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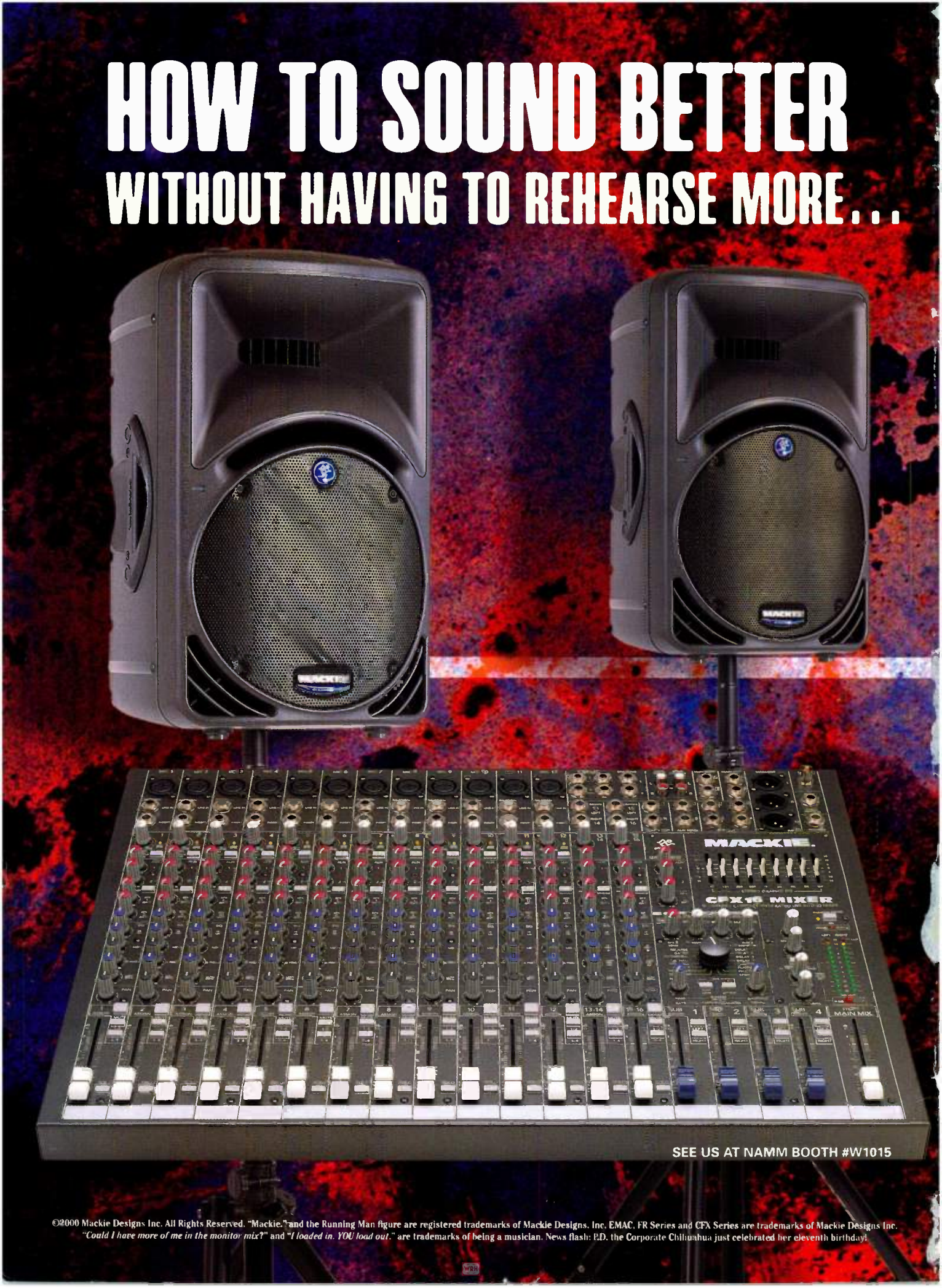
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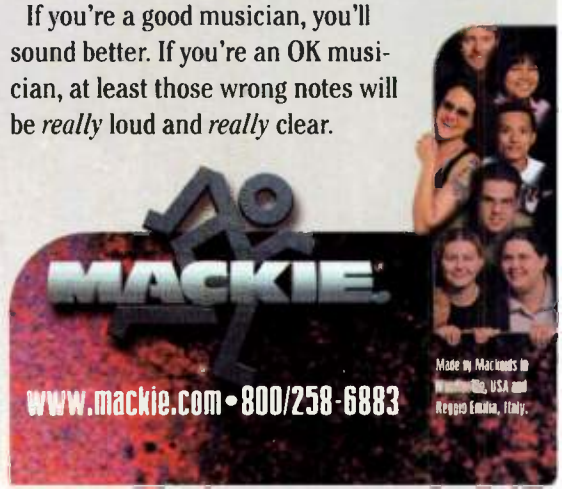

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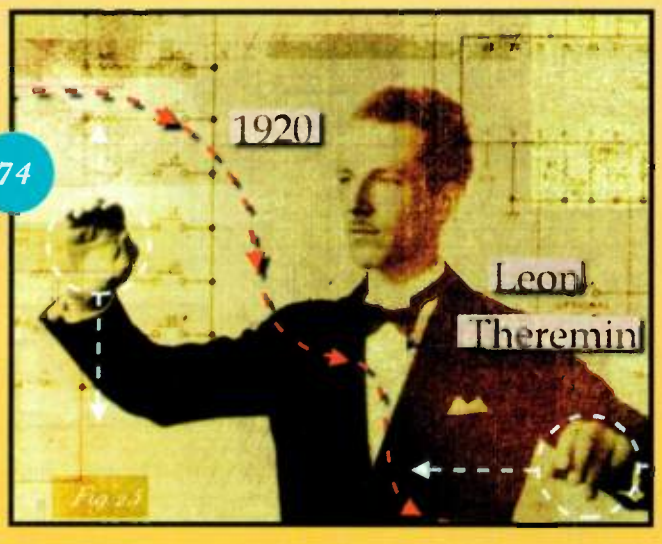

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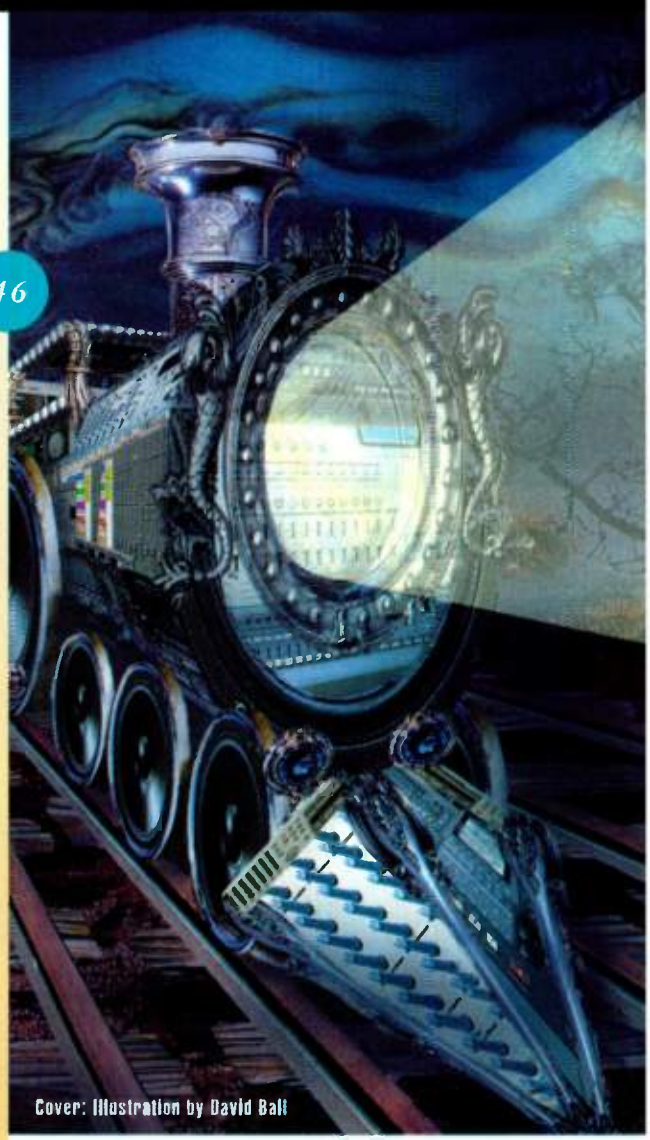

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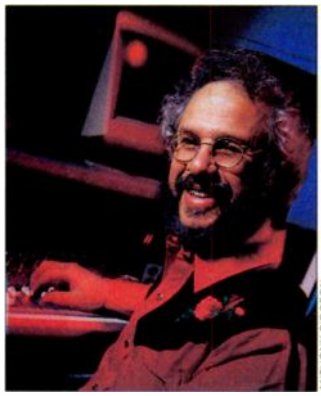
Hear Ye!


ANTHONY PIDGEON

Despite all that has been written and said, a lot of people ignore basic hearing safety. To the extent that they are hurting only themselves, it's their problem, but it's still a drag.

On the other hand, in this era of increased workplace-safety awareness, organizations of music-industry professionals should insist on safe hearing practices at industry trade shows. Large trade shows tend to be loud to start with, and when it comes to music-gear shows, well, making sound is what musicians are about. But an ongoing, high-level sonic assault on our ears (and nerves) is obviously unhealthy, and major trade shows should regulate the sound level. Some do it better than others.

This February issue of **EM** is being distributed at the Winter National Association of Music Merchants show, where guitars, stage amps, drums, horns, and a host of electronic products often join in wild cacophony. NAMM demos and crowd noise can sometimes blur into a loud, ambient buzz that forces voices to rise to the straining point. According to NAMM's rules, the maximum acceptable level at the periphery of a booth is 85 dB SPL, but those rules are loosely and inconsistently enforced. NAMM's "sound police" threaten; they rarely act. I'd guess the ambient noise alone is close to 85 dB SPL. Contrast that with a recent Frankfürt Musikmesse show where, after several warnings, a major manufacturer was told to turn down or have its power cut off.

As a result, enjoying a demo at Winter NAMM can be a chore. It's hard to listen to a conversation, let alone a new effects processor, while a drummer two booths away drowns you in waves of percussion. Sometimes it's even hard to think.

In comparison, the U.S. Audio Engineering Society convention is more moderate. The AES show admittedly is smaller than Winter NAMM and hosts fewer musical-instrument manufacturers. Still, the organization's attitude also must be credited for the show's more bearable sound levels. According to the rules, sound-pressure levels at the boundary of a booth cannot exceed 70 dB, A weighted, and the show's sound police enforce some degree of sonic restraint. Loud demos are supposed to be confined to soundproof booths or banished to separate demo rooms.

AES attendees are also reminded about hearing preservation by the Mix Foundation's annual Technical Excellence and Creativity Awards ceremony, which benefits the House Ear Institute (www.hei.org), a nonprofit research and education center that studies the causes, prevention, and treatment of hearing loss. Although the institute exhibits at NAMM, it does not appear to get much cooperation or encouragement from the association.

Clearly, NAMM needs to get serious about improving the sonic environment at its trade shows. Stricter sound-level rules should be firmly enforced. The use of sound-isolation enclosures, portable acoustic treatment within booths, and acoustically treated, off-floor demo rooms should be encouraged. We might be able to hear all of the demos and conversations clearly for a change!

In the meantime, Winter NAMM attendees can find free earplugs at the House Ear Institute booth and **EM**'s booth (#W201), among others. We're going to need them.

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JANE! STOP THIS CRAZY THING!

As I write this I'm in the middle of working on my first major Hollywood movie and trying to meet the Deadline from Hell. But my thoughts have wandered to Southworth, the hilariously inept '80s manufacturer that couldn't produce a product that actually worked.

Today, in a matter of a few minutes, *Studio Vision* crashed because I dared to use its audio "capabilities"; my E-mu E4 Ultra decided it would no longer save to the same disk it had been saving to for the past week; and my Akai S6000—which never reliably saves its entire 256 MB memory to *any* medium—froze, requiring a 20-minute reload. Then, after I painstakingly rebuilt my session, my Mackie board decided it would not put out sound on one side unless I rebooted!

My point is not that I need an uninterruptible power supply (got one, no dif) or that this is "bad" gear. In fact, it runs the gamut from the usually dependable Mackie to the scandalously flaky Akai. The problem is that, with our increasing reliance on microprocessor-based instruments, the old standards of 99 percent reliable are no longer acceptable. I don't know anyone doing a major project and using his or her gear to its fullest extent who doesn't have a session-stopping experience on a maddeningly regular basis.

I believe that the pro magazines, including **EM**, should make reliability as important a criterion as features or price when evaluating new gear. I'm awfully tired of involuntary beta testing. We consumers need to demand greater accountability from manufacturers on this issue. Otherwise, we face a future of design by Southworth.

Michael Levine
via e-mail

Michael—If you think Southworth was hilarious, you have an admirable sense of gallows humor. That was a grim situation.

I don't remember high-tech products ever being significantly more reliable than they are now. Stability has always been a problem, and we try our best to report bugs and reliability issues. However, you learn a lot more about a product after living with it for a long time than you could possibly pick up in the month or so we get to do our tests. Sometimes a product behaves fine for the entire review period (during which time it is being used on real-world productions), but months later, long after the review has been published, we discover problems. By then, it's too late. But if we take longer for testing, our reviews will be published later, and we get a lot of complaints that they run too late already. What's an editor to do?—Steve O.

LAPTOP LAMENT

I may have sent similar laments your way in the past, but here's another one: why on earth is *everyone* putting out identical PCI-based audio cards and systems, and *no one* putting out a laptop-ready system with a similar feature set? I realize this is not your fault (all you can do is continue to put out a superb magazine about what people *are* doing), but perhaps you can give me a reason for this strange phenomenon.

I cannot believe that I am the only person in the world who thinks a PowerBook or Wintel laptop with a real hip breakout box (say something along the lines of the new Digidesign Digi 001) would be the ultimate portable studio. Is there really so much money in PCI cards that companies must fall all over themselves putting out products that are all pretty much the same? Am I crazy for thinking that someone might make more money by being the first to land a quality product in an empty niche? The box could hook up to a PCMCIA/Cardbus card via something like a FireWire connection, as in the MOTU 2408 series, and manufacturers could even put out a PCI card with multiple connections, like the MOTU series, to complement it. Better yet, just make the thing FireWire compliant. The connection cards already exist for both formats on both platforms! All you have to do is write the drivers!

It seems to me that a box with features similar to those of the Digi 001 (say, ADAT switchable to optical S/PDIF, coaxial S/PDIF and MIDI I/O, some analog I/O with nice A/D/A converters, a couple of phantom-equipped preamps, and a headphone amp thrown in for

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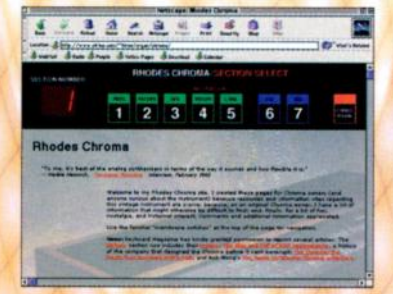
CHRIS RYAN'S RHODES CHROMA SITE

Enthusiasts of the vintage Rhodes Chroma programmable analog synthesizer should check out www.redrooffs.com/chroma/. The site includes Chroma patch downloads and conversion utilities; a list of manuals and how to get them; and information on parts and service, Chroma patch storage and editing software, and MIDI retrofit kits. You can also learn about the Chroma's history, link to related sites, browse through For Sale and Wanted postings, and connect with the online Chroma community through the site's mailing list. Ryan's site can be easily navigated by means of the cool "Chroma membrane switch" section selectors. **EM** editor and long-time Chroma Cultist Steve O. highly recommends this site.



good measure—if it could run at 24/96, groovy, but if not, 24/48 would do just fine) that is also ASIO compliant would compete very well on the PCI platform as is. But if it could be the portable solution as well, why not? Please, somebody, what are you waiting for?

Thanks, end of rant. Love the magazine as usual, keep up the good work.

Tobias Tinker
via e-mail

Tobias—Don't stop ranting! You've got some great ideas, and some manufacturers are starting to see your point. Notebooks have traditionally suffered four disadvantages in the quest to become the ultimate portable studio: a higher price-to-performance ratio; small, slow hard drives; complicated and proprietary designs; and a PC Card (PCMCIA) specification that hates audio. Additionally, there is a lingering perception that there's no market for notebook audio. But recently, notebook prices have plummeted, and notebook performance has caught up to that of desktops, and while the sort of device you've described is still a ways off, we are starting to see some exciting new notebook audio devices.

The PC Card interface has performance potential comparable to the PCI bus, but its audio-unfriendly design and often haphazard implementation by notebook makers have been the ruin of several promising sound cards. (My Web site, members.aol.com/notebooks1, features a tribute to a number of PC Card sound cards that flopped or died on the vine, along with a guide to all current hardware for making music with a notebook.) E-mu's EMU8710ps (Win) is the only surviving self-contained PCMCIA audio/MIDI card. The Vxpocket (Mac/Win) from Digigram is a high-end PC Card audio interface with stereo analog and digital I/O. Ego-Sys's WaMi Box (Win) uses a PC Card in conjunction with a breakout box to provide an impressive array of MIDI and audio features, including four independent analog outputs, a first for notebooks.

The rapid adoption of the Universal Serial Bus (USB) on both Macs and PCs inspired Opcode to create the DATport and SONICports, the first and only audio devices that work not only on both Macs and PCs, but on desktops as well as notebooks. Unfortunately, Opcode's future seems in doubt right now. Roland's UA-100 and UA-30 utilize the USB port as well, but they are currently PC only. One can only hope that more manufacturers will see the economic sense of making such, well, "universal" devices, especially if FireWire catches on with PC makers.

Another exciting option, albeit somewhat pricey and less portable, is a PCI expansion chassis. It connects to your PowerBook's device bay and contains four or more PCI slots into which you can plug your favorite desktop audio device. Magma makes one that's certified by Digidesign for Pro Tools compatibility, and the company is about to release a new model that connects to a Windows notebook's PC Card slot.

I could go on and on—in fact, I already have in this year's Desktop Music Production Guide. *Pick up a copy for a complete roundup of hardware, software, and techniques for notebook music making. And to answer your question directly, you may be crazy but you're not alone. Good luck, and thanks for the kind words.*

By the way, here's an important safety tip: Don't ever say, "All you have to do is write the drivers!" within reach of a programmer. It's like telling a composer, "All you have to do is write a symphony...that you can play on any instrument...in any key...at any tempo...preferably without reading the manual—I mean score."—Brian Smithers

DIY QUESTION

I read Peter Mosher's article on the **EM** level converter in the October 1999 issue of **EM**. Very interesting, but I'm not an engineer. So here's the question: What's the advantage of using a level converter like the one he wrote about versus buying inline transformers? You know, like the ones you buy at Radio Shack that convert ¼" Hi-Z to XLR Low-Z. They're about the size of a cigar and cost around $10.

Is there any advantage to using one or the other? Please educate me. I'm ignorant on the issue.

Cody Griffin
via e-mail

Cody—Thanks for writing. Small, inexpensive matching transformers are fine for low-level, limited-bandwidth signals, but you're going to run into problems if you try to push wide-range, high-level signals through them. When it comes to achieving studio-grade signal matching, you have three options: buy commercially available active units (not cheap), buy top-quality transformers (ditto), or build your own active units, such as those described in my article. Thankfully, it's sometimes possible to find a satisfactory ten-dollar solution to an audio problem at your local electronics shop, but unfortunately, this isn't one of those times.—Peter Mosher

ERROR LOG

December 1999, "What's New," p. 22: We reported that Bomb Factory had, while creating its plug-ins, worked individually with the manufacturers of each hardware device modeled. However, Universal Audio was not included in this process.

November 1999, "What's New," p. 25: The Korg D16 can simultaneously play eight 24-bit tracks, not four.

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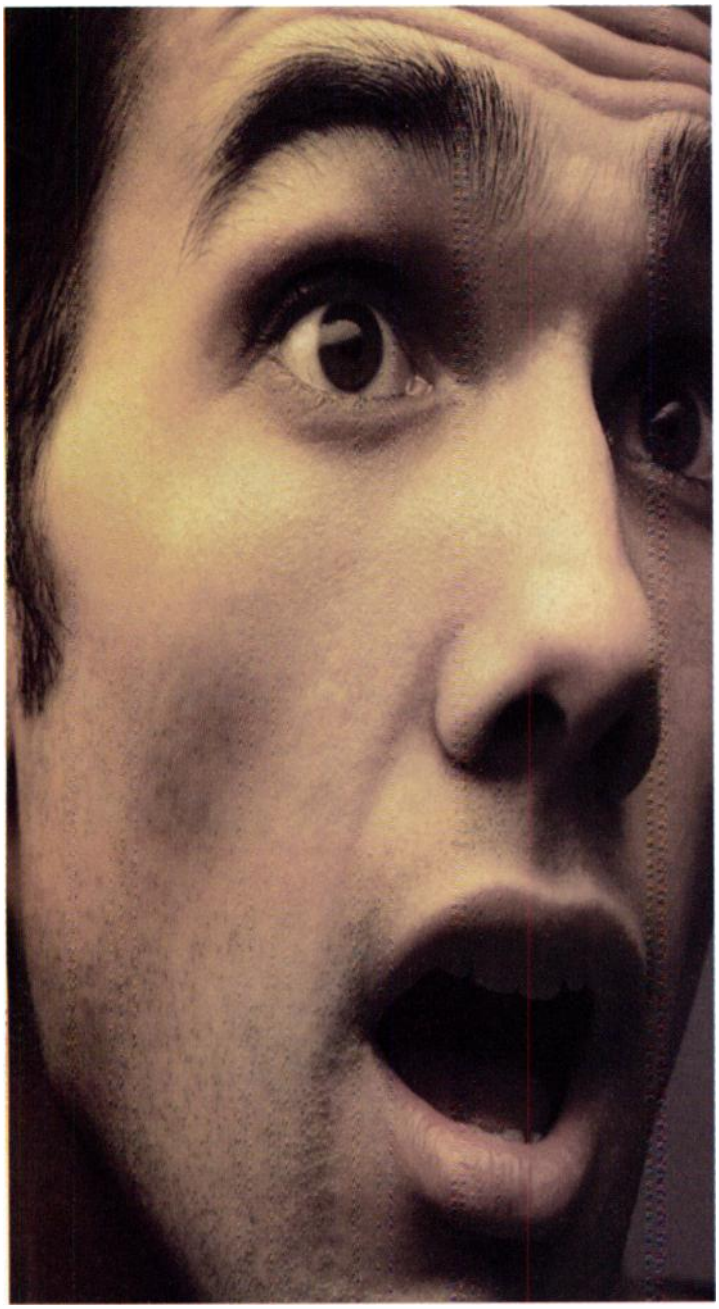

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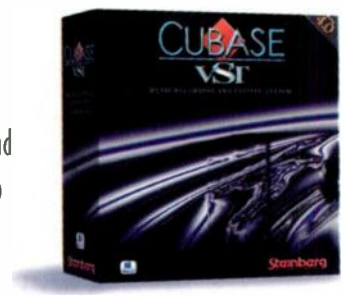

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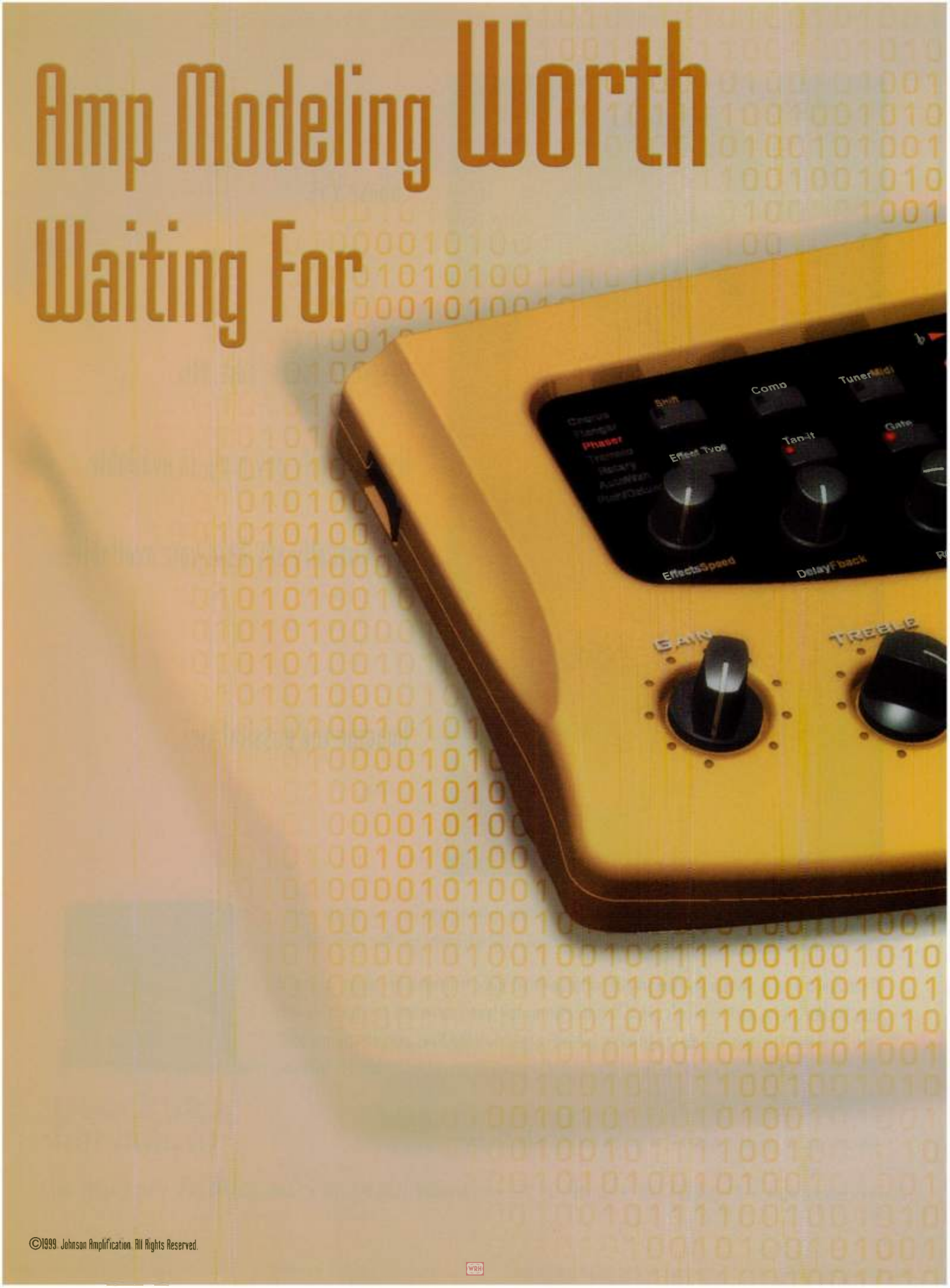

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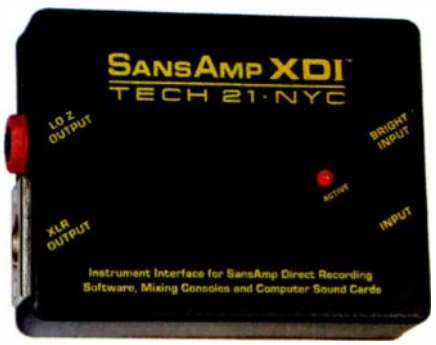
WHAT'S NEW

By the EM Staff



▲ TECH 21 SANSAMP XDI

Tech 21's SansAmp XDI ($95) is a direct injection box that is designed to convert a high-impedance guitar signal to a low-impedance one for input into a computer's sound card or a mixing console. The unit can be used to transmit signal over long cable runs for lowered signal degradation and less induced noise. Its housing is made of cast aluminum measuring just 4.5 × 3.5 × 1.5 inches.

Two inputs are provided: Normal and Bright, both on unbalanced ¼-inch connectors. The Bright input simulates the EQ curve found in tube amps with similar jacks. Output is on both a balanced XLR connector and an unbalanced ¼-inch jack. Both send a low-impedance signal.

The SansAmp XDI can operate under phantom power through the XLR output, or by using a 9 VDC power supply or 9V battery. Tech 21; tel. (212) 315-1116; fax (212) 315-0825; e-mail info@tech21nyc.com; Web www.tech21nyc.com.

▼ DIGITECH VOCALIST VR

With the Vocalist VR ($399.95) from DigiTech, you can add up to four harmony parts to your own vocal. You determine whether additional parts will be above, below, or in unison with your vocal using the unit's Voicing buttons. You can add or delete harmony parts on the fly using any of these buttons, and you can control their relative levels in the mix. The unit also has built-in reverb, with nine reverb types and 50 preset programs. Reverb types include three rooms, three halls, a cathedral, and two plates.

The Vocalist VR lets you define the key of the song as well as what scale is used, and can be completely controlled with MIDI. It can follow chord progressions via MIDI and recognizes 12 chord types: major triad, major 7, minor triad, minor 7, diminished 7, major 6, augmented 7, m7 (♭5), diminished, suspended, 7 sus4, and minor (maj7). You can also set the Vocalist VR to follow your voice so that it will produce harmonies based on a selected scale. The unit can identify the note you are singing, determine its position in the scale, and produce a harmony. It will also bend notes before reaching the next available semitone.

Input for the unit is on a balanced XLR connector and an unbalanced ¼-inch line-level jack; an additional ¼-inch input feeds directly into the Vocalist VR's reverb. Stereo output is on two unbalanced ¼-inch connectors; the outputs are switchable between +4 dBu and –10 dBV operating levels. A ¼-inch footswitch input and MIDI In, Out, and Thru connectors are provided. DigiTech rates the Vocalist VR's frequency response at 20 Hz to 20 kHz, signal-to-noise ratio at >92 dB (A weighted), and THD+N at <0.04%. DOD/DigiTech; tel. (801) 566-8800; fax (801) 566-7005; e-mail customer@digitech.com; Web www.digitech.com; www.dod.com.

▶ BENSON AUDIO LABS PC20 SERIES

Benson Audio Labs has released the PC20 Series ($999) of small-diaphragm condenser microphones. The series consists of a brass-bodied mic and three interchangeable capsules: the PC20 omnidirectional, the PC21 cardioid, and the PC22 hypercardioid. The capsules all have diaphragms of vapor-deposited, gold-coated Mylar. According to Benson, the diaphragms exhibit uniform axis response characteristics and are well suited for virtually any application.

The microphone features a 6 dB/octave highpass filter centered at 80 Hz. The electronics use a transformerless direct-coupled design. This design is meant to hamper the distortion that can be introduced with a transformer in the circuit path, to prevent phase shifting, and to ensure that all frequencies are reproduced at the same time.

Also available is the DM30 hypercardioid dynamic drum mic. It features a Mylar diaphragm and edge-wound copper voice coil mounted in a neodymium magnet structure for increased sensitivity. Edge winding allows Benson to place more copper in the magnetic gap, which creates a hotter signal. The transducer is internally shock-mounted to reduce rumble and other low-frequency artifacts.

Each of the mics uses gold-plated XLR connectors for better conductivity. The PC20 Series mics require 48V phantom power and ship with a stand adapter and a foam-lined carrying case. Benson rates the PC20 Series mics' frequency response at 20 Hz to 20 kHz (+2/–0 dB), signal-to-noise ratio at >65 dB, and maximum SPL at 140 dB. The DM30's frequency response is rated at 20 Hz to 20 kHz, and maximum SPL at 145 dB. Benson Audio Labs; tel. (412) 914-0575; fax (412) 914-0571; e-mail bensonaudiolabs@prodigy.net.

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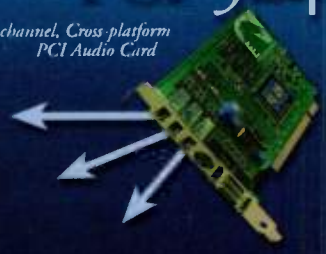

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▲ MINDPRINT T-COMP

Mindprint has released its third product, the T-Comp ($749), a stereo tube compressor that provides VCA-based soft-knee compression. The unit uses two 12AX7 tubes, one for each channel.

Each channel has its own set of controls, letting you process two mono signals or a stereo signal using the T-Comp's Link button. Channel controls include input and output level knobs; a tube saturation control; and threshold, ratio, attack, and release knobs. A Filter button activates a compressor mode that uses a sidechain input to control frequency-dependent compression; this mode leaves signals below 300 Hz untouched. An Adaptive mode adjusts the T-Comp's overall attack and release settings, while still letting you shape the response using the attack and release knobs.

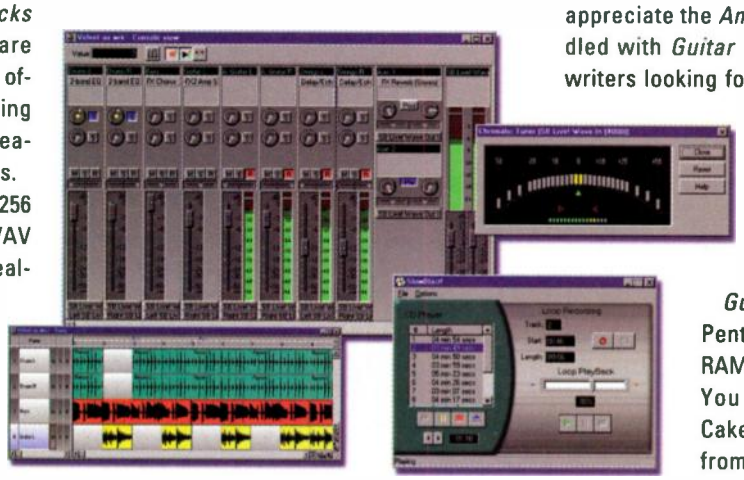
Input for each channel is on a balanced ¼-inch TRS and a balanced XLR connector. Each channel's output is also on a balanced ¼-inch TRS and a balanced XLR connector. The optional DI-Mod ($249) expansion module can be factory installed, giving you 24-bit stereo digital I/O at sample rates of 44.1 or 48 kHz.

Mindprint rates the T-Comp's frequency response at 10 Hz to 22 kHz, dynamic range at 92 dB, and THD+N at 0.006%. Mindprint/Steinberg North America (distributor); tel. (818) 678-5100; fax (818) 678-5199; e-mail info@steinberg-na.com; Web www.us.steinberg.net.

▶ CAKEWALK GUITAR TRACKS

For guitar players just getting started with computer multitracking, Cakewalk now offers *Guitar Tracks* (Win; $69), an entry-level software package. This affordable program offers 8-track digital audio recording with a simple user interface that features tape recorder–style controls.

Guitar Tracks can record up to 256 virtual tracks and saves files in WAV format. Mixing is enhanced by real-time effects processing—with a built-in chorus, reverb, delay, echo, and flanger—and support for DirectX plug-ins. Cakewalk provides a basic waveform editor for rearranging song parts, and you can configure volume changes, pan curves, and fades with the mouse.



To make *Guitar Tracks* an even more useful tool for guitarists, Cakewalk includes a time-stretching feature called SlowBlast. This lets you record audio from a CD and play it back at a slower tempo without changing pitch—helpful for learning new tunes. Guitarists who like the sounds of vintage amplifiers will appreciate the *AmpSim Lite* plug-in bundled with *Guitar Tracks*. And for songwriters looking for rhythmic inspiration, the Drag-and-Drop Drummer offers a library of drum loops that you can use to put together a quick rhythm track.

Guitar Tracks requires a Pentium 200 with 32 MB of RAM and Windows 95 or 98. You can also upgrade to Cakewalk's *Guitar Studio 2* from *Guitar Tracks*. Cakewalk; tel. (617) 441-7870; fax (617) 441-7887; e-mail sales@cakewalk.com; Web www.cakewalk.com.

▼ MACKIE DESIGNS HDR24/96

Mackie is working on the HDR24/96 (price to be announced) for release soon; it is a system capable of recording up to 24 tracks of 24-bit audio at sample rates of 44.1 or 48 kHz, or 12 tracks at 96 kHz. The HDR24/96 also includes its own editing software. You can plug an SVGA monitor, mouse, and keyboard directly into the rear-panel ports of the unit. The HDR24/96 is meant to be used either as a stand-alone recording, editing, and mixing environment or with a Mackie Digital 8-Bus mixing console.

In addition to the 24 tracks of audio, you can record up to 192 virtual tracks. The HDR24/96 has a built-in 20 GB Ultra-DMA IDE hard drive, making it possible for you to record up to 100 minutes of 24-track audio at a 48 kHz sampling rate, or 50 minutes at 96 kHz. There is an extra drive bay, which can hold a second IDE hard drive. A front-panel floppy-disk drive lets you import tempo maps and software upgrades.

You can use the software interface to control all of the unit's functions. You can also perform drag-and-drop crossfades and regions, phase inversion, waveform reversal, normalization, pitch-shifting, and time compression and expansion.

The HDR24/96 syncs to SMPTE time code, MMC, video black burst, NTSC, and PAL. Also included is word clock I/O on BNC connectors. Mackie; tel. (800) 898-3211; fax (425) 487-4333; e-mail info@mackie.com; Web www.mackie.com.

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PLUG-IN BONANZA ▲▲▲▲

▲ EMAGIC

Emagic has announced the *ES1* ($99), a plug-in that performs subtractive synthesis within Emagic *Logic Audio Silver, Gold,* or *Platinum* or *MicroLogic AV*. The software simulates the function and sound of analog synths, and you can use up to eight *ES1* instruments simultaneously, each with up to 16 voices, dependent only on your computer's performance. Its integration into *Logic Audio* gives *ES1* sample-accurate timing.

ES1 provides numerous oscillators, including square, sawtooth, and random waveform generators. You can also route an external oscillator into the plug-in. An LFO includes six wave shapes and lets you use an external waveform, and you can set the rate of the LFO at any time. A lowpass filter with a continuously variable cutoff frequency and a choice of four filter slopes is included. There is also an ADSR envelope generator.

You can switch the *ES1*'s display between the graphic interface and a simple numeric display. Every parameter found within the plug-in can be automated. *ES1* can use real-time plug-ins within *Logic Audio,* and when you're using *Logic Audio Gold* and *Platinum,* audio can be routed into *ES1* and used as modulation sources.

ES1 requires *Logic Audio* version 4.0 or higher. To run the plug-in on a PC, you'll need at least a Pentium 200 with 64 MB RAM running Windows 98. For a Mac, a 604e processor, Mac OS 8.5, and 64 MB RAM are required. Emagic USA; tel. (530) 477-1051; fax (530) 477-1052; e-mail emagic@emagicusa.com; Web www.emagic.de.

▼ SOFTWARE TECHNOLOGY

If you think your music sounds best in a live club atmosphere, Software Technology's *RoomVerb* plug-in (Win; $97) offers you a way to re-create the natural reverberations of the club space of your choice. *RoomVerb* enables you to simulate an acoustic space in detail by letting you control the room dimensions and separately pan the direct room sound along with the early and late reflections, while maintaining the stereo image of the original input signal.

Also new from Software Technology, *SpinDelay* (Win; $83) is a tap-delay plug-in that supports 3-D imaging. It gives you two stereo taps that can be linked at a predefined ratio, so they can change simultaneously at the same rate, producing effects like cross-feedback delays. Controls adjust delay times, feedback, volume, 3-D panning position, a lowpass cutoff filter, phase reversal, and conversional output pan. *SpinDelay*'s delay calculator lets you set a tempo for each tap in bpm.

Both plug-ins are available in VST and DirectX formats, and they provide 32-bit processing with a 96 kHz sample rate. They support VST automation, so you can save and play back midtrack changes to parameters. Onscreen knobs are designed for easy fine-tuning: they move in smaller increments the farther away you drag your mouse. You can right-click on a knob to read its exact value.

Both *SpinDelay* and *RoomVerb* will run under Windows 95, 98, or NT with the appropriate host software and 32 MB of RAM; *SpinDelay* requires a Pentium 100 or faster, and *RoomVerb* requires at least a Pentium 200. Software Technology; fax (530) 658-6224; e-mail info@software-technology.com; Web www.software-technology.com.

