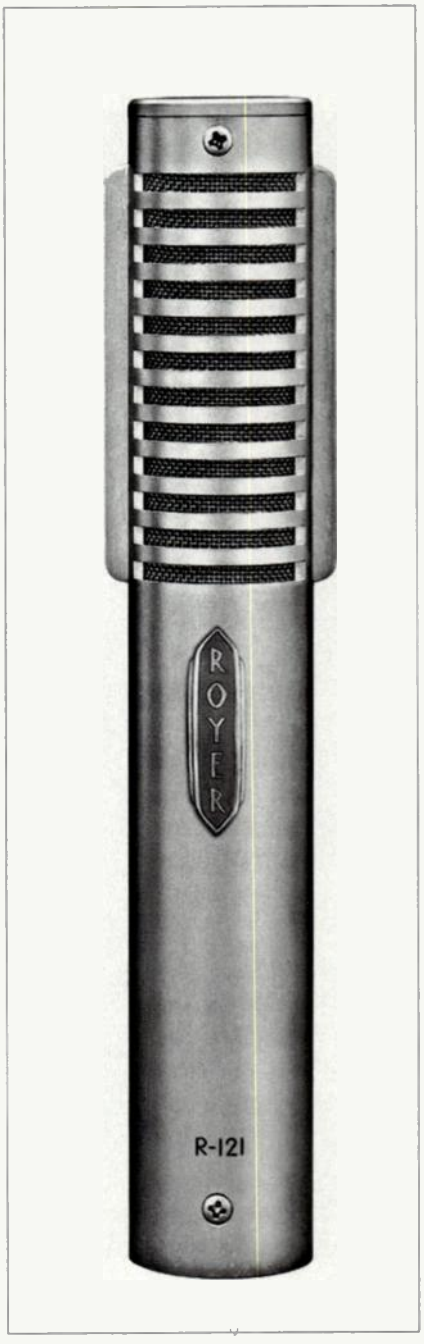
Among the other three mics, there was really no contender. Although each can be magical for certain recording applications, none exhibited a sufficiently flat frequency response to warrant comment here.

The frequency-response charts for the Coles and Royer models revealed no dramatic differences between the two. Both graphs track a flat response curve from 40 to 15,000 Hz (±2 dB), with the R-121 extending impressively up to 18 kHz (well beyond Royer's conservative specs). Output gain was equivalent for the two mics, both of which have classic bidirectional (figure-8) polar patterns.

The R-121 will probably evoke many comparisons with the Coles 4038 because the Royer mic is the newcomer in this limited field and is the 4038's closest competitor in both sound and price among available ribbon mics. The Coles 4038 is one of my ten favorite microphones, and it served as a useful reference for many of the sonic comparisons in this article.

COMPARED TO WHAT

Royer Labs supplied a matched pair of R-121s, so I also compared the mics with each other (as distant room mics on a drum kit) and found that they sounded identical to each other. Obtaining this level of consistency is notoriously difficult with condenser mics. But the structural simplicity of ribbon tansducers (which have fewer electronic parts and a more basic mechanical system) evidently makes uniformity easier to achieve.



The Royer Labs R-121 incorporates several changes to the classic figure-8 ribbon-mic design, resulting in hotter output, higher SPL handling, and better high-end response than that of most other ribbon mics.

I also compared an assortment of dynamic and condenser mics with the R-121. On a blues-guitar track, the ribbon mic preserved the vital cutting power of a Danelectro guitar and Fender amp pairing, and sounded more intimate and less metallic than either of the dynamic mics I typically use in this application. Combining accurate transient response, subtle detail, and hard-hitting upper-bass frequencies (250 to 400 Hz), the R-121 had more impact and realism.

A premium, large-diaphragm, cardioid condenser mic was surprisingly close to the R-121 in its frequency response, but in the end, none of the mics I auditioned delivered the same pick sound and level of nuance that give the R-121 its wonderful "you are there" quality.

Upon first listen to the test recording of an Epiphone hollow-body guitar (played through the same Fender amp with the R-121 positioned nine inches back from the grille cloth), I was left momentarily breathless. Here were all the full lows, rich mids, and fingers-on-the-strings sensuality that you expect to hear in live situations, coming right off the DAT with astounding realism. For this job, the other mics just couldn't compete: the dynamic mics sounded thin; the other ribbons were too bottom heavy; and the large-diaphragm condenser, though a close second, didn't provide the R-121's depth, dynamics, and clarity.

TOSS-UPS

On percussion, choosing among the R-121's sound and three of my favorite condenser microphones was a toss-up. The R-121 gave a more pure tone during the decay of a small cymbal, and in general sounded more sensitive and a little less fuzzy. But it also made the sound of the cymbal strike a bit too dark.

On a dumbek, the R-121 provided less power and sustain on the low *dum* tone and less high-end detail on the *bek* than the condensers. But again, it was a toss-up: depending on the accompanying tracks, an engineer might prefer the softer, more organic tone of the R-121 over the brighter, more distinct sound of a condenser mic. Of course, mic positioning and room tone (the room in this case was fairly dry and lifeless) are critical when it comes to miking such a complex instrument—especially with a figure-8 pattern mic, which is more susceptible to rear reflections and off-axis

coloration than the average cardioid condenser mic.

On acoustic guitar, miked mono, the R-121 had its moments, but it wasn't always a clear winner. On rapidly strummed rhythm parts, for example, it was too dark and mushy sounding to be useful. On the lazy, arpeggiated chords of a jazz improvisation, however, the R-121 again demonstrated its impressive honesty, rendering a clear, balanced representation of frequencies and rivaling the clarity of the condenser mics.

TWO OF A KIND

I like the increase in depth and presence that stereo-miking offers and have often deployed matched pairs of mics for live recordings, vocals, and acoustic instruments in multitrack mixes. So it was with great interest that I put up twin R-121s alongside two tried-and-true pairs of condenser microphones.

At first listen, the stereo recordings of a wood block sounded similar, but upon repeated auditions, I noticed that the R-121 tracks were easier on the ears, were more dimensional, and sounded more true-to-life. In comparison, the condenser tracks sounded slightly harsh and flat, and they exhibited a veiled fuzziness that made the wood block sound vaguely electronic.

Next, I recorded the dumbek again. This time, though, to test the mics' off-axis response, I used a live room and positioned the drum about six feet behind the mic cluster. Here, the drum sounded great, thanks to the R-121s' crossed figure-8 patterns and full midrange response. However, a tambourine (in front of the mics) was too thick in the low end and dull in the highs as compared with the condenser pairs.

On the acoustic guitar, beating the bright sound of the stereo condenser pairs on a busy strummed rhythm was predictably hard. But on a classical guitar piece, my decision was split: I wanted to hear something midway between the crisp condenser tone and the slightly muted but beautifully "woody" ribbon sound. (With a little EQ and optimal mic positioning, the R-121 could really shine on this instrument.)

I also had the guitarist play and sing simultaneously for this same double-XY configuration, and one of the cardioid condenser pairs gave a very pleasing balance of voice and guitar that the R-121s were unable to match. With the R-121s, the soft, female voice sounded more distant and off-axis than I would have expected. A glance at the mic's polar-pattern response chart provided a likely explanation: the performer's voice was about 45 degrees off-axis, and with these mics, a flat frequency response is possible only within 30 degrees left and right of the center of the ribbon. This tight patterning also helps account for the difficulties I had in my next test—using the R-121s on a drum kit.

OVERHEAD HANKERING

I've always wanted to try using ribbon mics as drum overheads, and the matched pair of R-121s gave me cause to experiment extensively with stereo placement. I miked a midsized Drum Workshop kit at a conventional distance, and also miked it as close as the drummer's stick activity would allow. I approached the kit from the front and from the back, with the mics at varying

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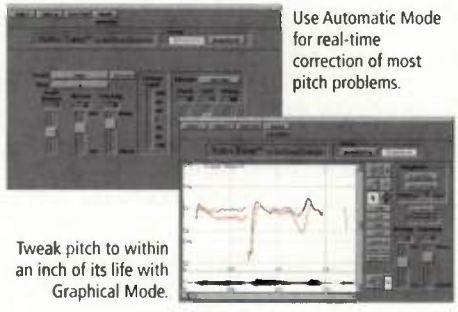

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RIBBON MICS

The ribbon or "velocity" microphone was developed by RCA engineers during the late 1920s, and its basic design principles endure to the present day in the Royer Labs R-121 microphone, among others. RCA's first production models dated from the early 1930s and include the 44A broadcast model, PB 17 soundstage microphone, and 30A lapel mic. Offering dramatic sonic advantages over the carbon microphones and experimental condenser units that preceded it, the ribbon transducer concept was simple and elegant.

RCA's classic design implements a light, extremely thin corrugated aluminum-foil strip that is secured at both ends and suspended vertically between the two poles of a large magnet. The pressure-gradient ribbon responds to the velocity of air particles (rather than sound pressure), and its movement within the strong magnetic flux field generates a small AC voltage. This signal is sent to a step-up transformer within the microphone body, which raises the output voltage and also increases the output impedance to a value (typically 150 to 300 ohms) that is optimal for input to a microphone preamplifier.

Because of the mechanical characteristics of the suspended ribbon, sounds that originate at the front or back of the microphone are reproduced evenly over the entire audible frequency range, while sounds that arrive at the sides of the mic—which produce no pressure on the ribbon—are rejected. This polar response is known as a bidirectional or figure-8 pattern and is characteristic of classic ribbon mics. In 1933, RCA introduced the 77A, a cardioid-pattern, dual-ribbon mic, and toward the end of the decade, Western Electric introduced the 639, a unidirectional ribbon/dynamic hybrid.

Spurred on by the movie and broadcasting boom of the 1930s, a number of smaller American companies (including Electro-Voice and Shure Brothers) began producing microphones, and most of them had ribbon models in their catalogs throughout the '40s, '50s, and even into the '60s.

A roster of long-forgotten microphone manufacturers vividly recalls the United States' glory years of industrialism, including such grand names as Altec, American, Amperite, Bell, Bruno, Carrier, Eastern Sound, Lifetime, and Universal.

Overseas ribbon-mic manufacturers included Aiwa, beyerdynamic, Coles, Lomo, Marconi, MB, Oktava, Reslo, Peerless, STC, Toshiba, and Bang & Olufsen (B&O), whose space-age silver-finned ribbon was the inspiration for the design of the new Royer R-121. The German titans AKG, Neumann, and Sennheiser never marketed ribbon mics, choosing instead to concentrate on dynamic models (which were more rugged than ribbons) and high-output condenser mics. Their technological innovations, resulting in outstanding and versatile microphones such as the Neumann U 47 and M 49, signaled the end of the ribbon mic's golden age.

A few ribbon mics have persevered in the marketplace, and ribbons have even gained renewed popularity among a new generation of digital recordists. Notable among currently available models is the venerable Coles 4038, which has remained in production unchanged (except for a transfer of ownership) since the mid-1950s. This model is listed in the Beatles' recording logs as an overhead mic, was used by Pink Floyd, and has often been championed by engineer Steve Albini.

My experience recording with the Coles 4038 has been that it offers a pronounced and rounded low-end response and can help soften unpleasant upper mids and highs, making it an ideal choice for using on string instruments, electric guitar, organ-and-Leslie-cabinet combinations, jazz guitar, and woodwinds, any of which can sometimes sound "scratchy" when recorded with large-diaphragm condenser mics.

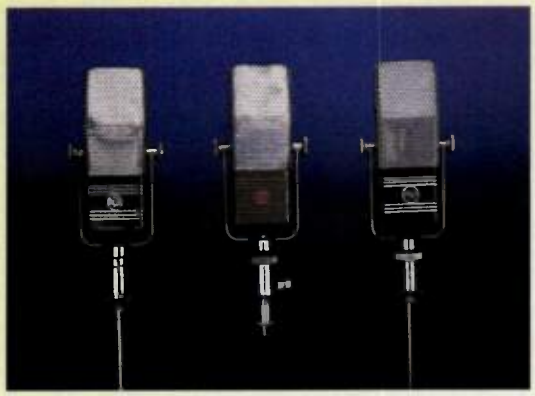

FIG. A: The AEA R44C classic bidirectional ribbon microphone (right), available from Audio Engineering Associates (www.wesdooley.com), is a replica of the original RCA 44B (left). The mic in the middle is an RCA 44BX.

Other contemporary ribbon mics include the short-ribbon beyerdynamic M 160, M 260, and M 500 models; a Fostex printed ribbon; the Speiden stereo mic (now made by Royer Labs); and the new Audio Engineering Associates AEA R44C (see **Fig. A**), which is a replica of the vintage RCA 44B using genuine RCA ribbon material. Oktava is reportedly working on a Russian ribbon reissue, and with the audio market being driven by vintage aesthetics, it wouldn't surprise me if other major manufacturers were reconsidering ribbon designs, as well.

Despite these signs of a comeback, it is unlikely that ribbon transducers will ever dominate the industry as they did back in the '30s and '40s. On quiet sounds and sources that may benefit from a high-end presence boost (such as pop vocals and drums), condenser mics offer a clear advantage. Figure-8 ribbon designs can also be a liability when miking large ensembles or when seeking isolation in studio recording environments. But when used creatively, bidirectional ribbon mics can yield wonderful room ambience, as well as blends of direct and reflected sound, that cardioid patterns cannot. And nothing's quite as sweet as that old-time ribbon-mic sound for rootsy blues, R&B, jazz, swing, retrorock, and certain folk-music styles, especially on acoustic bass, cello, tuba, trombone, and trumpet.

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ALESIS

degrees and angles, with and without EQ, and yet I still was unable to capture a sound that had the tonal balance, high-end zip, and tightly focused imaging and ambience of the condenser-mic pair I routinely use.

I achieved the most suitable tone by miking the kit as close as possible from in front and above, then using wideband equalization (-2 dB at 600 and 900 Hz) to counteract the abundant midrange produced by the R-121s' proximity to the toms and cymbals. Combined with a 3 dB high-frequency shelving boost, this arrangement eventually yielded a tight, saturated sound with lots of punch on the toms and increased definition and clarity for the five cymbals.

Listening to the playback, drummer Karen Stackpole commented that the sound of the equalized tracks was much fuller than that obtained with the condenser pair (unequalized), which sounded washed out and thin by comparison. And yet the R-121s' high end still lacked in crispness above 8 kHz, and the more remote cymbals were under-represented in the stereo spectrum due to the inherent off-axis attenuation of the R-121s' figure-8 patterns.

Moving the mics higher up from the floor would, in theory, make the sound field wider and more inclusive. But in fact, the highs suffered and the room sound quickly became overpowering as the miking distance was increased. I could imagine the R-121s working much better with a more compact jazz kit, or on a cymbal-bashing rocker, or in a drier acoustical space.

R-121 Specifications

Acoustic Operating Principle	electrodynamic pressure gradient
Generating Element	2.5 micron aluminum ribbon
Polar Pattern	bidirectional
Frequency Response	30 Hz–15 kHz
Sensitivity	-54 dBV (1V/Pa ±1 dB)
Output Impedance	300Ω @ 1 kHz (nominal)
Maximum SPL	>130 dB
Dimensions	6.13" (L) x 1" (W)
Weight	8.6 oz.

HANDLE THIS

Miking a kick drum isn't a stunt I'd try with my vintage RCA 44BX; older ribbon mics have a reputation for being easily damaged by loud, plosive sounds. But John Jennings, sales manager at Royer Labs, assured me that two notorious engineers—Sean Beavan and Fletcher—both failed in their attempts to send these mics to ribbon heaven, so it seemed worth the risk.

Positioned at a conservative distance (nine inches) from the double-headed kick drum, the R-121 did indeed hold up beneath the volley of arena-rock thunder. And although it didn't give me enough attack for the rock part that was going to tape, the R-121 track, when compared with tracks recorded the same way by two different large-diaphragm condenser mics, exhibited the best low-end extension and least snare/hi-hat leakage.

FARRAGO

During various commercial studio sessions, the R-121 also proved worthy on clarinet, trumpet, violin, and distant-miked percussion. It also confirmed its unique ability to capture deliciously thick, yet well-defined, electric-guitar tones. On close-miked acoustic bass, the R-121 held its own against the Coles 4038 and even provided outstanding results as far back as four feet from the instrument—a distance at which the 4038 began to sound diffuse and dull.

SMOKIN'!

Throughout the test period, the R-121's performance impressed me as well as refreshed my long-standing appreciation of ribbon technology. In general, this microphone matches the smooth response and rich midrange characteristics of vintage ribbon mics (and many tube mics), and it often surpassed other microphones in my collection, thanks to its upper-midrange realism, crisp high-end definition, and superior reproduction of ambient or distant sources.

When positioned too close to a source (and on certain dense, loud, or full-frequency percussive sources), the R-121 often exhibits an exaggerated proximity effect and loss of high-end sensitivity. However, this "clouding" can be reduced in most cases by moving the mic back a few inches, as long as a corresponding increase in room sound is acceptable. On the other hand, it is a tremendous advantage to have a ribbon model that can safely be placed close to bass drums, loud amps, and other sources that have been traditionally regarded as off-limits to ribbon mics.