▼ NATIVE INSTRUMENTS

Those who crave the sounds of yesteryear can find another modeled adaptation of a sought-after analog synth: *Pro-Five* (Mac/Win; $199) from Native Instruments is fashioned after the Sequential Circuits Prophet 5. *Pro-Five* can be run as a stand-alone application or as a VST plug-in; it can play up to 32 multitimbral voices simultaneously.

There are two oscillators and one noise generator per voice. *Pro-Five* also provides a low-frequency oscillator; for the LFO and Oscillator B, you can choose square, triangle, and sawtooth waveforms. Oscillator A has triangle and square waveshapes. A resonant lowpass filter is also present. You can set ADSR envelopes on both the amplifier and the filter. The plug-in, unlike the original, has MIDI automation of all parameters, the ability to run multiple *Pro-Five* synths together in parallel, and optional Velocity sensitivity. Also differing from the Prophet 5 is the plug-in's 512 presets, 120 of which are original factory presets from the Prophet 5. *Pro-Five* can be run in two modes: Analog Warmth or Digital Accuracy.

The program requires at least a PowerPC 604/120 running Mac OS 8.51 or a Pentium 133 running Windows 95, 98, or NT, each with 32 MB RAM. Native Instruments/Steinberg North America (distributor); tel. (818) 678-5100; fax (818) 678-5199; e-mail info@steinberg-na.com; Web www.us.steinberg.net.

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▶ PEAVEY CEL 2 AND TMP 1

Peavey has released two new single-rackspace studio modules: the TMP 1 ($289.99) Class A tube mic preamp and CEL 2 ($279.99) dual compressor/expander/limiter.

The TMP 1 is a single-channel mic and line preamp that uses a 12AX7 tube at the input stage and a 12AT7 at the output. Inputs include both balanced XLR and unbalanced ¼-inch jacks. Output also includes a balanced XLR and an unbalanced ¼-inch connector. The unit provides 24V phantom power and a switchable highpass filter with a cutoff frequency of 40 Hz.

The CEL 2 is a 2-channel compressor. The channels can be used independently or linked for stereo operation. Voltage-controlled amplifiers and RMS-rectifier integrated circuits are used to minimize distortion and noise. Peavey provides soft-knee compression as well as two 12-segment LED

meters that show output level and gain reduction. The CEL 2's downward expander section has threshold and ratio controls that let you go from noise reduction to a full gate. The brickwall limiter has a threshold control and an LED that indicates when limiting occurs.

Inputs and outputs are on balanced XLR and unbalanced ¼-inch jacks. There is also a ¼-inch sidechain input for each channel and a switchable hardwired bypass.

Peavey rates the TMP 1's frequency response at 20 Hz to 20 kHz (+0/–3 dB), equivalent input noise at –106 dBV, and total harmonic distortion at <0.2% (at maximum gain). The CEL 2's frequency response is rated at 20 Hz to 64 kHz (+0/–1 dB), signal-to-noise ratio at 97 dB, and total harmonic distortion at 0.01% (20 Hz to 20 kHz). Peavey Electronics Corporation; tel. (800) 821-2279 or (601) 483-5365; fax (601) 486-1278; e-mail peavey@peavey.com; Web www.peavey.com.

▶ ZOOM GFX-8

The GFX-8 ($499) guitar multi-effect console from Zoom offers a lot of good things in a small package. The 17.9 × 8 × 3.15–inch floor unit weighs eight pounds and is housed in a solid metal case that should withstand road wear.

Onboard are 69 effects, including distortion, reverbs, delays, and modulation effects, as well as digitally modeled classic guitar and amp sounds. There's even an acoustic guitar effect, so you can get the bright zing of an acoustic without having to put down your electric. The patch memory comes with 160 factory presets and space for 80 user settings. For on-the-fly live looping, a built-in sampler lets you store and replay as much as 25 seconds of music.

The GFX-8's control panel sports a large display for easy visibility, along with ten rotary controls, including three EQ knobs, a presence control, a gain knob, and controls for adjusting modulation and delay parameters. There is a pedal on top of the unit that can be used for wah-wah, volume level, and modulation parameter adjustment, as well as for other GFX-8 functions.

The GFX-8 has an unbalanced ¼-inch input and two ¼-inch connectors for stereo output on the rear panel. Next to these jacks is an output level knob. You'll also find MIDI In and Out connectors, ¼-inch jacks for effects send and return, and a ⅛-inch aux input jack. Samson Technologies Corp. (distributor); tel. (800) 328-2882; fax (516) 932-3815; e-mail sales@samsontech.com; Web www.samsontech.com.

▼ VOYETRA MUSIC WRITE 2000

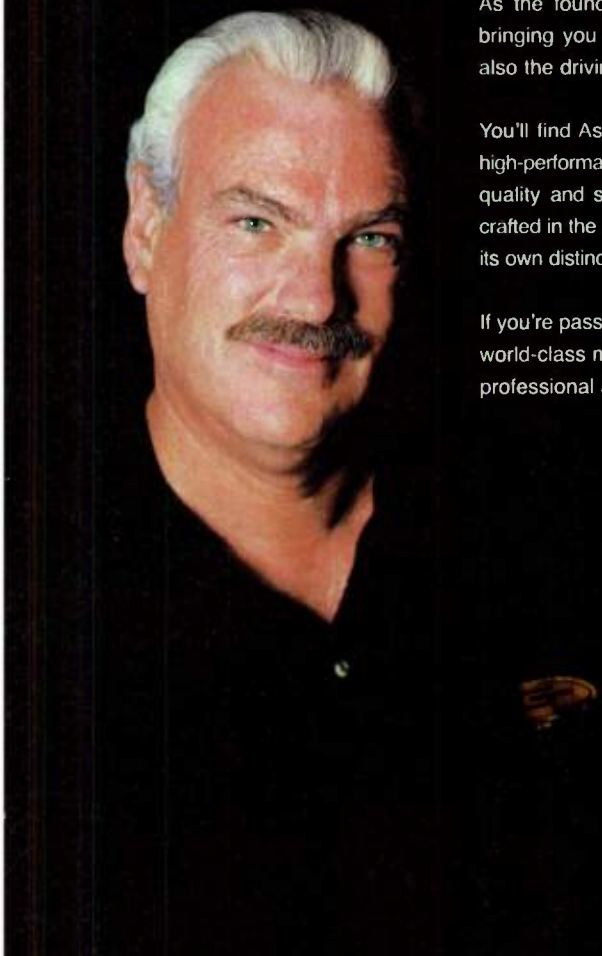
Music Write 2000 Professional Edition (Win; $179) from Voyetra combines standard notation features with MIDI sequencing. *Music Write 2000 Professional Edition* can mix imported audio tracks with your MIDI tracks and can sync to MIDI Clock, MIDI Time Code, and SMPTE, making it useful for many composition applications. The program lets you work with up to 48 tracks and 96 staves. The user interface is laid out in several editor views, including the Track Sheet, where you can assign track numbers and MIDI channels, select patch sounds and key signatures, and name each track.

Other editing windows include the Mixer, which emulates a hardware interface with sliders and buttons for each track; the graphical Song Editor, supporting cut/copy and drag-and-drop sequencing of song parts; a Controller Editor for tweaking MIDI data; the Piano Roll Editor; and an Event List. For notation editing, the Score Editor provides adjustable spacing and cross-staff beaming, as well as features such as transposition, automatic harmony, and chord generation. Drum notation is supported, as is customizable guitar tablature. You can add multiple verses of lyrics, synched to the melody's rhythm.

Music Write 2000 Professional Edition can run on a Pentium PC that is 75 MHz or higher, with Windows 95/98/NT, 16 MB of RAM, and any 16-bit sound card. Voyetra Turtle Beach; tel. (800) 233-9377 or (914) 966-0600; fax (914) 966-1102; e-mail sales@voyetra.com; Web www.voyetra.com.

Aspen Pittman and GT Electronics:

A Passion for Sound



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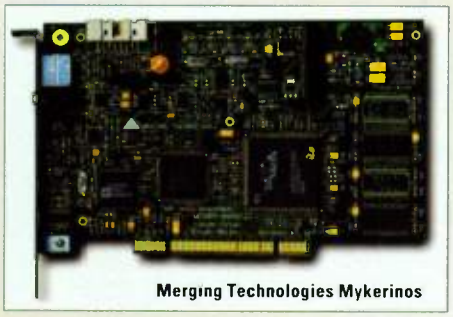
AUDIO INTERFACES ▲▲▲▲

The number of digital audio interfaces already on the market is staggering, and more are being released every day. Many of these systems have been previously available in similar forms; nearly all of the current incarnations provide newly affordable 24-bit, and in some cases, 96 kHz or higher audio capability. Although some products are designed to work on a single computer platform, it is common to find cross-platform interfaces.


Merging Technologies Mykerinos

Some systems are simply PCI cards; products of this nature are generally cross-platform and incorporate a breakout cable to provide audio and MIDI I/O. Other systems feature a PCI card and an accompanying hardware interface. These often house their A/D/A converters in the interface, reducing the potential for induced noise, which can be a problem when converters are used in proximity to computer circuitry.

One of the few completely new interfaces that has just been released is the Mykerinos ($1,995) from Merging Technologies, a PCI card interface that uses a Philips Trimedia VLIW processor and can handle up to 64 channels of simultaneous I/O (at sample rates of 44.1 or 48 kHz). This is accomplished using Merging Technologies' MADI daughterboard, which ships with the Mykerinos and piggybacks onto the card using a 64-pin connector. This setup takes up only one PCI slot. The daughterboard comes with your choice of coaxial electric or optical digital I/O. Daughterboards with FireWire and AES/EBU I/O are also being developed.

The card can handle audio at 16-, 24-, and 32-bit depths and sample rates of 32, 44.1, 48, 64, 88.2, 96, 128, 176.4, and 192 kHz. The MADI daughterboard card has a BNC connector, and you can program the connector to be used for word clock input or output, allowing the Mykerinos system to work as a clock master or as a slave. The system can also read and generate LTC and VITC for video post-production.

Up to eight Mykerinos cards can be used simultaneously. To use this system, you'll need a Pentium II or Celeron 300 MHz processor with 64 MB RAM and Windows NT 4.0. Merging Technologies; tel. (847) 272-0500; e-mail info@merging.com; Web www.merging.com.

Other recently introduced card-only interfaces include the Siena ($699) from SEK'D, the WaveCenter/PCI ($389) from Frontier Design Group, and the Wave/424 ($299) and Wave/496 ($399) from Gadget Labs. The SEK'D Siena has eight channels of analog I/O, all on unbalanced RCA connectors. The card is capable of converting the analog signal up to 24-bit, 96 kHz digital audio. In addition, there are two MIDI In and two MIDI Out connectors, providing up to 16 channels of MIDI I/O. Audio and MIDI connectors are housed on the breakout cable.

The Siena ships with SEK'D *Samplitude Pro* (an 8-track version of the company's flagship multitrack audio-recording software) and a DirectX-compatible mixer with a real-time reverb plug-in. SEK'D America; tel. (800) 330-7753 or (707) 578-2023; fax (707) 578-2025; e-mail info@sekd.com; Web www.sekd.com.

SEK'D Siena

Frontier WaveCenter

Frontier's WaveCenter/PCI is a card that provides 8-channel ADAT Optical input and output and 16-channel MIDI I/O. Stereo S/PDIF digital I/O is also provided on gold-plated RCA connectors; these channels can be used simultaneously with the optical I/O for up to 10-channel use. The card supports 16- and 24-bit audio, at sample rates of 44.1 and 48 kHz, and it can also resample 8, 11.025, 16, 22.05, and 32 kHz audio.

The WaveCenter/PCI has drivers for Mac or PC use; it also ships with a low-latency ASIO 2.0 driver and a direct interface for Nemesys's GigaSampler. The WaveCenter/PCI control panel software displays card status and lets you make parameter adjustments. An internal CD-ROM connector cable is also provided for making transfers from audio CDs. Frontier Design Group; tel. (800) 928-3236 or (603) 448-6283; fax (603) 448-6398; e-mail info@frontierdesign.com; Web www.frontierdesign.com.

Two new PCI cards from Gadget Labs add to the company's WavePro line. The

EVERYTHING ABOUT THE A-20 HAS BEEN DESIGNED WITH THE UNDERSTANDING THAT SPLITTING HAIRS IS EXACTLY HALF AS GOOD AS QUARTERING THEM.

SPECIFICATIONS: ***Amplifier power:*** 250W rms/ch, 400W (100ms peak). ***Peak acoustic output:*** 117dB SPL (100 ms pink noise @ 1M). ***Residual hum/noise:*** ≤10 dB SPL (A-weighted @ 1M). ***THD @ 90 dB SPL:*** <0.4% (100Hz - 10kHz @ 1M). ***Response ±2dB (1/3 oct. swept noise):*** 48Hz - 20kHz @ 1M, 45Hz - 20kHz @ 2M. ***-6dB LF cutoff:*** 40Hz. ***Control Amp Dimensions/Wgt:*** 3.5"h x 19"w x 10.75"d (2u), 42lbs.

Electronic Musician
2000
EDITORS
CHOICE

SYSTEM: ***Type:*** Modular, active near/mid/far-field monitor. ***Configuration:*** 2-way acoustic suspension. ***Woofer:*** 6.5" treated paper. ***Tweeter:*** 1" metal dome. ***Magnetic Shielding:*** Partial. ***Monitor Dimensions/Wgt:*** 14"h x 7.5"w x 11.9" d, 17 lbs. ***Monitor Enclosure Materials:*** 3/4" mdf w/HP laminate. ***FEATURES/CONTROLS:*** ***Connectors: Input:*** XLR, TRS. ***Output:*** XLR. ***Controls: Input sensitivity:*** -10, -3, +4, +11, ∞ dBu. ***Listening proximity:*** 5 position (near/mid/far). ***Boundary proximity:*** 5 position (0,1,2)

A-20 Everything, *as in every single thing*, about the A-20 points to the concept of unmitigated clarity and razor sharp reference – revealing every nuance in detail, in balance and in sonic image. The amplifier is a horse (check out those specs), and due to its outboard nature, there is more efficient heat dissipation and head room than when crammed inside a more conventional wood-based monitor enclosure. Moreover, this puts acoustic controls and diagnostics within your fingers' easy reach. Incorporate some of the finest drivers made and the result is a monitor that not only helps make each session as predictable and repeatable as humanly possible, it makes for a recording that is cut with considerably more precision than any previously known.

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NHT PRO

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AUDIO INTERFACES ▲▲▲▲

Wave/424 ($269) offers four channels of 24-bit I/O on unbalanced ¼-inch connectors. Drivers for Window 95 and 98 currently ship with the card, as do Mac drivers; Windows NT support should be available soon.

The Wave/496 system ($349) includes a half-rackspace interface box that provides 4-channel I/O. The I/O is on balanced ¼-inch connectors, and you can set the unit to +4 dBu or –10 dBV operating levels. Options include daughterboards that piggyback to either card (as well as to Gadget Labs Wave/824) and provide added ADAT Optical ($249) or S/PDIF ($129) digital I/O. Gadget Labs; tel. (503) 827-7371; fax (404) 685-0922; e-mail info@gadgetlabs.com; Web www.gadgetlabs.com.

Aardvark Direct Pro 24/96

Other companies with products of the card-and-interface variety include Echo, Aardvark, and Terratec ProMedia. Echo's Mona system ($995) provides four input channels on its interface, each with an A/D converter capable of 24-bit 96 kHz operation. Front-panel channel inputs are on XLR/¼-inch balanced/unbalanced combo connectors, and each channel has a Guitar button, which switches the input from its normal status as a balanced +4 dBu input to a high-impedance guitar input.

The front panel of the Mona interface also has four 10-segment LED level meters, a switch for global 48V phantom power, and a stereo headphone output. There are six analog outputs on both balanced XLR jacks operating at +4 dBu and unbalanced RCA connectors at –10 dBV. The D/A converters are 24-bit, with 128x oversampling. The system also has stereo S/PDIF and 8-channel ADAT Optical I/O.

Echo Audio Mona

To use the system, you'll need a Pentium processor running Windows 95 or 98. Mac users will need a Power Mac 604 with Mac OS 8.1 or higher. The unit can also operate with BeOS 5.0. Echo rates Mona's frequency response at 10 Hz to 22 kHz (±0.25 dB), dynamic range at 115 dB, and THD+N at 0.001% (20 Hz to 22 kHz). Echo; tel. (805) 684-4593; fax (805) 684-6628; e-mail info@echoaudio.com; Web www.echoaudio.com.

Aardvark's Direct Pro 24/96 ($699) interface also has four mic preamp inputs on XLR/¼-inch balanced/unbalanced combo jacks, a front-panel switch for global phantom power, and a stereo headphone jack. On the unit's rear panel, you'll find MIDI In and Out connectors, analog output on six ¼-inch TRS connectors that operate at +4 dBu (balanced) or –10 dBV (unbalanced) operating levels, two aux outputs on RCA connectors, and a 25-pin D-sub connector for hookup to the host PCI card. The card gives you S/PDIF digital I/O on RCA connectors.

The Direct Pro 24/96 card also provides real-time DSP effects, including a compressor, 3-band EQ with sweepable midrange, and reverb on each channel. You adjust parameters for these effects within the system's software control panel, which also lets you monitor input and output levels, access presets, and add a master reverb.

Gadget Labs Wave/496

The system requires a PC with a 133 MHz processor, 32 MB RAM, and Windows 95 or 98. Aardvark rates the Direct Pro 24/96's frequency response at 7 Hz to 44 kHz (±0.5 dB at 96 kHz), THD+N at 0.002% (@1 kHz), and dynamic range at 110 dB (D/A) and 100 dB (A/D). Aardvark; tel. (734) 665-8899; fax (734) 665-0694; e-mail info@aardvark-pro.com; Web www.aardvark-pro.com.

Terratec ProMedia's EWS88 MT ($599) provides 8-channel analog I/O at 24-bit resolution, with sample rates selectable between 44.1, 48, and 96 kHz. This system's interface is designed so that it can be mounted either externally or in an empty drive bay in your PC case, with a 6-foot ribbon cable connecting it internally to its PCI card. All I/O is on the front panel; it consists of eight inputs and eight outputs, all on unbalanced RCA connectors. The inputs are individually switchable between +4 dBu and –10 dBV operating levels, while the outputs are globally switchable. MIDI In and Out connectors are also provided.

The unit's PCI card has a stereo output on a 3.5 mm jack for monitoring; also on the card is S/PDIF stereo digital I/O on RCA connectors. The system can be expanded, letting you internally daisy-chain up to four cards in a single PC. These run off a common clock source for sync of up to 40 tracks, depending on your PC's computational muscle.

The EWS88 MT system comes with drivers for Windows 95, 98, and NT 4.0. Terratec ProMedia; tel. (407) 331-4002; fax (407) 331-8239; e-mail info@terratec-us.com; Web www.terratec-us.com.

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KEY CHANGES

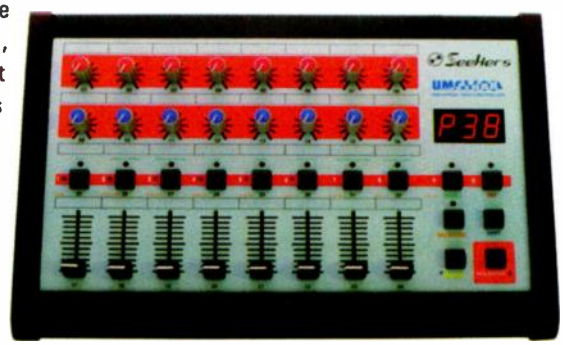
Yorkville has announced its acquisition of **Applied Research and Technology.** A.R.T. will continue to operate from its Rochester, New York, facility...If you need to fill some holes in your rack but abhor boring, blank metal panels, you might want to check out **Funk Logic**'s DD-301 Digilog Dynamicator ($19) and AP-302 Algorhythmic Prosecutor ($24). Available in red or black, these faceplates give off the appearance of elegant, high-end audio gear. For more information, check out the Funk Logic Web site at www.funklogic.com... **McDSP** has added support for Digidesign's Real Time Audio Suite (RTAS) plug-in format. You can purchase RTAS versions of *FilterBank* and *CompressorBank,* or, if you already have authorized TDM versions of the plug-ins, you can get RTAS versions by e-mailing rtas@mcdsp.com...**FAQ System Engineering** and **Wave Digital** are each offering complete, audio-ready computers. These computers are made from brand-name components, and you can choose from several popular software digital audio sequencers, editors, and more. These systems also let you choose other hardware, such as digital audio I/O cards and MIDI interfaces. You can put systems together and get price quotes by contacting the companies at www.faqsys.com and www.wavedigital.com... **Steinberg** has discontinued development of a TDM-compatible version of its *Cubase* software, opting instead to focus on its own VST technology...**Keyfax Software** has released a native format disk of hip-hop and R&B grooves for the Yamaha RM1x. *Yamaha RM1x Hip Hop and R&B Groove Library* is available for $29.95; see www.keyfax.com for more info...**Koblo,** the Danish developer of software synthesizers and samplers, has announced that its Studio9000 software package will be distributed in the United States by **Digidesign;** for more info, see www.koblo.com.

SEEKERS UMC1688

Seekers has designed a "universal" MIDI control surface to streamline real-time parameter changes on MIDI-compatible software or hardware. The UMC1688 ($369) is a tabletop unit with 32 assignable controllers: 16 knobs, 8 sliders, and 8 buttons. The buttons can be set to toggle or used for press-and-hold operation. Each controller can be assigned to any MIDI channel and can send continuous data, Note data, Control Change messages, Program Change messages, RPNs, and NRPNs.

The UMC1688 can store up to 40 programs, and you can save programs to, or upload from, external memory via SysEx. It comes stocked with presets that are set up for a number of popular synths, including the DX series, O1V, and others from Yamaha; the Jupiter, JV series, and others from Roland; and models from E-mu, Kawai, and Korg, as well as Koblo's *Vibra* software synths. These presets can be reprogrammed if you wish to switch a particular parameter—for example, from a fader to a rotary knob. Future presets designed by Seekers will be available for free download from the company's Web site.

The control surface of the UMC1688 has additional buttons for programming presets, and one MIDI In port and two MIDI Outs are located on the back. Seekers/Drum Machine Museum (distributor); tel. (415) 613-9862; fax (781) 723-6620; e-mail mickeyt@drummachine.com; Web www.drummachine.com.



E-MU ESI 2000

The ESI 2000 ($995) from E-mu offers professional sampling capability and expandability. The stock 4 MB of RAM can be upgraded to as much as 128 MB, via 72-pin SIMM slots, allowing for more than 25 minutes of mono sampling time at 44.1 kHz. The unit has 64-note polyphony and 64 digital 6-pole filters (in 19 varieties).

DSP capabilities built into the ESI 2000 include time compression and expansion (preserving pitch) and pitch shifting (preserving time). The ESI 2000 also offers parametric EQ, crossfade looping, truncating, a psycho-acoustic exciter algorithm, signal-to-noise normalizing, and dynamics processing. Editing functions include cut, copy, and paste, as well as audio scrub for finding optimum loop points.

The ESI 2000 ships with two ¼-inch unbalanced inputs, four ¼-inch unbalanced outputs, and MIDI In, Out, and Thru ports. The optional ESI 2000 Turbo Board ($249) expands the I/O with four more ¼-inch outputs, S/PDIF digital I/O, and a stereo effects submix output. The Turbo Board also increases DSP power with two 24-bit stereo effects processors that include more than 30 effects algorithms such as reverb, chorus, and distortion.

Using the SCSI port on the back panel, you can save your samples to any storage medium as well as access more than 1,000 presets that ship with the unit on two CD-ROMs. The ESI 2000 accepts the Akai S1000/S1100 sound library, as well as E-mu's own extensive collection of sample CD-ROMs.

E-mu rates the ESI 2000's frequency response at 20 Hz to 20 kHz, S/N ratio at >90 dB, and THD+N at <0.05%. E-mu-Ensoniq; tel. (831) 438-1921; fax (831) 438-8612; e-mail info@emu.com; Web www.emu.com.

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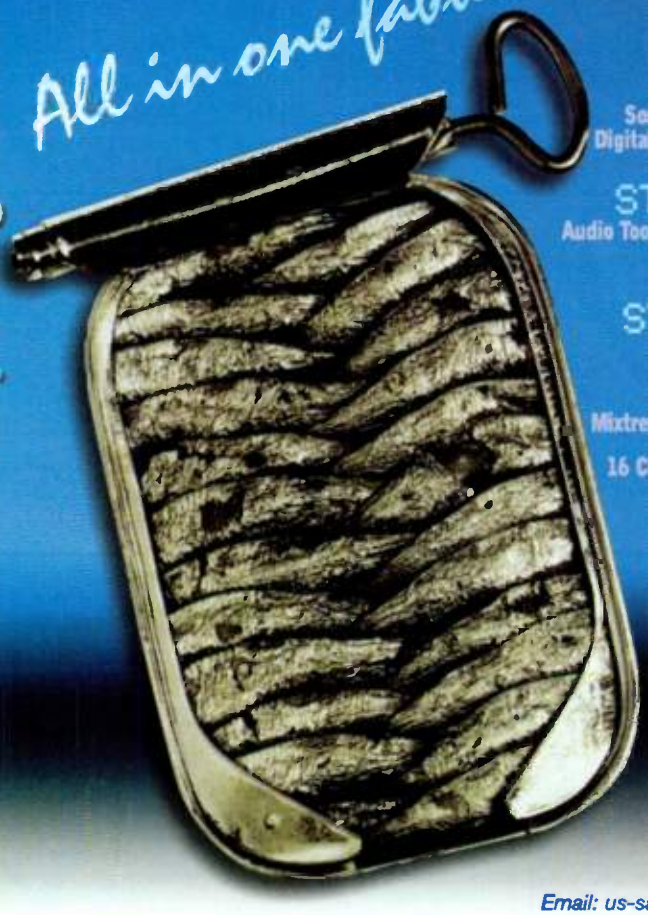

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▼ PANASONIC WZ-AD96, WZ-AD96M

Two A/D converters are available from Panasonic that deliver up to 24-bit, 96 kHz digital audio. The WZ-AD96 ($2,195) is an 8-channel A/D converter; the WZ-AD96M ($2,495) offers the same converters and adds an 8-channel mic preamp. The units can work with 16-, 20-, or 24-bit digital audio at sample rates of 44.1, 48, 88.2, or 96 kHz. On each unit, 128× oversampling converters are used.

The WZ-AD96 and WZ-AD96M both feature eight analog inputs on balanced XLR connectors and 8-channel AES/EBU digital output on both an ADAT Optical connector and four XLR connectors. On the WZ-AD96, you get a 10-segment LED level meter on every channel and a control for setting reference levels. On the WZ-AD96M, each mic preamp provides 48V phantom power, a peak meter LED, and gain adjustment from –60 to +4 dBu. Both units have front-panel controls for choosing the word length and sample rate of the output, a 4-segment reference level meter, and a control for switching sync between internal and external word clock.

Panasonic rates the frequency response of the WZ-AD96 and WZ-AD96M at 20 Hz to 20 kHz (+0/–2 dB). Dynamic range for the WZ-AD96 is rated at 118 dB; for the WZ-AD96M, 117 dB (both A weighted). Panasonic; tel. (800) 528-8601, (714) 373-7277 or (714) 373-7272; fax (714) 373-3903; Web www.panasonic.com/proaudio.

▶ METASONIX TS-21

Life would be so boring with only plain old square, triangle, and sawtooth waves. The new Metasonix TS-21 Hellfire Modulator ($749) takes those namby-pamby waveforms and mangles, contorts, and deforms them to create sounds you've never dreamed of. This 2U rackspace device is tube based and uses all analog circuitry. Everything you need is on the TS-21 Hellfire Modulator's front panel, including the ¼-inch audio input jack on the left and a round display in the center that lets you view your waveform.

The Waveshaper section is uniquely designed with a television tube. It takes a mono input signal and folds or doubles the waveform, adding tube distortion and nonlinearities. Output can be in mono, or you can use the two LFO knobs and Speed control to alternate slightly varying output between left and right stereo channels through the front-panel ¼-inch stereo output jack.

The TS-21 Hellfire Modulator also has a pulse-width modulator (PWM) with a single control that dials in different pulse shapes and noise bursts, and stable to wildly unstable oscillation. The PWM can be bypassed with a front-panel switch, and it can be controlled by the CV input on the left.

Last, there is a pentode-tube preamp section, which provides an Input Level knob that can produce a range of clean to distorted signals. A second CV input, on the right side of the panel, allows for external level control for the preamp section, so you can use the TS-21 Hellfire Modulator as a VCA with your other analog synths. Metasonix; e-mail info@metasonix.com; Web www.metasonix.com.

▼ PHOENIX AUDIO GTQ2

Phoenix Audio has released the GTQ2 ($1,995), a stereo mic preamp that features Class A transistor circuitry throughout. The GTQ2 was designed by engineers David Rees and Geoff Tanner, who worked on original Neve products. Each channel has its own control strip, which is outfitted with a 3-band equalizer. Each band provides up to 15 dB of cut or boost; center frequencies are set to 80 Hz, 12 kHz, and 400 Hz or 3.2 kHz (switchable) for the mid band.

The GTQ2's knobs are stepped in 5 dB increments from –10 to +80 dB. An array of illuminated on/off buttons govern 48V phantom power, the EQ section, phase, and a low-cut filter with a cutoff frequency of 45 Hz.

On the front panel, there is an unbalanced ¼-inch direct-injection input for each channel. Each DI input has an impedance of 10 MΩ and applies an additional 10 dB of gain to the signal. The back panel has XLR connectors for mic inputs and for balanced outputs, as well as a pair of unbalanced ¼-inch outputs for linking a guitar signal straight through to an amplifier.

The 1U rack-mount GTQ2 has an integrated power supply. Phoenix Audio rates the maximum output at +26 dBu, frequency response at 20 Hz to 20 kHz (±1 dB), and noise at 80 dB with a gain of –45 dBu. Phoenix Audio; tel. (323) 462-4373; fax (323) 462-6137; e-mail phoenixaudio@earthlink.net; Web www.phoenixaudio.com. ●

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PRO FILE

By Rick Weldon

Tribal Connection

Tribes of Neurot is the alter ego of the Bay Area–based rock band Neurosis. In either identity, the punk collective is physically and musically imposing, able to fill a truckload of sonic space when it wants to. The band has loads of guitars, singers, and drums: Steve Von Till (guitar, vocals, and percussion), Scott Kelly (guitar, vocals, and percussion), Noah Landis (keyboards, samples, and tapes), Pete Inc. (visuals), Jason Roeder (drums and percussion), and Dave Edwardson (bass and vocals). But the mix of sustained primal screams, sludge guitar, and tribal percussion was just one of the aural possibilities the members of Neurosis desired.

Tribes of Neurot further expands the horizons of punk rock.

Therefore, in order to further their vision, Neurosis formed the freeform, instrumental Tribes of Neurot. Tribes had been a separate entity from the rock band, but when Neurosis released its eighth album, *Times of Grace,* the band decided to bring the two identities closer together. To this end, they designed Tribes' fifth full-length album, *Grace,* to be played at the same time as the Neurosis record, on a second stereo system. The two records share the same sequence and track times, and are designed to complement one another. The rock record was recorded with great clarity by Steve Albini at Electrical Audio in Chicago; *Grace* was tracked on an ADAT passed around by the band and mixed at Seismic Sound in San Francisco.

With such a heavy album on one side, the band had to tread carefully to make the two releases work together. Says Von Till: "With tracking, we wanted a lot of different elements. The first rule was that *Grace* had to have the same flow, but without rock. And once we decided we wanted the two CDs to play at the same time, *Grace* also had to happen without rhythm. There's no way two CDs are going to be perfectly in sync, so it had to be arrhythmic."

The band made an effort to tie the two albums together in both overt and subconscious ways. While working on a Tribes song, Landis would pull samples from the corresponding Neurosis song, drop them an octave, and move them around in the stereo environment. "Those samples are still in the right pitch, and they make reference to the Neurosis album," he says. "Even though it's a different sound and texture, your mind hears the connection."

The sampler was used for composition as well. "We would take some sound, like a bowed electric guitar note," Landis recalls, "and sample that, screwing with the pitch and making a melody out of it. As you slow it down, you hear more of the grit, more of the friction of the bow on the string. The sound gets pulled apart. Sometimes it's easier to come up with different melodies on a sampler than to compose something with a bow and a guitar."

Mixing *Grace* from a single ADAT tape and making its track times and index marks identical to the Neurosis album's was a daunting prospect, so Tribes worked with their friends at Seismic Sound. "We ran our ideas by them, because they're pretty good brains as far as this stuff goes, and they talked us into mixing it in their Pro Tools system," says Von Till. "That way, we could nudge things and add a few layers to what we already had."

Working within Pro Tools made it easy for the band to visualize the total audio content of the two records, and to draw in volume levels on the Tribes mix until there was enough aural space for the two records to coexist. "We have a tendency to overorchestrate anyway," Von Till observed. "We needed to be careful not to just replace the clarity we'd gone for on the Neurosis record with Tribes of Neurot material. We wanted the albums to retain their own character, their own space."

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By Scott Wilkinson

Prismatic Synthesis

A new type of synthesis should stir things up.

I've always been fascinated by various forms of sound synthesis. Additive techniques are precise but laborious, while wavetable-based subtractive synthesis is much easier to use if you want to paint with a broad sonic brush. Physical modeling provides unprecedented expressive potential, but it's a real bear to program anything useful with that technology.

After what seems like a long dry spell in the development of new synthesis techniques, something interesting is about to emerge from a company called EuPhonics, which was recently acquired by 3Com (www.3com.com). Called Parametric Resynthesis by Interpolated Signal Models (PRISM), this technology vaguely resembles certain aspects of wavetable and physical-modeling synthesis, but it's really something new.

As with sampling, a PRISM sound starts with a recording of one or more notes. These recordings are then separated into pitched and unpitched (noise) components, each of which is analyzed to determine its power envelope and spectral characteristics. A pitch envelope is also derived from the pitched component. The spectral characteristics are represented by a series of filter coefficients, which can vary in time along with the pitch and power envelopes (see **Fig. 1**).

Once the analysis is complete, the derived parameters are used as a model to reconstruct the original sound and manipulate it in any number of ways. Unlike physical modeling, which is based on complex equations that describe the general acoustic behavior of certain types of instruments, PRISM is based on specific recordings. As a result, this technique is called *signal modeling*, and the timbre of the synthesized sound depends entirely on the quality of the source recording.

Among the many differences between PRISM and wavetable synthesis is the fact that PRISM sounds are not looped. Instead, the derived parameters allow a note to be held for any duration, regardless of the original recording's length. In addition, sustained notes are not static; all the irregularities of the original human player can be modeled and applied to the synthesized sound. PRISM instruments can also include the natural vibrato, tremolo, and release of the original sound, and the formants do not shift along with the pitch of the notes. All of this contributes to the natural, organic quality of the final sounds.

Even better, the system smoothly interpolates between different sets of parameters, which allows seamless morphing between the timbral characteristics of notes played at soft and loud volumes, at low and high pitches, and even by completely different instruments. This goes way beyond crossfading and provides exceptional expressive potential, especially when you consider that all of these activities (and many more) can be placed under independent MIDI control. In addition, you need to record only one soft note and one loud note per octave to recreate a realistic simulacrum of the original instrument. Try that with a sampler!

Best of all, PRISM sounds will be easy for end users to create. 3Com plans to develop software that automates much of the analysis process and allows musicians to manipulate the results in musically meaningful and intuitive ways. Using such software, any sort of real or imagined acoustic or electronic sound can be easily realized. The first commercial PRISM product is likely to be a PC sound card for the gaming and desktop-audio markets; it should be available by mid-2000.

I've heard some early prototype examples of PRISM sounds, and I was impressed. In particular, the examples I heard included a vocal sound that knocked my socks off. The flute was excellent as well, but the saxes still needed some work. I'm very excited about the potential this technology offers to electronic musicians, and I can't wait to plug my MIDI wind controller into a PRISM synth. Be still my beating heart!

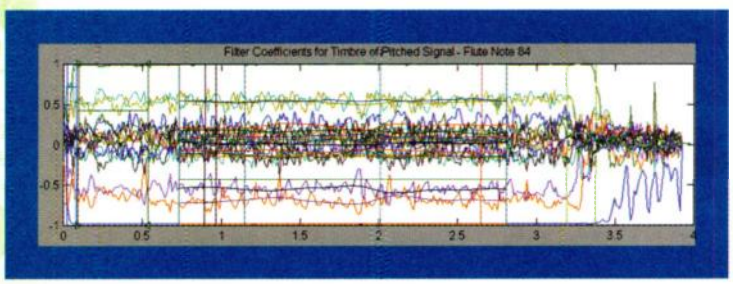

FIG. 1: The time-varying timbre coefficients derived from a recording of a flute note are displayed in the main window of this prototype PRISM software.

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The HIGHEST LLAMA

Sean O'Hagan meditates on the **High Llamas** and the meaning of analog.

By JoE Silva

Sean O'Hagan specializes in wedding the lush string arrangements and warm vocal harmonies of midperiod Beach Boys to the digital sounds and meandering compositions peculiar to the style of music often called *post-rock*. He formed the High Llamas as a one-man band in 1990 after the demise of his former group, Microdisney. Eventually, the High Llamas evolved from a solo effort to the current four-person lineup, with O'Hagan on vocals and various instruments, Jon Fell on bass and vocals, Rob Allum on drums, and Marcus Holdaway on keyboards and vocals. Since 1991 the band has released five albums and two EPs filled with channeled Brian Wilson harmonies, contemplative guitars, tender banjos, and sick synths.

Over the years, O'Hagan has developed relationships with a number of trendsetting acts and artists in America and in the United Kingdom, where he resides. He has worked extensively with Stereolab, writing string and horn arrangements, and has coproduced Chicago denizens Jim O'Rourke, Bundy K. Brown, and John McEntire. He also has a good bit of remixing credits to his name, having worked with such artists as the Boo Radleys, Shonen Knife, Pizzicato Five, and Mouse on Mars. In 1998, the High Llamas gave some of the songs from their fourth album, *Cold and Bouncy,* to many of these same artists and others for reinterpretation, resulting in the remix album *Lollo Rosso.*

For their latest release, *Snowbug* (V2 Records), the High Llamas recorded at the Drugstore, the Jesus and Mary Chain's studio in London, and at Steve Albini's Electrical Audio in Chicago. I caught up with O'Hagan in London to discuss *Lollo Rosso, Snowbug,* and the continuing evolution of the band.

an AS modular synth that we put the Wurlitzer through. But for a lot of the sounds, we didn't want to use complicated systems of processing. For instance, we wouldn't use a filter system; we would use a wah-wah pedal instead. There's a company in Reading [England] called Lovetone, and they make filter boxes that are just fantastic. There are about 100 of them in England, maybe 200 throughout the world. It's a cottage industry.

We also used little Evans delay boxes that were popular in early '70s dub music. We would put an electric piano through a Lovetone filter and then through one of these delays, and it's just fantastic. At the end of "Cotton to the Bell" on *Snowbug*, a bizarre little tune on the coda uses that sound as it fades out. We used a slow LFO operating on the AS modular system, which we put the Wurlitzer through, and you just get this really nice, slow wah.

We also used DOD envelope filters. Its classic sound is the Bootsy Collins bass sound, but we would run a Rhodes piano through it instead. We did that on a whole section of "American Scene," and it almost sounds like Sly Stone. We would record an organ through a wah-wah on the first two beats of the bar, and the second two beats of the bar would be a Rhodes through a DOD envelope. You could get the distinctive filter sounds going back and forth, sort of like Sly Stone but without it being funky. We didn't want it to be funky, just off. That was a lot of fun, and it was all done on 2-inch tape, rather than digitally, which was really interesting.

ROBERTA MOORE

Jon Fell (left) and Rob Allum of the High Llamas take a break at the Drugstore.

Does it take you longer to work with analog tape?

It's very interesting working on 2-inch again after working on hard disk. I did ten remixes last year, and it's a totally different ball game. I found it actually quite fast working on 2-inch. Sometimes we'd have to play things over more; with hard disk you end up saying, "Well, the second chorus is pretty good, so let's just scrub that first chorus and just drop this one in." It's good fun, but you spend a lot of time looking at a computer screen. I really enjoyed working with analog this time out and saying, "Let's just play it again."