Whether as an introduction to the soothing sounds of ribbon transducers or as an addition to an established mic cabinet, the Royer R-121 gets my heartiest recommendation. And in case you're wondering whether this mic has what it takes to please a hardcore mic fanatic, I can assure you that at least one Royer Labs R-121 will find a home in my cabinet.

Myles Boisen *is head engineer/instructor at Guerrilla Recording and the Headless Buddha Mastering Lab in Oakland, California.* *Special thanks to Karen Stackpole, Tarik Ragab, John Jennings, David Josephson, Ty Ford, Wes Dooley, and Jim Steele.*

ROYER LABS
R-121 ribbon microphone
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AUDIO QUALITY ■■■■■
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PROS: Flat frequency response. Low self-noise. Clearer, more extended highs than other ribbon mics. Excellent realism, detail, and clarity on electric guitar and certain percussion sources. Consistent stereo-pair matching. High SPL handling. Small, light, easy to set up and position. Attractive, high-quality wood case. Lifetime warranty and one free reribboning.

CONS: Exhibits limitations common to most ribbon mics, such as low output and decreased high-end response (as compared with condenser mics), as well as significant off-axis attenuation. Exaggerated proximity effect on some close-miked sources.

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LEXICON

SIGNATURE 284

Record huge tones at low volume—or no volume at all.

By Matt Blackett

It has been said that nothing beats the sound of a cranked-up tube amp. Many years ago, this statement was undeniably true. The tone that comes from driving not just a preamp but also a power amp and power transformer helped make all those classic electric-guitar recordings sound so, well, classic.

Nowadays, however, several companies are giving the vacuum tube a run for its money. There are, for example, solid-state amp simulators like the Tech 21 SansAmp, as well as digital-modeling amps like the Line 6 Flextone. On tape, these nifty units can sound enough like the real deal to fool some of the most discerning tube snobs. What they can't seem to do, though, is *feel* like the real deal. Even if you connect an amp simulator to a power amp and cabinet, it will lack the depth, sag, and delightful inconsistency of a cranked-up tube amplifier. The end result may sound "tubey," but because it feels different, it causes you to *play* differently.

Okay, then, why not just crank up your favorite amp and be done with it? Well, if your favorite amp happens to be a 50- or 100-watter, the answer is obvious. Sadly, few urban dwellers can get away with cranking their guitar amps to ten—not without disturbing the neighbors and possibly violating a noise ordinance. Enter the Lexicon Signature 284, an all-tube, 3-watt-per-side, Class A guitar amplifier designed to simulate various classic speaker-cabinet setups so guitarists can record authentic overdriven amp sounds without destroying their hearing or getting evicted.

HEFT AND VIBE

The Signature 284 is built like a tank, weighing in at 24 pounds with an all-black, solid-steel, 2-unit chassis. Designed by John McIntyre, it employs three 12AX7 tubes in the preamp stage and a pair of EL84 tubes (one per channel) in the output stage.

The 284's front panel is a model of simplicity. Starting from the left, there's a ¼-inch input jack followed by seven equally spaced and clearly labeled "chickenhead" control knobs. On the right, just beneath a Fender-style "blue jewel" power-indicator light, are on/off switches for Power and Standby. The graphics, too, are simple, with white silk-screened hash marks and logos, and Lexicon's signature blue stripe beneath the controls.

From left to right, the seven knobs are labeled Gain, Bass, Midrange, Treble, Presence, Left Volume, and Right Volume. The Gain control knob can be pulled out to give the input signal an extra boost, and the dual volume controls let you adjust output separately for each channel.

The front-panel input overrides a second ¼-inch input located on the unit's rear panel. Also on the back are three sets of stereo outputs: recording, slave, and speaker. The recording outputs are on XLR jacks, and each has an accompanying switch for Bright or Smooth speaker simulation as well as a ground-lift switch. The ¼-inch slave outputs are designed to plug into the inputs of an external power amp, allowing the 284 to act as an amp head. For live setups, two ¼-inch speaker outputs enable you to drive any combination of 8-ohm or 4-ohm (switchable) guitar cabinets.

The rear panel also provides stereo sends and returns for an effects loop, with the sends configured to carry the same signal (from the preamp output) and the returns wired for stereo, mono, or parallel (split) operation.

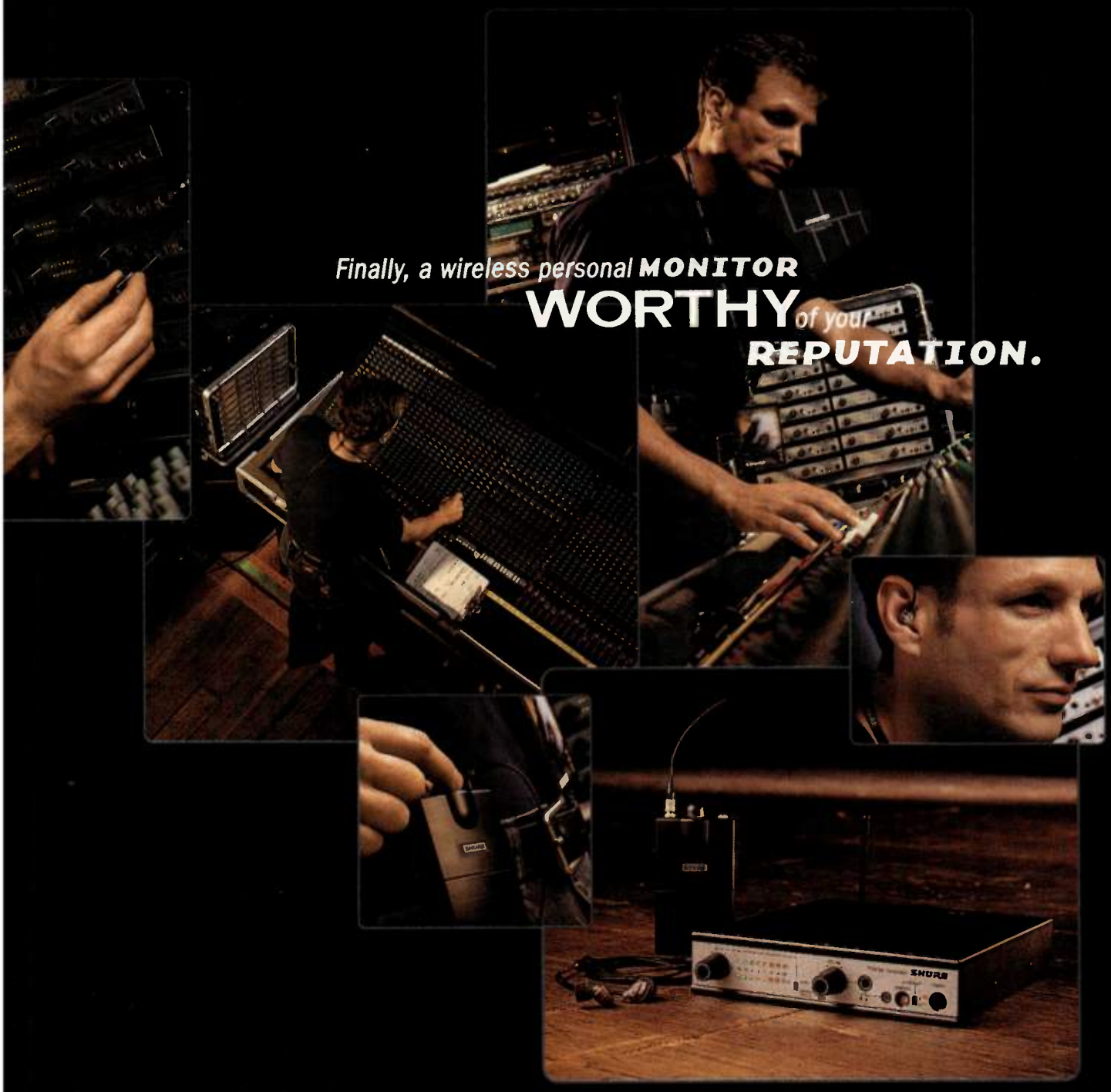
I tested the 284 with a stock '50s reissue Fender Stratocaster and a custom Ibanez loaded with Seymour Duncan pickups, experimenting with all three output options. First, I plugged the speaker outputs into a stereo 4 × 10–inch cabinet with Eminence speakers. Next, I ran the recording outputs into an analog mixer (to access the XLR jacks) and from there into a Roland VS-880 hard-disk recorder. Last, I ran one of the slave outs to a separate amp to see how the unit fared in a live rig.

CABINET MASTER

The 284's tone through the 4 × 10–inch cabinet was fabulous. With the master volumes high and the preamp volume low, you get chimey, ringing, clean tones with the depth and complexity of a great amp. As you nudge the gain knob up, the amp begins to overdrive pretty quickly (it's only 3 watts per side, after all). These slightly dirty "in-between" tones have a definite Vox AC30 vibe—the standard by which all Class A amps are measured. They run the gamut from bright and edgy to warm and dark, thanks to the amp's responsive and interactive tone controls.

The 284 nicely illustrates the difference between preamp and power-amp distortion: preamp distortion is fuzzier and more compressed sounding, while power-amp distortion sounds throatier and chunkier. On most amps with master-volume controls, preamp distortion can be achieved at low volumes, whereas power-amp distortion requires extreme volume levels. That's one of the coolest things about this amp—you can mix and match these two distortion flavors without drastically changing the volume. Try *that* with your 100-watt amp.

This is one piece of gear whose front panel says it all: the Lexicon Signature 284 All Tube Class A Stereo Recording Amplifier and Direct Source. Unfortunately, the unit's speaker simulations are less impressive than its otherwise extraordinary sound and quality.



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WRH

Thanks to multiple output options, the Signature 284 is as versatile as they come.

The boost that kicks in when you pull out the Gain knob changes the whole character of the amp, increasing the gain substantially and bumping up the low end. Good-bye, Vox zing; hello, Marshall thump. The boost turns the 284 into a real fire-breather with lots of distortion and sustain. Although I found myself turning down the bass control to compensate for the massive low end, I definitely liked the modified Marshall-style tone that this setting produced. My only complaint is that it's difficult to pull out the Gain knob.

All the tones—clean and dirty alike—translated well, with clarity and definition. Even the more distorted sounds cleaned up when I rolled back the volume knob. Interestingly, the biggest sounds I achieved were not the most overdriven ones. Also, don't be fooled by the 284's low wattage—this unit puts out a surprising amount of sound when everything is cranked. Just as cool as the sound of the 284, however, is the feel of it. No matter where you set the volume level, this amp feels lively and sounds three-dimensional, responding to every nuance of style and attack. Simply put, the Signature 284 is inspiring. It makes you want to play.

To capture the sound of the cabinet on tape, I simply miked one of the speakers with a Shure SM57. I got some great-sounding tracks that way, although I had to tweak the 284's tone controls and levels a bit to make the sound that was going to tape more like the sound in the room.

THE DIRECT ROUTE

If you get inspired to record when your housemates are asleep, or if your apartment's paper-thin walls require that you make no noise at any time of day, the 284's recording outputs are a godsend. Passive speaker loads automatically kick in when you disconnect the speaker jacks—a nice touch that makes silent recording a breeze.

The two settings, Bright and Smooth, can be individually selected for each recording output. The Bright setting is meant to simulate a 2 × 10–inch speaker cabinet, and the Smooth setting mimics a 4 × 12–inch speaker cabinet.

Lexicon labels the 284 a "direct source" right on the front panel, so I was expecting some really awesome speaker simulation. I was disappointed, though: the direct sound was more compressed and less dynamic than what I had obtained by running the amp through a speaker cabinet. The tone wasn't bad, but it certainly wasn't as happening as the cabinet sound.

The direct sound was actually closer to the recorded sound I'd gotten by miking the cabinet with the SM57—as if the direct sound simulated both the speaker and the mic. As it turns out, this is what Lexicon had in mind, which makes it understandable that the 284's direct sound differs from its sound through a cabinet. After all, the sound of a cabinet on tape is usually different from its sound in a recording space. For just that reason, when miking a cabinet, I tend to back off on the gain and adjust the EQ slightly to improve the sound—and that's just what I had to do when using the recording outputs on the 284.

Using the direct-sound output also altered the feel of the 284. The cool, three-dimensional bloom that I had felt through the cabinet was replaced by a more two-dimensional vibe that was closer to the sound of a distortion box than to a living, breathing tube amp. (Most direct-recording products sound somewhat two-dimensional compared with a real cabinet in an acoustic space; to my ears, this is even more true of the 284.) For my purposes, even when recording direct, I'd still want to simultaneously run the amp through a cabinet so I could hear it in the room—just for the inspiration factor.

SLAVE LABOR

In my final test, I patched the 284's slave outputs into the effects-return jack on a 100-watt Rivera combo amp with a 12-inch Electro-Voice speaker. (I used the effects-return jack so as to bypass the Rivera's preamp section.) Because the slave outputs are post–power amp and do not simulate a speaker, they preserve the tone of the entire amp. This application worked to great effect. You could definitely gig with this kind of setup, setting the 284 for a high-gain sound and using your guitar's volume control to clean it up.

The Signature 284's manual, which is comprehensive and well written, also describes how to use the unit for recording a variety of instruments other than guitar. I tried it with a bass, for example, and got great sounds, whether clean or slightly grungy (think "Sunshine of Your Love"). Keyboards came out sounding warm and full, happily devoid of that creepy, digital edge. (Conventional wisdom says to run keyboards clean, but I liked what happened

Signature 284 Specifications

Inputs	(2) ¼" (one front, one rear)
Outputs	(2) ¼" speaker, switchable 4Ω or 8Ω per channel; (2) ¼" slave, +4 dB uncompensated; (2) XLR recording (with speaker simulator), +4 dB balanced
Effects Sends	(2) ¼", -20 dB (instrument level) unbalanced
Effects Returns	(2) ¼", -20 dB (instrument level), wired for stereo, mono, or parallel (split) operation
Power Amp	3W RMS per side (stereo)
Tubes	(3) 12AX7 (preamp); (2) EL84 (power amp)
Tone Controls	Bass, Midrange, Treble, Presence
Output Bandwidth	20 Hz–20 kHz
Dimensions	2U x 10.5" (D)
Weight	24 lbs.

For manufacturer information, please see Contact Sheet, p. 171.

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LEXICON
Signature 284 guitar amplifier/direct recording source
$1,095

FEATURES ■■■■
EASE OF USE ■■■■
AUDIO QUALITY ■■■■■
VALUE ■■■■
1 2 3 4 5

PROS: Great-sounding tube amp. Lots of tonal variety. Excellent power-amp distortion at manageable volumes.
CONS: Mediocre speaker simulation.
CIRCLE #443 ON READER SERVICE CARD

in this application when I pushed the 284 into overdrive.) And you don't have to stop there. Look at this thing as the world's coolest direct box: you can run vocals, horns, and just about anything else through it with interesting results.

RUBIK'S TUBE

The Signature 284 presents something of a quandary in that it works least well in one of the applications for which it was intended. It is touted as an "all-tube, Class A, stereo recording amplifier and direct source," and I have no gripe at all with most of that subtitle. Although I would have liked a bigger-sounding speaker simulator, the recording outputs are nevertheless a valuable feature.

On the other hand, I would rank the Signature 284, as a guitar amp, with some of the best-sounding amps I've heard. This thing has it all: warmth, depth, dynamics, you name it. It also does a bang-up job as a tube DI. And compared with most low-wattage boutique amps, its $1,095 price tag is reasonable. If Lexicon improves its speaker-simulation section, the Signature 284 just might become one of the neatest amps going. It's a great product, and tone freaks should definitely check it out. This unit is just what a guitar amp should sound—and feel—like.

Matt Blackett *is a guitarist and guitar instructor in Berkeley, California. He also moonlights as an Elvis simulator.*

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FATAR

STUDIOLOGIC SL-990

Bare-naked control and nothing more!

By Julian Colbeck

Let's say you're a keyboard player who needs a full-length MIDI controller in order to play—rather than simply trigger—piano and other chunky keyboard sounds. In the studio, your sequencer has all the bells and whistles you need in terms of programming aids and plug-ins. Live, you just want a decent keyboard on which to play one or two strong tones, and with which you can relax and perform. Oh, and you don't want to pay a lot for it.

This is the problem that Fatar, the Italian king of the MIDI keyboard controller, has addressed with the Studiologic SL-990. With a retail price of $1,095.95, the unit provides 88 weighted-hammer notes under your fingertips and only the merest suggestion of control features. Fatar's engineers provided only three front-panel control buttons, eschewed both pitch and mod wheels, and filled in all the holes on back save for a lone MIDI Out, a sustain jack, and a power socket. What remains is access to 128 MIDI Program Changes, Bank Select control, and the opportunity to adjust the keyboard's Velocity response.

ON THE OUTSIDE

The external design of the SL-990 is inevitably sleek and sparse, with a pleasingly rounded front end and a thoughtful bite taken out in the center to protect the MIDI, pedal, and power sockets. My only gripe here is the utter flimsiness of the power connector: the fit from cord to socket is very loose, with no clip or bracket to keep it in place. You're going to feel really daft on a gig when the movement of your playing gradually shakes the plug free. Any accident that can happen on stage, does. (Trust me—I've had some 25 years on the road, after all.)

The weight and shape of the instrument (relatively thin) makes the SL-990 a good bet for the bad-back brigade and perfect if you'd like your gigging rig to comprise a decent keyboard, a few rackspaces' worth of modules, and a quality combo amp.

GOING, GOING, GONE!

What's missing? you ask. The folks at Fatar know better than anyone else what features you can add to a keyboard controller, so I won't insult them by reminding them about multiple MIDI Outs or assignable sliders. But I am a little concerned about the absence of pitch and mod wheels. Sure, these are cost-saving omissions, but even though I don't often use these controllers, I'm not sure how I'd like not having them around. (For $200 more, you can find these features on the SL-990's big sibling, the SL-880.)

The SL-990 may not appeal to players who rely on MIDI splits and Velocity-dependent zones, unless they already use—or want to buy—a separate processor box for the purpose. That said, being creative with programs on your synthesizer or sampler patches isn't rocket science. You should be able to write a blank dummy patch, or rewrite a patch so that it plays only over a specific keyboard zone, all fairly easily.

I'll give you a tip for free: more work put into fewer sounds will pay handsome dividends in live performance. The SL-990 might force you into such behavior, but you, your sound engineer, and your audience will be glad that it did in the end.

ACTION PICKED

Thus stripped, the SL-990 is focused very much on keyboard action. The weighting is medium—quite sufficient for piano playing, but still perfectly acceptable for organ. The MIDI Velocity response, both in feel and actuality, is smooth. You can max out at 127 with just the right amount of vigor. A light touch can still produce even results. The weighted keys bounce back without a hint of sluggishness, so even playing classical piano should be within reason. I'm pretty picky about keyboard feel; it can make you play well, overplay, or play just plain badly. I could play the SL-990 without any worries at all.

There are four Velocity curves to choose from, each offered in negative and positive mode (see Fig. 1). Shape 1 is normal—that is, a smooth linear response to added key speed and

FATAR
Studiologic SL-990 MIDI master keyboard
$1,095.95

FEATURES ■■▮
EASE OF USE ■■■■▮
VALUE ■■■
1 2 3 4 5

PROS: Almost total absence of learning curve. Throws the emphasis back onto your most valuable set of controllers: your fingers.
CONS: Wobbly power plug. No pitch or mod wheel.
CIRCLE #444 ON READER SERVICE CARD

Fatar's Studiologic SL-990 is an 88-key, weighted-hammer MIDI master keyboard that is well suited to both piano and organ playing. The controller offers MIDI Program Change buttons but has no pitch or mod wheel.

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strength. Shape 2 has a heavy response; if your playing has all the finesse of an end tackle (or whatever the front-line, cannon-fodder football guys are called), then you may appreciate this one. Shape 3 is just the opposite—light—while Shape 4 is featherlight, almost skittish. Although there is nothing startling in this level of control, it is good to be able to tailor the action to suit your character and style.

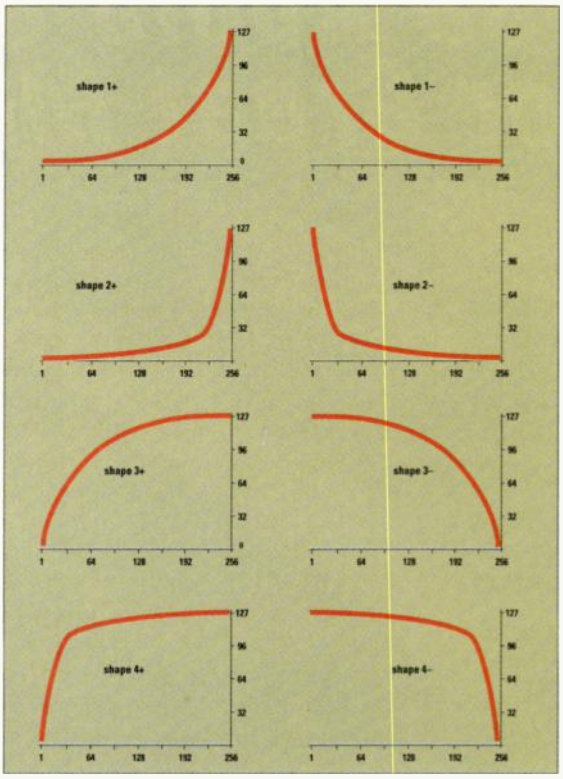

FIG. 1: The SL-990 provides four Velocity curves that can be used to configure the keyboard to fit your playing style.

MAKING THE PLAY

To make control adjustments on the SL-990, you just hit the Bank, PC (Program Change), or Shape button in the center of the control panel and use delineated keys on the keyboard to adjust the controls as necessary. Entering, say, Bank Select 32, Program Change 110 involves holding down the Bank button, stabbing out 3-2 on keys corresponding to a numeric strip on the panel, and then letting go. Then you hold down the PC button, stab out 1-1-0, and release. I wouldn't want to have too many patch changes using this type of system. If you are considering the SL-990 for a live rig, this is certainly something that you'll need to take into consideration.

Fatar is mindful of the fact that standardization of Bank Select has never been nailed down. (Some instrument manufacturers still insist that you enter values after assigning a control channel.) You can specify that a higher byte is coming down the slot by pressing the key below the symbol -/H. This is Fatar's perfectly acceptable workaround to a hassle that in no way is of the company's own making.

CONNECTIONS

As for connectivity, you can plug in a sustain pedal. If you're desperate for Volume control, you can always connect a MIDI Volume pedal inline or into your sound source. And if you're looking for real-time control over sounds via knobs or sliders, then the Studiologic SL-990 offers plenty of empty control surface on which to sit such a unit.

Controller keyboards are generally riddled with MIDI ports. I've never really understood this, much less ever had the need to hook up three or four Ins and Outs. A lone MIDI Out port might seem a bit scary, but, as with all the omissions to the SL-990, there are workaround boxes or other solutions if you require them. (In this instance, you can just link your sound sources in a daisy chain.)

WEIGHING IN

For all of Fatar's valid and sensible streamlining, it's a shame that the SL-990's power arrangements have been left so accident-prone. The absence of pitch and mod wheels could also be a worrying omission—and if you consider these a "must have," you'll need to look elsewhere (quite possibly to Fatar's SL-880). Aside from that, the reasonably priced Studiologic SL-990 offers a refreshingly clean and clear solution to an age-old problem.

Julian Colbeck *once spent a year on the road with ABWH/Yes, frustrated by a keyboard controller that defied comprehension. Go for the simple life.*

For manufacturer information, please see Contact Sheet, p. 171.

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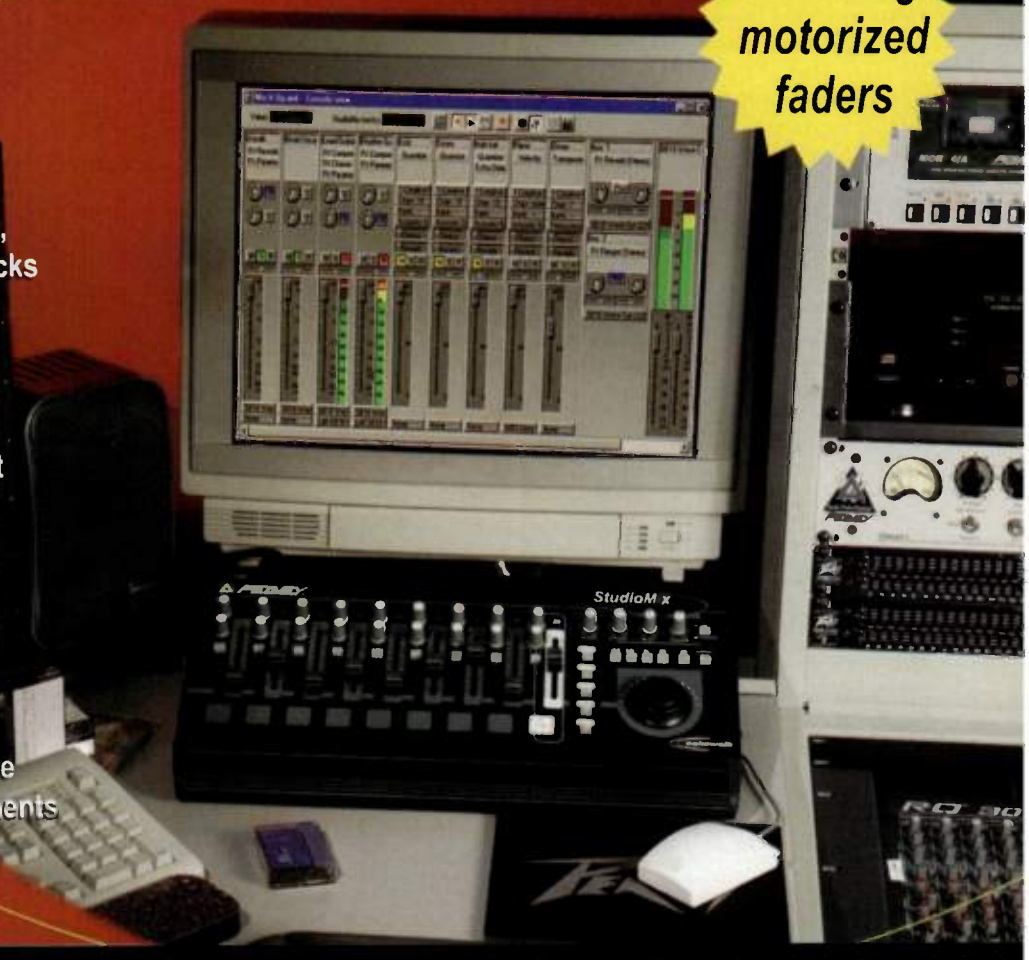

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QDESIGN

QDESIGN MUSIC CODEC PROFESSIONAL EDITION (MAC/WIN)

Deliver high-quality, low-bit-rate streaming audio with QuickTime.

By Neil Leonard III

The fidelity of on-demand Internet audio is improving rapidly. Home computers with moderate to fast Internet access have made it commercially viable for audio engineers to explore what is known about audio data compression. Until recent months, Liquid Audio, RealAudio, and Shockwave Audio were the reigning technologies for Web audio broadcasting. QuickTime joined the competition when it began to include *QDesign Music Codec Basic Edition (QDMC)* as a standard feature.

Using *QDMC*, one minute's worth of Red Book (CD) audio can be reduced to less than 200 KB (down from 10 MB for the noncompressed data) and streamed over a 28.8 kbps modem. The resultant file maintains stereo imaging and is perfectly acceptable for casual listening. The QuickTime Pro software bundle, which includes a developers' version of the MoviePlayer utility, is all you need to encode audio using the *QDMC* software.

Although *QDMC* alone was enough to raise the stakes in Web broadcasting, QDesign has released a newer product called *QDesign Music Codec Professional Edition (QDMC Pro)*, which is geared for professional audio developers. *QDMC Pro* encodes audio in half the time of *QDMC*. Files encoded with *QDMC Pro* can play back on any computer that has QuickTime 3 installed. The basic encoding engine of *QDMC Pro* and *QDMC* is the same; however, *QDMC Pro* provides an interface that lets you adjust a number of parameters (see **Fig. 1**), whereas the basic *QDMC* simply lets you select a bit rate for encoding.

The *QDMC Professional Edition* requires QuickTime 3 and an application that supports its audio export functions. You can download a demo version of *QDMC Pro* from the QDesign Web site (www.qdesign.com) that will work for 15 days. To continue using the software, you must pay $399 for an access code to remove the software time lock.

NUTS AND BOLTS

I found *QDMC Pro* easy to use. The downloadable files are less than 1 MB and install in a few minutes. *QDMC Pro* is a software component that was created specifically for QuickTime 3. It is automatically loaded whenever the Sound Settings dialog box is invoked while exporting audio, and it replaces the QDesign Music Codec option in the dialog box (see **Fig. 2**). In order to access the *QDMC Pro* interface, first select the *QDMC Pro* codec from the Sound Settings dialog box, then click the Options button. The demonstration version supports all the professional features and was used to examine the encoder's performance for this article.

The simplest way to use *QDMC Pro* is to select one of the style presets; this adjusts the bit rate and the encoder's five parameter sliders to settings that correspond to the style. Presets include pop, classical, jazz, voice, and one generic setting. Except for the generic preset, each style has two transmission-speed settings.

Selecting a musical style at 28.8 kbps sets the bit rate to 24 kbps to compensate for TCP/IP data-rate fluctuations. Adjusting the transfer rate to 56 kbps sets the bit rate to 48 kbps. Switching between transfer rates for one style simply changes the lowpass filter setting. (More on this later.) You can save custom settings to disk, and they will appear immediately in the Preset pop-up window. *QDMC Pro* supports 18 data-transmission settings between 4 and 128 kbps, as opposed to *QDMC*'s 8 settings. Both programs support any sample rate between 8 and 48 kHz.

Clip Detection and Limiting checkboxes enable *QDMC Pro* to warn you if the dynamic range of the system is exceeded and to limit the audio automatically. For best results when encoding audio with *QDMC Pro*, you should work with files that do not exceed -3 dB or 70 percent dynamic range. If you haven't normalized in advance, or if you simply want to eliminate distortion caused by dynamic spikes, these options are tremendously convenient.

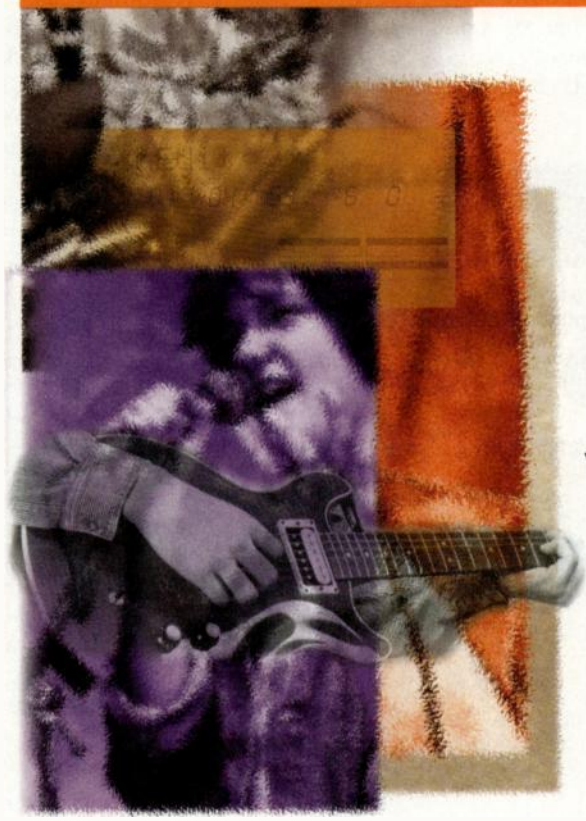
The first of *QDMC Pro*'s sliders tweaks the algorithm's Attack Sensitivity. This parameter is of fundamental importance, because the *QDMC Pro* algorithm will reshape the dynamic contour of the sound and can produce synthetic-sounding results. Moving the slider (from 0 to 100) controls the transient response of the codec. Higher settings cause the codec to render percussive attacks with more precision but can truncate or granularize sustained sounds. Lower settings smooth out sustained sounds, such as horns, strings, or pianos, but affect the timing of attacks.

The Spectral Emphasis slider manages the trade-off between the time and frequency resolution of the codec. You move this slider to select a number in the range of 0 to 100. Instrumental-only audio files are best encoded when the slider is set to a value between 0 and 25.

FIG. 1: *QDesign Music Codec Professional Edition* provides an interface that allows you to adjust a number of parameters without any prior knowledge of audio-compression techniques.

Way More Than Four More

The New Fostex FD-8: Eight Tracks of Unprecedented Flexibility and Power—Priced at Under $900



You could say that the new Fostex FD-8 is a duplicate version of Fostex's groundbreaking FD-4 digital recorder plus 4 channels more. But you'd be overshadowing the FD-8's amazing list of powerful, professional features. Because in addition to offering 8 channels of pure Fostex digital audio, the FD-8 also gives you two independent recording modes (one maximizes sound quality, the other recording time), 16 Virtual Tracks (for a total of 24 recording tracks), "Digital Track" inputs and outputs, and much more. Even full MIDI implementation. Plus, just like the FD-4, it gives you the freedom to choose your own optional SCSI recording media from a wide variety of available removable and hard drives. And with an M.S.R.P. of only $899, it shines a whole new light on what you can expect from a portable digital multitracker.