We also made a decision not to be afraid of making mistakes or of being loose and keeping those takes. The records that we as a band listen to and like aren't afraid of those things. So there was a lot on this record that wouldn't have made it onto previous records.

At this stage, do you guys want a permanent studio setup of your own?

My only worry about owning a studio is maintenance and leases and all that. At home I have a Mackie 32-track, a hard disk setup, a couple of good EQs, and a bunch of mics. I like that; it suits me for at-home use. In London you just can't get a cheap little place; it would cost a lot of money to maintain a studio.

ROBERTA MOORE

Dominic Murcott recording vibes. He also played marimba and steel drums for *Snowbug*.

What was the process behind putting together *Lollo Rosso*, the remix album?

Very easy, really. To be quite honest, I was a little disappointed that the artists stuck to the originals as closely as they did. I would have liked to have heard something that was filtered to such an extent that I'd barely recognize what was going on. In preparing for the album, I'd talk to each person about the song they were remixing to find out what tracks they needed, and they'd say, "I'm going to use the strings, the Wurlitzer, and maybe the bass part." I would literally record those tracks one by one on the right or left channel of the DAT in mono. That's how they'd get the material most of the time. Stock, Hausen & Walkman just used the CD and cut that up, which I quite like. Jim O'Rourke wanted 2-inch tape.

Actually, I prefer Jim's mix of "Mini-Management." I regard that as a much more successful final mix than our own. It was so adventurous. When we did "Mini-Management" on *Cold and Bouncy*, the brass playing chords in 6/8 time was very important to me. Jim took those chords, filtered them, and contextualized them in a completely different way. The melody really came to the foreground.

Were you surprised by anything you got back?

Not really. I'm not sure how successful the whole thing was. I thought there were a few clichés. When we do remixes, I usually take two harmonic ideas and restructure them. Sometimes I'll put beats in, sometimes not. But I quite like taking the original harmony and just saying, "I'm going to put new chords here." That way, we can come up with something unique.

You were recently in negotiations to work with Brian Wilson and the Beach Boys. Did you have ideas about bringing certain kinds of technology to that project?

If I had done anything, I would have

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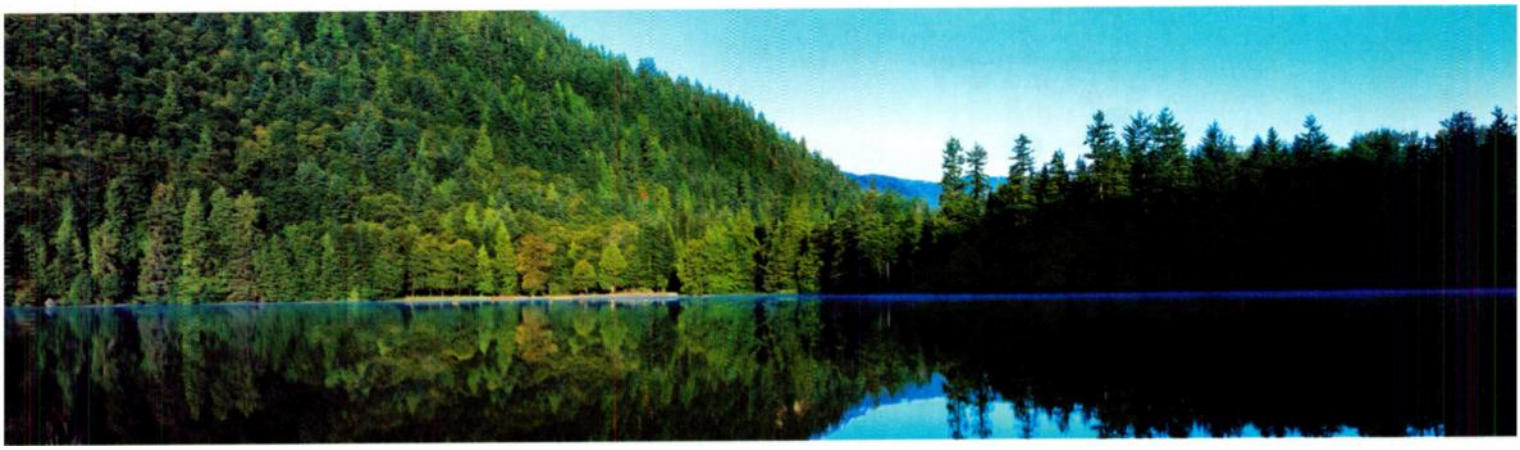

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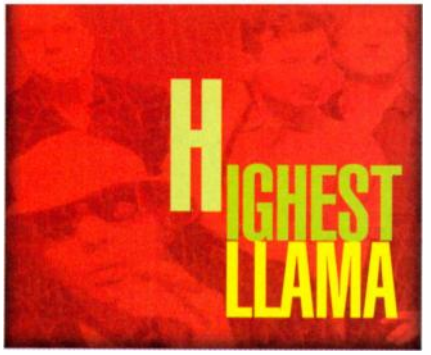

gone out of my way to encourage them to make a semi-instrumental record. I didn't get to talk to Brian that much, but when I talked with the Beach Boys, I talked about the records of theirs that excited me. I didn't draw on *Pet Sounds*, because if you do that, the Beach Boys would think, "Oh no, this guy's just going on about Brian's record again." You have to talk abut *Sunflower*. You have to talk about *Friends*.

We talked about the instrumentals and about the impressionistic side of those records. I just wanted to get them in touch with the avant-garde side of their pop music. If I'd had the opportunity, I would have tried to make an avant-garde record. They were interested in making a record that was going to turn heads again. They were really up for that. They've said, "We don't know how to be the Beach Boys anymore. That disappeared years ago." And Carl Wilson basically said, "If this record happens, you choose the musicians, you produce it, and you make the record that you think the Beach Boys should be making."

I hope you were sitting down when he was saying all this.

The whole thing was very complicated. The lawyers for Brian Wilson weren't interested. I was in the studio with Brian when he began recording *Imagination*, but I wasn't allowed to be alone in the same room with him. It was just L.A. and Nashville session guys with poodle haircuts. He wasn't in charge of that record. One thing that he did say to me, though, was that he was a big fan of *Hawaii*. There was one moment when we were heading to the elevator, the only time we were together alone, and he said to me, "You love Moogs!" It really excited him; he can't get enough of those fat analog sounds.

JoE Silva *is a freelance writer and author living in Athens, Georgia. He is currently working on an authorized biography of Robyn Hitchcock and trying to increase his* Cubase *savvy.*

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On The Right Track

By Gino Robair

ILLUSTRATION BY DAVID BALL

There has never been a better time to do multitrack recording. The tools you need to make pro-level recordings are plentiful and the price of gear continues to drop. This is most evident in the field of digital multitrack recorders.

With so many popular digital multitrack formats to choose from, how do you determine which is right for you? For many people, the decision is based on a combination of price, features, popularity, resolution, and portability, among other factors.

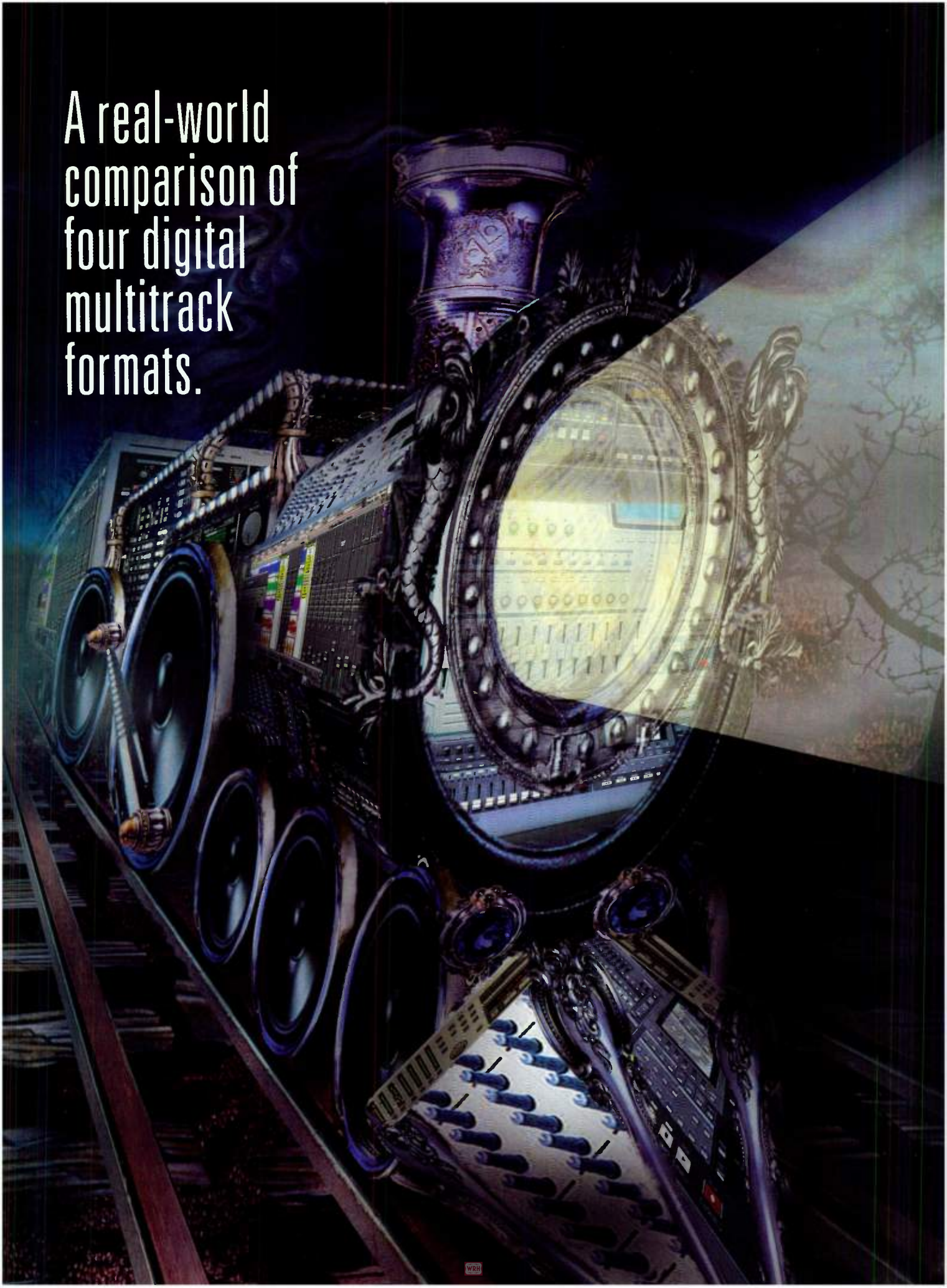
For example, part of what made cassette multitrackers popular was that they were inexpensive mini-studios in a box: for less than $500 you could buy a 4-track recorder and analog mixer with EQ, and blank cassettes cost $3 or less. Granted, you had to deal with the problems inherent in the cassette tape format, such as a slow tape speed, hiss, wow, flutter, and narrow track widths. But in the right hands (such as those of EM associate editor Brian Knave), multitrack cassette recorders could yield CD-quality results.

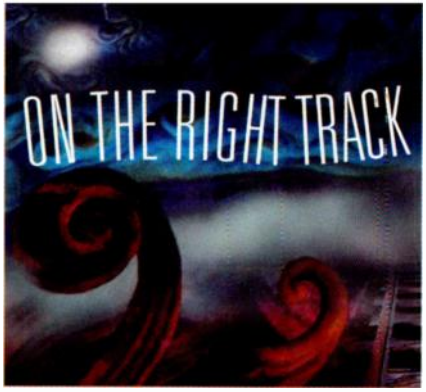
A growing number of digital multitrack recorders in a variety of formats is available today. You have your choice of using tape (a linear format) or going tapeless (for nonlinear, random-access recording), and each calls for particular ways of working.

If you already have a mixer, effects, and mic preamps, you may feel there will be some redundancy if you invest in a recorder that also includes these items. On the other hand, you might be looking for a complete recording package that is portable and doesn't take up much space.

This article examines the main features of four popular multitrack formats, as well as what's involved in working in each. The formats are multitrack MiniDisc, modular digital multitrack (MDM), computer-based digital audio workstation (DAW), and stand-alone hard disk multitrackers.

A real-world comparison of four digital multitrack formats.





TEST SUBJECTS

The differences in sound quality between digital formats aren't the same as they are between the various analog tape formats. The factors that greatly affect the sound of digital recorders are the quality of the converters, the data resolution, and the amount and type of data compression used.

I chose to examine 8-track recorders because eight is a useful (but not overwhelming) number of tracks for the personal studio, and because it meant I could begin with a reasonably level playing field for the formats. The limited number of audio tracks in any multitrack system (analog or digital) can be enhanced using MIDI instruments and an external sequencer. Unlike analog multitrack recorders, each of these digital systems has sync capabilities and doesn't require you to use an audio track for sync tones.

Another bonus of using eight or more tracks is that it allows you to record the six audio channels required for a 5.1 mix as well as a stereo mix of the same program material. As surround formats increase in popularity, this is something to consider.

Representing stand-alone hard disk multitrackers is the Roland VS-880. **EM** assistant editor Rick Weldon (editor of *The EM Guide to the Roland VS-880* by Duane McDonald, Tom Stephenson, and Eric Wroblewski) was a great source of information about this machine. For the computer-based DAW, I chose Pro Tools because of my own experience with the system. Similarly, the MDM format I chose is DTRS using the Sony PCM-800 and Tascam DA-38. Finally, for a multitrack Minidisc (MD), I settled on the Yamaha MD8, currently the only 8-track multitrack MD available.

FIG. 1: The Tascam DA-38 is an example of a DTRS-format MDM. Notice that the record-enable buttons for each track are conveniently placed below the corresponding level meters.

The selection of a particular product for this article should not be construed as an endorsement. Rather, the products should be thought of as representative of their particular field as a whole. You can apply the ideas discussed here to products from any manufacturer.

WE BEGIN WITH A SONG

I began the evaluation process by tracking the same song on each format under the same recording conditions. For this session, I enlisted Brian Knave to cover the drums, harmonica, and vocals, and Myles Boisen for guitar and bass parts. The tracking sessions were done at Guerilla Recording using Boisen's outboard mics and preamps so we would have a consistent quality of line-level signals going to each recorder. The drums and bass were tracked to two recorders simultaneously; vocals, harmonica, and guitar overdubs were done to each recorder individually. I also added overdubs at home to check out the specific features of each recorder.

FIG. 2: The analog I/O options of the Tascam DA-38 include RCA jacks for unbalanced signals and 25-pin D-sub connectors for balanced signals. Digital I/O is via the TDIF interface.

A FAMILIAR LAYOUT

The setup of the VS-880 and MD8 is familiar to anyone who has worked with an analog cassette multitracker. The mixing section is on the left and the transport and media section is on the right. The MDMs are the only tape-based units, while Pro Tools is predominantly software-based. Each of the units uses familiar transport controls.

Modular digital multitrack. MDMs accept one of two kinds of videotape: Hi-8 mm (in this case, referred to as Digital Tape Recording System or DTRS) or S-VHS (subcategorized as ADAT Types I and II depending on the digital word length). Alesis developed the ADAT format and Tascam followed soon after with DTRS. Both formats have become industry standards, with Fostex and Panasonic releasing ADAT-format recorders, and Sony adopting the DTRS format.

The maximum amount of time you can record in the DTRS format is 108 minutes, which is a significant amount beyond the 67-minute maximum of the ADAT Type II format. The DTRS transport runs about 10 percent faster than a camcorder, so you need a 120-minute cassette to get the full 108 minutes of recording time.

Another nice feature on DTRS machines is a shuttle wheel that allows for one-fourth to eight times normal-speed operation in either direction. This feature further evens out the playing field in our format comparison because the VS-880 and MD8 have shuttle wheels, and Pro Tools gives you a software tool for scrubbing audio.

The Tascam DA-38 (see **Fig. 1**) allows for internal track-to-track copying, so you can assemble composite tracks without leaving the machine. And because the DA-38 has 18-bit A/D converters

Burn Your Own CDs

Yamaha A-series samplers are the only ones that can be hooked directly to a CD recorder so you can easily create native format CD-ROMs or burn your own audio CDs - complete with DSP processing.

Mo' Better FX

A-series samplers have more effects and more effects blocks. The 96 different effects, on both the A4000 and A5000, is 25 more than the nearest competition. Actually, rivals in the A4000's price range don't even come with effects!

A Universe of Sounds

Both new Yamaha samplers come bundled with 9 CD-ROMs loaded with studio quality sounds. And, since you can never have enough, both have a built-in SCSI interface and compatibility with Akai, E-mu, Roland, AIFF, and .WAV CD-ROMs. No sampler on the market has that kind of total compatibility.

Killer Specs

The A5000 features 126 note polyphony and 6 effects blocks. The A4000 sports 64 note polyphony and 3 effects blocks. Both can be expanded up to 128 MB of RAM and have 16 different filter types, EQs for each sample, MIDI synched LFOS and so many MIDI controls, they equal dedicated keyboard synths.

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Competition is a good thing. It's what drives innovation and price performance. With the release of two new A-series samplers, Yamaha is changing the landscape in the sampling wars with a couple of products that are destined to blow the competition away.

Whether you're a dance remix producer who wants to take advantage of all the cool loop-based features like BPM Time Stretching, Beat Remix and Loop Divide, or a studio player/producer who needs access to a huge library of top-quality instrumental sounds, the new A-series samplers come with everything you need. And at $1595 MSRP for the A4000 and $2295 MSRP for the A5000, their price performance is unbeatable.

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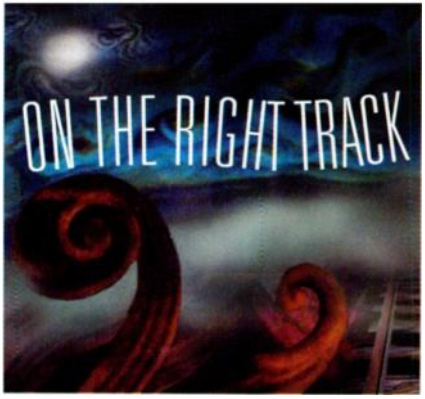

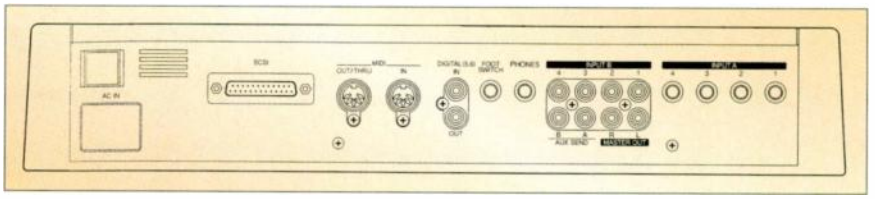

FIG. 4: The VS-880 has four ¼-inch and four RCA analog inputs, S/PDIF digital I/O, two aux sends on RCA jacks, and a pair of master outputs on RCA jacks.

but records at 16 bits, you can choose to dither down the signal while recording to eliminate quantization noise.

I used a Sony PCM-800 for tracking and a DA-38 for mixing. Although it has 16-bit converters, the PCM-800 has balanced XLR connectors for the analog inputs and outputs and operates at +4 dBu. The DA-38, on the other hand, needs a 25-pin D-sub connector for balanced I/O at +4 dBu but has 18-bit converters (see **Fig. 2**).

Hard disk multitrackers. Stand-alone hard disk multitrackers are essentially portable DAWs: they provide the nonlinear editing features you would get in a computer-based system but with greater portability.

We used the Roland VS-880 with software upgraded to version 3.1 (see **Fig. 3**). The VS-880 has 18-bit converters and can record with or without data compression (in this case, Roland's proprietary R-DAC technology). The VS-880 lets you choose the amount of compression you want to use to manage the amount of recording time (see the section "Size Matters").

One limitation of the VS-880 is that it can record only four tracks at a time. There are four unbalanced ¼-inch inputs, four RCA inputs, and S/PDIF digital I/O on RCA jacks. The two master outputs and two aux sends all use RCA jacks (see **Fig. 4**). Other features of the VS-880 include 999 levels of undo, 32 locate points, 1,000 marker points, and a SCSI port that can be used for external drives, CD-RW, or CD-R backup.

The next generation of the VS-880, the VS-880EX, upgrades the I/O to include six balanced ¼-inch analog inputs and an optical I/O, and increases the converters to 20 bits. This unit can record eight tracks at a time.

Multitrack MiniDisc. MiniDisc is a robust optical storage format that is wear resistant and handles heat, dirt, and shocks relatively well. There are two types of MiniDiscs—audio (MD) and data (MDD). MD is primarily a 2-channel consumer format. Multitrack Minidiscs require MDDs, which were originally designed for computer data.

Of the recorders in this article, multitrack MDs are the most similar in design to portable cassette studios, with an onboard mixer and simple routing options. But besides sharing the ability to bounce tracks with their cassette forebears, multitrack MDs allow you to perform simple copy and paste edits using markers. This kind of editing is ideal for quickly rearranging parts of a song, copying rhythm or background parts, or cutting together ideas from several takes.

The Yamaha MD8 (see **Fig. 5**) can record eight tracks at a time. The I/O includes phantom-powered XLR and balanced TRS ¼-inch inputs, as well as inserts on tracks 1 and 2. Inputs 3 through 8 accept unbalanced ¼-inch mic- and line-level inputs (see **Fig. 6**). If you're planning to record to the MD8 with eight microphones, you're going to have to come up with a way to deliver the signals of six of them on ¼-inch TS plugs, as well as get additional phantom power where it's needed.

One major drawback of the MD8 is that it doesn't have digital I/O. Consequently, there is no way to make a digital backup of your work. The only multitrack MD with digital output is the Tascam 564, which has an S/PDIF output on mixer channels 1 and 2. This output is designed for transferring internal mixes directly to DAT or hard disk recorder, and cannot be used for file-type data backups.

Multitrack MiniDiscs are playable in any multitrack MiniDisc machine, although you will lose markers if the machine you're using is made by a manufacturer different from the one that made yours. You can also play your 8-track MDD disc in a 4-track machine provided you submixed your eight tracks down to four or fewer tracks.

FIG. 3: The powerful recording and editing features of the VS-880 are accessed by using button combinations and the data wheel.

For manufacturer information, please see Contact Sheet, p. 227.

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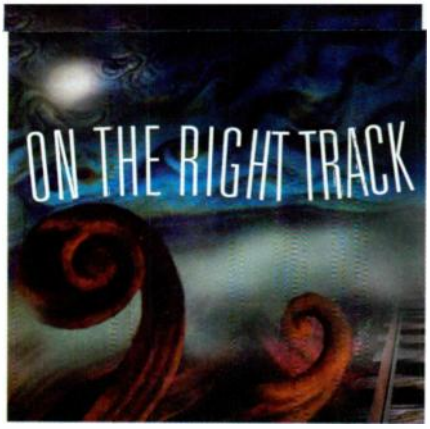


44.1 kHz audio. The combination of three sampling rates (48, 44.1, and 32 kHz) and six levels of compression lets you customize your disk space for any kind of session.

Having the ability to swap hard drives is a big plus with a hard disk system. A system that can work with an IDE drive allows you to find storage that's the right size, speed, and price for your studio.

Additionally, hard disk prices are decreasing faster than digital audio resolution is increasing, so the personal-studio owner can reasonably afford the greater storage capacity needed to achieve the higher levels of sound quality. If your digital recorder works with external drives (the VS-880 lets you chain up to seven SCSI drives from its SCSI port, for example), you can use little or no compression if you can afford the storage space.

Access any portion of your audio quickly with random-access recording systems.

THE RESOLUTION ISSUE

For many people, the issue of resolution is a confusing one. The standard CD specification of 16-bit, 44.1 kHz is what many of us still use when recording music. However, it's important to consider the future because the future has a higher resolution. Luckily, a growing number of recorders do as well. The computer-based systems are the most flexible in this regard because the components in these systems (software and hardware) can be upgraded to record high-resolution audio.

The more recent models of MDMs either record higher bit rates to tape or use high-bit-rate converters but dither the signal down to 16 bits when printing to tape. With the ADAT Type II format, Alesis raised the resolution of the S-VHS format to an impressive 20 bits at either 44.1 or 48 kHz while maintaining backward compatibility for working with 16-bit tapes. Amazingly, the company was able to keep the same amount of recording time on a tape with the greater resolution for significantly less than the cost of the original ADAT.

The Type II ADATs also give you a format for surround mixes that are 20-bit, 48 kHz DVD compatible. And, with any 8-track MDM, you can get two channels of 24-bit, 96 kHz audio across the eight tracks using the bit-splitting methods on devices such as Apogee's PSX-100 and Rosetta digital converters.

Tascam has just released its first 24-bit DTRS recorder—the DA-78HR, which is essentially a high-resolution version of the DA-38. The DA-78HR has the look and feel of a 16-bit recorder (and is, in fact, backward compatible) and retains the same amount of record time—108 minutes with a 120-minute tape—as the earlier DA models. I was not able to test a DA-78HR for this article, but if the audio quality is anywhere near that of Tascam's DA-45HR 24-bit DAT machine, the sound will be impressive.

VIRTUAL TRACKING AND MIDI

The easiest way to expand on a multitrack system is by synching MIDI instruments to it with a sequencer. This is called virtual tracking. Virtual tracking allows you to use as many MIDI instruments as you want, without having to use any of your recorder's audio tracks. If your sequencer and recorder are in sync, both audio and MIDI tracks play simultaneously. When the project is ready to mix, the MIDI instruments are mixed in with the audio tracks.

Virtual tracking with analog multitracks requires you to dedicate one of the audio channels to a sync tone. With each of our digital formats, you can sync to MIDI without sacrificing a track. And it's easy to get a digital multitrack up and running with MIDI in each of our systems.

The MD8 has built-in MIDI In, Out, and Thru jacks on the back panel. The MD8 synchs to a sequencer using MIDI Time Code (MTC) or MIDI Clock, but it must be the master device in either system. You can also control the MD8 using MIDI Machine Code (MMC), but this kind of control doesn't include sync information.

On the DA-88 or PCM-800, installation of the optional sync card allows the units to read, generate, and chase to SMPTE, and adds MTC functions as well. In addition, the DA-38 can sync to MMC with the optional MMC-38 adapter.

The VS-880 has MIDI In and Out/Thru jacks and can use MTC (as either the master or the slave device) or MIDI Clock (as master device only).

Until version 5.0, Pro Tools didn't

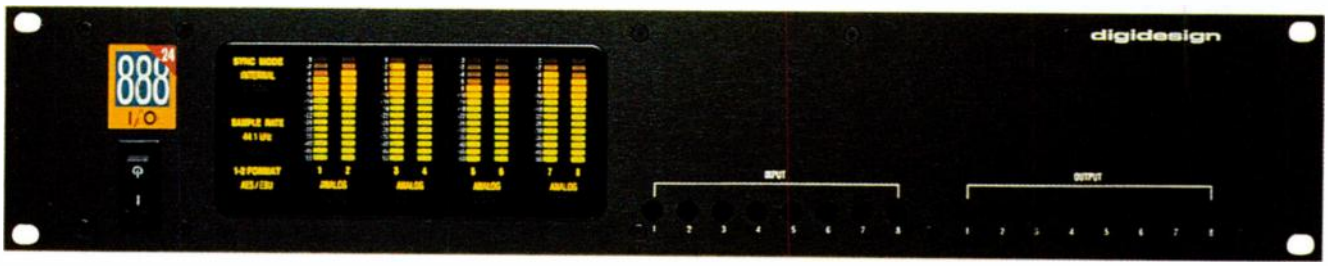
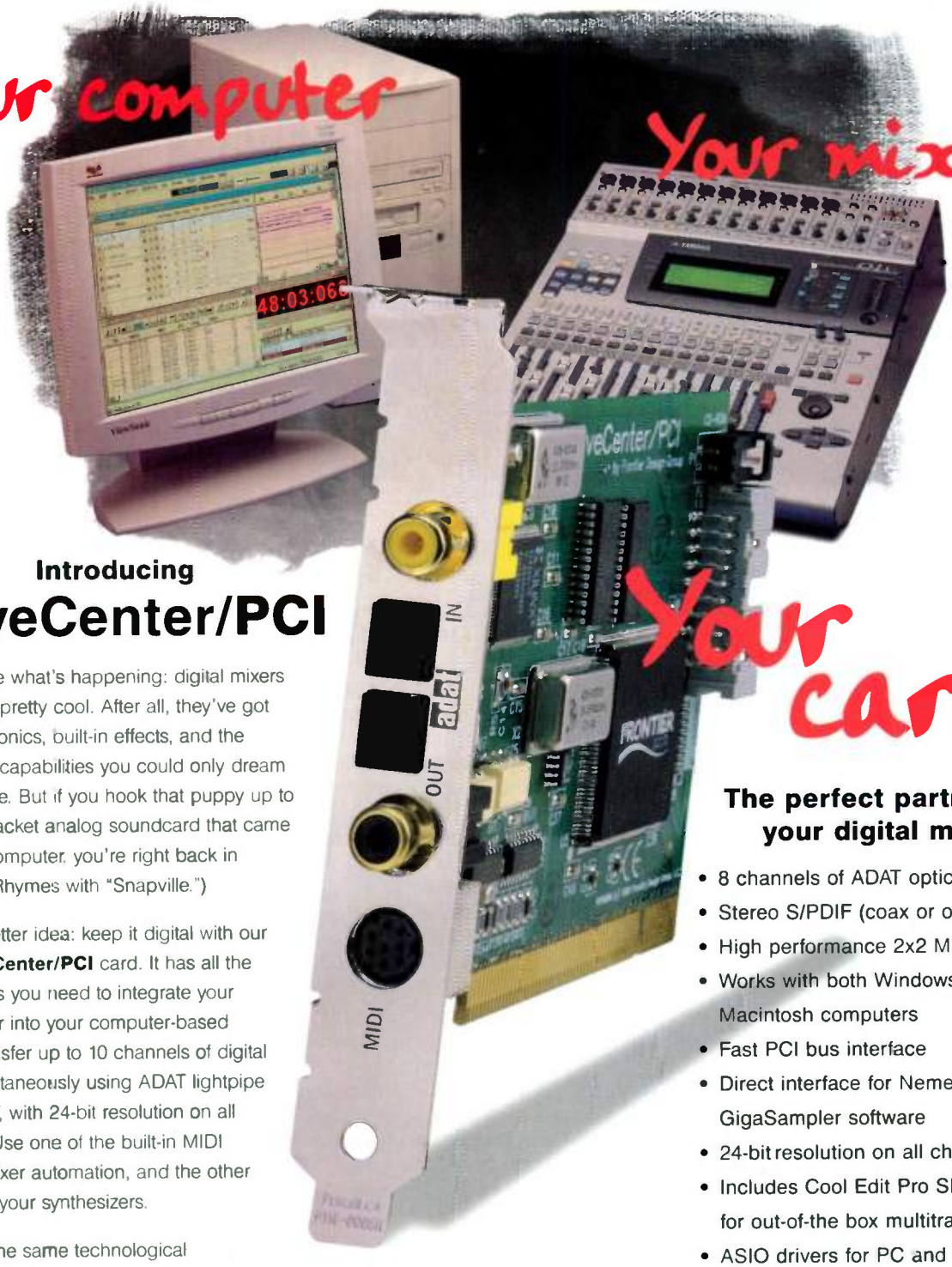


FIG. 7: Digidesign's 888 interface for Pro Tools includes 8 channels of analog I/O on balanced XLR connectors, 8 channels of AES/EBU digital I/O on XLR connectors, and 2 channels of S/PDIF digital I/O on RCA jacks.



Introducing

WaveCenter/PCI

OK, you see what's happening: digital mixers are looking pretty cool. After all, they've got incredible sonics, built-in effects, and the automation capabilities you could only dream about before. But if you hook that puppy up to the NoiseRacket analog soundcard that came with your computer, you're right back in ****ville. (Rhymes with "Snapville.")

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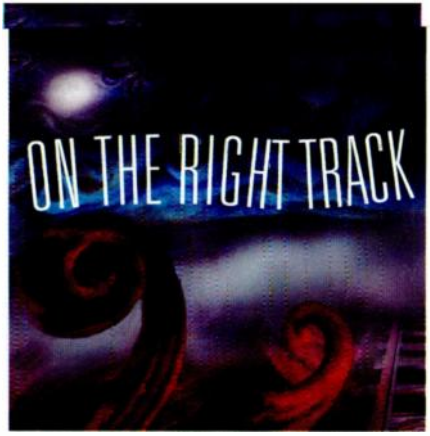

you 48 virtual tracks and lets you play any 16 of them at one time.

One thing to remember is that *all* of the tracks on the VS-880 are considered virtual tracks, including the top level tracks that you play back. One of the most powerful aspects of this system is that the user determines the track hierarchy. The track sheet from our session in **Fig. 8** shows that track 5 has been dedicated to guitar parts. I never had to worry about exhausting the eight virtual tracks of track 5, because further guitar takes could be recorded on other unused virtual tracks.

Virtual tracks are also useful for submixing, bouncing, and creating composite tracks from a number of different takes. For example, I can take a small portion from each of the guitar solos and create a composite solo by saving them to an open virtual track. Then, I can move the composite guitar solo to the playing level of the track. The other guitar solos remain undamaged in memory just in case I want to create another composite track later. I can also bounce instruments with effects to virtual tracks to get around the limitation of available effects in this workstation.

In Pro Tools, I use the Bounce to Disk command to submix and process tracks when I am running low on DSP power. Furthermore, I can determine whether I want to replace or retain the original track.

TRACKING

Recording was easy on every one of the machines, and there were no surprises. The transport layout of each is intuitive for anyone who has used a tape or CD player.

As I mentioned earlier, a big difference between the formats is the number of tracks you can record simultaneously. The MD8, both MDMs, and Pro Tools with one 888 interface let you record a maximum of eight analog tracks at a time. Since we were recording only four rhythm tracks at once, the 4-analog input limitation of the VS-880 didn't pose a problem for this session.

The transport controls of each system respond fairly quickly, with the biggest latency problem residing in Pro Tools. For overdubs or punching in a part, the small delay between the time when you hit record and when the unit begins recording can sometimes be a problem. MDMs have the added problem of getting the tape transport engaged and the tape up to speed. If you have a number of MDMs linked together, a significant delay occurs as they each engage before rolling. The Hi-8 mm transport of the DTRS format engages quickly and smoothly, and this is one of the reasons I like working with this tape format.

Of the four formats that we tested, the MD8 had the lowest recording quality. The change in the drum sound was the easiest to hear; the MD8 seemed to remove the important subtleties that the room added to the drums, giving them a two-dimensional sound. The biggest giveaway was the count-off, which appeared on the drum overhead tracks. Rather than fade into the reverberance of the room, the voice seems to be immediately gated after each number is spoken—as if the voice were made from severely truncated samples. This led us to surmise that some of the redundancy that ATRAC eliminates to save disk space is the room tone that gives a recording character.

The difference in sound quality among the other three formats was quite small. The body of the drum sound, for example, was evident on each recorder, with the VS-880 (used in Mastering mode) sounding especially rich in the low mids.

CUT-UPS

Although crude compared with waveform editing, digital "splicing" on a multitrack MD works fine if you're doing simple part arrangement. Editing on the MD8 is a destructive process, so you need to make a copy of the song to another part of the disc before making any changes. With the size limitations of the disc, this can prove to be a problem with larger works.

With the VS-880, you get a lot more editing sophistication. To begin with, editing is nondestructive, and your 64 virtual tracks can be destinations for sophisticated edits if needed. If you use up your 64 virtual tracks (and once you get hooked on using virtual tracks, you probably will), just move to another 64 virtual tracks using the handy 24-hour trick. Song timings are in hours/minutes/seconds/frames. By simply advancing a track's time by one hour, you create a new set of virtual tracks to use. What makes this trick work is that the exact minutes/seconds/frames times are the same, so you can move your favorite performances or comps back and forth from the original tune by merely changing the hour designation. No need to nudge or move the audio any further to keep it in sync.

The physical layout of the VS-880 and MD8 will be familiar to anyone who has worked with an analog cassette multitracker.

Simple editing moves on the VS-880, such as exchanging the position of a track, require a minimum amount of button pressing. For example, it's easy to take advantage of the channel link function that allows you to simultaneously control the EQ and panning of adjacent tracks, even though the tracks you want to link aren't adjacent.

You can, of course, create splices of greater complexity, although it requires a bit of patience at first. When editing, you can set up to four location points: Start, End, From, and To. Start and End define the beginning and end of the region you want to move or duplicate. The To locator will be the destination of the event, and the From setting is used if you have a sync point (other than the Start point) that you want to hit.

For instance, if you're simply duplicating a part, such as a drum loop, you

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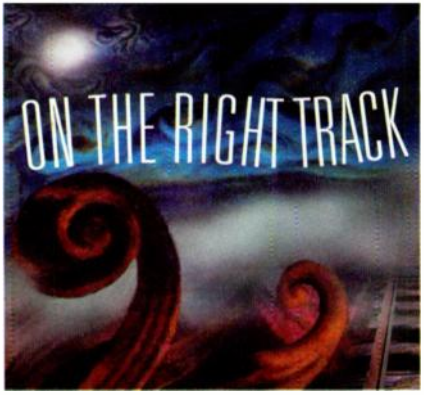

need to specify only the times for Start, End, and To because the loop will be placed one after the other. But if you're moving a loop that has a pick-up note and you want to make sure the down beat is placed at the beginning of the bar, you will use the exact timing of original down beat for From, and define To as the destination of your From point (see **Fig. 9**). That way, you can accurately place the downbeat where you want it, while retaining the pickup beat using the Start point. Once you've tried this a couple of times, it becomes easier than it sounds.

All of this editing is easier in a computer DAW environment. Simply use your mouse to highlight the audio region you want and edit using the familiar word-processing commands such as cut and paste. The ability to view the waveform down to the sample level allows for a substantial degree of editing accuracy.

MIXING

The MD8 version of our song was the first track we mixed at Brian Knave's White Cow Studio. Knave has quite a bit of experience with cassette multitrackers, and his skill with the MD8 was quickly evident. Because the MD8 allows you to mix an additional eight inputs with the eight recorded tracks, we were able to access dynamics processors for the voice and harmonica using the direct outputs as sends and the additional inputs as returns. Using the Cue Mix to Stereo switch allowed us to combine the dry and processed signals, although it took a bit of experimentation before the right balance was achieved.

The only dedicated insert points on the MD8 are on channels one and two, which contained the drum overheads. We used the inserts to quickly patch in the Joemeek C2 compressor to fatten up the drums, which made up for the weaknesses in the MD8's recording quality.

Using a selection of additional outboard effects (including reverbs, the BBE 482 Sonic Maximizer, and SPL Vitalizer Jack), we ended up with a mix that, to my ears, was CD quality. The rhythm tracks were punchy, the vocal had character, and the harmonica and lead guitar had bite. Of course, it helps that we tracked with a set of quality

THE ALESIS ADAT/EDIT

The Alesis ADAT/Edit package ($399; Mac/Win) allows ADAT users to easily transfer their tape-based tracks to and from their PCI-compatible computers, and to perform nonlinear editing, use software plug-in effects, and access other familiar DAW-style editing functions. The ADAT/Edit system works with any ADAT, including the original units as well as ADAT Type II units such as the LX20, XT20, and M20.

The system includes the software applications *ADAT/Edit* and *ADAT/Connect* as well as the ADAT/PCR PCI card. The ADAT/PCR card has both ADAT Optical I/O and ADAT 9-pin synchronization I/O. Eight-channel synchronous transfers can be accomplished at 16-, 20-, or 24-bit resolutions. The ADAT/Edit package also includes two 3-meter ADAT Optical cables and a 3-meter ADAT Sync cable.

Codeveloped by Alesis and Emagic, *ADAT/Edit* is a multichannel audio-editing program that features standard cut, copy, and paste functions, as well as DSP effects such as reverb, time expansion/compression, pitch shifting, and EQ. Drivers included with the package give you the option of working with other popular multichannel editing applications, including MOTU *Digital Performer*, Steinberg *Cubase*, Emagic *Logic Audio*, Cakewalk *Pro Audio*, and Opcode *Studio Vision*.