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FOSTEX

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Voice-only files sound best when recorded with a setting between 75 and 100.

The encoder added a metallic tinge to the overall sound of a number of files that I tested. Setting the Spectral Spread slider closer to 0 creates cleaner but more metallic-sounding files. Setting the slider closer to 100 creates warmer-sounding but noisier audio.

The highpass filter reduces frequencies below a selectable cutoff frequency of between 0 and 400 Hz. Using the highpass filter to reduce frequencies allocates more bandwidth for the remaining audio. The lowpass filter attenuates audio above a selectable cutoff frequency of between 0 and 22,050 Hz. Like the highpass filter, the lowpass filter frees up bandwidth by reducing the range of frequencies.

QDesign encourages *QDMC Pro* users to encode all audio at a 44.1 kHz sample rate, regardless of the desired bit rate, and to use the lowpass filter to reduce the frequency bandwidth. Setting the lowpass filter to 11,025 Hz, for example, is the equivalent of downsampling a file to 22,050 Hz, but without adding the noise that typically occurs when downsampling.

BANDWIDTH VERSUS FIDELITY

So, how does audio encoded with the *QDesign Music Codec Professional Edition* sound? To find out, I imported five one-minute CD excerpts of music in the jazz, pop, and classical genres that are accommodated by the software's presets. Then I created encoded versions of each file for delivery at both 28.8 and 56 kbps. I played this collection of encoded files for a number of musicians who, overall, were stunned by the results. They didn't realize that it was possible to achieve such a wide frequency response at such low transmission speeds.

The first excerpt that I tested was a fragment of Miles Davis's "All Blues," encoded at 24 kbps. The saxophone lines, the brush work on the snare, and the piano riffs were preserved at near-CD quality. However, when the drummer switched to the ride cymbal for the solos, the encoder introduced a pronounced flanging effect. The attack of the drumstick striking the cymbal was altered—it often sounded like a brush hitting the cymbal. At 48 kbps, the flanging effect was greatly decreased, and the ride cymbal attacks became more accurate.

I encoded Mariah Carey's "Vision of Love," Jimi Hendrix's "Ezy Rider," and Los Van Van's "Hoy se Cumplen Seis Semanas" to test the encoder's Pop preset. The Hendrix and Los Van Van songs have a relatively high amplitude and full sound throughout, and they encoded with minimal flanging effect. On these pieces, the QDesign encoder delivered an unprecedented high spectral content at 24 kbps.

The introduction to the Carey song turned out to be a real challenge for the encoder. Carey's voice is recorded

QDesign Music Codec Professional Edition
Minimum System Requirements
Mac: Power Mac 601/100; hard drive on SCSI bus 0 or 1 or on IDE bus; QuickTime 3; any application that supports the export functions of QuickTime 3
PC: Pentium 133; Windows 95 or NT; QuickTime 3; any application that supports QuickTime 3's export functions

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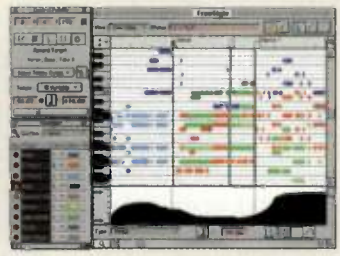

GM, XG, OR GS–THE N5EX PLAYS 'EM ALL BACK. PLUS, BOTH THE N5EX AND N1 COME BUNDLED WITH MARK OF THE UNICORN'S *FREESTYLE LE* SEQUENCING AND UNISYN EDITOR/LIBRARIAN SOFTWARE—A $500 VALUE!

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*Producer/Remixer Doug Beck's remix credits include Salt-n-Pepa, The Rolling Stones and Shania Twain.

KORG

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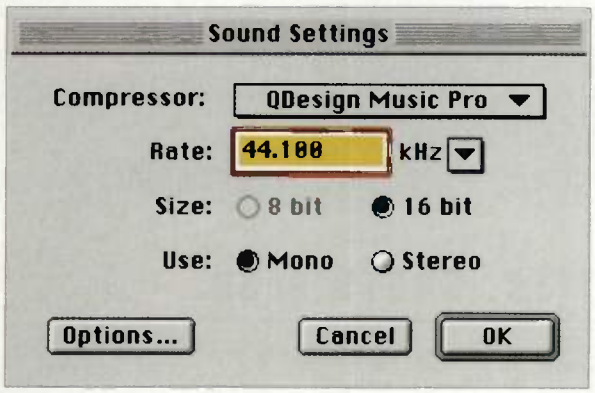

FIG. 2: *QDMC Pro* is automatically loaded whenever the Sound Settings dialog box is invoked while exporting audio.

with an emphasis on high frequencies, and the encoder produced intense noise. However, when the rhythm section and background vocalists came in and filled out the arrangement, her voice encoded much better.

The problem of too many artifacts arose on a recording of the Brahms Sextet in B-flat Major for two violins, two violas, and two cellos. The instruments sounded fine, but the encoder added artifacts that sounded like exotic effects processing.

The *QDMC Professional Edition* encoder's presets did not always surpass the performance of the *QDMC Basic Edition* encoder. However, the Basic Settings preset has parameter settings similar to those of the *Basic Edition*, so you don't lose any options by installing *QDMC Pro*.

But even at *QDMC Pro*'s fastest encoding rate, ten one-minute test files took a long time to process. If I had tried this with my 100 MHz PowerBook, I would have tied it up for several hours; instead, I used four Power Mac 9600s.

The *Basic Edition* is fine if you plan to encode only a couple of files for your Web page; however, if you are working in a production environment, there is a definite speed benefit to using *QDMC Pro*.

BETTER THAN THE REST?

The resultant quality of any compressed audio is based largely on the encoder's ability to determine which parts of the signal can be removed with minimal loss of fidelity. QDesign claims that, unlike other perceptual codecs that are based purely on psychoacoustic modeling, *QDesign Music Codec* yields better results because it uses a hybrid approach for analyzing and compressing data.

The professional version gives you other advantages as well. With a *QDMC Pro*–encoded file, you can cut and paste data while it remains in the compressed format. (Currently, only QuickTime 3 supports this capability.) With most other codecs, you have to decompress a file to edit it. Editing in compressed form avoids unnecessary encode/decode cycles, which degrade the audio quality.

Another advantage comes from the fact that QDesign encoders are QuickTime components and can therefore be accessed by any program that supports QuickTime's audio-export features. That means you can use *QDMC Pro* within Terran's *Media Cleaner Pro*, AudioEase's *Barbabatch*, BIAS's *Peak* 2.0, and Adobe's *Premiere* 5.1.

To compare *QDMC Pro* to the competition, I created comparable versions of the five previously mentioned CD excerpts in RealAudio 4.0, Dolby Labs AC-3, Macromedia Shockwave, and MPEG 2 Layer III (MP3) formats. At 28.8 kbps, RealAudio 4.0 and Shockwave do not offer stereo as an option.

QDESIGN

QDesign Music Codec Professional Edition audio data-compression software

$399

FEATURES ■■■
EASE OF USE ■■■■
DOCUMENTATION ■■■■
VALUE ■■■■

1 2 3 4 5

PROS: Easy-to-use, effective compression with control over several parameters. Clip detection and limiting functions. Allows editing of compressed data. Functions seamlessly as a component of QuickTime 3. Try-before-you-buy option.

CONS: May add a metallic quality in exchange for noise reduction. Processing can be slow. A bit pricey.

CIRCLE #445 ON READER SERVICE CARD

With each encoder, one minute of audio can be compressed to less than 200 KB for delivery using a 28.8 kbps modem. (RealAudio 5.0 is now widely used as an Internet audio format, and it offers somewhat improved performance over version 4.0.)

Files encoded with *QDMC Pro* always produced music with a much fuller frequency spectrum than the other formats. The RealAudio and Shockwave encoders sounded as though they downsampled the audio and permanently removed the high end. They also introduced their own distortion at times. For example, the high harmonics of Jimi Hendrix's sustained guitar on the intro to "Ezy Rider" were distorted beyond recognition when encoded with Shockwave; they were rendered with far more accuracy when encoded using *QDMC Pro*.

Although *QDMC Pro* was a clear winner at 24 kbps compression, the other formats can sound better than it does in the 80 to 128 kbps range. QDesign recognizes this shortcoming and states that its next version will offer better-than-MP3 quality at all compression bit rates. *QDMC Pro* version 2.0 should be available by the time you read this review.

FINAL BITS

QDMC Pro comes with a manual in PDF format that is clear and easy to follow. You can read it in one sitting, and it gives useful background information and premastering tips.

QuickTime is arguably the best technology for cross-platform delivery of multimedia content; according to Apple, it is currently used on more than 50 million computers. If you're planning to develop audio on a professional basis for QuickTime delivery over the Internet, QDesigns' *QDMC Pro* is an indispensable tool.

With careful tweaking of the on-screen sliders, you can reduce the flanging artifacts to acceptable levels and deliver the best real-time audio possible over a 28.8 kbps modem. If you want to hear your music played with cutting-edge technology, it's well worth downloading the *QDMC Pro* demo and giving it a try.

Neil Leonard III *received this year's award for the most valuable contribution to the Music Technology Division curriculum at Berklee College of Music in Boston.*

For manufacturer information, please see Contact Sheet, p. 171.

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ORAM

MICROPHONE WORK STATION MKII

Fat tone and premium British EQ in a well-built package.

By Myles Boisen

During his 14-year tenure as consulting chief of design for Trident, British audio engineer John Oram helped produce the famed 65, 75, and 80 Series Trident mixing consoles, among other products. Now at the helm of his own company, Oram Professional Audio, he has brought out the BEQ Series 8 and 24 analog mixing boards, the Series 48 digitally controlled analog mixer, and a variety of outboard devices, including the Audio Microphone Work Station (MWS) mkII.

The Oram MWS provides two channels of mic/line preamplification and equalization from the BEQ Series 24. Designed for direct-to-media recording, the MWS has a modified input-gain control that accepts both mic- and line-level signals.

Based on the unit's solid construction and good looks (not to mention Oram's reputation), I figured I had a winner the minute I opened the box. Looks, of course, can be deceiving. However, quality construction is often a good indicator of high-quality electrical engineering, and this product is extremely well built. So far, so good.

SUPERFICIAL CONCERNS

The MWS is a conservative-looking, 2U rack-mount device with a steel chassis and an institutional blue-green paint job. The front panel—a rigid slab of 6 mm aluminum with a glossy finish—has independent sets of controls occupying the left and right halves, which are separated by a black line. I was pleasantly surprised to find the AC power switch also located on the front panel, which makes for easy access when the unit is mounted in a rack. This is a clear indication that the MWS was designed by someone who considered the needs of the end user.

Controls on the MWS are laid out as vertical pairs of knobs and button switches. Some of these pairs are related in their respective functions; others are not.

First up is a phase-reverse switch and an input-gain knob. With the gain knob turned fully counterclockwise (marked 0), the input level is unity gain for +4 dBu line-level signals. Because the design varies from the norm, let me repeat that the MWS uses a *single* input jack and gain control per channel for the full range of line and mic signals. And there's no switch for -10 dBV operation, either. However, the unit provides 70 dB of gain, which is more than enough to accommodate the needs of mixed -10 dBV/+4 dBu studios.

Next up is a low-cut filter (12 dB/octave) that is sweepable from 5 to 200 Hz (with markings at 5, 35, 75, and 200 Hz), enabling precise attenuation of low-end rumble, proximity effect, and so on. Beneath the low-cut filter is an EQ in/out switch with a green LED that lights when an equalizer is engaged.

The next two controls handle low shelving. On top is a switch for selecting the shelf frequency (80 or 150 Hz) and directly below it is the cut/boost pot. All EQ gain knobs offer 16 dB of cut or boost.

The fourth pair of controls includes the low-mid frequency control (one-octave fixed bandwidth, 150 to 2,000 Hz range, with a midpoint marking at 700 Hz), which is marked "low sweep." The phantom-power switch has a red LED to indicate when 48V phantom power is engaged. To the right of this is a useful 10-segment bar-graph LED that shows output gain, ranging from -15 VU (-11 dBu) to +12 VU (+16 dBu—well below clipping). The meter's 0 VU setting is referenced to +4 dBu and can be adjusted internally.

Beneath the meter are two gain controls for the low-mid and high-mid frequency sweeps, connected visually to their respective knobs by bold, angled lines. Farther right are two more rotary pot and switch pairings. The High Sweep knob (one-octave fixed bandwidth, 1.5 to 15 kHz range, with a 6.5 kHz marker in the middle) is located above a high-cut switch. This button engages a unique high-end filter that begins to roll off at 9 kHz using a gentle 4 dB/octave slope, then graduates to a steep 18 dB/octave slope. Finally, a high-shelving section, functionally similar to the aforementioned low shelf, offers a switchable 8/12 kHz shelving frequency and a cut/boost knob.

The MWS's rear panel provides both XLR and ¼-inch TRS balanced input and output jacks, along with TRS insert jacks for each of the channels. Also located on the rear panel are the line voltage selector, fuse, and IEC power-cord socket.

SMOOTH OPERATOR

All controls on the MWS worked noiselessly, reinforcing my initial impression of the unit as sturdy and extremely well built. Each switch and detent clicks in confidently, leaving no room for tactile error. Also, its meter is one of the best I've seen on an outboard preamp; for any sort of highly dynamic sounds (such as percussion), it's a real boon.

Admittedly, the layout of the EQ

The Oram Microphone Work Station mkII combines two channels of mic/line preamplification with two channels of EQ. The preamps sound great, but the EQ is truly outstanding.

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section may seem hard to follow at first, especially to those who are familiar only with channel-strip equalization. But the MWS's staggered arrangement of alternating knobs and switches quickly becomes intuitive. The key is that frequency adjustments are made on the upper rows of knobs, and amplitude changes (cut and boost) on the bottom rows. Once you get the hang of it, the MWS is a joy to operate, thanks in part to the hefty knobs and easily engaged switches, but also due to the attractive beveled edges and ample spacing around the controls.

My only complaint with the physical layout is the dearth of calibration marks on the frequency and amplitude pots, which makes the MWS less user-friendly for novices, as well as for stereo recordists. Other British units I own exhibit this same frustrating penchant for secrecy, offering legends that are either cryptic, sparse, or nonexistent. This approach forces engineers to rely solely on their ears, which is a noble idea; however, short of using a grease pencil on the front panel, you can forget about doing repeat settings or a quick stereo setup with the MWS.

NO JOHN DOE

No matter what the application, the Oram MWS never sounded generic to me; rather, it imparted a rich tone and a full, rounded midrange to a variety of miked sources. As compared to other preamps in my rack, I would characterize its sound as immediate and tight, somewhat dry, and just a bit darker than average.

On a chirpy young female vocalist recorded with a Lawson L47 MP tube mic, the MWS worked like a charm, issuing smooth and controlled highs. A snare drum sounded authoritative and seductively "sandy" when close-miked with an Electro-Voice 408 using no EQ. Tabla drums, recorded with a single Neumann TLM 103, came through with tons of tone. On the tabla track, though, I wanted more high-end articulation, and for that task the MWS's onboard EQ proved very handy.

My studio partner, Bart Thurber, was quick to cite the MWS's deft handling of bass-drum recording—one of the most demanding tasks for any preamp. At his urging, I tried the MWS and a Sennheiser 421 mic on a drummer friend who often plays so quietly that his kick drum gets lost in the mix. The MWS was a lifesaver; with a few easy twists of the EQ settings, it brought out plenty of attack and a nicely controlled boom. Lack of headroom was never a problem on any of the percussion tracks, even when we were close-miking a snare drum.

A quiet acoustic guitar, miked in stereo with a pair of Oktava MC 012 condensers and recorded direct to DAT, sounded woody and full through the MWS, yet not as bright as I remembered the mics sounding on a previous session. In this case, rather than resorting to the EQ controls, I switched to a different preamp, and the Oktava mics' crystalline high end was restored.