The *ADAT/Connect* software recognizes any ADATs that are connected to your computer and lets you transfer audio tracks between the MDMs and the computer. You can designate start and end points and name each track within the program. Tracks are transferred with single-sample accuracy.

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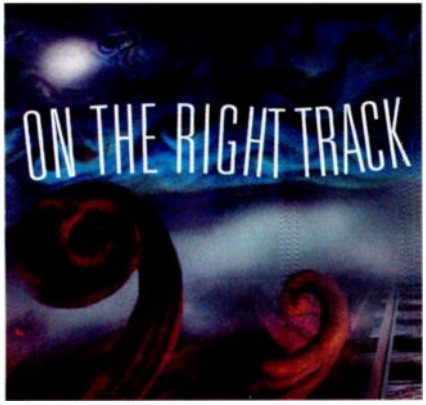

mics and preamps, then mixed in a pro-level studio with a knowledgeable engineer.

The Mix window on Pro Tools has much the same look as an analog mixer. However, every move is with a trackball or mouse unless you have a dedicated control surface. Fortunately there are a number of mix surfaces that work with Pro Tools and other DAWs, including Peavey's PC-1600, CM Automation's Motor Mix, JLCooper's MCS-3800, the Mackie HUI, and Digidesign's own ProControl.

It can be difficult to make subtle volume and panning moves with a mouse or trackball, but with Pro Tools you can automate most of the mixer moves, as well as the plug-in parameters. In addition, Pro Tools lets you draw in the mixer automation contours for each track. Use the Track Display Format selector to show any aspect of the track you want to control—pan, volume, mute, or plug-in settings (see **Fig. 10**). You can review and edit any automation you have performed in the Mix window in the Edit window with the Track Display. In Pro Tools 5.0, you can view and edit MIDI data in the Track Display as well.

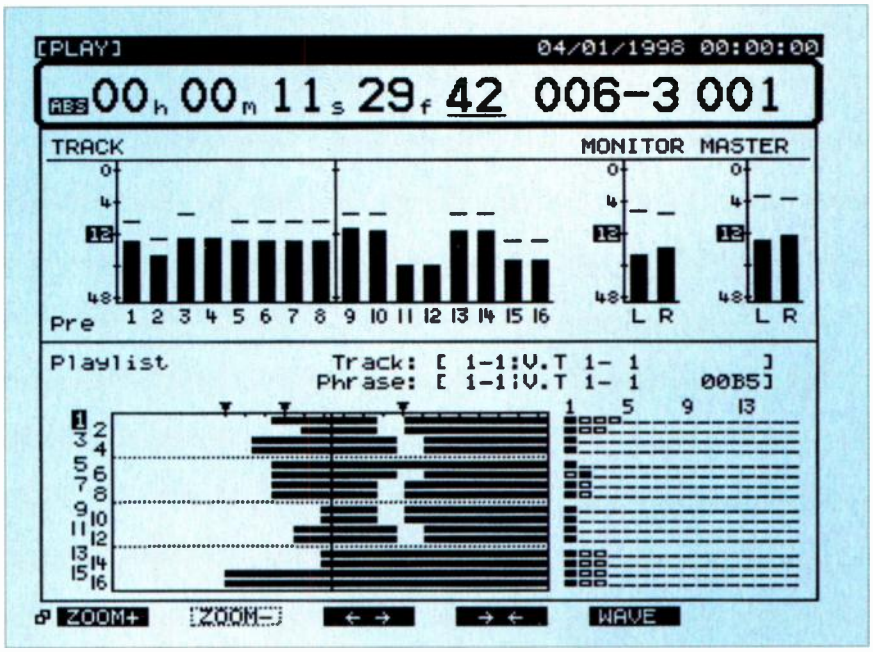

FIG. 11: The graphic display on the VS-1680 is greatly expanded over the display on the VS-880. In this shot, level meters and a graphic playlist are visible for each track.

When the entire Mix screen is in front of you, you get a clear and immediate visual sense of the status of your mix. To do this right, you need two monitors: one for the Mix window and one for the Edit window.

Mixing on the VS-880 is another thing altogether. A friend remarked that trying to access the exceptional mixing power of the VS-880 via its tiny display is like peeking through a knothole. For example, the EQ gives you a number of parameters to work with. But viewing and editing them one parameter at a time can be tiring with this interface. Anyone used to the immediate hands-on approach of an analog mixer is going to have to develop a good set of patience here.

By comparison, the VS-880EX and especially the VS-1680 graphic interfaces are a huge improvement over the VS-880 (see **Fig. 11**). The larger screen on the VS-1680 (which includes a dedicated control for adjusting its Contrast) makes tweaking much easier. For instance, all of the parameters of a track can be viewed on the screen at one time. If you want to view this on the big screen of your computer monitor, you can edit using a third-party application that allows you to edit parameters from your computer and avoid wading through the depths of key commands. These applications also include a MIDI sequencer and can be used with the VS-880 as well (see sidebar "Editing Applications for the VS-880"). Although having a computer interface for a portable digital workstation sort of defeats the purpose of using a portable studio, it would no doubt come in handy if you're going to be editing and mixing in your own studio.

Another powerful aspect of the VS system is its ability to save a particular mixer setup as a Scene. On the VS-880EX and VS-1680, you can automate a mix by using Gradation to change parameters between Scenes. The VS-880EX and VS-1680 also feature EZ routing, which allows you to save and recall useful recording, bouncing, and mixing setups. There are 29 user-definable and three preset EZ Routings in the VS-1680—enough to cover the various recording and mixing situations in a personal studio.

Tascam's new 24-bit DA-78HR has a

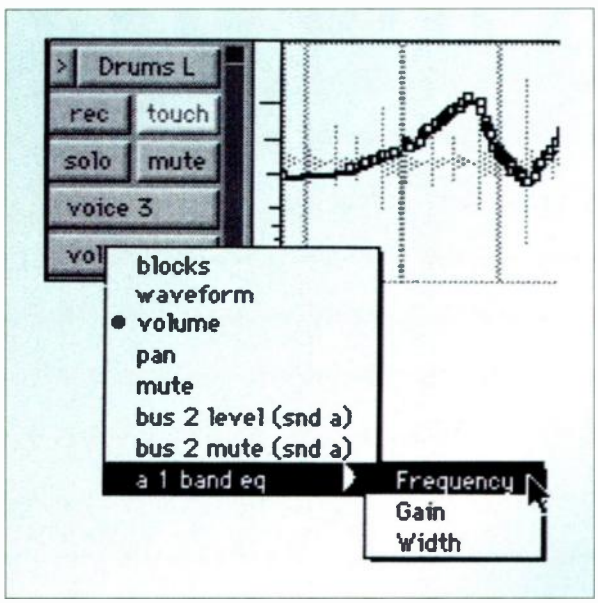

FIG. 10: In the Edit window, you can view or edit automation that has been added to a track using the Track Display Format selector.

For manufacturer information, please see Contact Sheet, p. 227.

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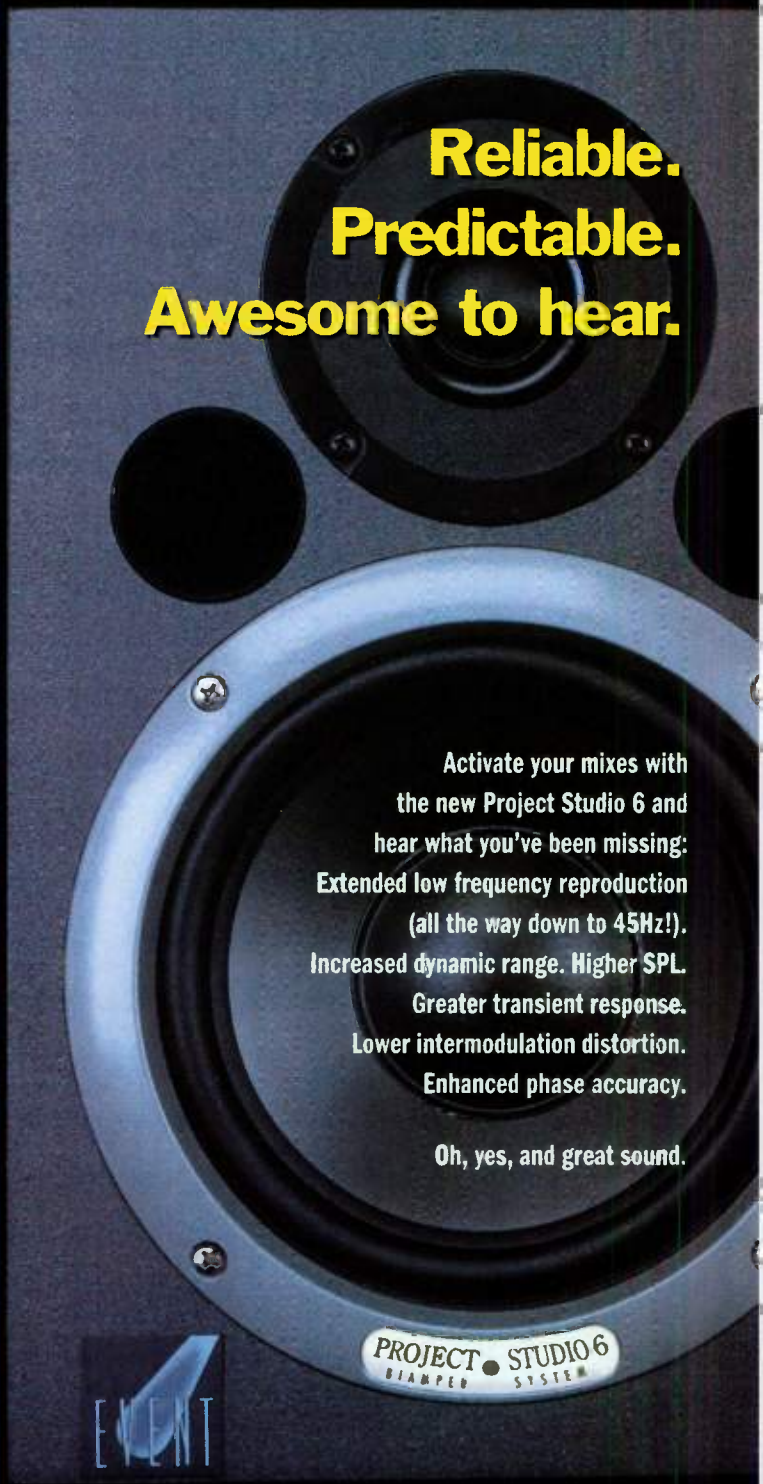

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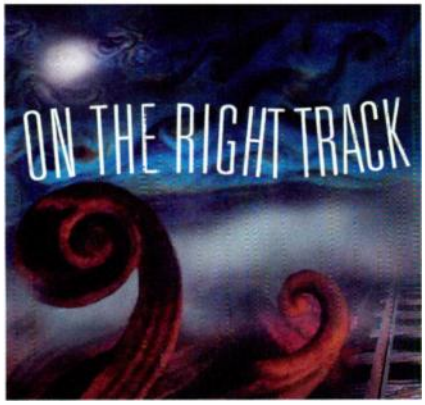

first for an MDM: an internal mixer. The mixer lets you adjust level and pan positions for the eight tracks—useful both for track bounces and mixing.

INTERNAL EFFECTS

Pro Tools and the VS-880EX come with internal effects, while the MD8 and DA-38 do not. Although the original VS-880 didn't come with the VS8F-1 effects expansion board, the effects come standard on the VS-880EX. Pro Tools TDM systems come with five useful plug-in effects (two EQs, four types of dynamics processing, three short delays, an extended delay, and dither), and the number and quality of third-party plug-ins for the system are remarkable.

In a Pro Tools TDM system, the processing power for real-time effects resides on the PCI DSP Farm card, which keeps your CPU from getting bogged down by extensive number crunching. For me, working with TDM effects is thoroughly enjoyable because it's easy to get great-sounding results. The particular system we used for our tracking session was not a TDM system, but this wasn't a problem. Once we had finished recording, I saved the session to hard disk, then copied it to a 1 GB Jaz disk so I could mix it on a TDM system later.

Pro Tools LE, which premieres with Digidesign's Digi 001 system, ships with the new Real Time Audio Suite (RTAS) plug-in format. As the name suggests, RTAS plug-ins allow real-time control over effects using the processing power of the host computer rather than a separate DSP chip. The obvious downside is that you can max out your system running only a few plug-ins at once. In fact, this can happen with one-card TDM systems if you're not keeping track of your DSP allocation. But intelligent use of the Bounce to Disk command can help you conquer these problems.

Roland's VS8F-1 expansion board has more bang for the buck as far as the number and quality of effects are concerned. This card gives you two stereo effects or four mono effects at the same time.

Tracking at Guerrilla Recording gave us the luxury of using loud amplifiers to get the rich guitar and harmonica sounds Boisen and Knave wanted. Using an amp at comparable volumes in a personal studio isn't always possible, which is one reason amp simulators have become popular.

Some of the VS-series effects use Roland's COSM technology to model microphone and amp characteristics. We could have chosen to monitor with the COSM amp simulations while tracking, but actually record the instruments dry. This scenario would have given the players the sound of an overdriven amp in their headphones, but printed a clean tone that we could process later to fit the mix. On the other hand, if you prefer to track the sound of the modeled amp with the performance, you also have that choice.

This same trick can be done in DAWs as well. A recent Pro Tools session I worked on used the amplifier modeling in Amp Farm by Line 6. In this case,

the engineer kept both the clean and processed parts.

SOMETHING FOR EVERYONE

After spending some time with the different formats, I've found certain attractions of each. I must admit that I find nonlinear recording to be the most interesting way to work. Although I sometimes pine for my younger days of tracking and splicing on a Teac 3440 reel-to-reel deck, I prefer the creative control that a DAW such as Pro Tools provides: I can quickly and intuitively manipulate audio and MIDI data in sophisticated ways.

As far as ease of use, the multitrack MD was very satisfying to use. The MD8 was the easiest of the bunch to get up and running right out of the box and was the simplest to demo with. The little pile of MDDs I filled up attest to this fact. Although the MD8 doesn't come with effects, and the sound quality is slightly challenged due to ATRAC, in the hands of a skilled engineer, CD-quality masters are attainable. And I welcomed the chance to have all of the mixer controls at my fingertips.

For sheer power, portability, and sound quality in one device, digital multitrackers like the VS-880 are a winner. Even though the recent VS-series recorders (the VS-1680 and VS-880EX in particular) are vastly superior to the older VS-880 I used, the sound and sophistication of the VS-880 is inspiring.

However, recording to tape remains a comfortable way to work. I particularly like the sound and features of the DA-38 and the fact that it works, more or less, like a DAT machine. I'm particularly attached to shuttle wheels because I tend to do a lot of audio scrubbing, and it's nice to have one built into the unit. I also like the fact that I can record up to 108 minutes on a tape that costs less than $20. Editing and mixing aside, none of the tapeless formats can touch this powerful aspect of the tape format.

Gino Robair *is an associate editor at* **EM**.
Thanks to Myles Boisen, Dean Santomieri, Christopher Robinson, Gilbert Marhoeffer, Brian Knave, Rick Weldon, Matt Gallagher, and Steve Oppenheimer. Special thanks to EMTEC/BASF and HHB for providing blank media during the research of this article.

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Plug In to Creativity

Get creative with plug-ins to produce your own signature sounds.

By Peter Freeman

Plug-ins that process digital audio continue to crop up in a seemingly endless variety of formats and types—TDM, AudioSuite, VST, Premiere, real time, non–real time, and so on. For me, one of the most important applications of these ubiquitous little programs is the creation of new sounds by transforming existing audio material. ♦ I'd like to share some techniques I've used with certain plug-ins to produce interesting, unusual results. My emphasis will be on creative uses of existing plug-ins, which I hope will encourage you to experiment with them on your own. Keep in mind that you can use hardware devices to apply many of the techniques and ideas described here; you don't have to limit these suggestions to plug-ins alone. ♦ Throughout this discussion, I'll mention particular plug-ins that are available in TDM, VST, AudioSuite, and Premiere formats. If you don't have a TDM system, you can obtain very similar sonic results with the other versions of the same plug-ins.

DRUM DECONSTRUCTION

You can do many fun things with drums using plug-ins. For example, add some distinctiveness and crunch to live or sampled drum sounds by using Digidesign's D-Fi series of plug-ins (TDM, AudioSuite); these plug-ins let you distort, destroy, and generally lower the fidelity of individual drums or entire kits. ♦ The Lo-Fi plug-in from the series is well suited for creating interesting overtones, distortion, and aliasing effects. If you're working with individual, isolated drum tracks, try applying it to the kick and snare, and experiment with low Anti-aliasing settings. The lower the setting, the more high-aliasing artifacts will be introduced, which can be quite effective on drums because of their metallic quality. In addition, try small amounts of distortion; low values can add some punch and "spread" to the sound of kicks and snares. Larger values tend to obscure the original sound completely and create a washy effect, which can be useful at times. ♦ You can also apply these techniques to stereo drum loops or drum-kit recordings. You will probably have to adjust the amount of anti-aliasing to compensate for the increased complexity of a full drum kit, because the high-frequency content of cymbals and hi-hats might clash with the overtones created by the plug-in.

ILLUSTRATION BY KITTY MEEK

For more drastic distortion effects, you can use *Recti-Fi*, another part of the D-Fi suite (see **Fig. 1**). A range of different distortion effects can be created using the Prefilter and Postfilter controls, so experiment with these. Even if you end up with an excessive, ridiculously distorted result, you can regain clarity by using the Mix control to mix the original signal back in.

Something to keep in mind about this plug-in is that it isn't true stereo. When processing a stereo source with certain settings, you might hear obvious phase artifacts. This is not a bug; the program's designer left it that way because he thought it sounded interesting, and I agree with him. Experiment with different settings and you'll find some unusual results.

FILTERING

Filtering can be an incredibly potent effect with many different sources, from drums to vocals. For the following examples, I'll use GRM Tools' *Band Pass* filter (TDM, VST) and Opcode's *fusion:Filter* (Premiere, AudioSuite, DirectX).

Lowpass is probably the most widely used filtering type. Once again, drums give you a good place to start. If you want to achieve a basic tonal change, apply a lowpass filter to the entire drum kit, setting the Cutoff Frequency and Resonance to about 40 percent or less. As a result, this produces a muted effect that gradually becomes a more pronounced "note" as you increase the resonance.

For more animated effects, modulate the cutoff with a sine wave LFO for cyclic effects or an amplitude envelope for a filter that varies with the volume peaks in the drum track. Opcode's *fusion:Filter* includes some presets that do exactly this (the "Cool Drums" patches). These techniques also work well with percussion tracks and loops.

FIG. 2: Apply GRM Tools' *Band Pass* plug-in to pitched, sustained material and drag the control cursor around the outer edge of the black "work area" to create a descending overtone sweep.

Of course, lowpass filtering has many other uses. On guitars and synthesizers, slowly swept lowpass filtering can give some tonal animation to repetitive parts. To start with, set Cutoff and Resonance to 50 percent with a medium (0.5 Hz) LFO modulation rate and medium mod depth. A sine wave is a good place to start for the LFO waveform, but be sure to try others as well—square, ramp, sawtooth, and even random waveforms can be useful in certain musical contexts.

Bandpass filtering is excellent for drastically deconstructing all sorts of musical sources. I have attained great results by applying it to drums, percussion, guitars, and vocals, but I encourage you to experiment with it on just about everything. You never know what you'll find.

GRM Tools' *Band Pass* Filter is a good-sounding, flexible filter plug-in that has a particularly musical sonic character, making it well suited for many applications. Perhaps the most obvious and immediate application is to make sounds "smaller." If you apply the *Band Pass* plug-in to virtually anything, the default setting makes the source material sound tiny, because the default uses a fairly narrow bandwidth with the center of a band in the upper midrange area (around 800 Hz). This can be a very effective tool as a special effect or to make a musical part fit better into a crowded mix. But thanks to the extremely precise (read "digital") nature of its design, this plug-in is capable of some specific, highly unusual effects beyond simple size reduction.

Try the following technique on pitched, continuous material, such as a sustained synthesizer texture. While the track is playing, drag the plug-in's control cursor along the rightmost edge of the black work area, from lower to upper right (see **Fig. 2**). In a continuous motion, keep going around the outer edge of this window, from the upper right corner to the upper left corner. You will hear a descending overtone sweep. The character of the GRM filter gives this sweep a distinctive quality that can prove very useful.

The *Band Pass* plug-in can also approximate the effect of a lowpass filter, creating dark, muted effects. Positioning the control cursor toward the middle left side of the work area puts you in the right "neighborhood" for this effect.

FIG. 1: Digidesign's *Recti-Fi* (part of the D-Fi suite) is great for creating some drastic distortion effects on drum parts and loops. Try tweaking the Prefilter and Postfilter controls.

VOCODING

Although vocoding is not a new effect, it is a relatively recent arrival in the world of plug-ins. Here is a useful technique that works equally well with a conventional hardware vocoder or a plug-in, such as Prosoniq's *Orange Vocoder* (see **Fig. 3**) or Opcode's *fusion. Vocode.*

You can realize one of the most interesting vocoder effects by modulating a sustaining, shifting texture with rhythmic source material, such as a drum track or rhythm loop. To do so, use the rhythmic material as the modulator and the sustaining texture as

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the carrier. That produces a composite vocoded signal with the rhythmic pattern of the modulator superimposed on the harmonic information of the carrier. This effect is great for creating intriguing textural rhythm patterns, particularly if you mute the original modulator source. Try experimenting with a variety of carrier and modulator sources; you are likely to find some pleasant surprises.

Another idea is to process the vocoded signal with additional effects, such as delays, reverbs, filters, and so on. Vocoder sounds are complex, but they are also quite familiar, so it behooves you to add interest by applying more effects. Two general suggestions for this are swept filtering and rhythmic delays, but by all means try your own ideas here as well.

REVERB

There are techniques that can breathe new life into the all-too-familiar digital reverb effect. One good place to start is to place other effects just before the reverb input. It's surprising what that can accomplish; even a humble flanging effect (set to fairly high regeneration and a slow, wide sweep) placed before a reverb's input can bring out lovely overtones in the reverb itself. That can go a long way toward creating a surreal atmosphere.

On the other hand, placing effects *after* the reverb can be interesting as well. For example, try using GRM Tools' *Doppler* effect or WaveMechanics' excellent *PitchBlender* (see Fig. 4) or *TimeBlender* (highly recommended) across the reverb return. That produces stereo pan/volume sweeps of the reverb tail that can be far more effective than standard reverb decay. Keep in mind that it tends to work best with longer (more than 2-second) reverb times. In addition, try using a medium-fast tremolo effect with moderate depth across a reverb return. Arboretum's *Tremolo* works well for this application, and the results can be quite unusual, particularly if you modulate the tremolo rate over time.

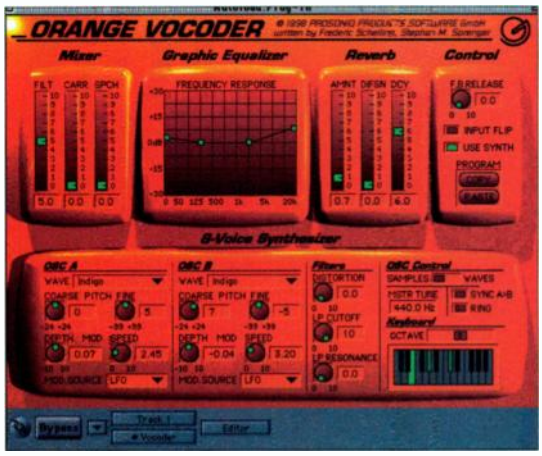


FIG. 3: You can achieve one of the most interesting vocoder effects by modulating a sustaining, shifting texture with rhythmic source material, such as a drum track or rhythm loop. Try this with a plug-in such as Prosoniq's *Orange Vocoder*.

For manufacturer information, please see Contact Sheet, p. 227.

PITCH CHANGE

Many plug-ins and hardware devices perform high-quality pitch-shifting effects. However, these effects can go far beyond the standard pitch correction or simple transpositions for which they are most commonly used. Pitch-shifting effects have always shown great potential for creating sonic interest when used imaginatively. For example, listen to producer Tony Visconti's use of the first-generation Eventide Harmonizer to create powerful, innovative drum sounds on David Bowie's landmark *Heroes*.

Here are some suggestions to get you started. On slow, legato parts (guitar is an excellent candidate), shift the pitch up by one octave and delay it by a musically related value (such as dotted eighth notes) to bring out the musical line in an interesting way. This is especially effective if the pitch shifter output is sent to a reverb or spatial effect and mixed in subtly.

Shifting drums and percussion tracks up or down by a major third or so can create unusual sounds, particularly if the shifted part is blended in as a background "shading" effect. Be sure to set any delay times in the pitch shifter to 0. Using high regeneration settings while shifting the pitch up one octave with rhythmically relevant delay times can be great fun, particularly on light percussion sounds or staccato synth patches.

ROUTING AND COMBINATIONS

One way to get the most out of your effects plug-ins is to combine them to create more complex textures, rather like a guitarist's pedalboard. Very often, combining seemingly mundane or simple effects in the right way can produce unexpectedly potent results. For example, consider a phaser or flanger plug-in. These sounds are so familiar that they are a bit boring on their own. However, placing a spatial effect, such as GRM Tools' *Doppler* or even one of the D-Fi plug-ins, directly after it can transform these ho-hum effects into highly unusual hybrids.

Approaching plug-ins as you would a guitarist's pedalboard can be very effective. Many individual plug-ins might not sound spectacular on their own (much like stompboxes), but when they are judiciously combined in series, some interesting things can happen. There are many reasons for this, but it's often because one effect emphasizes certain characteristics of the previous effect while eliminating other characteristics, or because certain effects combine well, acting as components of a more complex composite sound.

> ♦ Perhaps the most important concept I can communicate is experimentation.

Consider a filter placed after a distortion effect. Distortion creates overtones not found in the input signal, and filtering can bring out certain frequencies while eliminating others, so placing these two effects in series can actually change the perceived musical content of a sound or part. Try it for yourself, particularly on guitars and other harmonically strong material. You can get good results using practically any type of filter, from lowpass to bandpass/notch or even highpass.

You can also get a composite effect by using any swept effect (phasing, flanging, or swept filtering,

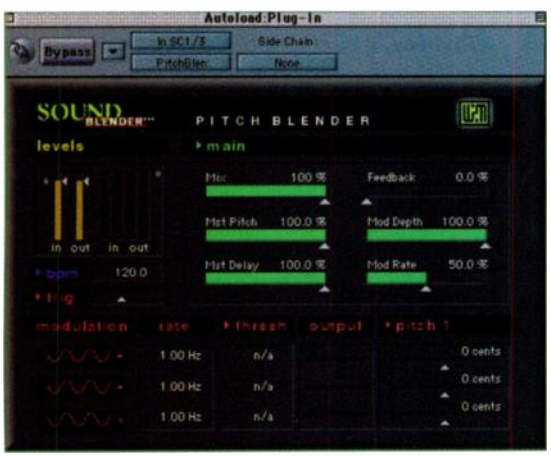
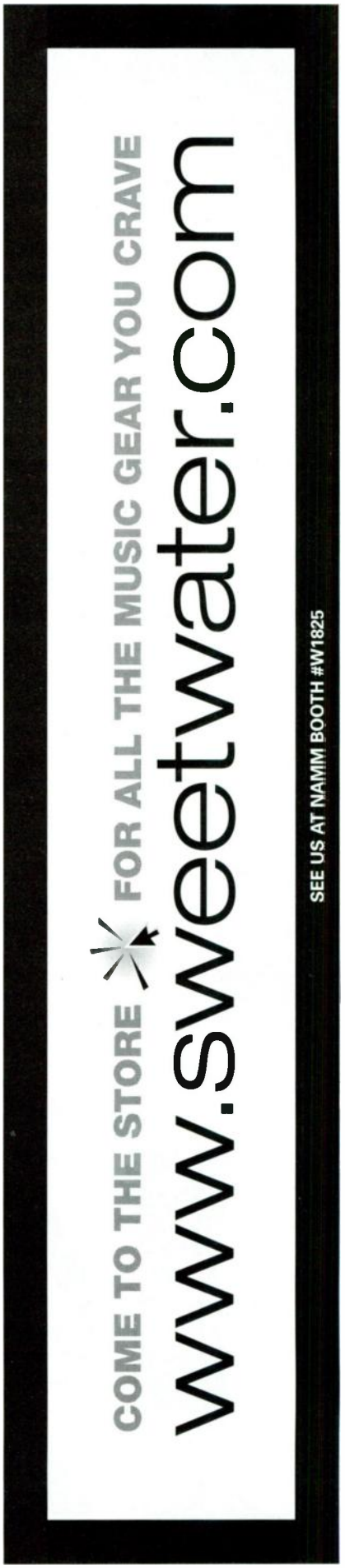


FIG. 4: Try placing a plug-in such as *PitchBlender* from WaveMechanics across the reverb returns to process the reverb signal.



for instance) followed by long delays with a substantial amount of regeneration. With many different types of source material, such as drums, guitar, and synthesizers, this simple combination can produce results that are sonically greater than the sum of their parts. The delays create a multiplying effect that increases the perceived complexity of the sweep. However, it doesn't have to end there. From this starting point, try adding other effects before the sweep (for example, distortion) or after the delay (for example, spatialization) to create even more complexity.

Real-time plug-in formats, such as TDM and VST, enable you to create complex signal routings, so take advantage of them. For instance, sending the same track to three aux sends, each connected to a different plug-in, can often produce great results. One combination that has worked well for me is reverb, delay, and swept filter, with a bit of the filter output routed through the delay, all applied to an atmospheric guitar part. This type of parallel connection lets you retain the clarity of individual effects and control their relative balance while blending in the original source track to taste.

When you run across a combination of parallel effects that you really like, it's always worth muting the original source track while retaining the sends to the effects. (Do this by making the sends prefader and muting the source's track. The "dry" signal will disappear, while the effects balance remains unaffected.) In general, I have found that some of the most interesting processed sounds happen when you monitor the effects returns in this way.

EXPERIMENTATION IS KEY

Perhaps the most important concept I can communicate is experimentation. Some of the most interesting sounds come about when you are just playing around and trying what-if scenarios. There are no rules, and the worst that can happen is that you won't like the results. So don't be afraid to try things, even if they seem outlandish or weird on paper. New things don't happen if you stick to established processes and conventions; besides, you always have these to fall back on if all else fails, so why be boring?

There is a formidable amount of processing power available to musicians who use effects plug-ins today, and I'm sorry to say that it's largely underexplored. Get extreme; try combining wildly different effects or too many effects. Put the wrong effect on a track, or use too much of the right one.

I hope the suggestions and techniques presented here prove inspirational. If I get just one person to try just one new idea, then all the time and effort I spent putting this information together will not have been wasted. Good luck, and happy tweaking.

Peter Freeman *is a bassist, composer, and producer living in New York. He has worked with artists Seal, Jon Hassell, L. Shankar, John Cale, Shawn Colvin, and Nile Rodgers, among others.*

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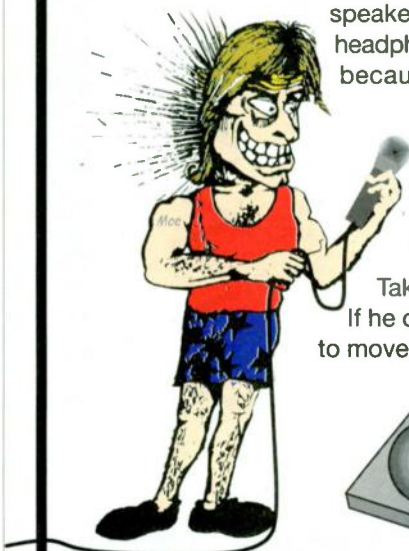

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The Electronic Century

PART I:

BEGINNINGS

By
Joel Chadabe

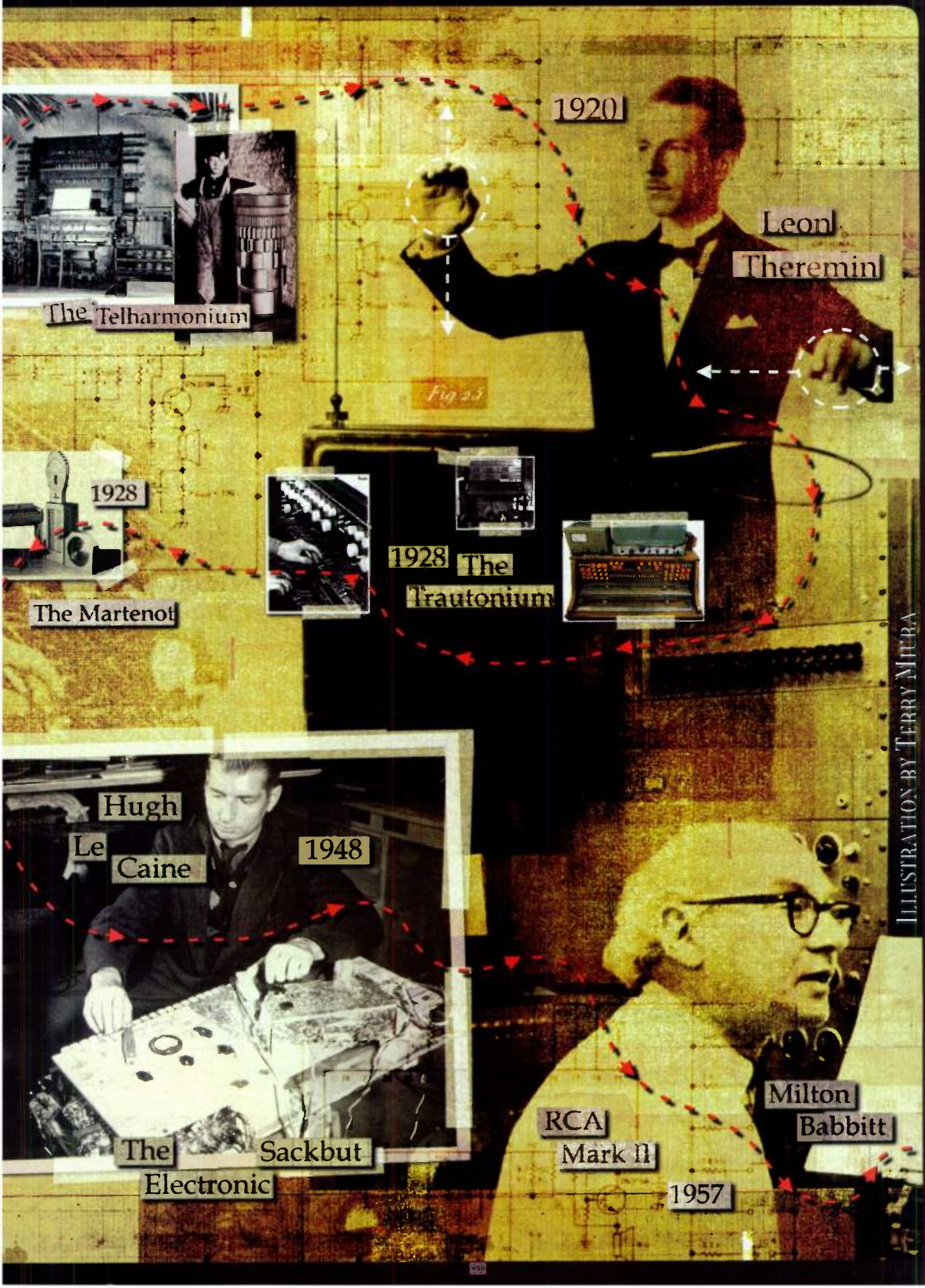
The early years of electronic musical instruments set the tone for a century.

As we enter the 21st century, electronic music is fast approaching its 100th anniversary. This is a good time to look at our roots and get to know how we came to be where we are. This is the first in a series of four articles in which EM explores the instruments, artistic ideas, business concepts, musicians and entrepreneurs, and technical breakthroughs of the century—from the first technological achievements to the synthesizers of tomorrow.

The focus throughout the series is on the technologies that have been used by musicians to expand on the resources available in traditional, acoustic instruments. Where appropriate, each article will also document important musical compositions that have employed these technologies. There's a rich and deep tradition to uncover, so let's begin our journey!

When did electronic music start? It's a question often asked. Was it in 1759, in France, when Jean-Baptiste de La Borde built the Clavecin Electrique, a keyboard instrument that employed static electrical charges to cause small metal clappers to hit bells? Was it in 1874, in the United States, when Elisha Gray invented the Musical Telegraph? In my view, these one-of-a-kind experimental devices, and many others that were built during the 19th century, were merely setting the stage for instruments to come.

The answer, then, it is widely agreed, is that electronic music began at the turn of the 20th century.


1920
Leon Theremin
The Telharmonium
1928
The Martenot
1928 The Trautonium
Hugh Le Caine
1948
The Electronic Sackbut
RCA Mark II
1957
Milton Babbitt
Illustration by Terry Miera

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The Electronic Century

BEGINNINGS

THADDEUS CAHILL

As the 19th century came to a close, electricity was not yet widely available. Automobiles were rare. Telephone companies were just beginning to lay their cables up and down city streets, and Thaddeus Cahill, a lawyer and entrepreneur in Washington, D.C., had an idea.

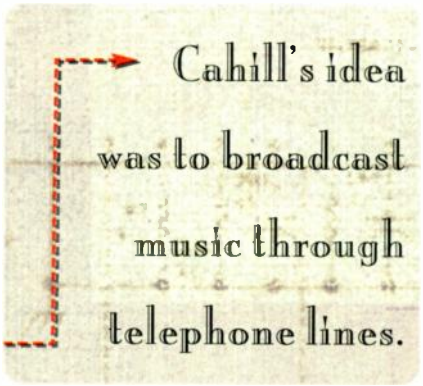
Cahill's idea was to build an electronic musical instrument and use it to broadcast music through telephone lines into homes, restaurants, and hotels. In an age when mass musical media such as tapes and discs did not exist, Cahill's Telharmonium was viewed by many as a major innovation in the distribution of music. (See the sidebar "For Your Reading and Viewing Pleasure.")

Events unfolded quickly. In 1897, Cahill was granted his first patent for "The Art of and Apparatus for Generating and Distributing Music Electronically." In 1898, he began to build the first version of the instrument that would later be called the Telharmonium. Cahill found financial backers in 1901, and the New England Electric Music Company was formed. In 1902, the company leased factory space in Holyoke, Massachusetts, and Cahill began to build an improved version of the Telharmonium. In 1905, the New England Electric Music Company signed an agreement with the New York Telephone Company to lay special cables for the transmission of Telharmonium music throughout New York City.

OPENING NIGHT

In 1906, the Telharmonium was dismantled and transported to New York City, where it was reassembled in the newly established Telharmonic Hall at 39th Street and Broadway (see **Fig. 1**). The instrument weighed approximately 200 tons and had to be transported from Holyoke in more than 12 railway boxcars.

The Telharmonium was played by two performers seated at a two-keyboard console that was installed on the ground floor. The sound-generating method was additive synthesis, accomplished by alternating-current dynamos, which were installed in the basement along with the switching system, transformers, and other electrical devices. Sine waves were generated by toothed wheels rotating near inductor coils. As a tooth on the turning wheel came closer to the coil, the voltage in the coil would rise, and then the voltage would dip as a gap between teeth passed the coil. Different wheels produced different harmonics, as the number of teeth on a wheel determined the frequency of the resulting waveform.



Telharmonic Hall was opened to the public and press on September 26, 1906. The first broadcast to a restaurant was on November 9, 1906, to the Cafe Martin, on 26th Street between Fifth Avenue and Broadway. At the restaurant, romantic couples seated at tables were treated to Telharmonic sounds through special loudspeakers peering through plants on their tables. It was a festive moment.

But then the troubles began. The broadcasts of Telharmonically generated Rossini overtures, through the cables laid by the New York Telephone Company, interfered with telephone conversations. This led the telephone company to terminate its agreement to lay cables, and a crisis ensued. Cahill's business colleagues reacted by forming the New York Cahill Telharmonic Company and seeking a franchise from New York City to lay its own cables. But in the meantime, there were no cables. And without cables, no sounds were broadcast. Without sounds, there were no subscribers to the service. Without subscribers, there was no business. The doors at Telharmonic Hall were soon closed.