Throughout the testing period, the Oram preamp was clean and quiet, distortion-free, and pleasing to the ear, as one would expect from a device in this class. But I found it to be somewhat shy of detail and room ambience when contrasted with other high-end

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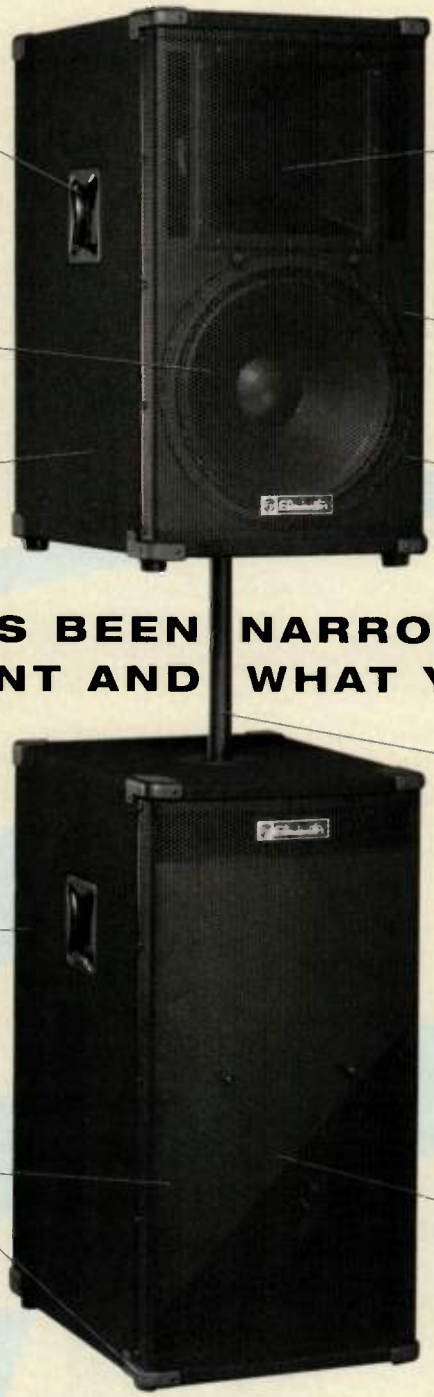

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EV Eliminator

MWS mkII Specifications

Main Inputs	(2) balanced XLR mic, (2) unbalanced ¼" line
Main Outputs	(2) balanced XLR mic, (2) unbalanced ¼" line
Other Connections	(2) TRS insert jacks; IEC power jack
Frequency Response	20 Hz–20 kHz, ±5 dB (-3 dB @ 40 Hz)
Noise	-90 dBu
Distortion	<0.005%, 20 Hz–20 kHz (0.002% @ 3 kHz)
Headroom	>24 dBu
Channel Crosstalk	-61 dB @ 20 kHz
Input Gain	0 to +70 dB
EQ Shelving Frequencies	low: 80 and 150 Hz (switchable); high: 8 and 12 kHz (switchable)
EQ Sweep Frequencies	low mid: 150 Hz–15 kHz; high mid: 1.5–15 kHz
EQ Bandwidth	1 octave (fixed)
EQ Cut/Boost	±16 dB
Lowpass Filter Cutoff Frequencies	5–200 Hz sweepable (12 dB/octave)
Dimensions	2U x 8" (D)
Weight	19 lbs.

units. To check this impression, I used the MWS while recording the Dynatones, a popular R&B band, at Guerrilla Recording in Oakland, California. Employing a Groove Tubes 6TM set to its omni pattern as a room mic (an application I find particularly revealing of detail and accuracy in mics and preamps alike), I was able to compare the MWS on tape with a neutral-sounding, American-made Class A preamp.

The thick midrange quality of the MWS (an audible boost around 300 to 750 Hz) was immediately apparent, as was a softening of the highs on cymbals. The slightly muffled quality—reminiscent of vintage tube gear but without the vintage noise—was certainly appropriate to the production values of the project. However, the American preamp conveyed deeper low-bass notes and clearer guitar tones from the distant, unbaffled amps located in the drum room. These observations raise some doubts about whether the MWS preamps would be well suited for all-purpose pop-music recording, given that market's predilection for paint-stripping high end.

FAT EQ

I was surprised to find that the Oram manual does not mention the potential of the MWS to double as a line-level equalizer during mixing. This capability adds significant value to the unit—especially for the budget-conscious personal-studio owner—and could be a key selling point.

When connected to the stereo-mix bus inserts on my board (EQ bypassed), the MWS was transparent and passed signal at unity gain. Engaging the EQ circuit with all gains set flat resulted in a thickening of the snare-drum sound around 200 Hz but otherwise had no effect on a rhythm-section mix. (This thickening is not necessarily a drawback, given that most engineers would jump through flaming hoops to get a little extra 200 Hz "punch" in their mixes.) I also noticed that the input-gain pots are jumpy and nonlinear in the first six to eight clicks of the line-input range, making them useless for minor gain boosting in stereo. A healthy 12 dB boost was the smallest increment of makeup gain I was able to achieve to match channel levels on a mono mix.

I also tried accessing the EQ through the send/receive jacks so as to enter the circuit after the line amplifier. While not standard practice, this approach has the added sonic benefit of shortening the signal path, though it makes it impossible to apply makeup gain because the line amp is bypassed. Using this configuration with the EQ engaged and all settings flat, I noticed a slight enhancement of airy high frequencies and less of a mid-bass boost than I got when processing via the stereo-mix bus inserts on my board.

As expected, the MWS's low-end EQ

For manufacturer information, please see Contact Sheet, p. 171.

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HAPHUFUL (brimful)

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EASEVE (user-friendly)

All the loops of this library, produced in cooperation with DATA BECKER, are already "cut to fit" and pre-produced into one of the 8 Tempi (60 - 150 BPM). All tonal elements such as licks & lines, are predominantly C-maj or A-min compatible, so that such sound building blocks are very easily combined. - For faster pre-selection PC-Users have the newly developed Smart-Soundbrowser (see picture) with various search functions at their disposal. Additionally you can pre-listen several licks & loops in combination " on the fly " in the Soundcheck-Window.

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2 HOUSE (HOUSE)

over 1570 drum & percussion loops, E-Piano, organ & Syn-Licks, bass lines, male and female house words & vocals, selected house chords as well as a sexy vocal part and a bass drum special.

3 HIP HOP (HIP HOP)

brand-new Hip-Hop-Library with over 1300 sound files, among other things complete raps, E- and Syn-Basses, Saxophon licks, Rhodes chords, countless drum grooves & fills, vinyl noises & super scratches.

4 DANCE (DANCE)

the dance floor library including Retro & old School items, more than 1300 sounds, hundreds of various drum loops, dance pianos, bass lines, vocal hooks, funky guitar licks, gated chords and more.

5 ROCK/POP (ROCK/POP)

the sound library with genuine guitar licks, true basses, acoustic drums and manually played percussion loops, furthermore B3-Organ & sax lines, various vocals and more - a total of 1432 sounds.

6 NEW AGE/CLASSIC (NEW AGE/CLASSIC)

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7 VOCALS (VOCALS)

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8 SOUND EFFECTS (SOUND EFFECTS)

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ABREAST (most current)

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boosting sounds broad, thick, and punchy; it will definitely provide whatever quantity of "fatness" you may require on bass and drum tracks. These controls are particularly effective for subtractive equalization, a practice that is highly recommended for removing muddiness in the lower midrange and for restoring brightness to tracks without adding treble frequencies.

HIGH-END MAGIC

The MWS's high end is so smooth, subtle, and distortion-free that it may fool the listener into thinking that the equalization section is bypassed. Crank up the highs, and all you get is sweetness and a polished sheen—a sound that's comparable to what a top-dollar mastering job provides. A 6 kHz boost to drum overheads through my console EQ sounded brash and paper-thin when compared to a similar increase through the MWS. And a boost in the MWS's high-shelving circuit contributed a pleasing crispness that never got brittle, putting my British console to shame.

On the other hand, the Oram MWS's Hi-Cut switch is not at all gentle. In fact, this button wipes out so much of the crucial upper octave of the spectrum

ORAM
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FEATURES ■■■■■
EASE OF USE ■■■■
AUDIO QUALITY ■■■■■
VALUE ■■■■
1 2 3 4 5

PROS: World-class preamp and EQ. Sturdy, precision construction. Front-panel power switch. Phase reverse usable on line input. Superb metering. Lots of headroom.

CONS: Slightly confusing front-panel layout. Insufficient calibration marks on EQ controls. Input-gain controls are jumpy and nonlinear at lowest settings. Mic preamps convey slightly less high-end detail and room ambience than comparably priced competitors.

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ADVERTISER INDEX

ADVERTISER	RS#	PAGE
Aardvark	538	83
Adaptec	•	45
Akai	527	63
AKG	533	77
Alesis (DM Pro)	508	19
Alesis (GT)	541	89
Alesis (QS6.1)	579	143
Antares	578	141
Apogee Electronics (Rosetta AD)	526	61
Apogee Electronics (PSX-100)	603	177
Arboretum Systems	552	109
Audix	606	179
B & H Photo-Video	607	180-183
Berklee College of Music	551	107
Big Briar	604	178
Cakewalk Music Software	535	79
Caruso Music	575	139
Carvin	582	149
Computers & Music	534	78
Conservatory of Recording Arts & Sciences	583	150
dbx Professional Products (Quantum)	503	14-15
dbx Professional Products (704X/504X)	513	30-31
Demovision	•	130
Digidesign	505	11
DigiTech (S200)	516	39
DigiTech (Vocalist Harmony Series)	562	123
Disc Makers	571	134
Discovery Firm	521	52
Earthworks	561	121
Ebtech	553	109
Edirol	585	153
EGO-SYStems	573	135
Electro-Voice	593	165
EM Sweepstakes	•	98-99
Emagic	507	4-5
E-mu Systems	611	203
Ensoniq	504	9
Event Electronics	566	127
Ex'pression Center for New Media	586	154
Fostex	588	157
Frontier Design Group	563	125
Full Compass	545	95
Gadget Labs	536	81
Generalmusic	555	113
Glyph Technologies	547	101
Guitar Center	549	104
Guitar Center's Rhythm City	597	168
Hafler	537	82
HHB Communications	539	85
IMX - Interactive Music Expo	•	158
IVL Technologies	540	87
JBL Professional	580	145
John Lennon Songwriting Contest	522	53
Keyfax	598	169
Korg (Electribe)	512	29
Korg (D8)	530	71
Korg (N5EX)	589	159
Korg (1212 I/O)	543	93
Kurzweil Music Systems	548	103
Leigh's Computers	565	126
Lexicon (Studio)	612	59
Lexicon (MPX 1)	584	151
Lucid Technology	525	58
Lynx Studio Technology	594	166
Mackie (VLZ PRO Series)	502	2-3
Mackie (SR24•4/32•4)	550	105
Mark of the Unicorn	501	204
Masterbits USA	595	167
Merrill's Music	567	128
Midiman	591	163
Mix Books #1	•	164
Mix Books #2	•	175
Music Books Plus	•	172
Music Dealers Expo	•	201
Musician's Friend	590	161
Musicians Institute	559	118
Musitek	577	140
NHTPro	511	27
Old Spice	•	173
Opcode	546	97
Panasonic	•	21
Peavey	587	155
PG Music	528	64-65
QCA	602	176
QSC Audio Products	531	73
Quik Lok/Music Industries	515	37
Rane	557	115
Recording Industry Sourcebook	•	129
Samson Technologies (SampleTrak)	523	54-55
Samson Technologies (S1000)	542	91
Seer Systems	532	75
Shure	581	147
Sonic Foundry #1	529	67
Sonic Foundry #2	560	119
Sony	•	135
Sound Chaser	564	126
Sound Quest	556	114
SoundTrek	576	139
Spirit	510	24-25
Steinberg North America	506	13
Stro Lion Technologies	601	176
Sweetwater Sound #1	514	35
Sweetwater Sound #2	608	184-185
Sweetwater Sound #3	609	186-189
Syntrillium Software	574	137
Tannoy	517	44
Tascam	558	117
TerraSonde	596	168
Taxi	544	94
Thoroughbred Music	599	172
USA Songwriting Competition	570	133
Waves	519	47
Yamaha (SU700)	520	49
Yamaha (RM1X)	554	111

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We want to know what you think of the articles in *Electronic Musician*! Now you can use your reader service card to give us feedback about EM's editorial coverage. We have assigned a rating number to each of the main articles in this issue. Please select a rating for each article and circle the appropriate number on your reader service card:

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	Very Helpful	Somewhat Helpful	Not Helpful	Didn't Read
A. Cover Story: "Seven Studios of Gold," p. 32	701	702	703	704
B. "Razor's Edge," p. 50	705	706	707	708
C. Production Values: "Seizing Control," p. 68	709	710	711	712
D. Square One: "Lost in Space," p. 84	713	714	715	716
E. Working Musician: "Managing Your Project," p. 90	717	718	719	720
F. Performing Musician: "Controlling Live Ambience," p. 96	721	722	723	724

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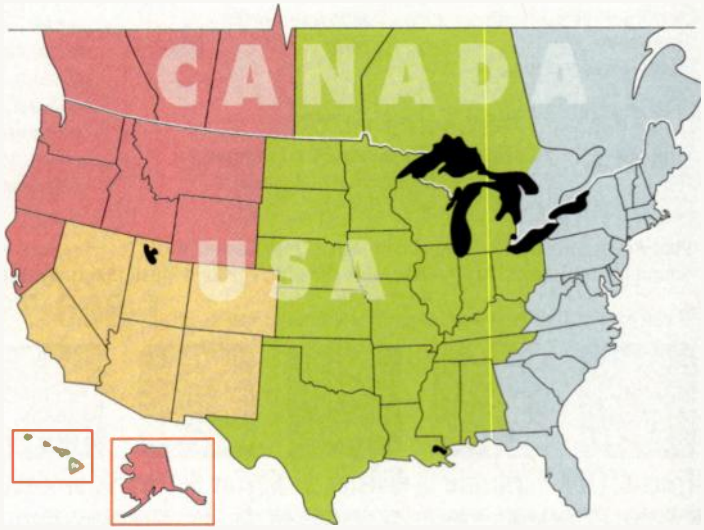

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Cover Story: Seven Studios of Gold
pp. 32–48

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Reviews
pp. 102–201

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that it should be marked "for emergencies only."

It seemed to me that the MWS's low and high sweeps cover a broader range of frequencies than the specified one-octave bandwidth. This was particularly apparent as I applied high-end attenuation. For example, a small cut at 1.5 kHz seemed to remove too many vital highs on a snare track. But when applied to a vocal track, this same subtractive processing proved favorable, bringing forth transparency and gloss when combined with a slight high-end boost.

WAY STATION

The overlapping ranges and musicality of the Oram MWS mkII's filters are typical of British EQ and are equally excellent for subtle sculpting of a single instrument or an entire mix. Of course, the MWS is not a fully parametric equalizer—the bandwidth of boosted or cut frequencies is not adjustable—so it's not the first tool I'd reach for to perform sonic surgery on a botched track. But as a stand-alone unit, it rivals the highest standards in both console and outboard EQ. Its six frequency bands offer nearly limitless control for tracking, mixing, and basic mastering.

As an outboard preamp, the MWS downplays the clinical extremes of high- and low-end detail in favor of uniquely saturated midrange coloration, making it a good match for drums or bass instruments, vintage-sound emulation, and overly bright sources such as strings, sibilant vocals, and so on. Overall, the unit's warm coloration makes it an ideal candidate for the front end of a digital-recording setup, where grating highs and a thin low end are common complaints. And I could certainly find a place for the MWS's sound in my analog studio, particularly when some EQ going to tape would be mandated.

For recordists looking to upgrade their signal path, or for those who wish to supplement a growing collection of mics and outboard processors, the top-notch sonics that the Oram Microphone Work Station mkII provides are definitely worth a listen. Although the unit may be out of reach for some personal-studio budgets, the MWS still rates as a good value for those who can afford it, simply because it offers so much, does everything that it promises, and does so with style.


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QUICK PICKS

NUMERICAL SOUND

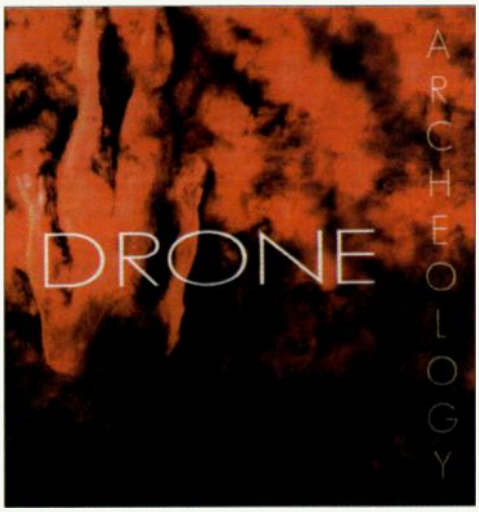
Drone Archeology

By Jeff Obee

Among the many hip sample CDs in today's market lurks an occasional gem that really excites me. *Drone Archeology* (audio; $99.95) is one such disc. Drones are musically dear to my heart, so I relished the opportunity to review this assortment of low tones.

Hovering Beneath It All

Drone Archeology consists solely of stereo drones. This choice may seem like overkill, but drones do have their niche in music, and their role as a textural foundation makes a disc's worth vastly useful. The drones are divided into seven categories: Basic Drones, Nature, Science, Drama, Industry, Voice, and Bell. Ultimately, these sounds are infinitely mutable, but their descriptions suffice as guidelines. All are stereo samples that range from 32 seconds to over a minute long, and the average sample size is around 7 MB.



Complex, shifting passages typify the kinds of samples found on Numerical Sound's *Drone Archeology*.

Drone Archeology's samples, generated using proprietary additive-synthesis algorithms, are programmed to evolve over their full length. They shift, hide, and reemerge; variations in amplitude and harmonic content continue throughout each sample's duration. You'll find a multitude of icy, hollow tones here, as well as complex, rippling passages. I was hard-pressed to choose a favorite: take my word for it—the disc's generous offerings suit a wide variety of tastes.

"Sand Dunes" has an eerie, sensuous quality graced with resonant whistling that rises and falls around its edges. "Tropical Moisture" and "Tropical Rainforest" are both chaotic sheets of buzzing aural pixels, akin to a swarm of jungle insects. "NASA Solar Wind" and "Solar Warnings" would be perfect synched to images of outer space—haunting, alien, and evocative of an endless void. "Ultra High Temperatures" conjures randomly bowed church bells more than heat, but its shimmering waves of bell-like texture are alluring nonetheless.

These files can be imported directly into your digital audio workstation or favorite sample-editing program. Exact loop points are provided in the basic sound-file tables; this audio CD is the first that I'm aware of to offer such a feature. Simply enter the loop points, and you're set.

Documentation

I wanted to hug *Drone Archeology*'s producers when I saw the 111-page booklet and accompanying session worksheets included with the disc. The booklet gives you detailed explanations of every aspect of the drones. The first 12 pages explain the graphs; speaker versus actual bass reproduction; harmonic properties (complex harmonic, complex partials, pure harmonic, or integer harmonic); and looping.

The remaining 99 pages contain right- and left-channel envelope graphs in decibels, along with graphs that display the amount of sonic energy contained within nine frequency bands (which aid you in choosing the correct drone to fit your mix). An informative table gives you the track, type, drone name, total length in samples, length in minutes, pitch, loop start and end points, loop length, and harmonic properties. Another table breaks down the loop data into even more detail.

As the Drone Fades

Eminently musical and useful, presented with admirable forethought and enough detailed information to sate even the most sophisticated users, *Drone Archeology* is a hit. A big high-five to Ernest Cholakis and Numerical Sound.

Overall EM Rating (1 through 5): 5

CIRCLE #447 ON READER SERVICE CARD

MIROSLAV VITOUS

Vol. 5: Classical Percussion & Harp

By David Rubin

When sample-CD developers assemble orchestral libraries, they typically (and understandably) focus on strings, woodwinds, and brass, often to the detriment of the percussion section. Miroslav Vitous, who is well known for his high-quality *Symphonic Orchestra Samples* series of CDs (reviewed in the September 1995 issue of **EM**), has set about to rectify this situation with volume 5, the final disc in the series.

I reviewed *Classical Percussion & Harp* ($795) in E-mu IV format, but it's also available in Roland, Akai, and SampleCell formats. The single CD focuses on orchestral drums, cymbals, bells, mallet instruments, harp, and miscellaneous pitched and nonpitched instruments. The disc also includes several banks with combinations of instruments mapped across the keyboard to facilitate live performing and sequencing. Many of the presets come in both Hall and Studio versions, and most are also offered in scaled-down versions to conserve memory.

Ring It In

The Bells section offers several fine presets including Play Bells, a lovely set of orchestra bells. The wonderful Boat Bell preset is also a nice addition to the collection, and the Big Chimes are appropriately full and carillon-like in spite of a slight amount of aliasing. Unfortunately, the Bell Tree preset is marred by some intrusive noise on several of the samples. The same is true of the Triangle Hall preset, although the Triangle Studio samples are much cleaner.

The Cymbal bank offers several excellent samples including a great-sounding large crash cymbal (with a very long decay) and an equally fine choked cymbal. The Large Gong is also noteworthy, with a strong attack that blossoms nicely into a long, languorous decay. Too bad there isn't also a cymbal roll with crescendo; that would have rounded out the set nicely.

For manufacturer information, please see Contact Sheet, p. 171.

Drummin' Up Support

The Drum section is arguably the strongest part of the collection. The excellent Bass Drum presets are powerful with good definition. I especially like the bass-drum roll that builds to a crescendo and then slowly fades; it's quite dramatic. The snare drums are a fine match for the bass drums: they have great presence and clarity with a variety of playing techniques, including rolls (with and without crescendos), flams, drags, paradiddles, rim shots, and combinations, as well as single hits with snares on and off.

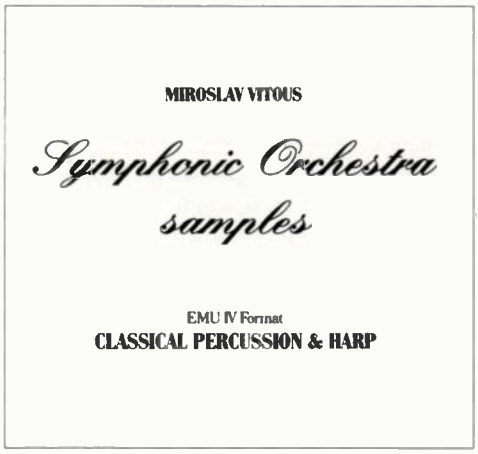
My favorite drum presets, however, are the timpani. The Timpani Hall preset in particular is exciting and powerful, unlike the anemic thuds that often pass for timpani samples. If you need to write a timpani part that will stop traffic, this disc is for you. The CD also includes several timpani rolls (with and without crescendos) and upward glides. (Too bad there aren't downward glides as well.)

Sticks and Tones

The Marimba preset is another standout; it's similarly clean and rich sounding, with an alternate "hardstick" preset. The low end of the marimba is especially warm and lush. A Vibraphone preset is also offered, but it's not as noteworthy as the Marimba. The vibes are played only without tremolo (motor off) and also come in a hardstick preset. Other presets include Bongos, Congas, Castanets, Cow Bell, Guiro (with several scraping techniques), Tambourine, and Wood Blocks.

The Harp preset is truly superb; it's one of the best that I've heard. In addition to individual notes, a few major and minor arpeggios are offered, and they sound quite good. I only wish the disc also came with diminished arpeggios and whole-tone scales, as well as various glissandos. It does, however, offer a set of Harp Overtones.

Classical Percussion & Harp is an excellent resource for composers and arrangers and should be viewed primarily as an archive of essential instrumental sounds. The presets are designed to sound as realistic as possible and therefore include no programming or looping. The minimalist documentation provides only a list of presets and banks. Several standouts—including Bass Drum, Snare Drum, Cymbals, Timpani, Marimba, and Harp—make this disc a must-have collection for pro-level orchestrators. The remaining instruments form a strong supporting cast and may fill in some important gaps in your current library.



The long-awaited *Classical Percussion & Harp* library rounds out the popular Miroslav Vitous *Symphonic Orchestra Samples* series.

Overall EM Rating (1 through 5): 4

CIRCLE #448 ON READER SERVICE CARD

QUICK PICKS

SPECTRASONICS
Symphony of Voices

By Mikail Graham

Spectrasonics, with its *Symphony of Voices* CD-ROM set ($499), aspires to present the world's premier collection of orchestral vocal samples—a daunting task, indeed. Does it succeed? In a word, yes.

The human voice, some say, is the instrument of ultimate expression, surpassing all others with its uncanny ability to resonate one's very soul. Any doubts I may have had about that notion fade further and further away as I work with this release.

The range of material in the collection is amazing. "London Choir" (80 voices, no less), which is beautifully recorded with male and female multisamples, offers up various phrases and many unique vocal effects. A boys' choir imparts gorgeous solo voices and phrases, and male vocalists perform an array of classic Gregorian chants that have never before been heard in a sample library. And the list goes on.

This comprehensive four-disc set comes in Roland, Akai, Kurzweil, and SampleCell formats. You'll need a minimum of 8 MB RAM to use it, although 32 MB is recommended. I used the Roland version for this review.

The Grail

The producers of *Symphony of Voices* recorded the samples with as little vibrato as possible to alleviate the all too common "wobbly pitch" syndrome, which can severely limit the musical settings in which vocal samples can be used. Another goal was to provide ambience by recording in real cathedrals rather than recording the samples dry and adding artificial ambience later. This touch is brilliant, as the depth and character of these samples give you a sense of actually being inside the sound.

Thankfully, the recordings are not overly saturated with the sound of the cathedrals, so you can still add a bit of reverb for an even more heavenly effect if you desire. Most of the *Symphony of Voices* samples were recorded in stereo, because the producers found that the mono versions did not accurately represent the overall quality of the voices.

The Crown Jewels

Pinpointing all the wonderful moments in this collection would be difficult, but I'll mention the high points to whet your appetite. On disc 1, "London Choirs," the Choir Swells and Various Techniques, such as light and heavy vibrato and gliding vowels, are no less than stunning.

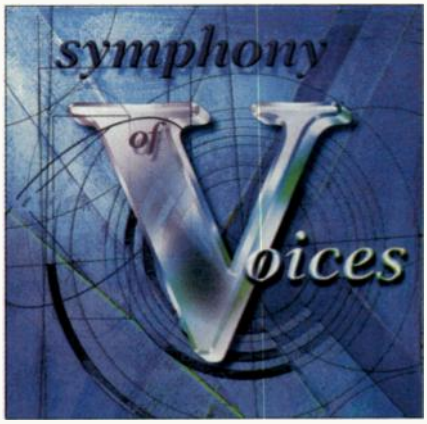
On the second disc, "Soloists and Choir FX," the Vertigo Spin patches—which clearly resemble the vocal effects in the classic score to *2001: A Space Odyssey*—totally knocked me out. Others, such as Clusters, Murmuring, Warm Up, and a wickedly fun and Velocity-switched Choir made it difficult for me to stop listening. Most of these samples have unique panning animation built into them, which I found very stimulating to the creative process. This disc is definitely my favorite of the four.

Disc 3 offers a variety of boys' choirs and solo phrases that you have to hear to believe. Also featured on this disc are those breathtaking Gregorian chants that will make the spiritually minded feel closer to the heavens with each press of a key.

Disc 4, "Pop Stacks," rounds things out with male and female combinations of "aahs," "oohs," "mmms," "vvvs," and "zzzs." (The multitracked "choirs" are actually layers of a single singer, Enya-style.) The Scoop Phrases and Moving Vowels are must-hear material, as are the patches that make up the disc's Synthetic Group. The latter collection will satisfy both trip-hop and new-age artists with plenty of textures and color.

Overall Control

All these samples are further enhanced by good use of Modulation messages for crescendo crossfading, filter sweeps, and brightness, as well as the usual vibrato and Volume (CC #1) for manual dynamics control. A nice touch is that Aftertouch is available for vibrato on many patches.



Spectrasonics' *Symphony of Voices* is a four-CD set of vocal samples ranging from chant-style intonations to pop-sounding "ooohs" and "aaahs."

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With the PSX-100, the answer is "yes."

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APOGEE ELECTRONICS has a reputation for producing the very best sounding digital conversion products available. You might also think of us as being quick off the mark. But in fact, we think very carefully before we release a new product.

That's how it was when we came to design our first 24-bit, 96kHz converter system: the **PSX-100**.

Anyone can make 24 bits dance up and down 96,000 times a second. The question is, does it sound any better? *In many cases, the answer is no* – and to our engineers, there was no point if the sound wasn't significantly improved. So clock circuitry had to be even more rigorously designed to minimize jitter. Analog components required special characteristics to realize the performance we specified. And much more.

We wanted to give our first 96kHz system all the features needed to make it truly indispensable. AES, S/PDIF, ADAT and TDIF I/O for highest flexibility. Bit-splitting for 24-bit, 96kHz mastering to 16-bit, 48kHz MDMs. UV22® for flawless 16- and 20-bit output. Soft Limit® for maximum level without overs. Digital copy, confidence and monitoring modes. Sync to word clock and optional video.

The result: a total stereo conversion solution. ***Fully independent A/D and D/A converters in a single 1U package.***

People kept asking us, "Does it do 96kHz?" and we said, "When we're ready, it will." Now, with the **PSX-100**, we're ready. Are you?

APOGEE ELECTRONICS
www.apogeedigital.com

APOGEE ELECTRONICS CORPORATION
3145 Donald Douglas Loop South,
Santa Monica, California 90405, USA.
Tel: +1 310/915-1000 Fax: +1 310/391-6262.
Email: info@apogeedigital.com.

QUICK PICKS

The two 48-page manuals offer lots of tips and tricks, in addition to recounting the entire history of this ambitious project. Very high marks overall to Spectrasonics for a first-class production.

In closing, I should mention that *Symphony of Voices* is the first volume of a two-part series. Demos of volume 2, titled *Vocal Planet,* are included on disc 4 of *Symphony of Voices.* Be prepared for yet another tour de force in the study of the human voice.

Overall EM Rating (1 through 5): 5

CIRCLE #449 ON READER SERVICE CARD

SIGNAL-1 ELECTRONICS

GS-1

By Gino Robair

The GS-1 is a multipurpose cable tester from Signal-1 Electronics that can diagnose shorts, broken or intermittent contacts, and other wiring problems. The tester accepts a variety of common connectors, including ¼-inch stereo and mono, RCA, XLR, and 5-pin DIN (which can be used to test MIDI cables, for instance). It can also check for out-of-phase wiring in XLR cables.

The GS-1 is the size of an average guitar stomp box, and it's portable enough to pack into a gig bag or an instrument case. The unit comes with your choice of a plastic ($129) or aluminum chassis ($169), and it operates on a 9V battery or AC adapter.

On the Face of It

The combination of heavy-duty Neutrik connectors and an aluminum faceplate make the GS-1 a sturdy unit. The front panel is divided into two sections, one for each side of the cable. All connectors are female, with the exception of one male XLR plug.

Eight LEDs on the GS-1 tell you everything you need to know. Five green LEDs correspond to the number of leads in the cable. For an XLR or TRS cable, the first three green lights are used, and these are appropriately labeled as sleeve, tip, and ring. The fourth and fifth lights are added for 5-pin DIN cables. The three red LEDs indicate a short in the cable, the status of the battery, and the duration of the test.

Get Shorty

Using the GS-1 is simple. You just plug each end of the cable into the appropriate jack and press Test. The test lasts for 15 seconds, giving you plenty of time to twist and bend each part of the cable. The GS-1 circuitry scans the wires in the cable at high speed, using a 2 mA signal. A green LED lights when the connection in a wire is good. A dim or flickering light indicates an intermittent problem. If the GS-1 notices a short in the wiring, the Short LED illuminates, and the green LEDs light to indicate which wires are shorting.

The GS-1 can test combination cables (such as XLR-to-¼-inch stereo) and multiple or split cables (for example, XLR split to a ¼-inch mono pair). You can also use adapters to test cables that aren't represented on the unit, such as mini- and microplugs. To check the phase of XLR cables with the GS-1, you need to connect a mono, ¼-inch adapter to the male end. This is a bit of a nuisance, but it's the only complaint I have with the GS-1. Just remember to pack the adapter when you're out in the field.

Look Ma, No Hands

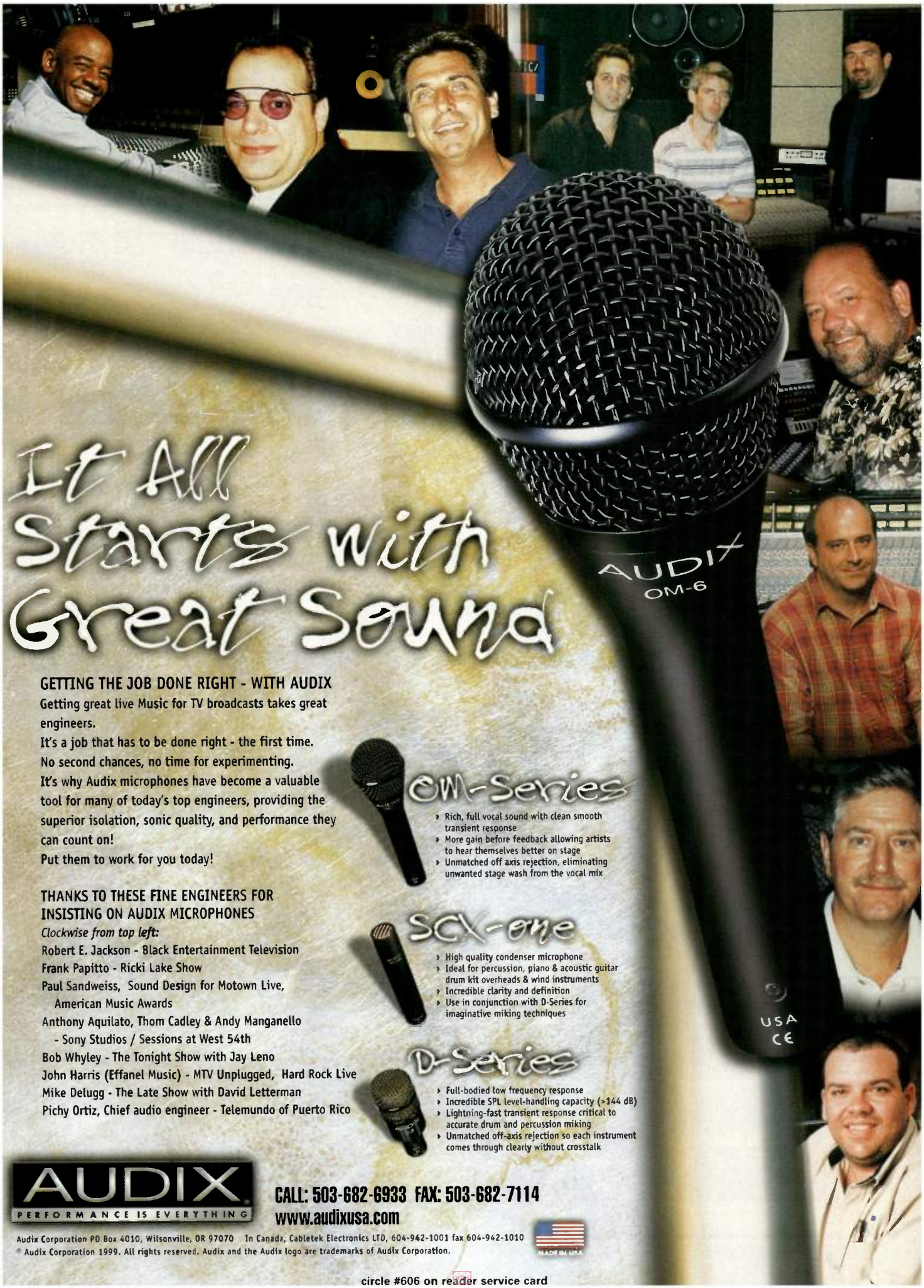
If you're used to testing cables with a volt meter, you'll appreciate using the GS-1, especially on cables with tiny leads, such as MIDI cables. The tester frees your hands so you can wiggle different portions of the cable and hunt for hidden defects, and it tells you at a glance whether your 5-pin DIN cable has all five pins connected or just the three middle pins required by the MIDI specification.