Cahill remained undaunted and determined and would not admit defeat. He shipped the Telharmonium back to Holyoke, took control of the company, and made a valiant attempt at a comeback with a third and improved model. Finally, in 1911, the franchise to lay cables was granted. Unfortunately, by then it was too late. The time for the Telharmonium had passed. Other instruments and technologies were capturing the public's attention, and the Telharmonium was no longer newsworthy. In 1914, the New York Cahill Telharmonic Company declared bankruptcy.

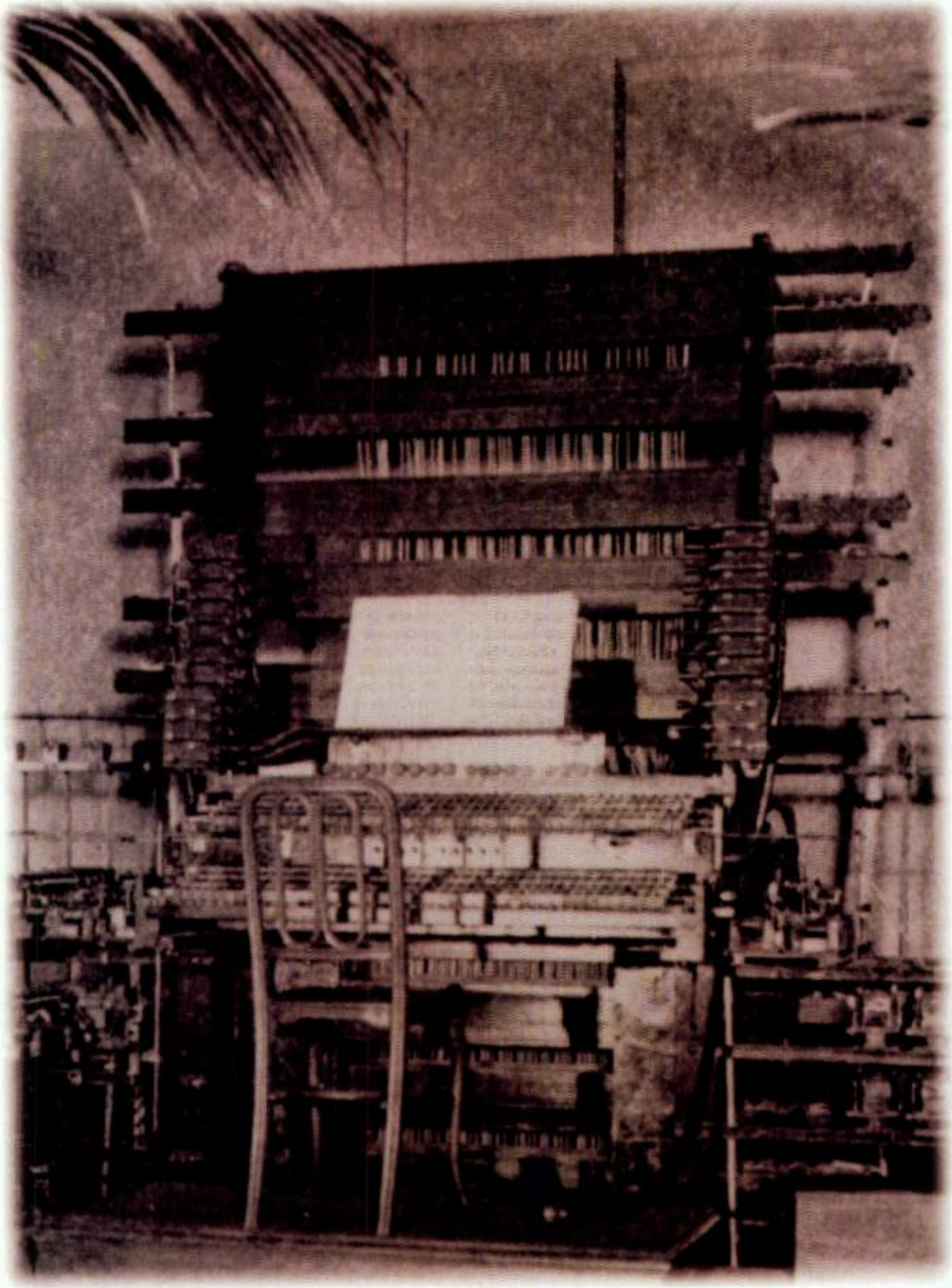
It was a sad ending. As both engineer and businessman, Cahill had taken a visionary idea to its limit. He failed because his idea required a technology that was simply not available at the time. The technology did exist, however, for the next major electronic musical instrument, invented just a few years later.

THE MAGICAL INSTRUMENT

Although the theremin has never sold in huge numbers to a mass market, it was by all other measures a resounding success. The story of the theremin and its inventor, Leon Theremin, is a tale of political intrigue as well as musical invention.

In 1920, while still an engineering student in Moscow, Theremin built a very unusual instrument and demonstrated it to his fellow students. It was a box with two antennas, one extending vertically from the top, the other projecting horizontally from the side (see **Fig. 2**). Theremin played his instrument by moving his hands in the air. He moved one hand relative to the vertical antenna to control pitch, and the other hand relative to the horizontal antenna to control volume.

At that time, the Russian government was making a major effort to introduce electricity throughout Russia. Since Theremin's instrument was electronic, it attracted attention. After presenting his instrument before a group of Soviet scientists in Moscow in 1921, Theremin was invited to demonstrate it



COURTESY ELECTRONIC MUSIC FOUNDATION

FIG. 1: Thaddeus Cahill's Telharmonium was installed in New York in 1906. It was transported from its home in Massachusetts in more than a dozen railway boxcars.

MIDI
IN
OUT / THRU
S/PDIF
IN
OUT
OUTPUTS
LEFT
RIGHT
Input Trim
Edit Pages
Edited
EDIT
1
2
3
4
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Change
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The Electronic Century
BEGINNINGS

for Lenin. He carried his instrument to Communist leader Vladimir Lenin's office and performed. Lenin then played it himself. As Theremin later recalled, Lenin had a musical ear.

It is reasonable to assume that the meeting in Lenin's office was the beginning of Theremin's involvement as an ancillary contact for the NKVD, the precursor of the KGB. Theremin was given a travel grant to demonstrate his instrument throughout Russia. In 1927, he received support in a very successful concert tour throughout Europe. When he arrived in New York in December, Theremin was welcomed as a celebrity.

Theremin stayed in New York for ten eventful years. He met Clara Rockmore, who became the first and best-known theremin performer. RCA produced theremins for a short time. Leon Theremin found patrons, built instruments himself, performed, worked with others in performance, and married. But he carried out unsatisfactorily his tasks for the NKVD.

In 1938, probably judging that he would be of more use in Moscow than in New York, the NKVD kidnapped Theremin and returned him to Russia. During World War II, Theremin worked on radar. In 1947, after the war, he developed a bugging device for what had become the KGB and, as a reward for his work, received the Stalin prize of 100,000 rubles. In 1991, at the age of 95, he returned to the United States for a brief visit, during which he played a concert at Stanford University and met with old friends. Leon Theremin died in 1993.

Sliding Pitches

Theremin wasn't alone in having the idea of a keyboardless device that could play pitches between the normal notes of a scale. If the theremin had been invented in the MIDI era, it would have been called an alternate controller. And although many keyboard instruments were built during Theremin's early years (including organs of many different types, shapes, and sizes), some of the most interesting instruments, among them the Trautonium and Ondes Martenot, were conceived without a keyboard in mind.

The Trautonium, developed in 1928 by Friedrich Trautwein in Berlin, was something like a horizontal metal violin, played by pressing a wire against a metal bar much as a violin string is pressed against a fingerboard. A second metal bar was used to control the volume and articulation of each note, and timbre was chosen by manipulating an independent bank of switches. Oskar Sala, who studied with Trautwein in Berlin, developed a two-manual version of the original instrument and called it the *Mixturtrautonium*. Sala was particularly interested in film music and used the device to compose music and sound effects for films, including some sound effects for Alfred Hitchcock's *The Birds*.

Maurice Martenot developed the Ondes Martenot in 1928 in Paris. In the first version of the instrument, Martenot played it by pulling a ribbon that was attached to a ring placed on his finger, so that as he pulled the ribbon, the pitch changed in a continuous glissando. While he pulled the ribbon, he used his left hand to vary volume and choose timbre settings from a bank of switches. Responding

FOR YOUR READING AND VIEWING PLEASURE

There are several excellent resources that you should consider if you'd like more information on the first era of electronic music technology. Here are some book recommendations:

Electric Sound (Prentice Hall, 1996), by Joel Chadabe, discusses developments throughout the 20th century, with excellent coverage of the first 50 years.

Magic Music from the Telharmonium (Scarecrow Press, 1995), by Reynold Weidenaar, is the most thorough book ever published on this amazing instrument; check out the video as well.

Sackbut Blues (Canadian National Museum of Science and Technology, 1989), by Gayle Young, chronicles the life and work of Hugh Le Caine, a fascinating innovator.

To supplement your reading, here are a few recommended recordings:

The Art of the Theremin (Delos) features Clara Rockmore playing transcriptions of music by Rachmaninoff, Saint-Saëns, Stravinsky, and others.

Oskar Sala: Subharmonische Mixturen (Erdenklang) includes compositions for the Trautonium by several composers, including Paul Hindemith.

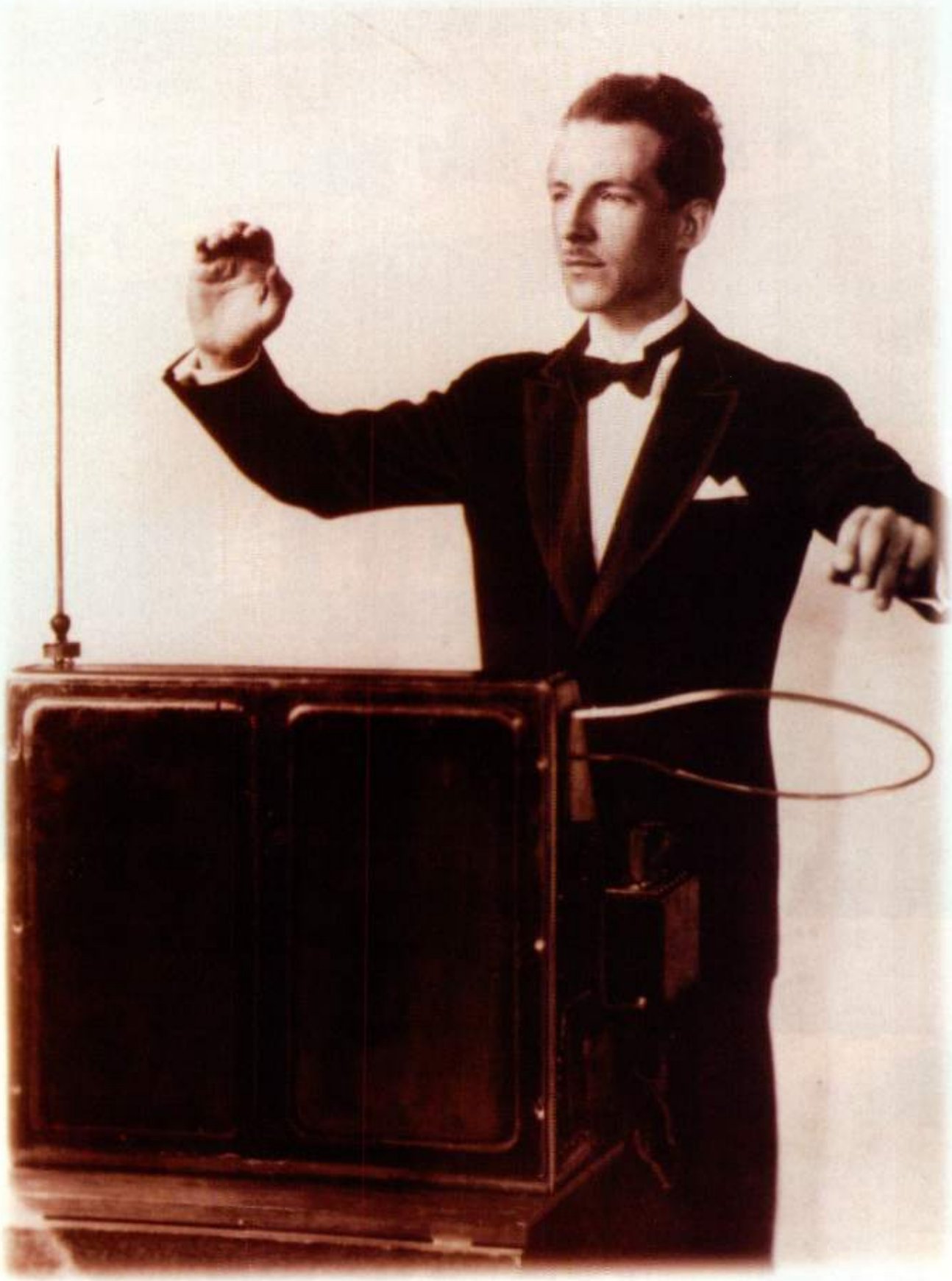
Les Ondes Musicales (SNE) features Genevieve Grenier performing Debussy, Ravel, Fauré, Gaubert, and Satie on the Ondes Martenot.

Milton Babbitt (CRI) includes the seminal work "Vision and Prayer," featuring Bethany Beardslee, soprano, and electronic sounds from the RCA Mark II Electronic Music Synthesizer.

We also recommend this videotape:

Clara Rockmore: The Greatest Theremin Virtuosa (Big Briar), produced by Robert Moog and Big Briar, features theremin performances and demonstrations by Clara Rockmore in an informal conversational environment with Robert Moog and Tom Rhea.

These and other interesting items are available from CDeMUSIC at www.cdemusic.org.



COURTESY ELECTRONIC MUSIC FOUNDATION

FIG. 2: The electronic instrument invented by Leon Theremin can be heard on various recordings even today.

The Electronic Century
BEGINNINGS

to requests, he later incorporated a keyboard in the instrument. He also added a knee-operated lever, placed under the keyboard, by which a performer could control continuous timbre change.

Neither Trautwein nor Martenot were businessmen. They were inventors. They designed and built their instruments without market analysis, without plans for mass production, and without a business strategy for public success. The Ondes Martenot, more than the Trautonium, did have buyers, but it was manufactured and purchased on a one-by-one basis.

By 1930, the field of electronic musical instruments seemed to have promise, though yet unfulfilled. One major business had failed, one innovative instrument had become well known, a few instruments had small followings, and many others had come and gone without any general public awareness.

Was there a large market for electronic musical instruments? Yes. And it was about to break open.

Commercial Success

Inventor Laurens Hammond designed and manufactured a variety of instruments: clocks, an automatic shuffling bridge table, and eyeglasses for viewing 3-D film. Then, in 1933, he bought a used piano and began to design an electronic organ.

Unlike Theremin, Trautwein, and Martenot—and the other electronic-instrument inventors who were motivated by the adventure of invention and a fascination with discovering new ways to make music—Hammond was motivated by profit through sales. His goal was to sell organs to a mass market. Like most businesspeople with a similar goal, he approached the problems of design, manufacture, marketing, and sales with a cool-headed eye toward reducing expenses and increasing revenue.

The designs for his organs reflected economy in manufacture. For example, after analyzing concave pedalboards in other organs, Hammond leveled the pedalboard in his design and omitted the pedals that were played the least often. The sounds in his organ were generated by additive-synthesis tonewheels that were refinements of the mechanisms that Cahill had used in the Telharmonium.

The Model A organ appeared in June 1935. Hammond's marketing was pervasive and intense, initially aimed at churches throughout the country. But his organ's distinctive sound was soon found to have just the right quality for jazz and blues—and eventually for rock. Many different models followed, with assorted variations and improvements, to satisfy customers' varied needs. The Hammond B-3, first introduced in 1936, has achieved legendary status in the music world. Especially when paired with a Leslie rotary speaker, the B-3 has brought tears of joy to the eyes of many musicians.

> Romantic couples enjoyed Telharmonic sounds through special loudspeakers peering through plants on their tables.

Hammond's organ was a major success. It was everywhere. And it demonstrated the existence of a mass market for electronic instruments. But it was limited in the variety of sounds it could produce. From the perspective of a musical-instrument inventor, there was a lot of work to be done.

The Electronic Sackbut

During World War II, Hugh Le Caine worked on microwave transmission at the Canadian National Research Council in Ottawa. In a more relaxed period following the war, he pursued a secret life. Working at home in the evenings, he was building an electronic musical instrument.

In 1948, Le Caine finished a working prototype of what he called the "Electronic Sackbut," a precursor to the voltage-controlled synthesizers to come in the 1960s (see **Fig. 3**). The Sackbut was capable of great performance nuance, with keys that were sensitive to sideways pressure to change pitch. One note could slide into another, vibrato could be performed by wiggling a finger side to side, or notes could be bent as far as an octave away from the basic pitch. Vertical pressure on a key controlled volume such that gradual attacks could be made. Even more interesting, Le Caine added mechanisms that introduced irregularities into the tones, such as breath sounds, buzzing, or raspiness, to enhance what he called the "monotonous purity" of electronic tones.

Following a public presentation of the Sackbut and many lectures and demonstrations, Canada's National Research Council established a studio for Le Caine. The studio enabled him to develop electronic musical instruments for manufacture by Canadian companies. This was an affirmation that an electronic-music market truly existed and that this market was beginning to open up.

The RCA Synthesizer

The next major electronic musical device to come along focused on the ability to make any sound. RCA's concept was to develop an instrument that could substitute for a studio orchestra. The RCA Mark II Electronic Music Synthesizer was a step in that direction, built by Harry Olson and Herbert Belar at RCA's Sarnoff Laboratories in Princeton, New Jersey, and finished in 1957.

The Mark II contained 750 vacuum tubes. It covered an entire wall of a room, horizontally and vertically. It was, in fact, a punched-paper-tape reader that controlled an analog synthesizer. Information was input by using a typewriterlike device to punch holes in a paper roll. The paper roll was then passed through a reader and read by contacts between metal brushes that touched through the holes,

COURTESY ELECTRONIC MUSIC FOUNDATION

FIG. 3: Hugh Le Caine with his Electronic Sackbut in 1954. Despite its technological innovation, it never reached a mass market.

COURTESY ELECTRONIC MUSIC FOUNDATION

FIG. 4: Renowned classical composer Milton Babbitt mastered the complex workings of the RCA Mark II synthesizer to produce some of the most significant electro-acoustic works of this century.

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thereby closing switches and causing the appropriate machine processes to start or stop.

Considering the time at which it was built, the Mark II was powerful. But its user interface was a nightmare. In fact, it was so difficult to operate that it had only one primary user. Acquired by the Columbia–Princeton Electronic Music Center in 1959, it was used almost exclusively by Milton Babbitt, composer and professor at Princeton University (see **Fig. 4**). (Babbitt later remarked, "I've got the patience of Job.") Although the Mark II was seriously damaged by thieves who broke into the studio in 1976, it still exists in the Columbia University Computer Music Center.

THE EARLY DAYS

In summary, the history of electronic music during the first part of the 20th century comprises the development of the early instruments more than the evolution of electronic musical art. These instruments, by and large, were not associated with innovative musical ideas. Rather, they were continuations of a long lineage of instrument invention, and they were generally intended for playing the same music that was played on traditional instruments. Cahill, for example, had set out to provide mass distribution of music that would include many musical styles, from Rossini overtures to popular music to church hymns.

Most of the early instruments, including the Telharmonium, did not offer composers a lot of new musical possibilities. They did offer some novel sounds, even if they were often difficult to play, and a few avant garde composers experimented with them. Paul Hindemith, for example, composed a few pieces for the Trautonium. Pierre Boulez and Olivier Messiaen, among other composers, had a passing interest in the Ondes Martenot—in fact, it's worth noting that the Ondes Martenot is still occasionally used by contemporary composers. Le Caine himself experimented with music for the Sackbut, but his hit number was a performance of the opening to Gershwin's "Rhapsody in Blue." The sounds of the RCA Mark II were documented on a demo LP made by RCA engineers, but the selections, which included Irving Berlin's "Blue Skies," were not exactly musically innovative.

The RCA Mark II was exceptional in that it did offer new musical possibilities. It offered precision of control, the possibility for substantial complexity in rhythm and texture, and a large palette of electronic sounds. These were the qualities that Milton Babbitt found important, and Babbitt's "Philomel" (1963) and "Vision and Prayer" (1964), both for soprano and taped electronic sounds made with the RCA Mark II, are probably the only masterworks created with the early instruments.

In one way or another, all of the early instruments foreshadowed the future. Cahill's business plan for the Telharmonium presaged Muzak. The Trautonium and Ondes Martenot laid the foundations for pitch bending and microtonality. The Electronic Sackbut was the forerunner of the voltage-controlled synthesizer, and the RCA Mark II Synthesizer, with its punched-paper-tape reader, prefigured the software sequencers of the MIDI age.

There was one exception: the theremin. Among the entire first group of electronic musical instruments, the theremin alone remains viable today in its original form. It has been used in music by the Beach Boys, Led Zeppelin, and many others, and its sound has provided an eerie background to films by the likes of Alfred Hitchcock. It is now lighter and less expensive than it was at the start, and its mechanisms have otherwise been improved by modern technology. But it does today exactly what it did when Theremin played it in New York in 1927.

Joel Chadabe, *composer and author of* Electric Sound, *is president of the Electronic Music Foundation. He can be reached at chadabe@emf.org.*

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Pressing Issues

Choosing the right format for your music.

BY GINO ROBAIR

Releasing an album can do a lot of things for an artist. First of all, it allows more people to experience your musical talents. Second, it provides a tangible source of income through sales you make at gigs, by mail order, on the Internet, and in retail outlets (such as book and record stores). But most important, your record propels you into the elite stratosphere of "recording artists," opening new avenues of publicity through radio airplay and record reviews.

Another significant aspect is the "cool" factor: an album is far more impressive than a demo tape when you're negotiating with clubs and trying to get *good* gigs.

Simply put, an album can be a very good tool for the serious musical artist. It's even better when it's on a major record label—but until they call, doing it yourself is the next best thing.

PLANNING FOR SUCCESS

No matter how you record your tracks, start thinking about the album *before* you mix. Take time to strategize. Begin by putting together a budget, accounting for *all* the costs of the project: mixing; editing; mastering; design charges, including materials; photo shoots and prints; preprinting charges, such as color separations and matchprints; printing; pressing; packaging and shrink-wrapping; sales tax (if applicable); and anything else you can think of. Now add a 10 to 20 percent contingency fee for those unexpected emergencies.

When budgeting, keep in mind that most pressing plants and printers have a clause in their contracts stating that all orders are subject to a ±10 percent over- or underrun. This means that a 1,000-piece order could theoretically yield anywhere from 900 to 1,100 pieces. The norm usually is in the ±5 percent range. In either case, you will be billed for the exact quantity shipped.

In the worst-case scenario (assuming you are using a separate printer and CD plant), you could wind up paying for 1,100 CDs and have only 900 booklets and tray cards! However, if you are wise enough to order more booklets and tray cards than CDs, you won't run the risk of getting shortchanged.

ILLUSTRATION BY DAVE EMBER

INITIAL CAPITAL

Pressing your own CDs isn't as expensive as it used to be. But the question remains: where's the money going to come from? A common solution for the band on a budget is to have each person in the band contribute an equal share of the costs. When the product arrives, each band member gets some of the discs, and the remaining copies are used for sales and promotion. For example, from an order of 1,000 CDs, each member of a five-piece group could get 100 to give to friends and relatives (all of whom want free copies, of course). This leaves 500 copies for in-store and off-stage sales and radio/press promos. Priced appropriately, the CDs that are sold will pay for all the production costs and then some.

Whether you're in a duo or an orchestra, the aforementioned scenario is a great way to divide the financial responsibility of producing your own release. It's interesting to note that a shared financial commitment in a release promotes a shared commitment to see it "sell through"; everyone hopes to get a return on their investment, whether it be a direct financial payback or the funding of a new release. Just make sure that everyone in the group agrees beforehand (it's advisable to get this in writing) on how the money collected from sales will be used.

TIMETABLES AND THE RELEASE PARTY

Artists releasing their first disc tend to want to start booking a record-release party while the CDs are still in the manufacturing stage. But before you set the date in stone, get out a pencil and paper and do some planning. Otherwise, the biggest no-shows at the record-release party might be your own records.

You will need to have firm answers to questions such as: How long will the entire process take, from design to delivery? What is the promised turnaround time from the replicator? And how much shipping time is required with every step of the process? Be conservative. Demand the quickest turnaround time, but expect the longest. Even if your broker guarantees that the project will be finished in three weeks, don't book your record-release party on the exact day the CDs are due to arrive; you'd just be asking for trouble.

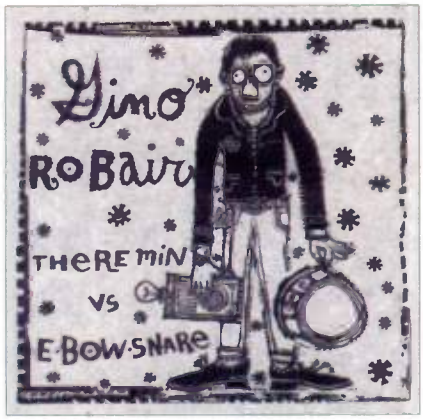
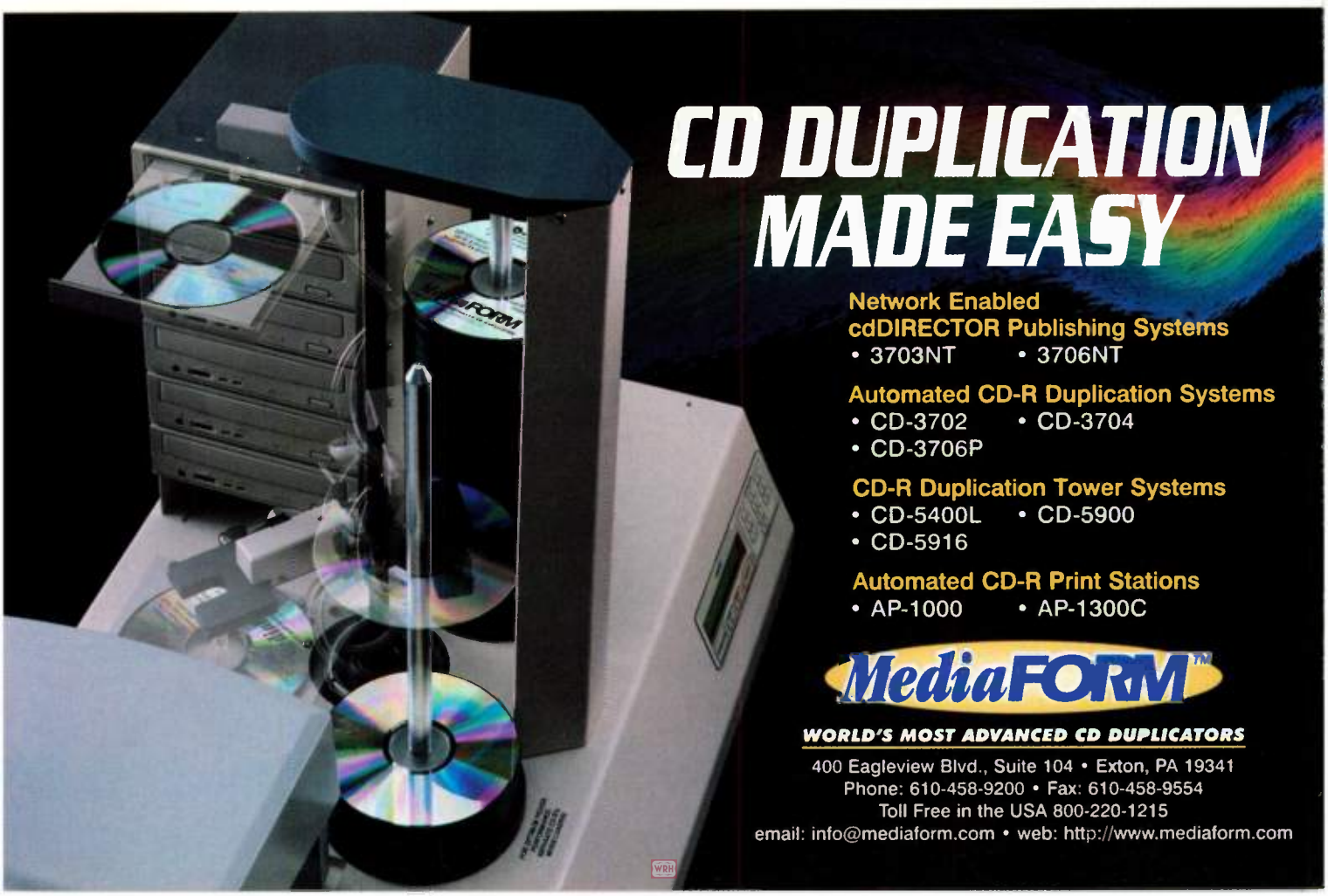
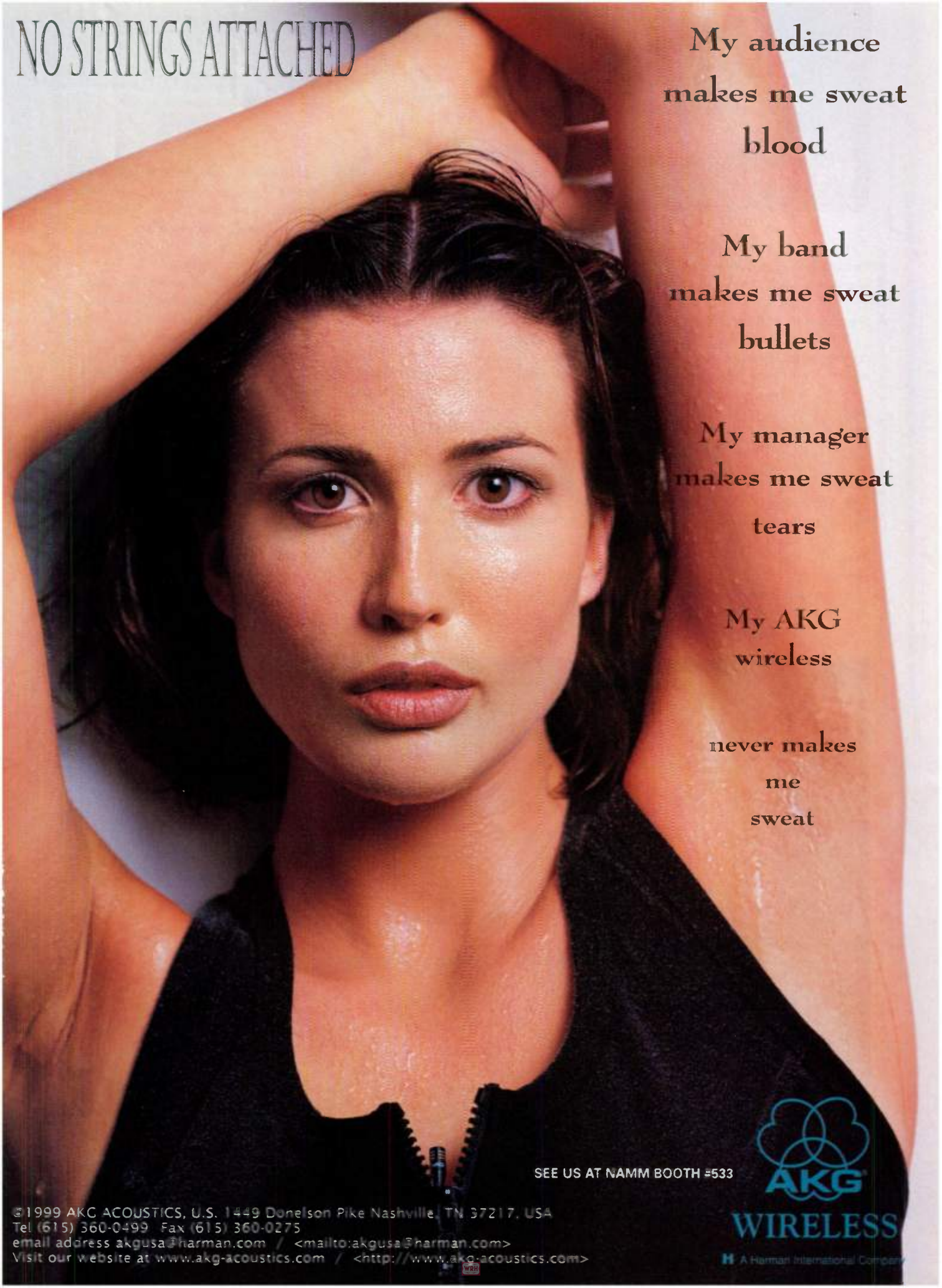


FIG. 1: For this 7-inch release, a custom sleeve was designed and created. Illustration by Dennis Palmer.

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Here are a few examples of things out of the artist's direct control that can cause a CD project to arrive late:

- Another band's CD-label artwork is printed onto your CDs.
- A flood in the Midwest delays all cross-country shipments, including the entire run of your discs, by one week.
- The computer disk that has your design files is found to be corrupted and the printer (which is across the country) cannot open them.
- The designer put the wrong bar code in the design.
- The colors on the matchprints are not what they should be.
- The wrong CDs arrive on your doorstep, which means somebody else probably got yours.

Another potential timetable bug is the time of year. The months of July

THE 500 CLUB

As you may know, most CD manufacturers have 1,000-piece minimum orders. However, in the past few years, replicators have begun offering 500-unit rates. If you compare the per-disc cost of 1,000-unit and 500-unit runs, you will notice that you are paying more for each disc when you make 500 discs.

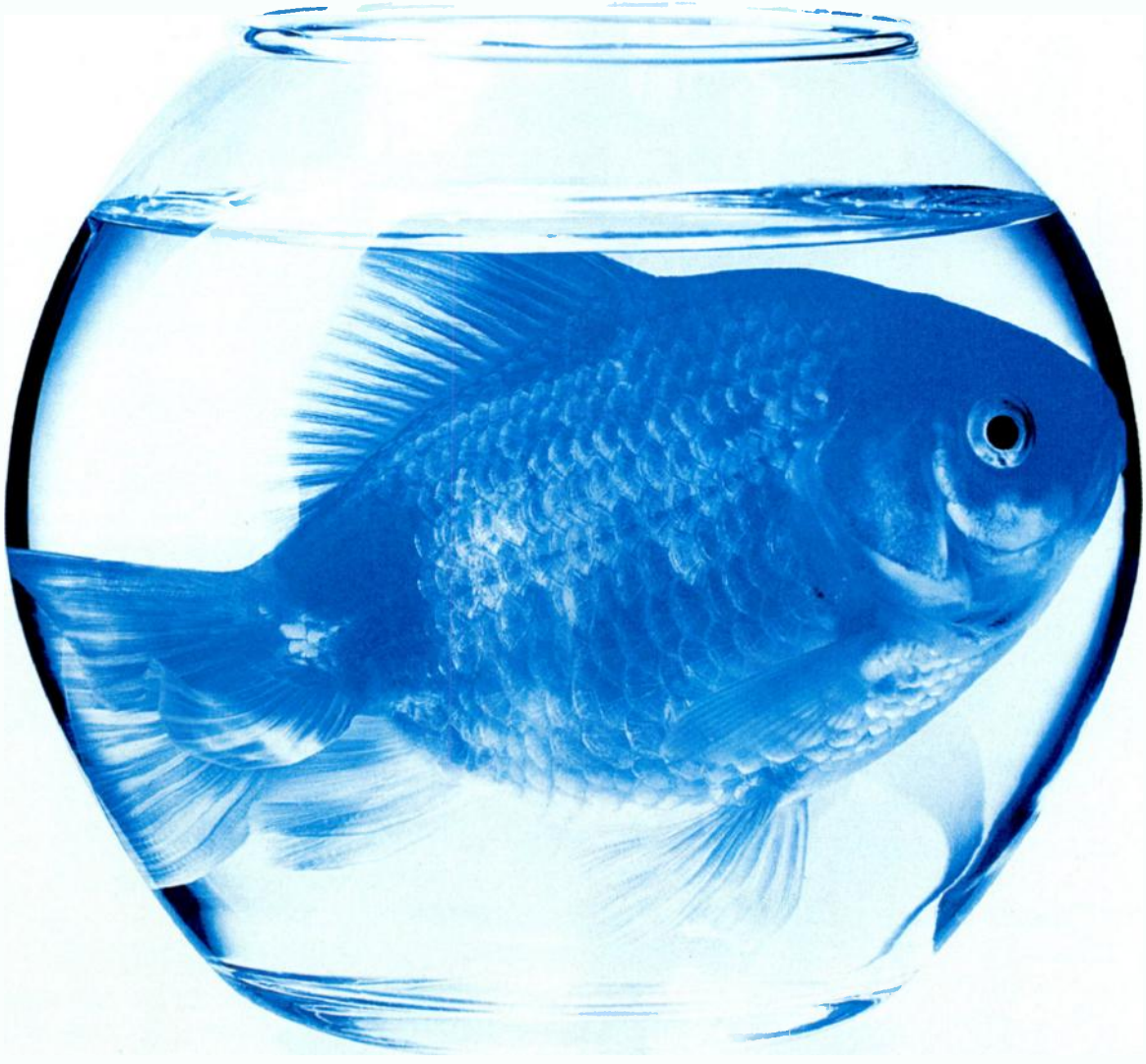
One reason for this is that small runs increase the replicator's production costs. The way any manufacturer makes a profit is by keeping their machines running and making the largest quantity of products possible per shift. By doing this, they keep the unit cost down because things like setup time and labor are maximized. Time spent setting up a machine for a new product is time taken away from actually making something. This is referred to as *downtime*.

Another big factor in the price of short runs is the cost of making the *glass master*. The glass master is used to create the stampers from which the CDs are duplicated. It has been customary for replicators to waive the fee for the creation of the glass master (which ranges from $250 to $600) with orders of 1,000 units or more. Although it may not be stated as such in a company's written estimate, you can be sure that you are paying for the glass master when you order fewer than 1,000 discs.

It takes up to 24 hours to create a glass master. Setting up the machines that mold CDs (that is, mounting and checking the stamper) takes a half hour or more. Actually molding the 500 discs takes less than an hour. Then it's setup time again, which means more downtime for the machine.

The same goes for the offset printing of booklets and tray cards. Again, the major costs are in the setup time, and printers usually have a 1,000-piece minimum so they can keep the presses going for as long as possible. Even if they get an order for fewer than 1,000 units, they will often print the extra and recycle or throw away the overage. Spend a bit more by ordering more than you need. You'll save yourself some money down the line.

Accept no hardware limits.



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through October are the busiest for pressing plants because everyone is getting releases ready for the holiday season. Don't expect to get a rush job done during these peak production months—in fact, expect orders to run late. Usually, the manufacturer or broker will tell you if they expect orders to take longer than usual.

The best way to make sure you have problem-free product at your record-release party is to wait until your CDs arrive before booking the gig. By waiting patiently for the process to come to completion, you will be able to concentrate on the other important tasks at hand: publicizing and playing the gig.

FORMAT CONSIDERATIONS

One of the first decisions you will need to make is which format to press. It was once customary for independent artists to press equal numbers of CDs and cassettes because many potential customers didn't have CD players. Now, almost everyone has a CD player, and for both independent and major labels, cassettes have become difficult to sell. Many distributors no longer carry them. Consequently, boxes of unsold cassettes fill the closets and basements of artists and labels that were pressing both formats well into the mid-'90s. As a top independent distributor recently stated at a national independent music convention, cassettes are dead.

▼ It s not always cheap, but there are several key advantages to using a broker

On the other hand, vinyl is back with a vengeance for many styles of music, thanks primarily to the DJ and indie-rock scenes. The major labels (and their distributors) haven't been able to kill the venerable "record" as quickly as they had predicted over a decade ago—and oddly enough, they've been getting back into the vinyl market as well. Many audiophiles prefer the sound of a high-quality vinyl pressing over a CD. And for many listeners and recording artists, the large-format graphics of a 12-inch LP jacket are far more appealing than the standard 4.75-inch-square CD booklet.