The GS-1 is quick and easy to use. Its durability and size make it ideal for the performing musician, and it's a device that will surely pay for itself with the amount of time it saves you.

The GS-1 from Signal-1 Electronics is a compact and roadworthy tester for cables with XLR, RCA, MIDI, and ¼-inch jacks.

Overall EM Rating (1 through 5): 4

CIRCLE #450 ON READER SERVICE CARD



It All Starts with Great Sound

GETTING THE JOB DONE RIGHT - WITH AUDIX

Getting great live Music for TV broadcasts takes great engineers.
It's a job that has to be done right - the first time.
No second chances, no time for experimenting.
It's why Audix microphones have become a valuable tool for many of today's top engineers, providing the superior isolation, sonic quality, and performance they can count on!
Put them to work for you today!

THANKS TO THESE FINE ENGINEERS FOR INSISTING ON AUDIX MICROPHONES

Clockwise from top left:
Robert E. Jackson - Black Entertainment Television
Frank Papitto - Ricki Lake Show
Paul Sandweiss, Sound Design for Motown Live, American Music Awards
Anthony Aquilato, Thom Cadley & Andy Manganello - Sony Studios / Sessions at West 54th
Bob Whyley - The Tonight Show with Jay Leno
John Harris (Effanel Music) - MTV Unplugged, Hard Rock Live
Mike Delugg - The Late Show with David Letterman
Pichy Ortiz, Chief audio engineer - Telemundo of Puerto Rico

OM-Series

- Rich, full vocal sound with clean smooth transient response
- More gain before feedback allowing artists to hear themselves better on stage
- Unmatched off axis rejection, eliminating unwanted stage wash from the vocal mix

SCX-one

- High quality condenser microphone
- Ideal for percussion, piano & acoustic guitar drum kit overheads & wind instruments
- Incredible clarity and definition
- Use in conjunction with D-Series for imaginative miking techniques

D-Series

- Full-bodied low frequency response
- Incredible SPL level-handling capacity (>144 dB)
- Lightning-fast transient response critical to accurate drum and percussion miking
- Unmatched off-axis rejection so each instrument comes through clearly without crosstalk

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HARD DISK RECORDERS

Roland VS1680 Digital Production Studio

New

The new VS-1680 Digital Studio Workstation is a complete 16 track, 24-bit recording, editing, mixing and effects processing system in a compact tabletop workstation. With its advanced features, amazing sound quality and intuitive new user interface, the VS-1680 can satisfy your *wanderlust*.

FEATURES–
- 16 tracks of hard disk recording, 256 virtual tracks.
- 24-bit MT Pro Recording Mode for massive headroom and dynamic range.
- Large 320 x 240 dot graphic LCD provides simultaneous level meters, playlist, EQ curves, EFX settings, waveforms and more.
- 20-bit A/D D/A converters
- 2 optional 24-bit stereo effects processors (VS8F-2) provide up to 8 channels of independent effects processing.
- 12 audio outs: 8x RCA, 2x stereo digital & phones.
- New EZ routing function allows users to create and save various recording, mixing, track bouncing, and other comprehensive mixer templates for instant recall.
- 10 audio inputs: 2 balanced XLR-type inputs w/ phantom power, 6 balanced 1/4" inputs, and 1 stereo digital input (optical/coaxial)
- Direct audio CD recording and data backup using optional VS-CDR-16 CD recorder.

KORG D8 Digital Recording Studio

New

The new D8 Digital Recording Studio features an 8-track recorder, a 12-channel mixer, onboard effects, and basically everything else you'll need to record and mix your music, you supply the talent.

FEATURES–
- 8-track recorder, 12-channel mxer.
- 1.4GB hard disk for up to 4.5 hours of recording on a single track.
- High and low EQ on each channel.
- 130 high-quality stereo digital effects for complete recording in the digital domain.
- MIDI clock sync, SCSI port and S/PDIF digital interfaces all standard.

DIGITAL MULTI-TRACK RECORDERS

TASCAM DA-98 Digital Audio Recorder

The DA-98 takes all the advantages offered by the DTRS format and significantly ups the ante for the professional and post-production professional alike. With enhanced A/D and D/A convertors, a comprehensive LCD display and full compatibility with the DA-88 and DA-38, the DA-98 delivers the absolute best in digital multitrack functionality.

FEATURES–
- Confidence monitoring for playback and metering
- Individual input monitor select switch facilitates easier checking of Source/Tape levels
- Switchable reference levels for integration into a variety of recording environments with internal tone generator
- Digital track copy/electronic patch bay functionality
- Comprehensive LCD display for easy system navigation
- Dedicated function/numeric keys make operation easier
- Built-in sync with support for MMC and Sony P2
- D-sub connector (37-pin) for parallel interface with external controller
- Optional RM-98 rack-mount ear for use with Accuride 200 system

DA-88 A standard digital multitrack for post-production and winner of the Emmy award for technical excellence, the DA-88 delivers the best of Tascam's Hi-8 digital format. Its Shuttle/Jog wheel and track delay function allow for precise cueing and synchronization and the modular design allows for easy servicing and performance enhancements with third-party options.

DA-38 The DA-38 was designed for musicians. Using the same Hi-8 format as the highly acclaimed DA-88, the DA-38 is an 8 track modular design that sounds great. It features an extremely fast transport, compatibility with Hi-8 tapes recorded on other machines, rugged construction, ergonomic design and sync compatibility with DA-88s.

ALESIS ADAT XT20 Digital Audio Recorder

New

The New ADAT-XT20 provides a new standard in audio quality for affordable professional recorders while remaining completely compatible with over 100,000 ADATs in use worldwide. The XT20 uses the latest ultra-high fidelity 20-bit oversampling digital converters for sonic excellence, it could change the world.

FEATURES–
- 10-point autolocate system
- Dynamic Braking software lets the transport quickly wind to locate points while gently treating the tape.
- Remote control
- Servo-balanced 56-pin ELCO connector
- Built-in electronic patchbay
- Copy/paste digital edits between machines or even within a single unit. Track Copy feature makes a digital clone of any track (or group of tracks) and copies it to any other track (or group) on the same recorder.

CD RECORDERS

HHB CDR-800 Compact Disc Recorder

The new CDR-800 Compact Disc Recorder from HHB is built rock-steady for the best recording on this widely accepted format. You can record direct from either analog or digital sources and it comes loaded with features, making it ideal for professional studios looking to output quality CDs.

FEATURES-
- Built-in Sample rate converter
- Analog and digital inputs and outputs
- 1-bit A/D converters for lowest possible distortion
- Synchronized recording and editing
- Digital fader for natural fade-in and fade-out.

STUDIO DAT-RECORDERS

Panasonic SV-3800 & SV-4100

The SV-3800 & SV-4100 feature highly accurate and reliable transport mechanisms with search speeds of up to 400X normal. Both use 20-bit D/A converters to satisfy even the highest professional expectations. The **SV-4100** adds features such as instant start, program & cue assignment, enhanced system diagnostics, multiple digital interfaces and more. Panasonic DATs are found in studios throughout the world and are widely recognized as the most reliable DAT machines available on the market today.

FEATURES–
- 64x Oversampling A/D converter for outstanding phase characteristics
- Search by start ID or program number
- Single program play, handy for post.
- Adjustable analog input attenuation, +4/-10dBu
- L/R independent record levels
- Front panel hour meter display
- 8-pin parallel remote terminal
- 250x normal speed search

TASCAM DA-30MKII

A great sounding DAT, the DA-30MKII is a standard mastering deck used in post-production houses around the world. Among many other pro features, its DATA/SHUTTLE wheel allows for high-speed cueing, quick program entry and fast locating.

FEATURES–
- Multiple sampling rates (48, 44.1, and 32kHz).
- Extended (4-hour) play at 32kHz.
- Digital I/O featuring both AES/EBU and S/PDIF.
- XLR balanced and RCA unbalanced connections.
- Full function wireless remote.
- Variable speed shuttle wheel.
- SCMS-free recording with selectable ID.
- Parallel port for control I/O from external equipment.

Fostex D-15

The new Fostex D-15 features built in 8Mbit of RAM for instant start and scrubbing as well as a host of new features aimed at audio post production and recording studio environments. Optional expansion boards can be added to include SMPTE and RS-422 compatibility, allowing the D-15 to grow as you do.

FEATURES–
- Hold the peak reading on the digital bargraphs with a choice of 5 different settings
- Set cue levels and cue times
- Supports all frame rates including 30df
- Newly designed, 4-motor transport is faster and more efficient (120 minute tape shuttles in about 60 sec.)
- Parallel interface • Front panel trim pots in addition to the level inputs

D-15TC & D-15TCR

The D-15TC comes with the addition of optional chase and sync capability installed. It also include timecode reading and output. The D-15TCR comes with the further addition of an optional RS-422 port installed, adding timecode and serial control (Sony protocol except vari-speed)

SONY PCM-R500

Incorporating Sony's legendary high-reliability 4D.D. Mechanism, the PCM-R500 sets a new standard for professional DAT recorders. The Jog/Shuttle wheel offers outstanding operational ease while extensive interface options and multiple menu modes meet a wide range of application needs.

FEATURES–
- Set-up menu for preference selection. Use this menu for setting ID6, level sync threshold, date & more. Also selects error indicator.
- Includes 8-pin parallel & wireless remote controls
- SBM recording for improved S/N (*Sounds like 20bi*
- Independent L/R recording levels
- Equipped with auto head cleaning for improved sound quality.

MIDI HARDWARE

Mark of the Unicorn

MIDI Time Piece™ AV
8x8 Mac/PC MIDI Interface

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

FEATURES–
- 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 high-speed MIDI data transfer.

Digital Time Piece™
Digital Interface

Think of it as the digital synchronization hub for your recording studio. The Digital Timepiece provides stable, centralized sync for most analog, digital audio, and video equipment. Lock together ADATs, DA-88's, ProTools, word clock, S/PDIF, video, SMPTE, and MMC computers and devices flawlessly. It ships with "Clockworks" software which gives you access to its many advanced features and remote control of some equipment settings such as record arm.

OPCODE

Studio 64XTC
Mac/PC MIDI Interface

The Studio 64XTC takes the assorted, individual pieces of your studio-your computer, MIDI devices, digital and analog multitracks and even pro video decks, and puts them all in sync.

FEATURES–
- 4 In / 4 Out, 64 channel MIDI/SMPTE interface/patchbay with powerful multitrack & video sync features
- ADAT sync with MIDI machine control
- Simultaneous wordclock and Superclock output, 44.1kHz or 48kHz for perfect sync with ADAT, DA-88 and ProTools
- Video and Blackburst in (NTSC and PAL)
- Cross-platform Mac and Windows compatibility

SAMPLING

AKAI S-Series
Rack Mount Samplers

Starting with 64X oversampling, Akai's S-Series Samplers use 28-bit internal processing to preserve every nuance of your sound and the outputs are 18- and 20-bit to ensure reproduction of your sounds entire dynamic range. These three new samplers add powerful capabilities, ease-of-use, expandability and affordability to set the standard for professional samplers.

KEYBOARDS & SOUND MODULES

Roland

XP60 & XP80 Music Workstations

The XP-80 delivers everything you've ever wanted in a music workstation. An unprecedented collection of carefully integrated features provide instant response, maximum realtime control and incredible user expandability. The XP-80 features a pro-quality 76-note weighted action keyboard while the NEW XP-60 features the same sound engine in a 61-note keyboard.

XP80 FEATURES–
- 64-voice polyphony and 16-part multitimbral capability
- 16 Mbytes of internal waveform memory; 80Mbytes when fully expanded (16-bit linear format)
- 16-track MRC-pro sequencer with direct from disk playback. Sequencer holds approx. 60,000 notes
- New sequencer functions like "non-stop" loop recording and refined Groove Quantize template
- Enhanced realtime performance capability with advanced Arpeggiator including MIDI sync and guitar strum mode and Realtime Phrase Sequence (RPS) for on-the-fly triggering of patterns
- 40 insert effects in addition to reverb and chorus
- 2 pairs of independent stereo outputs; click output jack with volume knob
- Large backlit LCD display

SR-JV80 Series Expansion Boards

New

Roland's SR-JV80-Series wave expansion boards provide JV and XP instrument owners a great-sounding, cost-effective way to customize their instruments. Each board holds approx. 8Mb of entirely new waveforms, ready to be played or programmed as you desire.

Boards Include–
Pop, Orchestral, Piano, Vintage Synths, World, Super Sound Set, Keys of the 60's & 70's, Session, Bass & Drums, Techno & Hip-Hop Collection.

KURZWEIL

K2500 Series Music Workstations

The K2500 series from Kurzweil utilizes the acclaimed V.A.S.T. technology for top-quality professional sound. Available in Rack mount, 76-key, and 88 weighted key keyboard configurations, these keyboards combine ROM based samples, on-board effects, V.A.S.T. synthesis technology and full sampling capabilities on some units.

FEATURES–
- True 48-voice polyphony
- Fluorescent 64 x 240 backlit display
- Up to 128MB sample memory
- Full MIDI controller capabilities
- 32-track sequencer
- Sampling option available
- Dual SCSI ports
- DMTi Digital Multitrack interface option for data format and sample rate conversion (Interfaces with ADATs or DA-88s)

KORG

Trinity Series Music Workstations DRS

Korg's Trinity Series represents a breakthrough in sound synthesis and an incredible user interface. It's touch-screen display is like nothing else in the industry, allowing you to select and program patches with the touch of a finger. The 24MB of internal ROM are sampled using ACCESS which fully digitizes sound production from source to filter to effects. Korg's DSP based Multi Oscillator Synthesis System (MOSS) is capable of reproducing 5 different synthesis methods like Analog synthesis, Physical Modeling, and variable Phase Modulation (VPM).

FEATURES–
- 16 track, 80,00 note MIDI sequencer
- Flexible, assignable controllers
- **DRS (Digital Recording System)** features a hard disk recorder and various digital interfaces for networking a digital recording system configured with ADAT, DAT recorder and hard disk.
- 256 programs, 256 combinations
- Reads KORG sample DATA library and AKAI sample library using optional 8MB Flash ROM board

TRINITY *88 Weighted-key/Solo Synth*
TRINITY *76-key/Solo Synth*
TRINITY *61-key/Solo Synth*
TRINITY *61-key*

(Digital IF, SCSI, Hard Disk Recorder, and sample Playback/Flash ROM functions are supplied by optional upgrade boards)

MONITORS

Hafler

TRM-8

Winner of Pro Audio Review's PAR Excellence Award in 1997, Hafler's TRM8s provide sonic clarity previously found only in much more expensive speakers. They feature built-in power, an active crossover, and Hafler's patented Trans•nova power amp circuitry.

- 45Hz - 21kHz, ±2dB
- 75W HF, 150W LF
- Electronically & Acoustically matched

MACKIE.

HR824

These new close-field monitors from Mackie have made a big stir. They sound great, they're affordable, they're internally bi-amped. "What's the catch?" Let us know if you find one.