Still, there's no denying that compact discs are the common currency in the music biz today. This has much to do with the convenience they offer: because it's a random-access medium, listeners can play the songs in any order they choose, skip songs they dislike, and easily repeat their favorite tunes. In addition, CDs are more robust and sound better than cassettes, which are notorious for hiss, wow and flutter, and potential breakage.

If the purpose of your release is in-store sales in the major chains, CDs are a must. But if you're catering to a niche

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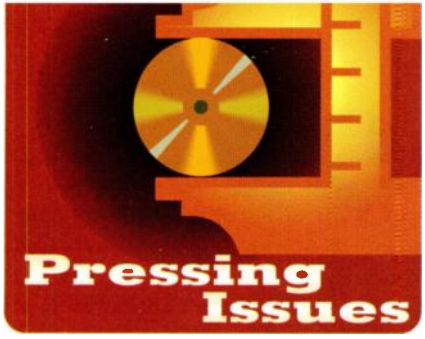

market that collects both CDs and vinyl, you might consider doing a split release.

If you care about the sound *and* image of your project, and you're willing to make a little greater financial commitment, releasing it on both vinyl and CD might be the way to go. Otherwise, put your hard-earned money into designing an outstanding release in the format that best suits your music.

PACKAGING

Now the real fun begins. Armed with your edited analog or digital master tape, you're ready to start hunting for a CD duplicator, tape replicator, or vinyl pressing plant that suits your needs, budget, and patience.

Keep in mind that the final package will probably be assembled mechanically rather than put together by hand. The size tolerances of automatic packaging equipment are extremely tight, often ±0.5 mm or less. That means the designer, printer, and manufacturer have to be on the same page when it comes to size specifications for the various elements, including CD booklets and tray cards, CD labels, LP labels, and cassette J cards. Usually, the designer and printer must meet the manufacturer's specs and machine tolerances. With that in mind, let's look at a couple of different approaches to pressing and packaging your music.

Brokers. The easiest way to go is to use a broker, especially if this is your

GREAT PACKAGING BEGINS EARLY

Whether you get mass-produced CDs, LPs, or cassettes, or make a small batch of CD-Rs, good-looking product is a prime consideration if you plan to sell your music to your fans. Begin thinking about design and packaging during the recording and mixing stages—don't wait until the last minute to begin this process. A well-conceived design that fully integrates with the music can take weeks, even months, to bring to fruition.

If you don't know where to start with the process, don't worry. A little window-shopping and research may get the ideas flowing. Take an hour or two and visit a record store that caters to your particular style of music, and also comb through your own music collection. Keep an eye out for what you consider to be successful designs within your genre, making note of design elements that work and don't work.

If you have colleagues who have released their own records and you like the packaging, ask them to recommend their designer. It's important to find a person who is sympathetic to your kind of music and is willing to use your suggestions. Remember that this album is going out in the world to represent you and your music, so don't be shy about making comments or changes to the design.

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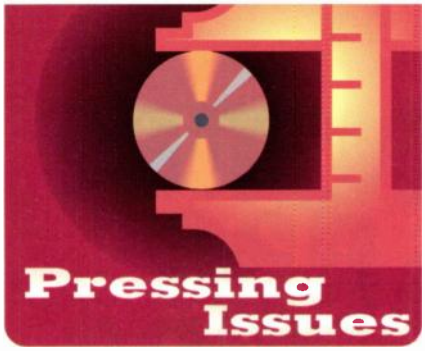

record design create and refine the layout. Any money you save by letting an inexperienced friend do the layout will be spent many times over when you have to have it modified (by the printer's staff designer at $50+ an hour) to fit the exacting specs of the manufacturer.

Another common mistake is using a printer that has little or no experience printing CD booklets or record jackets. For example, some printers might not be able to (or want to) cut your booklets to the exact size you specified. The exception to this rule is, of course, when you are using custom packaging (not to be confused with "custom jobs," which is how some manufacturers refer to small orders, such as 1,000 units or fewer). If you have grand design ideas that go far beyond the usual CD jewel case or 7-inch single sleeve—such as a folded paper sleeve with elaborate printing—you will want to find designers and printers that can do custom packaging (see **Figs. 1 and 2**). Because the products will have to be stuffed into the packages by hand, the standard sizes and tolerances do not have to be met.

By now you may be wondering whether there's any reward to the DIY approach. Well, it's like taking apart an automobile engine and reassembling it: going through the process will give you a clear understanding of how the different parts work together. If you don't already know about color separations, matchprints, blueline proofs, drum scanning, and *Quark* files, you will by the time your album is done.

PRODUCTION RUNS

By their very nature, CDs are well suited to large production runs. Typically, CD plants and brokers have a minimum order requirement of 1,000 units. Some companies will do runs of 500, but the rate per disc increases dramatically, and often you will be charged for items such as the glass master. Even companies that advertise great deals for runs of 500 may end up making 1,000 discs of your title and scrapping half—or worse, warehousing the extra 500 copies until you return to reprint, and then charging you the 500-disc rate again.

The situation is similar for printing CD booklets and tray cards. With small orders, the majority of the printing costs include the labor for prepress, setup charges, printing plates, and so on. Therefore, you might find it advantageous to print beyond the minimum order to bring the unit cost of the job down.

Let's say you plan to make 1,000 CDs. The minimum order for the booklet and tray card might be 1,000 units, with the next price break at 2,000 units. If you think that you might one day want to repress the disc, it would be wise to print the larger amount of booklets and set aside the extra copies for the future.

For example, take a typical printing run of four-page booklets and tray cards. The booklets will be 4/1 (which, in printing lingo, means four colors on the outside and one color—usually black lettering on a white background—on the inside) and the tray cards will be 4/0 (four-color printing on one side and unprinted on the other side, because it will be under the CD tray). Let's

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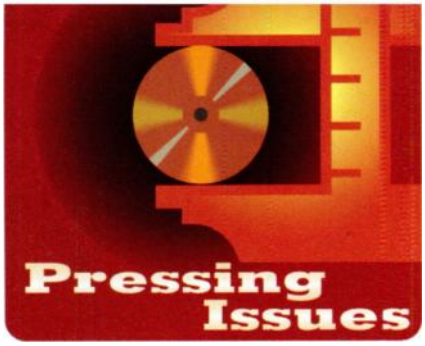

say the cost is $417 to print a quantity of 1,000. That comes to 41.7 cents per unit. However, you might find that printing a quantity of 2,000 units costs $528. That means you're spending an extra $111, but the unit cost declines dramatically to 26.4 cents.

If there is even a remote chance that you will reprint (and if you're in this for the long haul, you can bet on it), it is wiser to go with the larger print order and store the extra amount; to do the print run of 1,000 twice would cost you almost double what you'd pay for a single order of 2,000 units.

It can be tough to decide how many units you will need. A thousand discs may seem like a lot of units to move, but if you're gigging regularly, hitting retail outlets, selling discs over the Internet, and sending promo copies to radio stations and the press whenever you play, you may go through your supply in a year or two. If you happen to have a hit on your hands (whether from airplay, concerts, or retail sales), you may find them flying out the door in no time—it does happen. Both the Hooters (in the early '80s) and Hootie and the Blowfish (in the early '90s) sold tens of thousands of their self-releases before getting label interest.

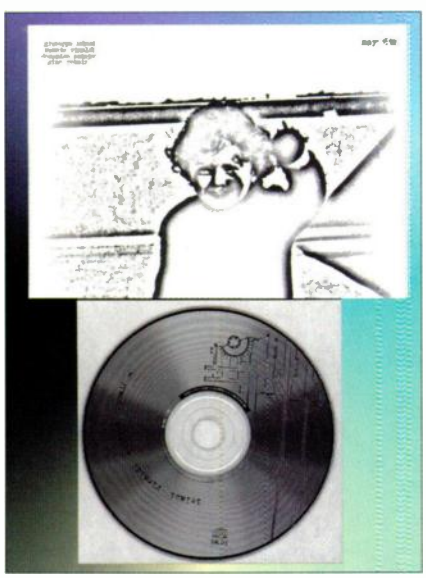

FIG. 3: This compact disc, on the Fringes label, comes in a simple yet elegant paper sleeve. This release is suited more toward offstage and mail-order sales than retail sales due to the unorthodox shape of the packaging. Design by Giuseppe Ielasi.

CDs ONE BY ONE

A growing trend in self-released music is creating CDs one at a time with a CD-R machine. Whether you do it with a stand-alone unit or a computer peripheral/software package, creating the CDs yourself may be right for you.

The obvious advantage is that you can make them as you need them, so you never have to warehouse large quantities of product. In addition, the price of the blank media has fallen below a dollar a unit when purchased in bulk quantities, and jewel cases can also be purchased in bulk. If you plan carefully, the cost of your CD-R release may be comparable to that of mass-produced discs.

Furthermore, customized packaging may be the perfect complement for a CD-R release. This can range from simple cardboard sleeves, decorated using rubber stamps, to elegantly folded origami-like envelopes (see **Fig. 3**).

The design concept can be carried over to the disc itself (see **Fig. 4**). The most common method of labeling a CD-R is with an adhesive label. The design and layout are created on a computer and laser printed directly onto an adhesive label. Some manufacturers of blank media suggest using the paper labels because they add an extra layer of protection to the top of the CD. On the other hand, the disc can be decorated using permanent markers; water-based inks are recommended over solvent-based inks, which can damage the dye layer of the disc. Be careful not to write on the discs with sharp objects. The pits and lands that the laser reads are closer to the top of the CD than the underside, so poking into the top layer may render the disc unplayable.

The downside of burning and packaging your own CD-Rs is that it's labor-intensive. Most people are surprised to learn how much time it takes to duplicate, print, cut, and assemble a dozen CD-Rs.

A new service provided by CD brokers includes manufacturing short runs (500 units or fewer) of CD-Rs packaged to look like mass-produced CDs. The service includes printing on the CD-R (usually one color only); a four-panel CD booklet (4/1); a tray card (4/0);

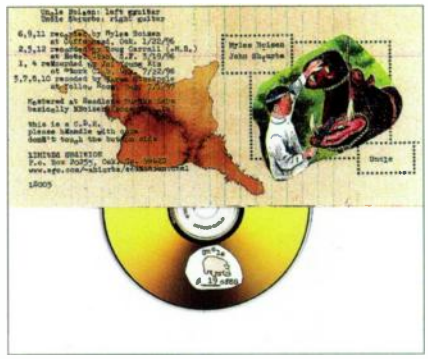

FIG. 4: The booklet for this CD-R release is a color photocopy that is cut and folded by hand to fit in a jewel case. A sticker on the CD-R itself is used to identify the disc. Designs by John Shiurba.

insertion into a standard jewel case; and shrink-wrapping. All you have to provide are a master and print-ready artwork. The replication in this case is usually done with an automated CD-R burner. The CD-R is then sent through an ink-jet printer, which prints directly onto the disc. The booklet and tray card are done on a color laser printer.

Obviously, it's going to be a bit more expensive per unit to have this done—but not prohibitively so. A survey of prices for this service averaged $4.50 per unit for a run of 250 copies; $5.25 per unit for 150 copies; and $8 per unit for 50 copies. Compare this with mass-produced CDs at $2.40 apiece for 500, or $1.25 apiece for 1,000. In both cases there is enough markup potential to make a profit on the discs.

The advantage of using a broker for CD-Rs is the quality of the final product. A packaged CD-R produced by a broker will probably look more like a commercially produced CD than one you could make at home, which may be appealing to some buyers.

THE FINAL WRAP

Releasing your own album is one of the most rewarding aspects of being a recording musician. Enjoy the process as much as possible, and revel in the knowledge that people all over the world will get a chance to hear and appreciate your work.

This article is an excerpt from the upcoming **EMBooks** *release* Making the Ultimate Demo, *2nd edition, by Gino Robair, distributed exclusively by Hal Leonard Corporation. For more information, visit www.mixbooks.com.*

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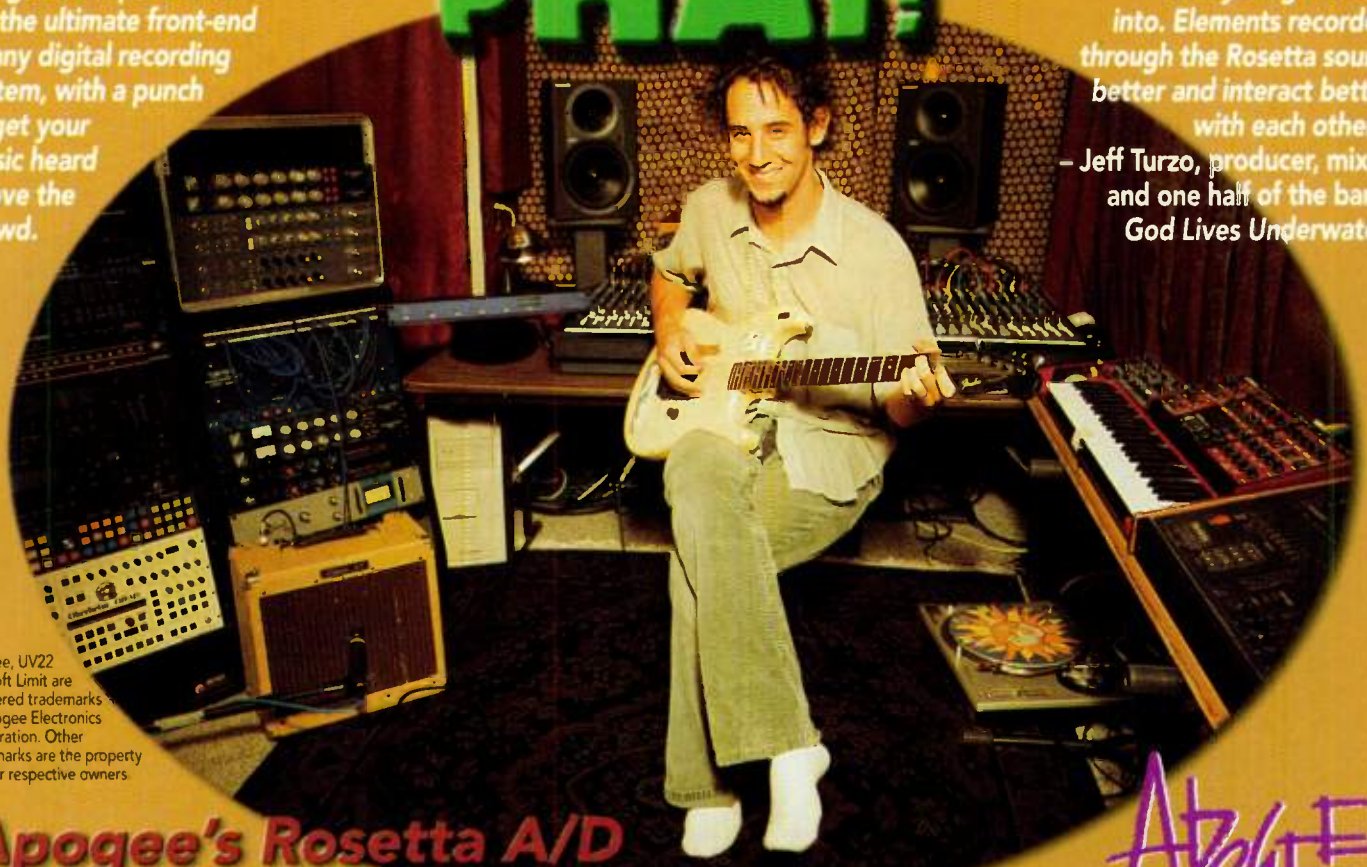

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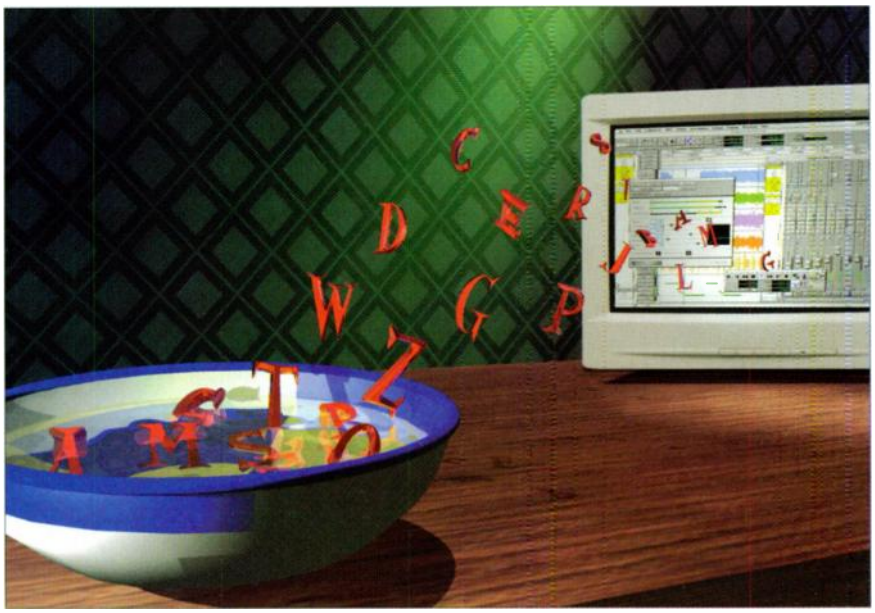
DESKTOP MUSICIAN

Alphabet Soup

EM's ABCs of DTM in POE (Plain Old English).

By Brian Smithers

This month we're going to wade through the morass of acronyms and abbreviations you need to know to make sense of articles and ads aimed at desktop musicians. A truly comprehensive glossary would fill a book, so we've focused on common, yet commonly misunderstood, alphanumeric combinations from the audio, computer, and Internet vernaculars. To dig deeper, check out the excellent audio reference at Rane's Web site (www.rane.com/digi-dic.htm), E-mu's Glossary of Electronic Music Terms (www.emu.com/support/free_expert/glossary.html), or the PC Technology Guide (www.pctechguide.com).



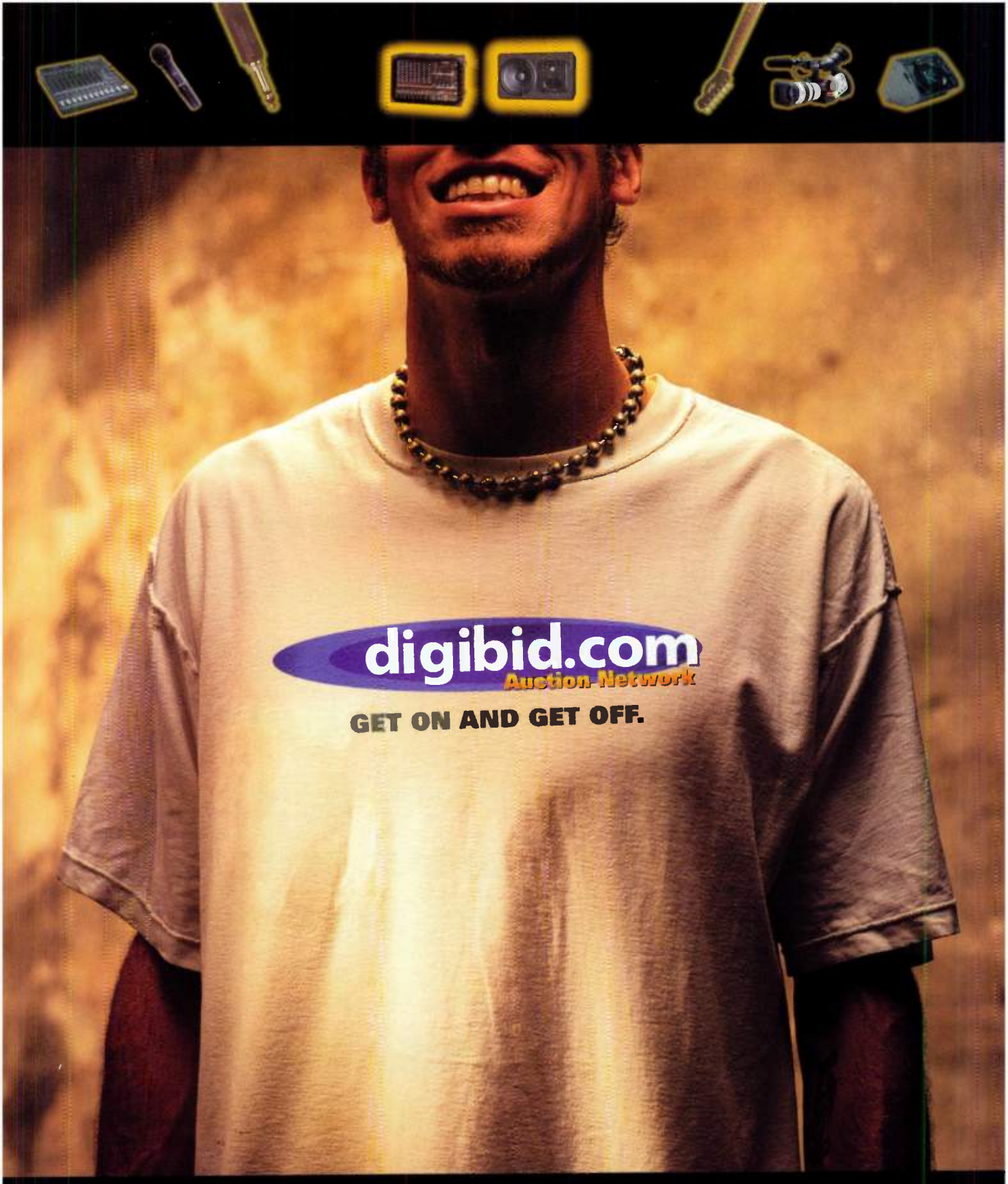
STEVE RAMIREZ

Our goal is to help you attain a practical understanding of basic concepts and terminology, so if you're looking for obscure details to impress the Ph.D.s at your next MENSA soiree, you're out of luck. Pragmatic readers, read on.

AC-3 (also Dolby Digital). A perceptual-encoding format that compresses six channels of digital audio in the now common "5.1" surround setup. The "5" refers to five full-range channels—left, center, right, left rear, and right rear—and the ".1" refers to the LFE (low-frequency effects) channel. The 5.1 surround standard for DVD-Audio does not use AC-3. Instead, it uses Meridian Lossless Packing (MLP) to compress six full-range channels of 24-bit, 96 kHz audio without data loss.

ADC (also A/D converter). *Analog-to-digital converter.* A circuit that translates analog audio into digital format. In simple terms, an ADC measures (samples) the amplitude of a waveform 44,100 times per second and describes it as a 16-bit binary number for "CD quality" audio. First, however, it must filter out the frequencies above 22.1 kHz to avoid the distortion predicted by the Nyquist Theorem, which is beyond the scope of this month's column.

ADSL. *Asymmetric digital subscriber line.* A very high-speed Internet connection that's called "asymmetric" because it's



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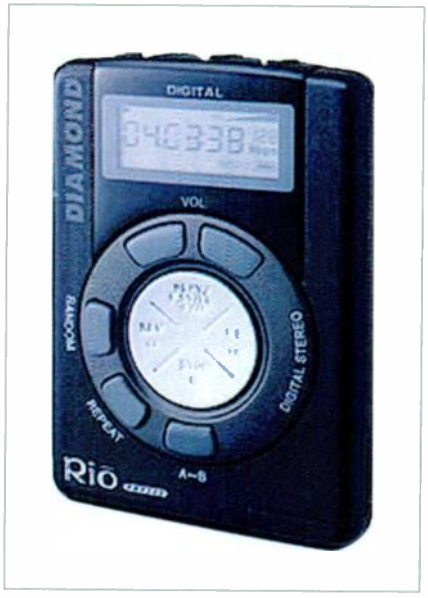

FIG. 3: The palm-size Diamond Multimedia Rio PMP300 lets you listen to MP3 files away from the computer.

interface on the PC platform. While capable of decent throughput, it was limited to four devices, two of which were commonly the floppy drive and CD drive. Also called ATA-2, its now common successor is UltraATA or UltraDMA, sometimes with a -33 or -66 to specify its bus speed.

FTP. *File transfer protocol.* A standard for sending and receiving files on the Internet.

HTML. *HyperText Markup Language.* The basic formatting language for Web pages. It uses simple tags to designate format attributes and allows for "hypertext" links, which allow users to associate a segment of text with another page or other object (see SGML and XML).

HTTP. *HyperText transfer protocol.* A standard for transferring hypertext files on the Internet. In simpler terms, the behind-the-scenes stuff that goes on every time you expect a Web page to appear in your browser (see HTML).

IEEE-1394. *Institute of Electrical and Electronics Engineers standard 1394 (also known as FireWire or Serial SCSI).* A very high-speed standard for attaching external devices. It supports the daisy-chaining of multiple devices, making it ideal for external audio disk drives. It's common on Macs but hasn't yet achieved the same popularity for PCs.

ISDN. *Integrated services digital network.* A high-speed Internet connection using fiber-optic lines (see T-1 and ADSL).

LTC. *Longitudinal time code.* A common implementation of time code in audio, in which the time code signal is "striped" (recorded) on an analog audio track. Most current digital audio gear is capable of sending and receiving time code through a dedicated connection, rendering LTC striping unnecessary (see SMPTE).

MDM. *Modular digital multitrack.* A digital tape recorder designed to link easily with others of its type to build a multitrack recording setup eight tracks at a time. MDMs, such as the Alesis ADAT and Tascam DA-88, brought digital multitrack recording within the reach of personal studios, enabling musicians to add tracks as their finances allowed or their needs dictated (see **Fig. 2**).

MMC. *MIDI Machine Control.* A set of MIDI commands enabling a device to control other devices. MMC includes such commands as Start, Stop, and Locate but does not provide synchronization information (see MTC).

MMX. *Multimedia extensions.* A set of 57 instructions incorporated into the third generation of Intel's Pentium chips, designed to facilitate processing of audio and video. Pentium/MMX chips also featured more Level-1 cache and other enhancements, resulting in better performance even for applications that didn't specifically use the new instructions.

MO. *Magneto-optical.* A format for long-term data storage. Magneto-optical disks represent a compromise between the stability and longevity of optical storage, such as CD and DVD, and the speed and rewritability of magnetic storage, such as hard disk and tape. Newer MO technology approaches the speed of modern hard disks, making it viable for digital recording.

MOD. *Module.* A type of file containing sampled sounds and a set of musical instructions for playing a song using those sounds exclusively.

MP3. *MPEG-1 Layer III* (not *MPEG-3*). The audio compression protocol defined in the MPEG-1 Specification. It uses a perceptual coding scheme to strip away "unnecessary" audio information, resulting in significantly reduced file sizes. Its reputation for excellent fidelity and rapid downloading has made MP3 easily the most successful such method to date, spawning portable MP3 playback devices in addition to creating an enormous popular stir on the Internet (see **Fig. 3**).

MPEG. *Moving Pictures Experts Group.* The organization responsible for defining some standards of video and audio compression that have proven useful in multimedia applications. The MPEG-2 audio specification pairs CD-quality audio with video suitable for broadcast or DVDs (see MP3).

MTC. *MIDI Time Code.* A form of time code transmitted over MIDI connections. MTC is useful for synching devices, but its resolution is too coarse to ensure sample-accurate positioning (see SMPTE).

PCI. *Peripheral component interconnect.* The standard interface for internal devices, such as modems and audio cards. Its adoption by both major platforms has led to a number of crossplatform audio devices. A "local bus" interface, it can redirect data without passing it through the CPU, making it much quicker than previous designs.

PCMCIA. *Personal Computer Memory Card International Association.* A credit-card-size interface commonly found in

FIG. 4: E-mu's powerful EMU8710ps PC Card combines analog audio I/O, S/PDIF output, MIDI I/O, wavetable ROM, and SoundFont samples in a PCMCIA card for laptop music production.

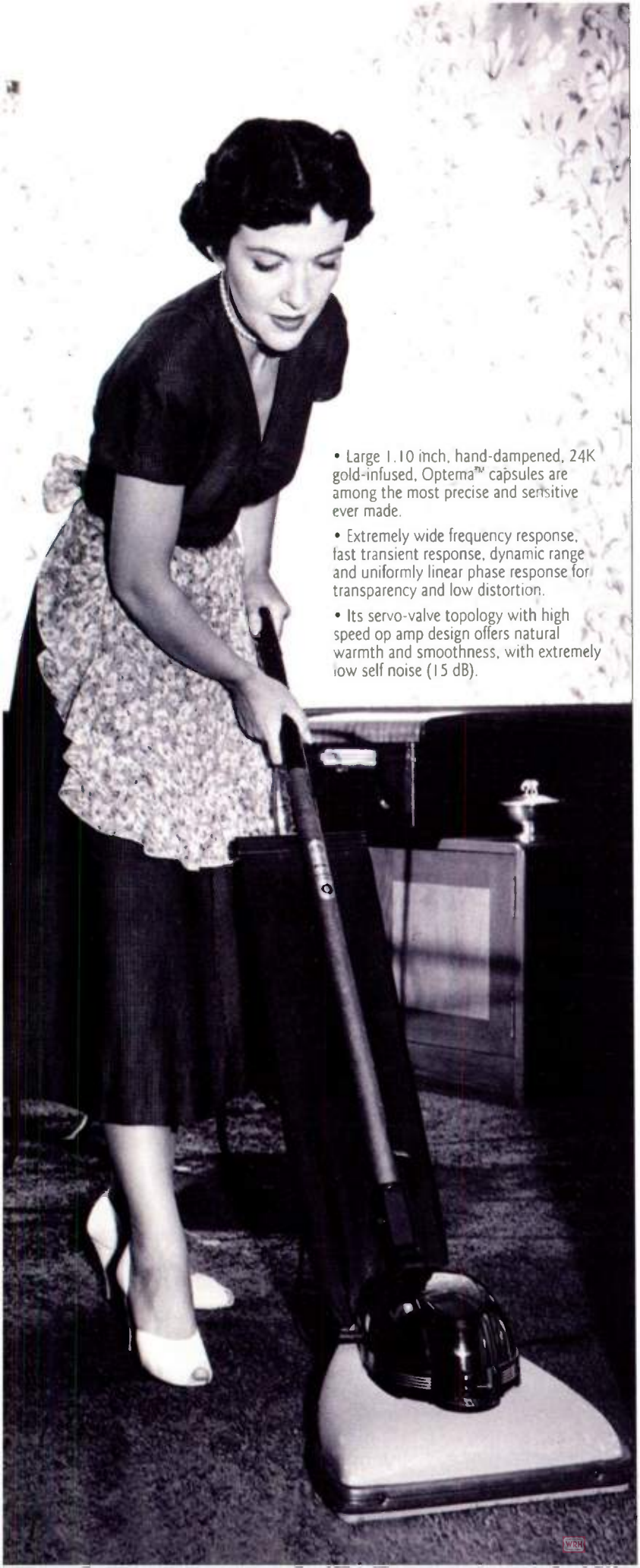

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FIG. 5: Mark of the Unicorn's popular MTP AV multiport MIDI interface/MIDI patch bay is one of several devices that are now available for USB-equipped computers.

notebook computers. Type III devices use the same connectors as Type II but are twice as thick. Primarily used for modems and network interfaces (and for storing programs in synthesizers), the PCMCIA specification historically has been inhospitable to audio devices. A handful of successful devices do exist, however. The current preferred term is PC Card, and a 32-bit implementation is called CardBus (see **Fig. 4**).

RAM. *Random-access memory.* A computer's high-speed short-term memory. Data and code are read from a disk or other "permanent" storage device into RAM, which passes it back and forth to the CPU for processing. RAM can't retain data without power, so files must be saved back to disk for storage. Various types of RAM include SRAM (static RAM), DRAM (dynamic RAM), SDRAM or SyncDRAM (synchronous DRAM), and EDO RAM (extended data out RAM).

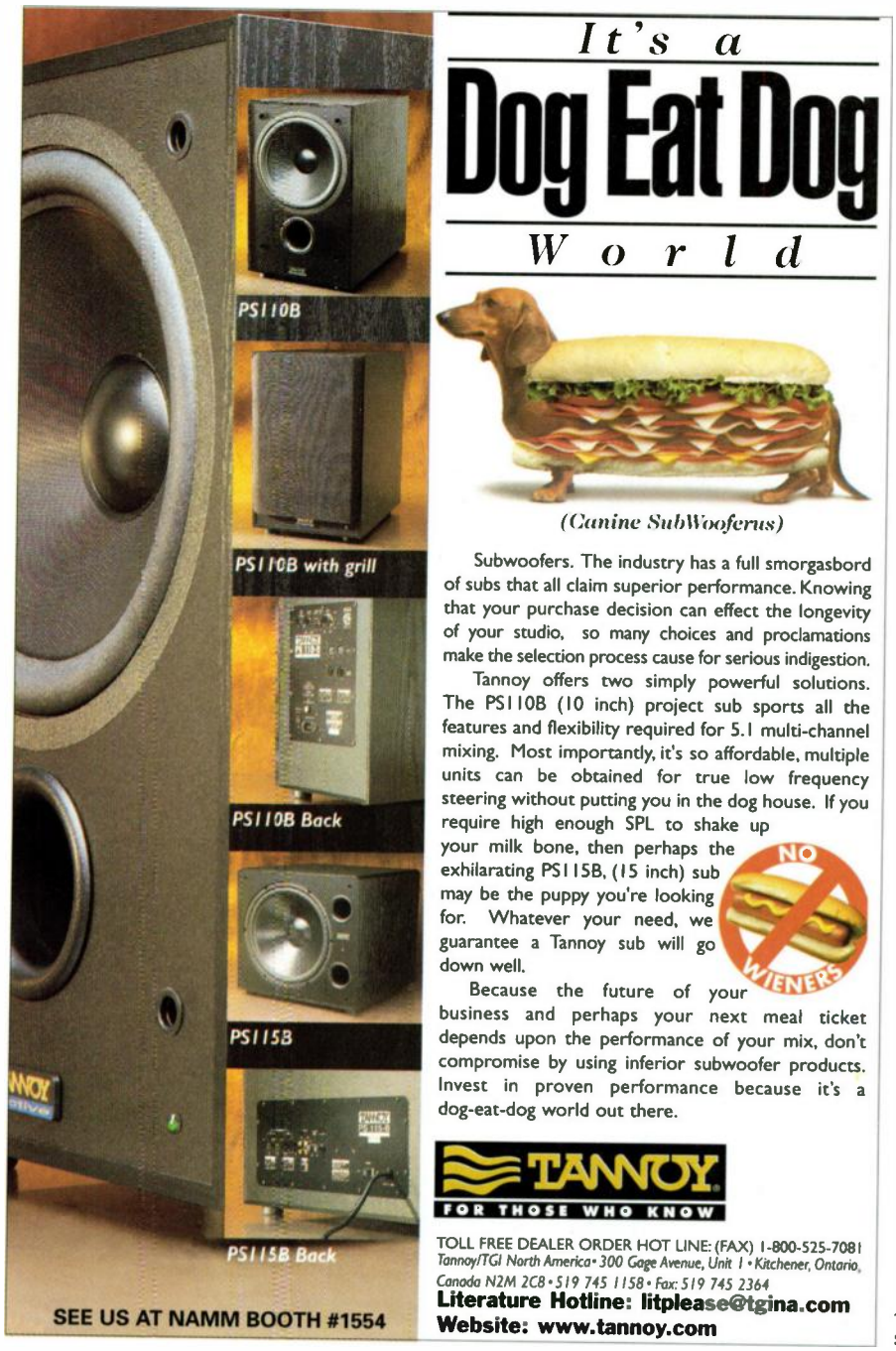
RCA. *Radio Corporation of America.* The familiar pin-and-collar connector used with most consumer audio gear, developed by RCA. Commonly used for unbalanced line-level connections or with coaxial cable for S/PDIF connections. Also known as a phono plug (see **Fig. 1**).

RMF. *Rich Music Format.* A type of MIDI file developed by Beatnik, Inc., designed to be played back with its Beatnik Player. The player incorporates a custom sound set and allows for additional sounds to be embedded in the file, enabling greater control over playback than you have with the GM specification alone.

ROM. *Read-only memory.* A type of memory chip that can be read but not changed. ROM is found in keyboards as well as computers and is typically used to hold wavetable data in sound cards or low-level instructions, such as a computer's BIOS.

S/PDIF. *Sony/Philips digital interface format.* A 2-channel digital audio transfer protocol. S/PDIF connections are made via RCA connectors on coaxial cable or via fiber-optic cable (see TOSLINK). Similar in format to AES/EBU, technically it must carry anti-piracy code (see SCMS), limiting its resolution. Most current implementations ignore the copy protection and transfer a full 24-bit word. If you see "SDIF," it's not a typo—it's Sony's own "professional" digital audio transfer format, which also uses coaxial cable but with BNC connectors.

SCMS. *Serial copy management system.* An antipiracy scheme built into "consumer" digital audio transfer devices,



namely those in S/PDIF format. Flags hidden in the data stream are read by special circuits in consumer digital recorders, allowing the user to make only first-generation copies, never copies of copies. Since the DAT format never caught on with consumers, SCMS has been largely ignored (see S/PDIF).

SCSI. *Small computer systems interface.* A standard for computer input and output. Historically, SCSI is the preferred interface for hard disk recording systems, as it provides high data-transfer rates and supports up to seven drives. While SCSI ports were standard on Macs for a long time, the format was reserved for high-end applications on PCs due to its well-founded reputation for being difficult to set up. Different "flavors," differentiated by bandwidth and speed, include SCSI-2, UltraSCSI, Fast/Wide SCSI, and the current state of the art, SCSI-3 (see EIDE and IEEE-1394).

SDS. *Sample Dump Standard.* A method of transferring sample data through a MIDI connection. Because of the large amount of data contained in sampler banks and the relatively low bandwidth of MIDI connections, SDS can be a tedious way to transfer data. SMDI (SCSI musical data interchange), which requires both SCSI and MIDI connections, is much faster.

SGML. *Standardized general markup language.* An ISO standard for electronic documents. SGML is more complex and powerful than HTML (see HTML and XML).

SMPTE. *Society of Motion Picture and Television Engineers.* SMPTE time code, often referred to simply as SMPTE, is used to communicate timing and positioning information among audio (and video) devices. SMPTE uses the format hours:minutes:seconds:frames (HH:MM:SS:FF) to specify locations (see LTC, MTC, and VITC).

T-1. A very fast type of Internet connection capable of moving a megabyte of data in less than 10 seconds (see ISDN and ADSL).

TDIF. *Tascam Digital Interface.* Tascam's format for transferring eight channels of digital audio over shielded cable with 25-pin D-Sub connectors. TDIF and ADAT Lightpipe are the two most common multichannel digital audio transfer protocols.

TDM. *Time Division Multiplex.* Digidesign's proprietary plug-in architecture. Based on technology developed by Bell Labs, TDM plug-ins run on the dedicated engines of Pro Tools DSP Farm cards (see DSP).

TOSLINK. *Toshiba Link.* A fiber-optic alternative to coaxial cable for S/PDIF transfers.

TRS. *Tip-ring-sleeve.* An audio connector used for stereo, balanced mono, or send-return connections. Similar to TRS, the TS (tip-sleeve) connector is used for mono connections, such as plugging a guitar into an amp (see **Fig. 1**).

URL. *Uniform resource locator.* The standard format for identifying sites on the Internet. It's the ".com" string of address gibberish that went from geeky to trendy in less than two years.

USB. *Universal serial bus.* A medium-speed serial interface for connecting external devices. Not nearly as fast as SCSI but faster than common serial ports, USB's ease of use, support for multiple devices, and rapid adoption by both major platforms has already led to the development of crossplatform USB devices. Common uses of USB include scanners, digital cameras, MIDI interfaces, and stereo digital or analog audio interfaces (see **Fig. 5**).

VITC. *Vertical interval time code.* The common implementation of time code for video. Timing information is contained in the "vertical blanking interval," the area between frames in which there is no video information (see SMPTE).

VST. *Virtual Studio Technology.* Steinberg's plug-in architecture.

WAV. Not an acronym: an abbreviation for "wave" or "waveform." An uncompressed digital audio file format, common on PCs, that was jointly developed by Microsoft and IBM (see AIFF).

XLR. Not an acronym but a part number (and trademark) for a circular three-pin connector created by Cannon. It became the standard connector for balanced analog and digital audio and is now used as a generic term (see **Fig. 1**).