FEATURES-
- 150W Bass amp, 100W Treble amp
- Full space, half space and quarter space placement compensation
- Frequency Response 39Hz to 22kHz, ±1.5dB

TANNOY

Reveal

New

The latest playback monitor from Tannoy, the Reveal has an extremely detailed, dynamic sound with a wide, flat frequency response.

FEATURES-
- 1" soft dome high frequency unit
- Long throw 6.5" bass driver
- Magnetic shielding for close use to video monitors
- Hard-wired, low-loss crossover
- Wide, flat frequency response
- Gold plated 5-way binding post connectors

SOUND CARDS

digidesign AVID
A Division of Avid Technology, Inc.

Audiomedia III
Digital Audio Card

Working on both Mac and Windows OS systems, Audiomedia III will transform your computer into an powerful multitrack workstation. Compatible with a wide variety of software options from Digidesign and Digidesign development partners, Audiomedia III features 8 tracks of playback, up to 4 tracks of recording, 24-bit DSP processing, multiple sample rate support and easy integration with leading MIDI sequencer/DAW software programs.

Tower of Power.

Put your entire recording studio inside this powerful machine.

Imagine a day when you sit at an uncluttered desk with a computer on it. You begin to create music. And you do it all — sound design, sampling, synthesis, recording, editing, mixing, effects processing and mastering — entirely in the computer.

That day is here.

The computer is Apple's new "Blue" Power Macintosh, the fastest personal computer on the planet — fast enough to run all of the components of a "virtual" recording studio.

The software is Mark of the Unicorn's Digital Performer 2.6, your "command center" for MIDI sequencing, hard disk audio recording, editing, mixing, effects processing & mastering.

For your virtual sampler and synthesizer, there's Unity DS-1 and Retro AS-1, the powerful new software instruments from BitHeadz.

For effects processing, throw in dozens of world-class plug-ins from today's leading DSP developers, including Waves, Antares, DUY, Arboretum and more.

Need I/O? MOTU has a complete line of USB MIDI interfaces and the latest breakthrough in hard disk recording, the expandable 2408 audio interface.

If you've got to have the feel of real faders under your fingers, there's Mackie's brilliant HUI mixing interface with full automation. And it's now seamlessly integrated with the complete virtual mixing environment in Digital Performer 2.6.

Store and back up your projects with the most reliable name in storage: Glyph Technologies.

And to help you bring it all together, talk to the experts at Sweetwater Sound, who can get you going quickly and efficiently.

So call Sweetwater today and turn your daydream into a dream come true.

MOTU
Digital Performer 2.6
Your "command center" for sequencing and recording

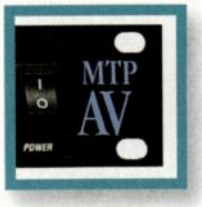
BitHeadz
Unity and Retro
Software sampler and analog synth

Waves
Native Power Pack I/II
World-class effects processing

Antares
AutoTune plug-in
The 'holy grail' of perfect intonation

DUY
Native plug-in bundle
More world-class effects processing

Arboretum
Ionizer
"Frequency morphing" and other advanced FX



MOTU
MIDI interfaces
All the MIDI I/O you'll ever need

MOTU
2408 audio interface
All the audio I/O you'll ever need

Mackie Designs
HUI control surface
Touch senstive flying faders (if you've gotta have 'em)

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What do you get when you combine a Windows computer with Mark of the Unicorn's 2408 hard disk recorder? You get an astounding, creative tool with a universe of powerful options for composing, editing, and recording.

Add hard drives, backup, and CD burning from *Glyph*, and software from *Steinberg*, *Sonic Foundry*, *BitHeadz*, *Waves*, and *Antares* for a comprehensive desktop studio!

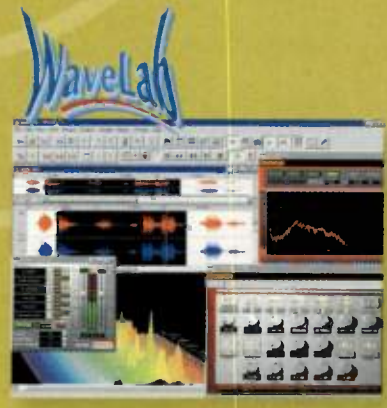
We do Windows ...together

Steinberg

Producer Pac / 24
Want the world's hottest PC software for recording, producing, mixing, and mastering your music in stunning 24-bit/96kHz resolution? Steinberg's Producer Pac / 24 brings together all of these top programs at a tremendous discount—over 50% off! And if you purchase Producer Pac / 24 from Sweetwater by September 1, 1999, you get the Magneto analog tape emulator plug-in at no extra charge—an additional value of $199, available only from Sweetwater Sound!

Cubase VST / 24
VST is the hub of your MIDI/Audio world. Often copied but never duplicated, Cubase defines graphic arranging and realtime MIDI effects. VST / 24 is the latest advancement with full 24-bit capability and powerful VST audio processing—another Steinberg-created standard!

FreeFilter
Spectral Design's FreeFilter boasts 30 (that's thirty!) bands of graphic EQ in either linear or logarithmic modes. The really cool thing about FreeFilter is that it can actually lift the EQ characteristics from one piece of audio, and apply it to another! Don't try that trick with any hardware EQ!



WaveLab
Far more than a stereo audio editor, WaveLab's extraordinary accuracy and unmatched plug-in support give you tremendous mastering capabilities. One of our clients traded in their $70,000, dedicated mastering "solution" in favor of WaveLab. Why? The sound is silky smooth with up to 64-bit internal processing (that's 1024 times the resolution of a 16-bit editor), operation is lightning-fast, extensive plug-in support gives it more processing power, and it runs on the same PC as your sequencer. WaveLab also features advanced file analysis, an extensive audio database, and the ability to burn Red Book audio CDs that are ready for duplication.

Wave's Renaissance Compressor is one of the most highly regarded audio processors ever. Use it on individual tracks or your entire mix—wherever you want amazing sound.

MOTU

Turn the page to discover more wonderful Windows opportunities!

The undisputed price/performance leader for multiple output Windows audio.

Why is the 2408 such a huge, world-wide hit? Its 24 channels of simultaneous input and output for under $1,000 is simply unmatched by any other device. You get analog I/O, digital I/O and tons of advanced features.

GLYPH TECHNOLOGIES, INC.

In Glyph We Trust!

We here at Sweetwater Sound can honestly say that we have enjoyed unrivaled performance from Glyph and give them our highest recommendation.

Put your drives and DigDAT™ backup in the same bay with Glyph's road-tested rackmounts.

It's essential to understand that not all hard drives are created equal! For the maximum number of playback tracks and plug-ins with error-free operation, you need a serious drive that has been specifically tested for digital audio with today's advanced audio software. While that "budget" drive in the PC catalog may be fine for word processing, your music demands bulletproof performance. You'd never trust the cheapest no-name tapes. A premium-quality hard drive is just as important. Glyph consistently combines top components, heavyweight construction, comprehensive testing, and stellar tech support to create the most trustworthy storage devices you can own. Plus, they are available in road-worthy rackmounts—perfect for your pro audio rig!

Want Fast, Painless Backup?

Nowhere is reliable backup more essential than with your original music. If you lose your files, they're gone forever! Don't like the hassles of backing up? That's why Glyph's DigDAT is such a fundamental foundation for your rig. Easily backup large sessions onto a single DAT tape. Confidently archive and retrieve your tracks quickly, without headaches or days of down time. Backup may not be "sexy," but nothing will win you more creative time than avoiding even a single devastating crash. Adding a Glyph DigDAT is perhaps the single best favor you can do for your music!

Which Glyph Drive is Right for You?

4 Gig? 9 Gig? 18 Gig? Fast & Wide? Ultra-Wide? The choices can be staggering. That's why your Sweetwater Sales Engineer will work with you to determine the best approach for your personal needs, rather than stick you with a cookie-cutter "solution."

...store in a cool place.

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WRH

Step 1: Start with a Windows computer.
Step 2: Add the MOTU 2408 recording system.
Step 3: Combine with software from Steinberg, Sonic Foundry, BitHeadz, Waves, and Antares.
Step 4: Complete with a robust Glyph hard drive, DAT backup, and CD-Burner.
Step 5: Serve hot and enjoy astonishing power!

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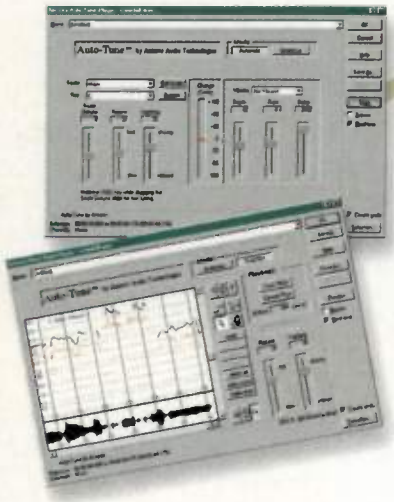

Auto-Tune Pitch Corrector—Now for Windows!

When Auto-Tune first hit the market as a TDM plug-in just a short while ago, the response was truly amazing. Delivering intelligent intonation correction without robotic side-effects, Auto-Tune was so good, folks were purchasing $8,000 systems just to run it! Now the full version of Auto-Tune is available as a DirectX plug-in to use with your Windows audio rig. Correct intonation problems in vocals or solo instruments in realtime, without distortion or artifacts, while preserving all of the expressive nuances of the original performance. Auto-Tune gives you both Automatic and Graphic Modes to fine-tune your fine-tuning! And the pros all love Auto-Tune because the only sonic difference between what goes in and what comes out is the intonation.

"Holy Grail of recording"—Recording Magazine

Sonic Foundry Mastering House

While Mastering House is an incredible collection of professional mastering tools, that's just the beginning. It also brings you brilliant creative capabilites you can use at every stage of the recording process. This new bundle saves you a bundle as well! Let's step inside:

Sound Forge 4.5—Your host? The award-winning Sound Forge Audio Editor of course! It slices! It dices! It sets the standard for editing Windows audio. Great with the 2408 or any Windows soundcard. MC Sound Forge also serves up steaming loops and DSP effects.

CD Architect—Who's spinning the tunes? Why it's CD Architect! Design and build your own audio CDs with speed and precision. You'll rave about the drag-and-drop playlists. Exacting control of crossfades, track markers, EQ, compression, and support for both SCSI and ATAPI/IDE burners help you perfect your master CD.

XFX 1 & 2—Take your sound out of bounds with the XFX 1 & 2 collections of amazing audio plug-ins. Noise Gate, Multi-band Dynamics, Compression/Expansion, EQ, Reverb, Time Compresssion, Pitch Shift and Chorus effects — whew! From tracking to mixing to mastering, you'll use these processors day in and day out.

More Sonic Foundry Software & Plug-ins

ACID—"The coolest, easiest way to remix," proclaims acclaimed remixer Doug Beck. "True innovation," says Craig Anderton in EQ magazine. Feeling the fervor even further is Jeff Mac of Audio Media magazine who writes, "ACID is an absolute godsend." But Jeff, how do you really feel? Electronic Musician magazine took the easy way out and simply awarded it a 1999 Editor's Choice Award. No matter how you try to describe it, ACID burns through your preconceptions about creating music with a battery of realtime tools. Seamlessly mix & match tempos and pitch from drastically different loops without dropping a beat!

Noise Reduction—Got 60-cycle nasties, annoying clicks & pops, or horrible hums & rumbles? You could spend the rest of your natural life redrawing waveforms by hand. Or you could simply reach for Noise Reduction. It works wonders restoring "damaged" audio. About the only thing Noise Reduction can't quiet down is our enthusiasm for it!

Acoustic Mirror—Tired of the same old Reverb? Acoustic Mirror adds the acoustical coloration of real environments and sound-altering devices to your recordings with uncanny realism and stereo imaging. Simulate everything from large concert halls to vintage tube mics, or generate new effects. It includes an extensive library of high-quality acoustics "signatures" from a wide variety of environments.

24 I/O, ADAT, TDIF, S/PDIF, Word Clock and more—under $1,000!
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Unity & Retro—Superb Sampler & Software Synth!
BitHeadz is storming the sound module world with unrivaled software sampling and synthesis. Using the power of your Windows computer, Unity and Retro simply blow away hardware approaches when it comes to both features and price performance. These are some of the most exciting products we've encountered in a long time. And with the multiple high-quality outputs of the MOTU 2408, you get everything you need to make Unity and Retro really sing! Both are ASIO and Direct Sound compatible.

Unity—The power and convenience of a full-screen software environment combined with awesome 24-bit, phase-locked stereo sampling! Imports 16 or 24-bit .WAV, .AIF, Akai S-100, CD-Audio, SoundForge 2.0, Sound Designer I/II, Sample Cell I/II and more. Cross-switch up to 128 samples per note. Simultaneously loads from disk while playing. Built-in digital audio editor. Includes over 250MB of sounds with instruments, loops & GM bank.

Retro—Transform your computer into perhaps the most powerful analog synthesizer ever devised. You get three oscillators per voice (plus LFOs) with any of 9 continuously variable waveforms. That's simply unrivaled flexibility! Use the 2 filters with 13 filter types in series or parallel. Includes Frequency and Cutoff (Poly Mod) modulation. Enjoy realtime control of every parameter simultaneously with MIDI. You even get 1,000 classic analog patches to get you going right away.

Native Power Packs
Waves is the most respected name in audio processing plug-ins. Once available only to the fortunate few, they've brought their delicious line of processors to Windows native audio in two great Native Power Pack bundles. Get both for a comprehensive collection of extreme fidelity software processors. Compatible with all the top Windows audio programs including Cubase VST, Sound Forge and WaveLab.

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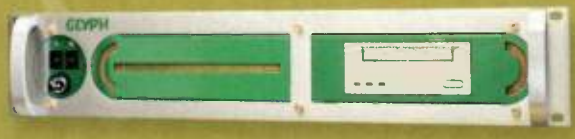

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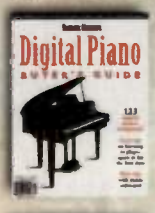

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FINAL MIX

By Larry the O

The Creative Cycle

When I compose, practice, mix, design sounds, or write, I need to be by myself. Depending on the task at hand, my self-imposed solitude can last anywhere from hours to months. Upon completion of the project, however, I become a social animal, hanging out with my friends, partying, goofing around town, and generally being a roustabout. After a while, I tire of that, and ideas for another project start bubbling up in my brain.

Having gone around this block many times, I began to wonder whether other creative people I know go through the same pattern. Although some of my acquaintances certainly don't fit that profile, I became intrigued with finding out how many of them did. Reflection yielded an interesting theory, which I call the Creative Cycle. To explain the Creative Cycle accurately, I must digress for a moment.

For a number of years, I searched for a satisfying definition of the term *music*. The characteristics of melody, harmony, and rhythm are great, but some of the music I liked did not display these elements, at least not in any traditional sense. I believe it was John Cage who once defined music as *organized sound;* Cage's definition comes closer, but it could just as easily apply to a politician's stump speech. The problem with such definitions is that they describe music in terms of its mechanics but say nothing about its *purpose.*

Finally, a more useful definition came to me one day, and the more I thought about it, the more it worked for me. Music, in my mind, is *a sonic expression of the human experience.* Good music conveys this essence well, which is why certain music can move people so deeply. As much as you may enjoy listening to the crashing surf, wolf howls, or whale songs, only humans make music.

The politician's speech or the preacher's sermon may sound musical, but the content is in the words: they are *verbal* expressions, enhanced with a musical delivery. Vocal music, even a cappella, gains its expressiveness as much from the sound of the voice as from the words; witness the Rolling Stones' lyrics, buried in the mix.

This definition is the key to understanding the Creative Cycle. My theory is that a creative person must live a while to gather the experiences from which they will draw their inspiration. (How, you might ask, do you explain prodigies, who generate incredible artistic works at very young ages? I don't. Prodigies are a mystery and an exception to many rules, including the one I just put forth.) But life does not come in measured doses, timed to allow events to be fully digested. It usually comes fast and furious, and the more time one spends around others in social activities, the more stimulation and distraction manifest themselves.

In order to forge those life experiences into a creative work, it is necessary to reduce the level of input so that impressions can form and insight emerge to guide the creative process. Thus, artists must isolate themselves, hiding away in their studios, garrets, or wherever they do their thing.

The process of bringing a creative work into the world bears some allegorical similarities to giving physical birth. By the time the work is finished, the artist is toast: completely sick of the project and tired of being alone all the time. The mere thought of plunging into another work right away is anathema.

Commercial production environments typically force an artist into the next project right away, which quickly leads to total burnout. If, however, the possibility exists of taking some time off from work, the artist emerges into society—getting back in touch with friends, lounging at cafés, and again soaking up this crazy world in which we live. Then, when the experiential glass is refilled and isolation calls once again, the artist can creatively regurgitate these bits of life as works of art that we all can enjoy.

Larry the O *is no longer a San Francisco-based musician, producer, and engineer. He is still a sound designer at LucasArts Entertainment. He's been grooving heavily on microphones lately.*

ILLUSTRATION BY STEVE CURL

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