XML. *Extensible markup language.* A W3C (World Wide Web Consortium) standard for electronic documents. XML is a simplified version of SGML (see HTML and SGML).

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

wacko

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RECORDING MUSICIAN

Warming Trends

Take the chill off digital tracks with these techniques.

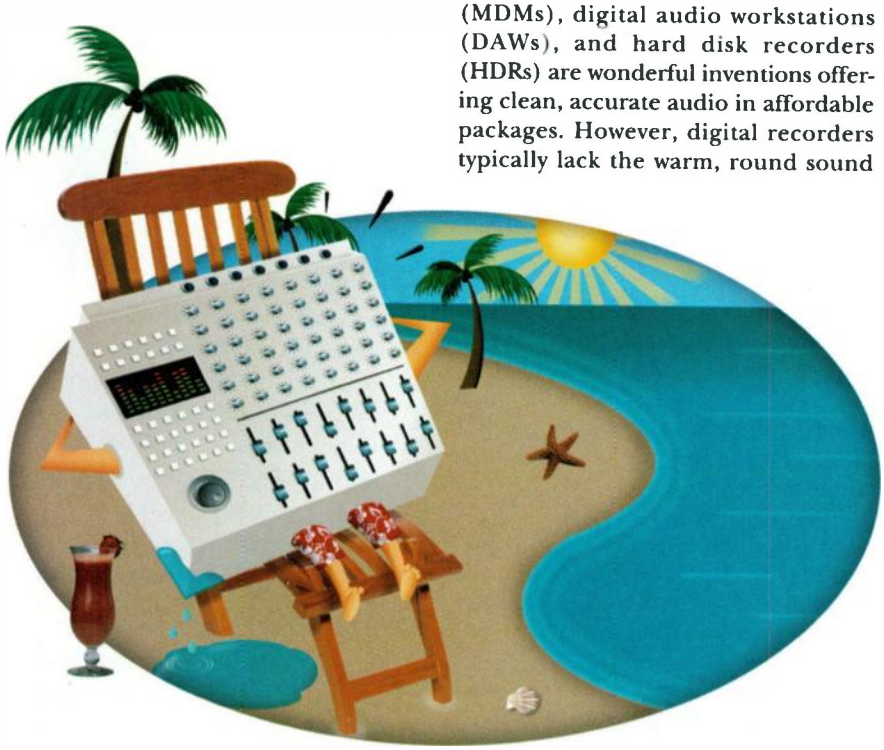
By Erik Hawkins

A warm tropical breeze blows over your body as you float effortlessly in the soothing, bath-temperature waters of the Caribbean. But then you snap out of it, jarred by the unsettling realization that your digital tracks aren't nearly as warm as your tropical fantasy. If anything, they're more reminiscent of the frozen North.

Modular digital multitrack recorders (MDMs), digital audio workstations (DAWs), and hard disk recorders (HDRs) are wonderful inventions offering clean, accurate audio in affordable packages. However, digital recorders typically lack the warm, round sound that analog-tape machines are prized for. Hence the renewed popularity of exotic tube preamps and vintage microphones—devices that can help warm up signals before they enter the cold, unforgiving digital domain.

Of course, shoestring budgets prevent many of us from owning such exalted gear, or from using a studio that does. So we make do with the usual suspects of the personal studio: mass-manufactured mics, cloned circuit boards, cookie-cutter mixing consoles, and preamps featuring a single tube sandwiched between cheap op amps. Come mixdown, we try feverishly to warm things up with EQ and plug-ins. But more often than not, the final cut still suffers from that annoying digital edge, a sound variously described as cold, thin, harsh, and devoid of personality.

But don't despair. Just because your setup is digital doesn't mean you have to settle for a sound that lacks analog flavor. With the following tricks, you can soften digital harshness and add some analog pizzazz during mixdown—without relying solely on plug-ins or going broke buying premium outboard gear.



JOHN VELAND

PLUG-IN DROPOUT

For those using computer-based DAWs, analog-emulation plug-ins (such as DUY's *DaD Tape*, Waves' *Renaissance Compressor*, and Bomb Factory Digital's *LA-2A*) are invaluable tools in the quest

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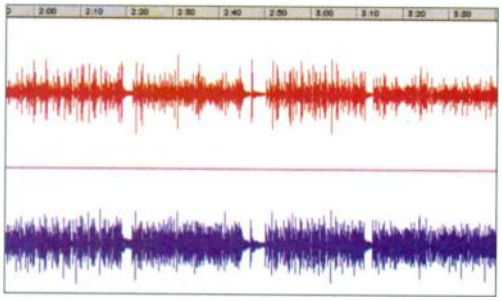


FIG. 1: This example depicts the dramatic impact that analog processing can have on a digital signal. The upper waveform is the original signal; the lower one shows the signal after it has been routed through an overdriven tube preamp and recorded to analog tape. Note how much thicker the processed signal is, and the compression that has taken place on many of the amplitude spikes.

for analog sound. Yet, as helpful as such applications are, they still seem plagued by a subtle lack of depth. They're only mathematical models of the real thing—close, but not quite there. However, by using analog-emulation plug-ins in tandem with real analog processors, you can meld the best of both worlds for a truly *phat* sound.

Of course, for those who work exclusively on an MDM or HDR (for example, a Tascam DA38 or Akai DPS12V2, respectively), software plug-ins aren't an option. Therefore, other avenues to analog warmth must be explored.

SAVED AGAIN

For the most part, the following techniques are based on processing digitally recorded tracks with analog gear and then rerecording the tracks to digital. Because this process alters the tracks' sound and sometimes results in excessive or unwanted effects, it is strongly recommended that you not erase your original tracks. You never know when you may need to resurrect them. It may be that you oversaturate a track and it sounds awful in the mix, or perhaps an electrical spike causes an error during the transfer that you don't notice until afterward. Either way, having the original, unadulterated track allows you to start again from scratch.

With DAWs and HDRs, storing tracks offline is a piece of cake. If you're MDM based, make sure your tracks are backed up on tape.

OUTSIDE HELP

The simplest way to introduce analog coloration to digital tracks is to run the tracks through real-world analog units and then rerecord them to your digital multitrack. Simply route the track from the digital source into the analog unit (using a direct output or equivalent) and then from the output of the analog box to a new digital track. This will add some analog distortion—the desirable kind—to the track, typically resulting in a smoother, thicker sound (see **Fig. 1**).

You can process and print tracks one at a time, so all it really takes is one analog unit. However, variety is always desirable, as each box will provide a distinct "flavor" of coloration, and some signals will sound better through certain units than through others. Therefore, I like to have a number of different processors on hand.

As for the type of gear to use, experimentation is the only way to find out. Preamps are obvious contenders, but

most any type of processor will work, including dynamics processors and multi-effect units. The trick is to bypass the processing and let the character of the passive circuitry alone do the job. At this stage, we're after only the *essence* of the analog machine, not the processing. (Save that for mixdown.)

If the unit doesn't have a bypass switch, set the controls so the signal is least affected. On a compressor, for example, put the ratio at 1:1 and the threshold at its highest setting. On a multi-effects unit, turn the mix knob to 0.

Interestingly, though tube units are generally thought to provide the most desirable coloration, solid-state gear—especially quality, Class A stuff—can do a great job, as well. For example, Tuck Andress (of Tuck & Patti, Windham Hill Records) uses an Avalon 737 compressor on his acoustic guitar tracks at mixdown, "not for compression," he explains, "but simply for tone and coloration."

In general, the better the gear, the better the quality of coloration it contributes to the signal. But that doesn't mean you have to spend a fortune to get something worthwhile. Almost anything with a 12AX7 tube in it will impart some analog attitude. One obvious pick is A.R.T.'s Tube MP mic preamp, which retails for only $139. There are also some inexpensive solid-state pieces that specialize in providing a vintage-type analog sound. For example, check out the Joemeek VC3 Pro Channel ($399) and C2 compressor ($399).

I would also encourage you to look beyond the world of studio gear. Keep an eye out at flea markets and in thrift stores—old stereo-tube preamps can be real jewels. Or try kludging the old with the new: find a vintage tube at a flea market, for example, and pop it in place of the stock tube in your budget processor.

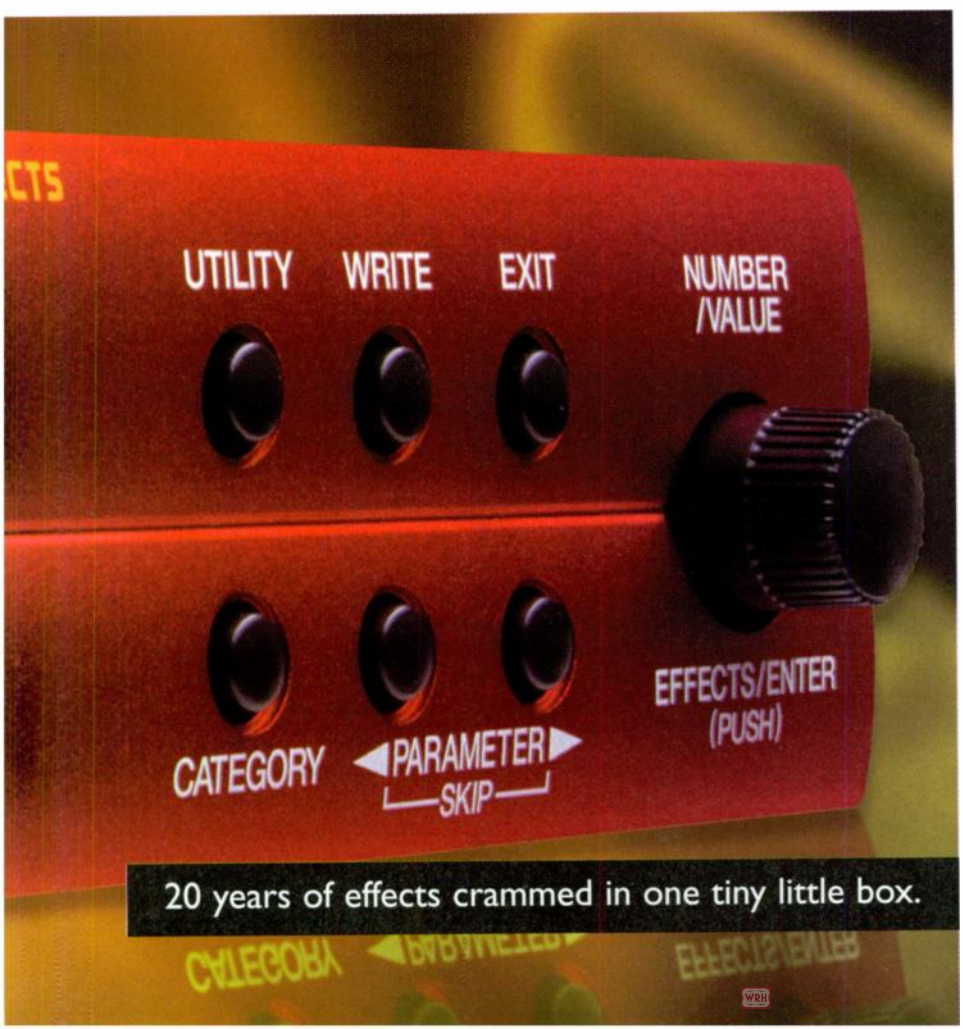
Another cost-effective approach is to rent the gear you need—an especially good option if you want the high-dollar stuff. Most major metropolitan areas have pro-audio equipment rental shops, as well as places that specialize in vintage gear. Get all your tracks together, rent a couple of exotic preamps or compressors (for example, Neve, Urei, and so on), and spend a day rerecording tracks.

LYGIA FERRA

Erik Hawkins warms up some digital tracks in his personal studio.

MAGNETIC RESONANCE

Adding real tape saturation to your digital tracks is a no-brainer. Simply record your digital tracks to tape and then rerecord them to your digital



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multitrack. The trick here is to hit the tape with enough level to cause saturation—in other words, push those needles into the red! You'll probably need a preamp to get the signal hot enough. Experiment with different levels and listen to the results before committing to a particular sound. Also, pay attention to what the preamp is contributing to the signal—you may find, for example, that a tube preamp coupled with tape saturation results in *too* warm a sound.

Old open-reel recorders are pretty easy to find these days and can often be had for cheap. In general, the wider the tape head (and tape), the better the fidelity. If possible, use a machine with built-in noise reduction. Hitting the tape with plenty of signal should push the noise floor down sufficiently, but for quieter passages, the noise reduction will further help in keeping tape hiss to a minimum. On the other hand, you may prefer the sound without noise reduction, so it pays to compare.

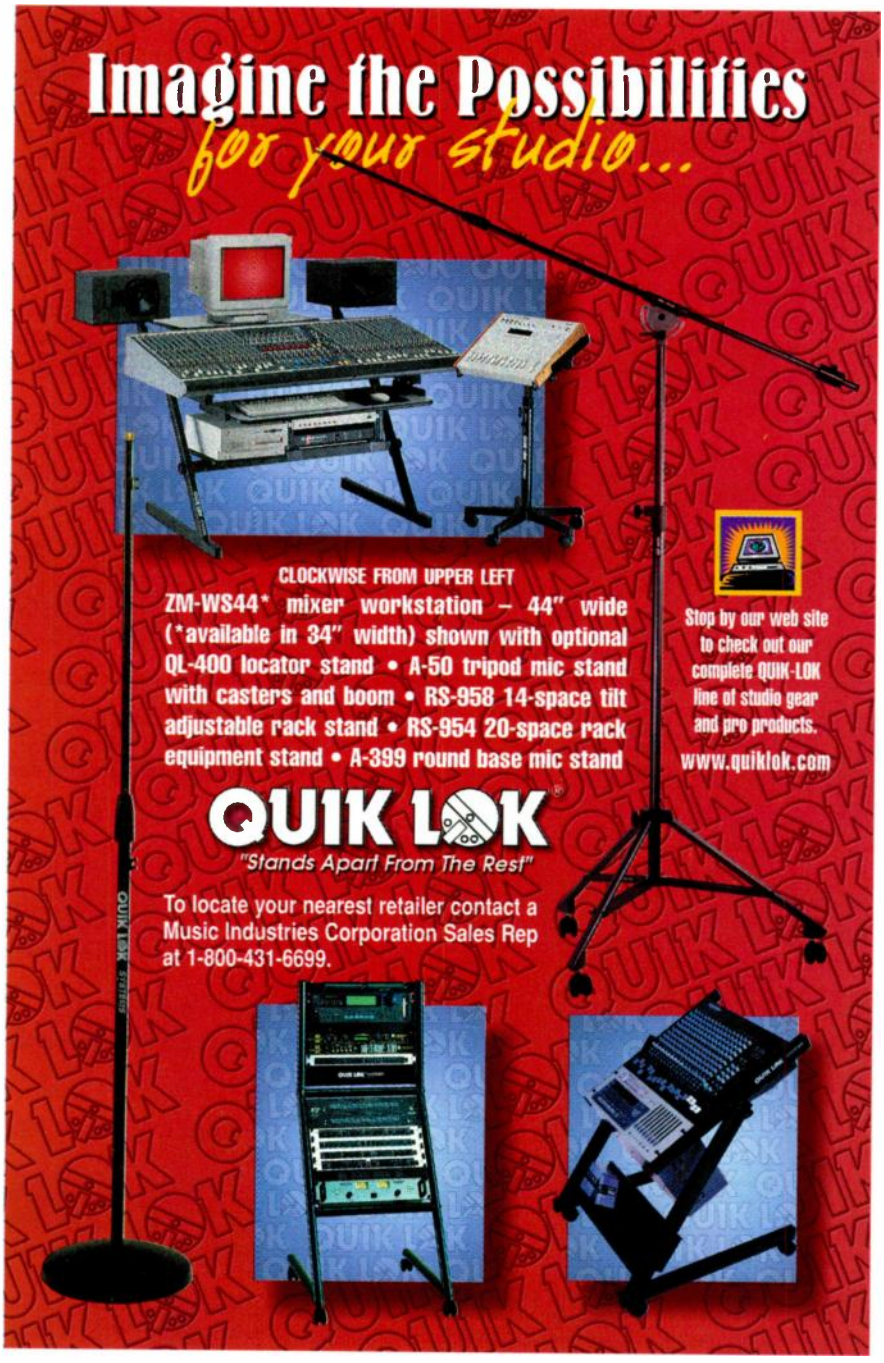
Multitrack units are preferable for "tape saturating" your tracks because they allow for stereo transfers and provide enough tracks for good SMPTE isolation (I'll explain this in just a second). However, depending on the quality of tape saturation you desire, almost anything can work. Hip-hop producers have long been sampling directly from cassette decks to capture a gritty, lo-fi analog sound.

The best way to transfer tracks is with the tape deck and the digital multitrack locked together. This is where the multitrack tape machine comes in handy. Strip an outside track (1 or 4, 1 or 8, and so on) with SMPTE and make the tape machine the master. You'll need a SMPTE to MTC sync box (for example, MOTU's MIDI Time Piece AV) to make this scenario work. To prevent SMPTE bleed, leave an empty track between the SMPTE track and the track or tracks you're recording to. For example, if SMPTE is on track 1, transfer to tracks 3 and 4.

With tape now sending SMPTE and your digital multitrack locked to the incoming time code, tracks can be flown back and forth between the two units without losing a beat. If some delay or slipping does occur, realign the processed track to the original. DAWs and HDRs have extensive cut-and-paste capabilities, making realignment a breeze.

To correct timing problems on MDM systems, use the sync box's SMPTE offset capability in combination with your MDM's track delay (built into most newer machines). To do this, set the offset so the processed track lays a hair early and then use track delay to nudge the track into time.

If you don't have sync capabilities, don't worry. Just fly your track to tape, ballpark a start time, press Play on both machines simultaneously, and rerecord the processed signal to your digital multitrack. With a bit of time spent cutting, pasting, nudging, and delaying, you'll be able to realign the track. Using the original track as a reference, align the processed track to it. You'll rarely get an exact lock, but you can tell the two tracks are extremely close when you hear flanging. This is, admittedly, a tedious procedure, but it lets you grab tape saturation from practically any machine, including portastudios and 2-tracks. Just bear in mind that cassette decks and other narrow-tape formats won't have the fidelity that a professional multitrack tape machine has.



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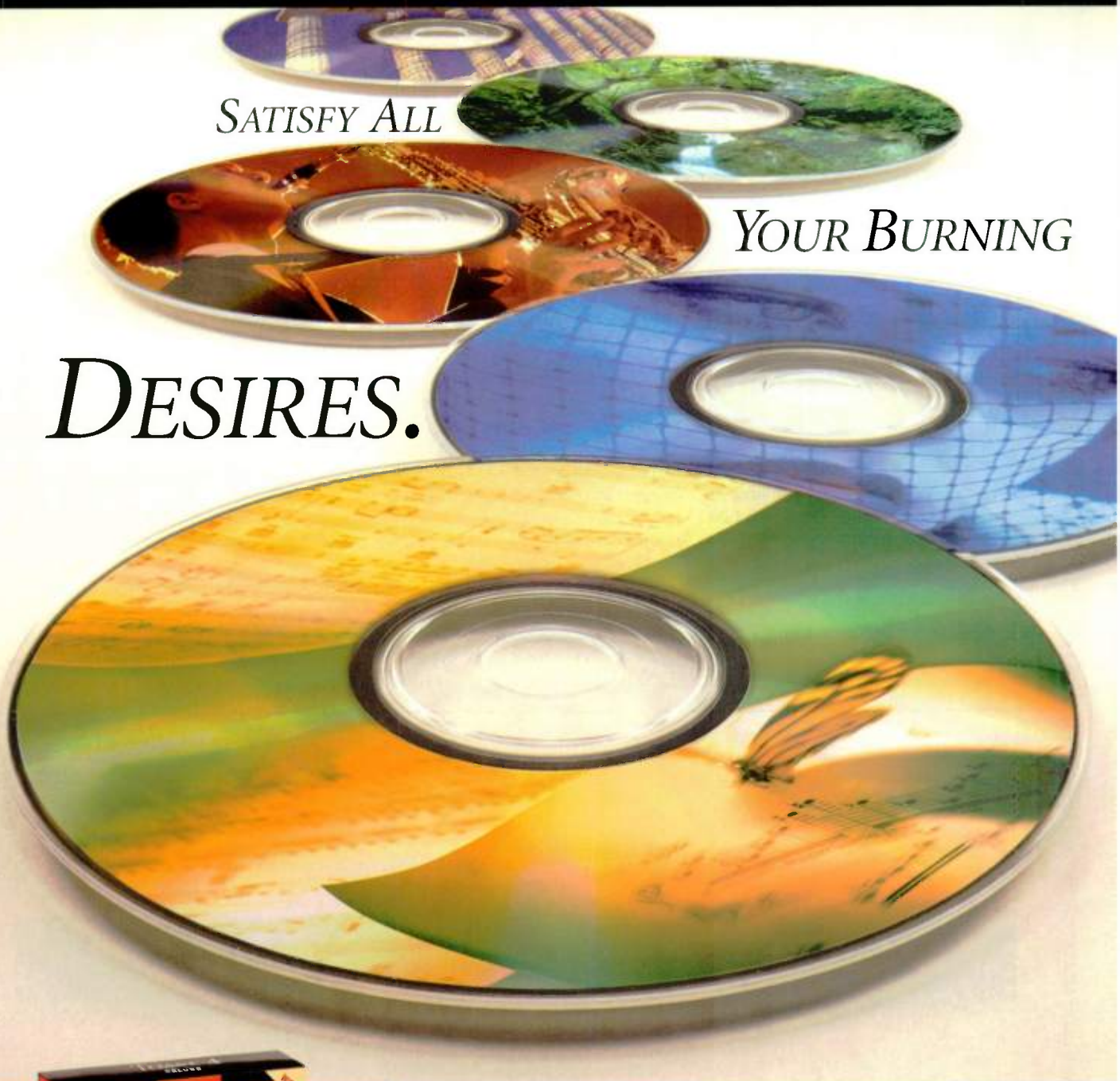
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LYGIA FERRA

Two of my favorite boxes for warming up digital signals are the Rolls RP220 Dual Tube Mic Preamp and the MindPrint En-Voice voice processor.

NOISE IN THE HOOD

In the past, generation loss and added noise from too many transfers was a real concern. But with today's digital machines, it's hardly an issue. Their quality converters and low S/N ratio allow for multiple analog transfers—at least two or three—without adding noise or causing noticeable signal degradation. Any noise introduced will most likely be from the analog processors, not from the digital equipment.

When noise does creep into the signal, whether it's tape hiss or tube hum, you can zap it in a variety of ways. If you're working on a computer, noise-reduction plug-ins such as Digidesign's *DINR* or Arboretum's *Ray Gun* are typically the most effective. If your tracks aren't in the computer, you'll need to use more traditional strategies. Noise gates work well with sharp transient sounds; downward expanders are better suited to signals with long attacks and decays. Parametric EQ can be useful for notching out some noise, but apply it judiciously so as not to spoil the sound of the instrument.

A favorite trick of mine is to print a track of the analog noise alongside the processed signal and then reverse the phase on the second track. By adjusting the gain between the two tracks, you can use phase cancellation to greatly decrease the analog background noise while leaving the original signal intact. This is a cool trick, but it works well only on noise that doesn't fluctuate.

A new breed of tube preamps has arrived on the scene, with digital connections either built in or available as mods. These machines are nice because they let you keep everything in the digital domain, minimizing possible noise from multiple analog I/O stages. The catch with these units is that sound quality is dictated entirely by the unit's internal converters—if they don't sound sweet, neither will your tracks. A reasonably priced unit that sounds good is MindPrint's En-Voice ($998 with digital I/O option; $749 without; reviewed in this issue).

AVOID GLOBAL WARMING

For the best results, warm up only those tracks that are key to giving your mix an analog flavor. It's not necessary to process every track. After all, some instruments in a mix just aren't loud enough to make much difference, and others are so processed with EQ and effects that

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the subtleties of analog coloration are lost. Also, too much tape and tube saturation on too many tracks will result in a muddy mix. By processing only the most conspicuous instruments, you reap the best of both worlds: the analog-processed tracks impart body and character while the digital tracks maintain premium fidelity and separation.

My first analog pass typically includes lead vocals, kick drum, bass (usually bass guitar), and the main comp instrument (usually acoustic or electric guitar). Every song is unique, of course, but in most pop music, these instruments take center stage, defining the sonic signature of the mix: the lead vocals are the focus, the guitar covers the midrange, and the kick and bass fill the bottom end. With different material, I may warm up other—or additional—tracks. The trick is to process only the key tracks, so that the overall impression of the song is analog.

If you want to go a step further toward an analog sound, take your DAT master, before mastering, and run it to a vintage analog 2-track tape machine (for example, an Ampex ATR 1000 ½-inch deck running 30 ips with Dolby SR noise reduction). Depending on the mastering facility, you can then perform the mastering directly from the 2-track analog master, or you can record from analog back to another DAT.

TO WARMER CLIMES

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The rerecording techniques described in this article are not new, but used specifically as a way to warm up digital tracks, they are somewhat unorthodox. But who cares? Be creative in the pursuit of new sonic flavors and colors. This is what distinguishes a good producer/engineer from an excellent producer/engineer. The tools are there. It's up to us to make them produce the sound we want—rather than have them dictate the sound we get.

Erik Hawkins *is a musician/producer working in Los Angeles County and the San Francisco Bay Area. You can check out his fledgling indie label at www.muzicali.com.*

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Modern MIDI Sequencing

Confused by quantization or stymied by sync? We'll ease your pain.

By Scott R. Garrigus

For more than 15 years, MIDI has exerted a tremendous influence on all types of music making. One of the most fundamental applications of this technology is recording, storing, and manipulating sequences of MIDI messages that represent all sorts of performance gestures—such as playing specific notes with specific durations and volumes, stepping on a sustain pedal, moving a pitch-bend wheel, and so on. This is performed by using a *MIDI sequencer,* which can be a dedicated hardware box or a software program running on a computer.

A basic MIDI-sequencing setup might be a MIDI keyboard and a computer with a MIDI interface running a sequencer application. MIDI cables connect the MIDI Out from the keyboard to the MIDI In of the computer's interface, and also connect the MIDI Out from the interface to the MIDI In of the keyboard. (An even simpler setup consists of a single keyboard workstation, which includes a built-in sequencer.)

Such a setup lets you record and play your performances on the keyboard. It also lets you change the performance in many ways. For example, you can change a note's length or Velocity; move it to a different rhythmic location; or manipulate Volume, Pitch Bend, Aftertouch, Modulation, or Program Change. Whatever MIDI data you record, you can change. Of course, how useful this is depends on the sophistication of your sequencing software or workstation's sequencer.

Typical sequencing software can display the recorded MIDI data in several different ways, including a tracklist, event list, and piano roll. Many also provide standard-notation displays (see **Fig. 1**). Each view gives you a different way to display and edit the same data. An event list lets you edit single MIDI events with

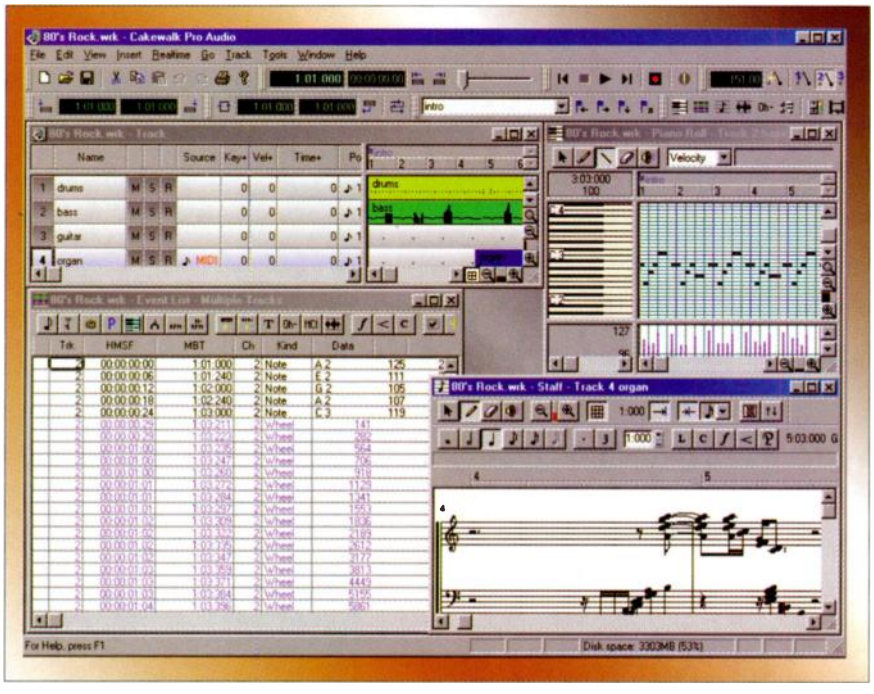

FIG. 1: A typical sequencing application displays a tracklist (upper left), event list (lower left), and piano roll (upper right). Many also provide standard notation editing and printing (lower right).

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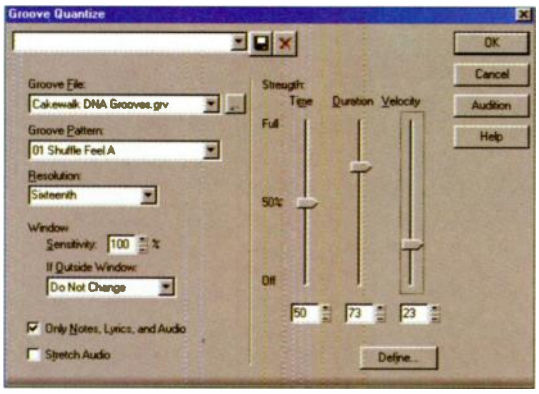

FIG. 2: Most groove-quantization tools let you determine how much the timing, duration, and Velocity values of the notes will be affected.

precise numerical accuracy. It also gives you access to System Exclusive and other nonperformance MIDI data.

A piano roll provides a graphical representation of note and controller data, so you can easily edit the expressive qualities of your music, such as crescendos and diminuendos. A notation display lets you change your music by dragging and dropping notes on a virtual staff page.

These common tools barely scratch the surface, though. Most sequencers also give you the power to manipulate MIDI data in more global ways, including quantization, real-time processing, virtual routing, and synchronization. In fact, today's sequencers provide so many features, you might be missing out on some of the more complex but very useful ones.

IN THE GROOVE

A real-time MIDI performance is not always as accurate as it should be. As you play, you're likely to perform some notes slightly before or after their intended rhythmic position, or hold some notes longer or shorter than you mean to. A sequencer's *quantize* tool can alter the timing and durations of your recording so they fit a specified time grid with fixed intervals.

For example, you might apply a 16th-note grid to a run of sloppily played 16th notes: any misplaced notes move to the nearest 16th-note timing interval. Those notes then play back with perfect timing (unless a note is so early or late that it falls closer to a note before or after the intended location in the grid, in which case it is moved to the wrong rhythmic position).

Applying this sort of strict quantization results in very precise, mechanical rhythms, which is fine for certain types of music. But if you want your music to retain a more human feel, see if your sequencer includes a *groove quantize* feature. Groove quantization uses a time grid based on a prerecorded rhythmic pattern—called a *groove pattern*—rather than fixed intervals. A groove pattern might simply contain timing information, making it compatible with different sequencer programs. Or it can be a proprietary format—such as Cakewalk *Pro Audio*'s native groove format—containing information on timing as well as on note duration and Velocity.

Basically, groove quantization works by imposing the timing, duration, and Velocity values of one piece of music onto another. For example, suppose you record a melody that sounds a bit too mechanical, but your bandmate slams out a really kickin' MIDI bass line that has just the feel you want. You can copy the bass track and use it as a groove pattern to quantize the melody track. This will impose the feel from the bass line onto the melody without changing the pitch of the notes.

▼

Many sequencers provide real-time MIDI processing.

This is just one of the many uses for groove quantization. Most of the groove-quantization tools (and straight quantization tools) give you control over how much influence a groove pattern or grid has over the data you're quantizing. You specify (as a percentage) how much the timing, duration, and Velocity of the notes will be affected (see **Fig. 2**). This lets you correct off-tempo tracks, add complex beat accents to each measure, synchronize rhythm and solo tracks, align badly timed tracks to one with good timing, and steal the "feel" from tracks as discussed earlier.

As a matter of fact, groove quantizing has become so popular, companies now sell groove-pattern files that let you steal the feel from tracks that have been recorded by professional keyboard, drum, and guitar players. It's almost like having Steve Vai play on your latest project!

REAL-TIME PROCESSING

Some sequencers let you process MIDI data only offline. If you want to quantize a track, scale a group of Velocities, or filter specific types of events from a track, you have to do it when the music isn't playing. Also, the selected MIDI data is altered destructively.

Real-time processing lets you change the MIDI data while it plays, but it doesn't actually alter the data. This type of processing might be found as a plug-in, such as the MIDI Effects in Cakewalk *Pro Audio*, or integrated directly into a program as it is in Steinberg's *Cubase* and Emagic's *Logic Audio*. Real-time MIDI processing is typically nondestructive because it doesn't change the recorded MIDI data; it just affects the stream of data that's being played back.

Some of the types of MIDI processing you will find are effects for quantizing, adding echo and delay, rechannelizing, filtering events, time stretching, adding arpeggios, analyzing chords, and changing note Velocities. It's usually possible to experiment with numerous types of settings, and you don't have to worry about your data being irreversibly altered in the process. For instance, you can easily try out many different quantization values as you listen to find the one that works best. Then, if you want, you can permanently apply the effects to your data, just as you would with any other editing command.

Cubase VST offers yet another type of MIDI processing: its MIDI Processor function allows you to apply MIDI effects not only to data you've recorded but to live input as well. And even more features are available in *Logic*'s Environment window, where you can design complex "networks" of processes that alter MIDI data in numerous ways. If you prefer, you can use one of the numerous user-created Environments available from *Logic*-based Web sites, such as Lynn Sasso's at www.swiftkick.com.

VIRTUAL ROUTING

If you have a multiport MIDI interface, it probably lets you route data from any In port to any Out port. For instance, you might route the data coming into MIDI In 1 to MIDI Out 3. This is useful for sending the data from your MIDI controller to another synth in your

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setup. Something similar can be done with different software applications running simultaneously on the same computer. It's called *virtual MIDI routing*.

A virtual MIDI router is a software driver that simulates any number of MIDI ports on your computer. You install it just as you would any hardware device driver. In Windows, the virtual MIDI ports that the router creates are listed under MIDI Devices and Instruments in the Control Panel Multimedia applet, along with all the other hardware-based MIDI ports. This lets you select any of the virtual MIDI ports in your sequencer (or other MIDI applications) as if they were hardware ports. By doing so, you can transfer MIDI data between software applications that are running on the same computer without using any MIDI interface hardware.

There are a number of great uses for this technology. For instance, Sonic Foundry's *Sound Forge* includes the *Sonic Foundry Virtual MIDI Router* (*SFVMR*), which lets you synchronize and trigger *Sound Forge* from your sequencer or drive your sequencer from *Sound Forge*. Installing *SFVMR* adds four virtual MIDI In and Out ports to your device lists (see **Fig. 3**). You can use *SFVMR* to route MIDI data between any MIDI applications. For example, if one application sends MIDI data through *SFVMR* Output 1, another application can receive that MIDI data via *SFVMR* Input 1. The MIDI data is routed solely through software; no hardware is required. (Hubert Winkler's *Hubi's LoopBack* and Jamie O'Connell's *MIDI-OX* are both free virtual routers that you can find on many MIDI sites.)

IN SYNC

Even though hard disk recording is extremely popular, multitrack tape is still used in many studio situations. And though software-based sequencers are more common, dedicated hardware sequencers and drum machines remain abundant.

If you use multitrack tape or MIDI playback hardware, you could synchronize this equipment with your software sequencer. For instance, you might like using tape to record audio, but maybe you want to augment these tracks with some MIDI tracks, or you might have recorded some cool drum-machine patterns that need to be transferred to your sequencer. These and other tasks can be accomplished with synchronization, of which there are two main types: MIDI sync and SMPTE time code.

MIDI sync is used to synchronize various MIDI devices, such as drum machines, dedicated hardware sequencers, and software sequencers. When MIDI devices are synchronized in this way, one acts as the *master*, and the others are called *slaves*.

The master sends out special MIDI messages to tell the slaves when to start and stop playback, as well as what tempo to keep. These messages include Start, which tells the slaves to start playback from the beginning of the current sequence; Stop; Continue, which tells the slaves to start playing from the last stop point; and Song Position Pointer, which identifies any point in the sequence at which the slaves should begin playback. The master also sends a Clock message 24 times for every quarter note, which defines the tempo for the slaves and keeps it in sync.

The software sequencer can be the master or a slave; when synching MIDI devices, it doesn't matter. The master is set to Internal Clock mode, and the others are set to External Clock mode.

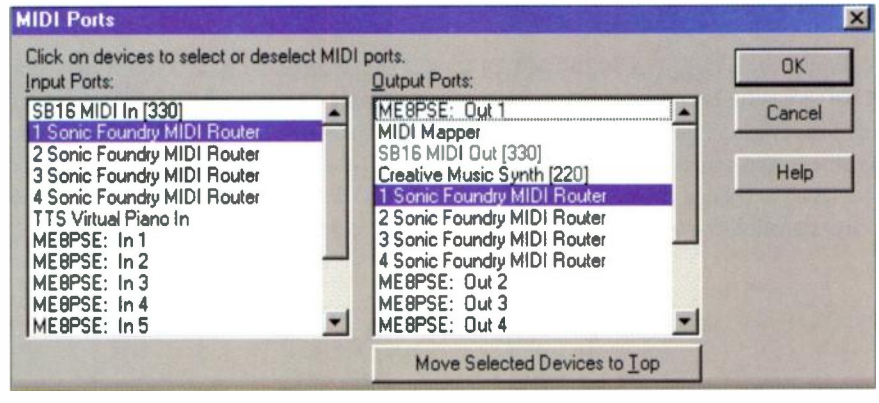

FIG. 3: Sonic Foundry's *Sound Forge* includes the Sonic Foundry Virtual MIDI Router, which allows you to "pass" MIDI data directly from one application to another.

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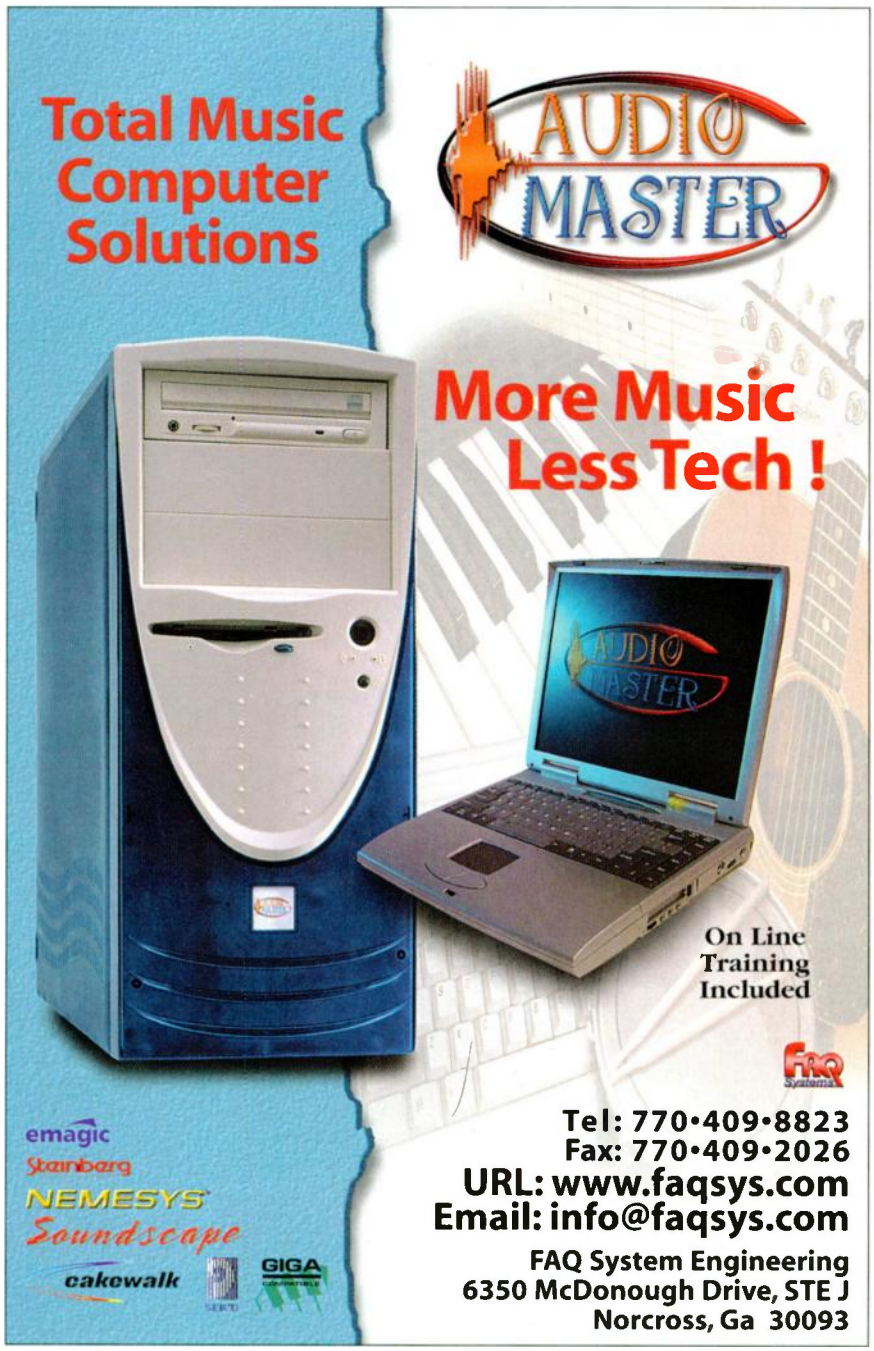
When synching to tape, the sequencer should be a slave, because it can easily adjust its tempo according to the speed of the tape deck. In this situation, SMPTE time code is used instead of MIDI sync. (SMPTE stands for the Society of Motion Picture and Television Engineers, the group that established the standard.) SMPTE time code is a complex audio signal that is recorded on one of the tape's tracks using a device called a *time-code generator.* Many MIDI interfaces also include a time-code generator, so you don't necessarily have to buy yet another piece of gear. (This technique is primarily used with analog multitrack tape decks; digital multitracks, such as the Alesis ADAT and Tascam DA-88, can generate SMPTE time code electronically without making you record it on one of the audio tracks.)

The SMPTE time-code signal represents absolute time over the length of the tape in hours:minutes:seconds:frames. (SMPTE time code was originally developed for use with film and video, which is why seconds are divided into frames.) For example, the beginning of a tape might correspond to a SMPTE value of 1:00:00:00, in which case the point one half-hour into the tape would be 1:30:00:00. The SMPTE value at the beginning of the tape can be anything you want, and all points after that are identified with a unique SMPTE time-code value that increases from the starting value you specify.

SMPTE time code is sent from the tape deck to the sequencer, which synchronizes its performance to the tape as it plays. This type of synchronization requires a *SMPTE converter,* which translates the SMPTE time code into MIDI Time Code (MTC). The MIDI interface reads the MTC and sends it to the sequencer. (If your interface includes a time-code generator, it probably includes a SMPTE converter, as well.) MTC is equivalent to SMPTE time code, except it consists of special MIDI messages rather than an audio signal.

As your sequencer receives MTC, it calculates the measure, beat, and tick that corresponds to the incoming time value. This lets you start playback anywhere along the tape, and your sequencer begins playing or recording MIDI data at precisely the right point in perfect sync.



BUT WAIT! THERE'S MORE!

We've examined a few of the more complex but useful tools found in today's MIDI sequencing software, but there is much more to explore. For instance, many sequencers give you total control over MIDI devices as well as MIDI data. You can create onscreen control panels to manipulate your MIDI hardware right from your computer. You can also manage synthesizer patch data and create instant snapshots of your entire studio setup for later recall. And don't forget the algorithmic-composition tools found in some sequencers. They can help you jump-start a project by providing a large amount of MIDI data to work with.

The best way to start is reading the manual that came with your software, cover to cover. It should tell you everything you need to know about unlocking the full potential of your MIDI sequencer. After that, your sequencing sessions will never be the same.

Scott R. Garrigus *is an author, musician, and multimedia expert. In addition to frequently contributing to* **EM**, *he publishes his own online 'zine called* Comp-media. *You can contact him at www.garrigus.com.*

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Getting Personal

Four pros shed some light on the personal management profession.

By Erik Hawkins

There are managers and there are *personal managers*. The latter are those brave souls who blur the line between best friend and career counselor, becoming involved in the most intimate details of an artist's life and business. Too often, these professionals are grouped under the catchall title of manager, which, while not inappropriate, doesn't really differentiate their unique function from the kinds of things other types of managers do. Because they provide a service that's hard to classify but always pivotal in an artist's career, personal managers deserve a closer look.

The essence of the job is probably best expressed through the words of professionals who've been there. The people mentioned in this story are either currently working as personal managers or have done so in the past. In talking about their duties and responsibilities, they clear up a lot of the mystery surrounding management structures in the music industry and give us a peek into the minds of personal managers themselves.

Kacey Lovelace, a Los Angeles–based personal manager and promotions consultant, is well known for her artist relations, which include coordinating A&R showcases like BMI's popular Acoustic in Black Showcase (featuring new urban alternative acts). Nadine Condon owns the Nadine Condon Company, a popular management consulting firm; her annual alternative showcase, Nadine's Wild Weekend, featuring three days of unsigned Northern California talent, is now well known in the music business. Aaron Walton, president of Aaron Walton Entertainment, manages several major-label acts, including Dakota Moon on Elektra. And "Joe Manager," a successful manager based on the East Coast who

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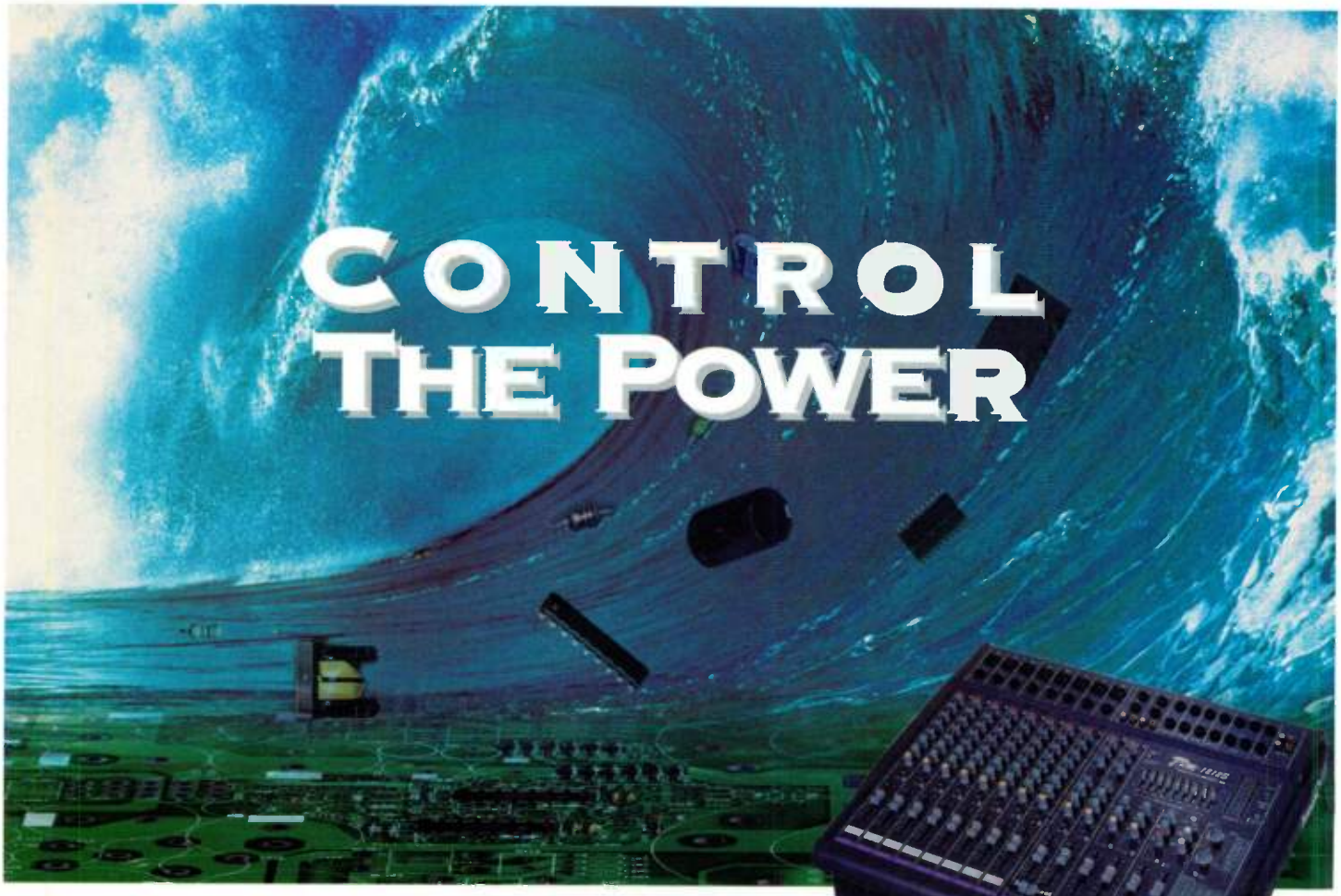

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ANNAMARIA DISANTO

Kacey Lovelace (center), a personal manager in Los Angeles, coordinates BMI's well-known Acoustic in Black Showcase, which features up-and-coming urban alternative artists. Attendees of the June 1999 Showcase included (from left to right) Cheryl Dickerson, senior director and writer in Public Relations at BMI; Woody Harrelson, actor; Macy Gray, Epic recording artist; and Neil Rocklin, owner of Gig Hollywood.

wished to remain anonymous (we'll call him J. M. for short), works with well-established acts ranging from 38-Special to Joan Baez.

DEFINING THE ROLE

Although there's enough popular folklore about personal managers to fill a book, the exact role these people play is difficult to define—mainly because the duties are so numerous they're hard to sum up. But when asked to talk about personal management in their own words, my panel of experts described many of the same responsibilities and traits.

"Personal management ranges from getting the artist's image together—picking out the right clothes, doing photo shoots, and other basic things like that—to helping select the songs for an album to planning out a tour," Walton says.

"Personal managers orchestrate artists' careers; they're like ringmasters," says Condon. "They have to be concerned with the day-to-day activities while gearing up for future endeavors. Also, they need to keep the artist in the studio, songwriting and recording, with an eye toward how the artist is developing, because it's that development that is going to take the artist where he or she wants to go."

Lovelace underscores these sentiments. "A personal manager should be very involved in making sure that artists are generating income through their art and that the exposure the manager gets them helps generate more income," she says. "The acts I work with are so niche, I need to have hands-on involvement because their art and the music are so much a part of their personal lives. This involvement is the only way to get the insight necessary for making really good management decisions."

"I usually sum up what I do with 'the buck stops here,'" says J. M. "Because, regardless of all those ancillary people who have responsibilities in connection with the artist's career—the tour managers, the business managers, agents, attorneys, assistants—it's up to me to be the last word, to determine whether these people did or did not fulfill their responsibilities in a satisfactory fashion. That means I have to be adviser, caretaker, and expert—or a quick study in a lot of areas. I decide the scenarios under which my artists go on the road or make records, and how the record gets marketed, advertised, promoted, and disseminated to the public. I'm the liaison with record companies to make sure they're getting all these things done. [The job is] all this, along with staying focused and keeping an eye on a common vision that's representative of the artist's vision."

AS MANAGEMENT TURNS

In the beginning, it's up to you to see if you have what it takes to get a buzz going on the local scene. Early in your career, it's not a big deal to pick up the phone and call your neighborhood club or your city's weekly entertainment journal. "Bands that are trying to play in local clubs and get publicity in local magazines don't need personal managers," Condon points out. "It's when your songs are generating a lot of interest and you're getting calls from record labels and large promoters that you'll need someone to negotiate things for you in a professional manner. These tend to be unfamiliar situations for many artists, so they need someone protecting their interests." As you start to move into the uncharted waters of complex business negotiations and other decisions such as when, where, and how often to perform and record, a personal manager becomes key.

Personal managers are especially important in the early stages of a performer's career, which is why you usually hear about them in connection with just-breaking acts. "With emerging artists and newly signed artists, you definitely have to be more hands-on, more involved in the personal aspect of their art," says Lovelace.

As an artist's career takes off, however, the managerial duties and responsibilities soon become too much for one person. At this point, the personal manager's obligations usually get divided among several different people. Business managers take charge of the artist's finances; personal assistants help outfit and equip the artist and coordinate the details of the daily routine; tour managers handle concert logistics; booking agents make sure the contracts for the shows are properly written and executed; promoters oversee concert advertising and the press coverage; attorneys make sure everything is legal and in the artist's best interests.

But even when an artist reaches star status, the personal manager remains as valuable as ever, though in a less personal and more general way. In this broader capacity, the manager oversees the many people who support specific areas of the artist's career and spends less time directly involved with the musician's artistic development. (The manager still has a say in how the music is progressing, but since the artist's creative identity is already well defined, it requires less attention.)

Lovelace puts it this way: "At the beginning stages, the personal manager is

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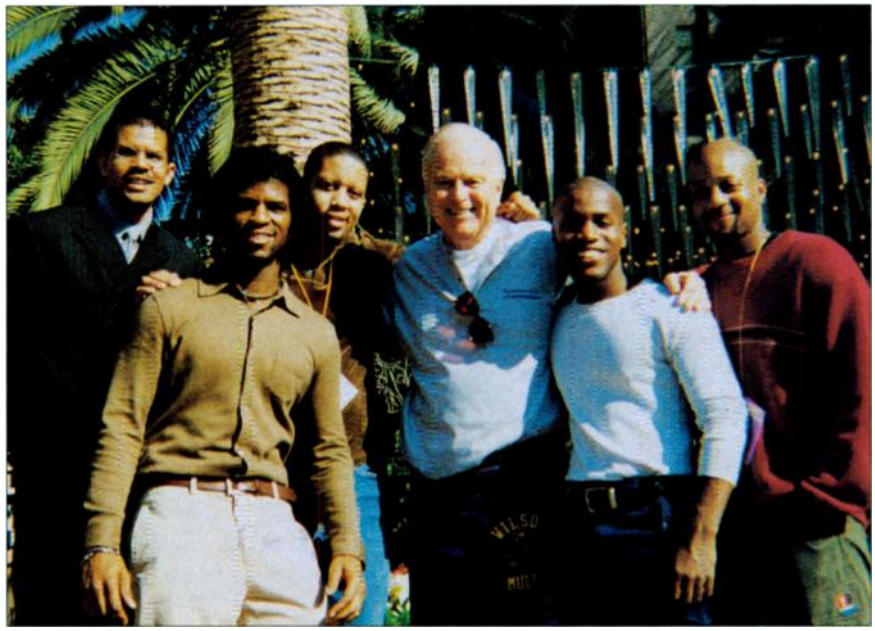
kind of everything to the artist—confidant, agent, tour manager, business manager. That continues until the artist has the income to employ other people to handle these things. You take care of every aspect of the artists' careers until they get to that point. It's like they have to walk first before they can run: they have to have a personal manager first before they're ready for all these other folks." But even after they've handed off the details, personal managers are still, as J. M. points out, "the responsible party for virtually all aspects of an artist's career."



AARON WALTON ENTERTAINMENT

Aaron Walton (far left) manages several major-label acts and is president of his own management firm, Aaron Walton Entertainment. He is pictured here with Los Angeles mayor Richard Riordan (center) and Elektra recording artists Dakota Moon (from left to right: Malloy, Joe Dean, Ty Taylor, and Ray Artis).

STAR SEARCH

There are no hard-and-fast rules for finding a personal manager. "Artists get frustrated because they feel they have to get whoever manages Alanis Morissette, Garbage, or some other superstar band, and that's not the case," emphasizes Condon. "I've always found that the best manager is someone who is totally in love with your music, someone you trust not to cheat you. That could be your best friend from college who is willing to take on this level of work." J. M. agrees, adding, "Many artists, in the early stages of their careers, have their management taken on by the guy who wasn't good enough to be the guitar player. Often, these guys develop into formidable managers."

A good way to locate a manager is to find out who's managing the bands you admire on the local scene. Once you've identified these candidates, you should get them on your mailing list, keep them abreast of what you're doing, and let them know you're serious. Lovelace points out that these people are busy, and it might take them a while to make it to one of your shows. "If you fax them once or call them once and they don't show up, it doesn't mean that they aren't interested," she says. "Diligence is the key: be persistent, but not a pest. They will make it eventually."

Walton says his company always takes the time to listen to new music—but usually on someone's recommendation: "I get referrals through friends, from agents, and from record companies," he explains. In fact, Condon says a word-of-mouth endorsement is essential at this stage of the game. "I think it's extremely hard to just go through an industry directory, sending out tapes blind with a letter that says, 'I'm looking for management,'" she says. "That's a waste of time and money. Managers are looking for referrals." Condon is right: cold calling is definitely not the way to go about looking for a personal manager—take it from me, I've tried it and gotten nowhere fast. Get to know people—other bands, club owners, attorneys—and if your music is solid, someone will put in a good word.

Lovelace has a more street-level approach to looking for new acts. "The way I've always found artists has been by getting out there, checking things out, keeping my ear to the street, always knowing what acts are hot and up-and-coming, and keeping attuned to the executive world—labels, movie studios, producers, and so on—to keep up on what they're looking for," she says. "There's no shortage of good talent; there's a shortage of good matches of good talent with good executives. I think if a manager is really on point in both worlds and making an effort to stay connected in both worlds, she or he should always be able to find those matches."

I've met other personal managers who work this way as well, so it is crucial that you get yourself in the public eye as often and in as many ways as possible—through gigs, special appearances, an Internet presence, and so on.

NO FREE RIDE

A personal manager's income is directly tied to the success of the artists he or she represents. If someone is going to work hard to promote an artist's music and find ways to generate income from that music, then it's only fair to compensate that person accordingly. Personal managers are paid on a commission basis, usually 15 to 20 percent of the artist's earnings. A written agreement, even a very simple one, is crucial. At the very least it must detail the artist's and manager's responsibilities, the manager's sources of compensation, and the structure of the commission.

As Walton puts it, "There are different sources of income for us: We can [take a] commission when the artists tour, when they sell records, when material is placed with corporate advertisers, or when the artists do music for commercials. Publishing is a big source of income, too." Lovelace adds, "I usually get a cut of the advance money artists receive when they get signed, as well."

Some managers ask to get a commission on everything and anything that has to do with your career—either for a set amount of time or in perpetuity, beyond the time you're actually working together. Working out this part of the deal can be tricky, acknowledges

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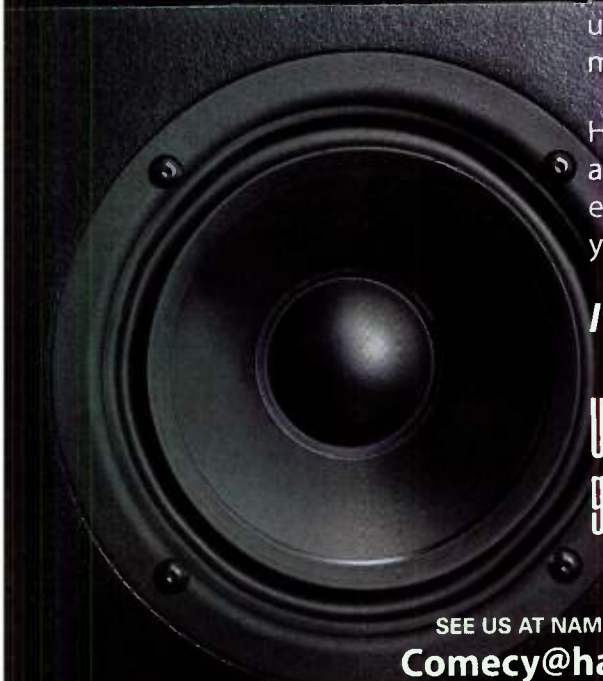

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Northern California entertainment attorney Bryan Robinson. "Deciding, in advance, how future proceeds will be paid to a manager no longer involved in an act's career is an extremely complex issue," he says. "It's crucial that all parties' interests are protected and that the manager's efforts up to the point of termination, regardless of whether the termination is amicable, are recognized." For example, sometimes managers are fired by acts who have reached the big time and now want to work with more established managers. Having a contract that includes a clause for fading out earnings over time, often called a *sunset clause,* is one way to prepare for this situation.

If you are self-contained (you have a direction, an image, your own studio, and so on) and just want to work with a manger for a specific period, a short-term management agreement called a *finder's agreement* might be a good option.

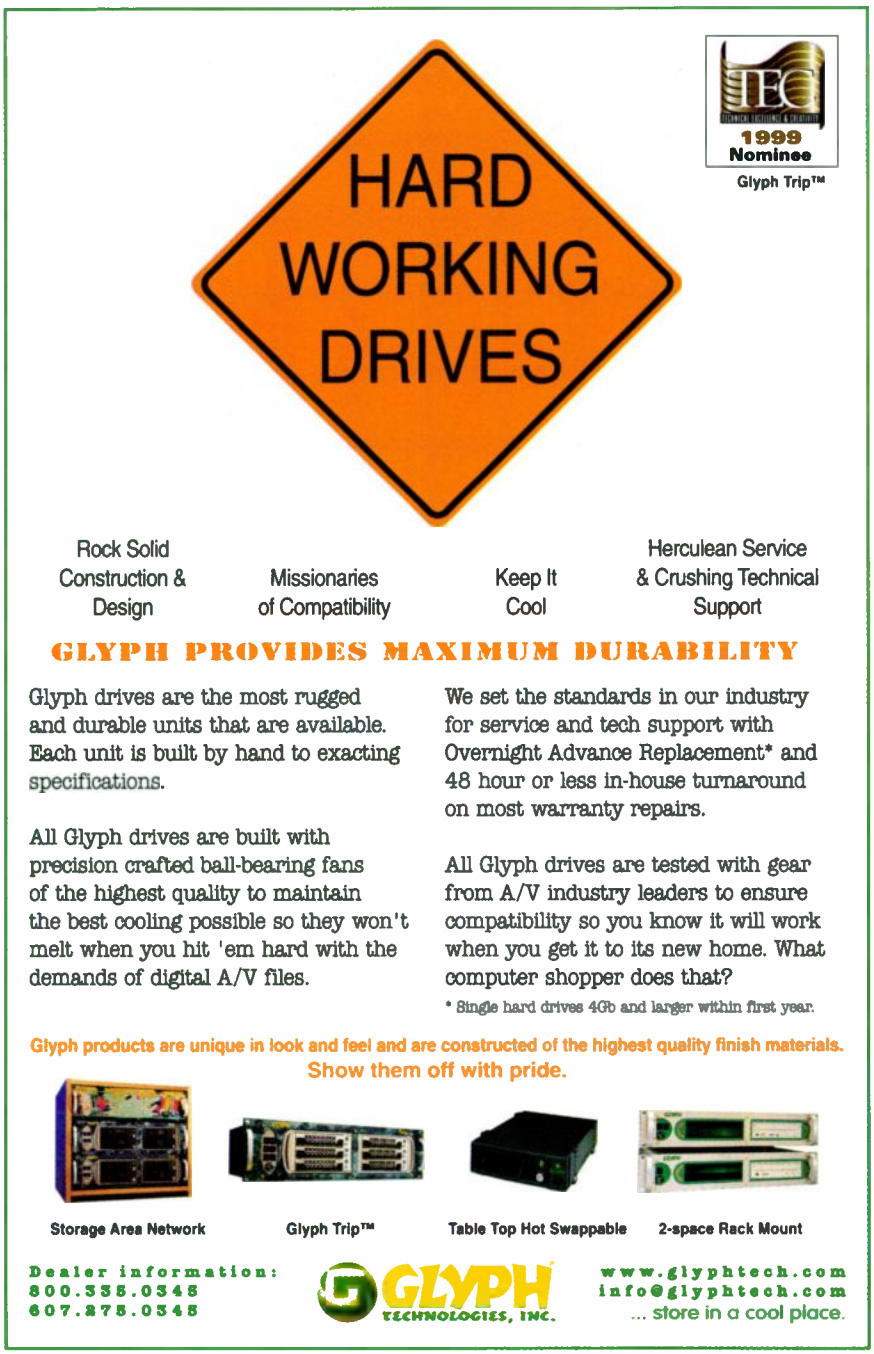
"I do a finder's agreement with some artists whom I'm not necessarily interested in managing long-term, but know I can create some exposure for and probably help secure a deal for," Lovelace explains. "It limits my involvement in both the business and the creative aspects. These are artists who don't need much development and have put a lot of time into their careers and their catalog already. They basically just provide me with product and I shop it. They love it and I love it because I don't have to be as hands-on, and I get commissioned specifically for what I do—if it's a label deal, a publishing deal, or whatever." The finder's agreement lets her concentrate on specific areas of promotion without getting tied up in supervising a support staff, so as a dealmaker she can be more efficient. A finder's agreement is also a great way to begin a relationship with management because it gives both of you the opportunity to get to know each other.

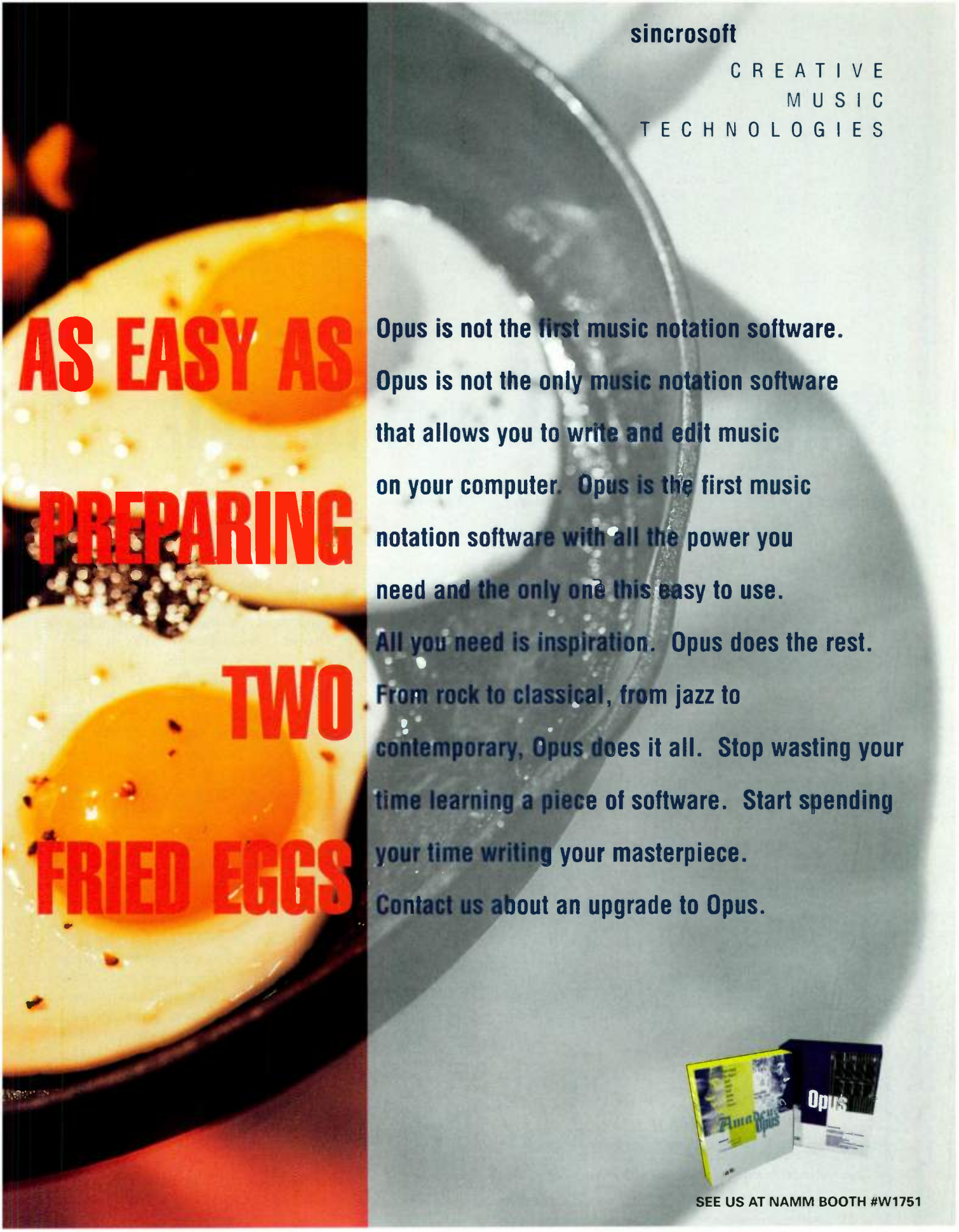
Management firms and successful managers usually try to have three or four acts on the burners at one time: a successful act that's living on residuals and working on its next project, an act that's actively generating income from touring and record sales, and a couple of acts in development. Otherwise, the personal manager is going to have to hold a day job just like the band members do until revenues start coming in.

MANAGEMENT 101

Who, when, how, and why are all considerations that musicians ponder when the issue of management arises. Many will tell you, as I will, that there are no clear-cut answers to these questions. "Management is probably the thorniest issue in an artist's career," Condon says. "I get more calls asking my advice on how to find management than on how to get a record deal."

There's no cookie-cutter mold for finding the right person, either; someone who's perfect for one artist may be the worst choice in the world for another. But once you understand the manager's role and how it affects an artist's career over the long haul, a lot of things fall into place. Personal managers are the cornerstones on which all other supporting systems in the music industry are built. If you understand that, you've aced Management 101, and when it's your time to find your own personal manager, you'll know what to look for.

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Songs in the Key of Beatnik

Creating custom instruments for RMF files.

By Peter Drescher

The Beatnik Audio Engine is a software synthesizer that produces music and sound effects by playing sampled instruments controlled by MIDI data. The current incarnation delivers high-quality, cross-platform interactive audio via the Beatnik Player, a browser plug-in that contains a compact library of sounds capable of rendering MIDI and Rich Music Format (RMF) files embedded in Web pages. More important, you can control all of the Beatnik Player's various functions with JavaScript commands, which let you create "sonified" Web sites that play sound effects in response to mouse clicks, Web-based interactive remixes of popular artists' songs, soundtracks for Macromedia Flash, and Shockwave movies. Versions of Beatnik's technology have also been licensed by Apple; WebTV; Be, Inc.; and Sun Microsystems.

You create RMF files with the *Beatnik Editor,* a Macintosh program available online at www.beatnik.com. One of the most powerful aspects of the software, from a composer's point of view, is its ability to create custom instruments. Want a particular kick and snare sound for your General MIDI tune? Dogs singing "Jingle Bells"? No problem. Import your samples into the *Editor,* create an instrument using the sounds, add a MIDI file to play the instrument, and export the whole bundle as a copyright-protected RMF file, ready for computer users worldwide.

To demonstrate, I produced a song in RMF titled "every seven years." You can play it at www.emusician.com/feb00/examples.html. You can also download the *Editor* session and MIDI files so you can see exactly how I created the file. The song contains two custom instruments: a Steinway piano and a vocal track. Because the samples are MPEG compressed, the entire three-and-a-half-minute song is under 450 KB.

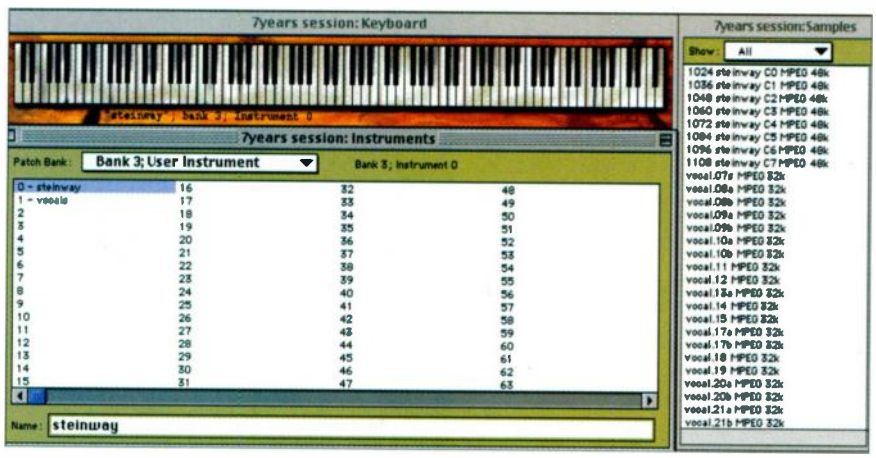

FIG. 1: A view of the *Beatnik Editor*'s User Bank. Notice that I have added MPEG-compressed piano and vocal samples. The numbers in the Instruments window refer to the MIDI layout—instruments 0 and 1 are piano and vocals, respectively.

CUSTOM INSTRUMENTS

Let's start with the piano. Earlier this year, I recorded all the C's and F#'s of my 1926 Steinway using a couple of

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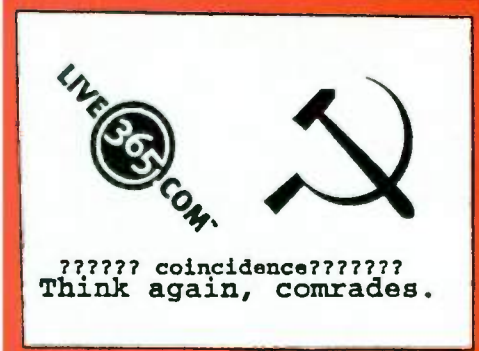

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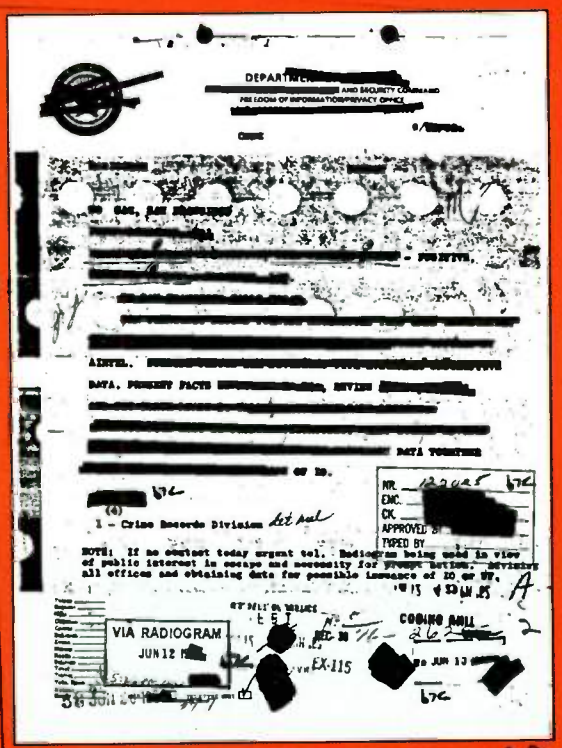

As this confidential document clearly shows, Live365.com's Internet radio scheme just may be the brainchild of the Freemasons (the government behind the government).

FACT 1

Live365.com is many times more powerful than regular radio!!!!!!!!
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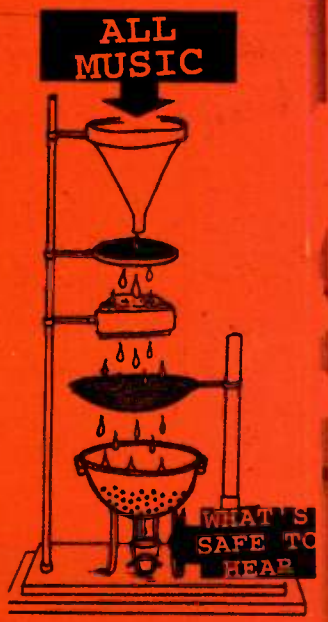

FACT 2

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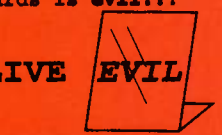
FACT 3

***Live365.com begins with the word live and live spelled backwards is evil!!!



That's right, pure evil 365 days a year. And don't even get us started on the "com" part. Can you say Audio Abomination!?!

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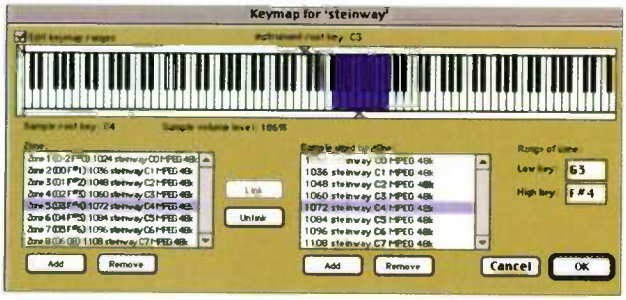

FIG. 2: The Keymap dialog box lets you specify which samples are played in a range of MIDI notes. Notice that the sample root key is C4, and the sample volume level is 186 percent.

Neumann mics in order to create a large, high-quality stereo instrument. Since I wanted to keep the data file size of this song as small as possible, I needed to make a more compact piano. Using only one note per octave, I looped the samples as short and tight as I could before downsampling to 22 kHz mono using Waves' *WaveConvert*. Then I fired up the *Beatnik Editor*, created a new, empty session, and imported the files by dropping them into the Samples window.

Now to create an instrument definition. From the Instruments window, I selected the User bank and named the first slot "steinway" (see **Fig. 1**). I double-clicked the name to call up the Keymap dialog box, which allowed me to specify which samples were to be played for what range of notes (see **Fig. 2**). On the right side of the dialog box, I added the piano samples; on the left, the required number of zones. Then I selected the first zone and the first sample and "linked" them; the second zone and second sample, and so on. Checking the Edit Keymap Ranges box let me specify the range of notes for each zone by clicking on the keyboard. In this case, I used G2 to F#3 for the C3 sample, G3 to F#4 for C4, and so forth. I was careful to set the triangular Instrument Root Key slider (at the bottom of the keyboard) to the appropriate note, and placed the Sample Volume slider (on the left of the keyboard) near the top to maximize the sound.

Finally, I set an ADSR envelope for the piano in the Volume dialog box, which allowed me to specify the rate of decay during the sustain loop. You can also set vibrato, tremolo, panning, and other effects using the Modulation and Filter dialog boxes. That was not necessary for this instrument, but I've found those features to be quite useful when file size is at a premium. Varying the settings can produce a wide range of sounds from a small number of tiny samples. For example, the *Beatnik Editor* created the WebTV GM bank, which can contain 128 instruments plus percussion in only 350 KB.

ADDING VOCALS

To produce the song in RMF format, I needed to create a Beatnik instrument that would play the vocal track. First, I recorded the piano part using Opcode's *Vision* sequencer and imported the MIDI file into Digidesign's Pro Tools for the recording session. With Jeff Lipton of Sonicopia engineering,

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- REVERSE - Reverse Delay with the flick of a key
- DYNAMIC - Set release time and threshold to let the Input signal control the level of Delay - keeping everything nice and tidy
- CHORUS - Or perhaps you prefer Flanger? Hit one key and you've instantly added it to your Delay
- FILTER - Increase filtering as repeats decay

I recorded Roberta Donnay singing the song at DubeyTunes in San Francisco.

At my studio, I began preparing the audio. I cut up the vocal phrases in Pro Tools on a 32nd-note grid, keeping track of where each piece started (to facilitate synching with the MIDI data later on) and splicing as close to the beginning of each phrase as possible (to keep the file sizes small). After shaving off extra space at the ends of the phrases, I used Waves' *L1* to maximize the audio while limiting to a –1 dB ceiling (this prevents distortion when the samples are MPEG compressed). Finally, I converted all the files to 16-bit, 22 kHz mono SDII files and imported them into the *Editor* session.

I performed the same procedure to create the vocal instrument, except that I assigned each vocal sample to a key range consisting of a single note, so that playing a chromatic scale fired off each phrase in sequence. I also made the volume ADSR completely flat, which indicated to the *Editor* that MIDI notes received for that instrument were intended only to trigger the sample.

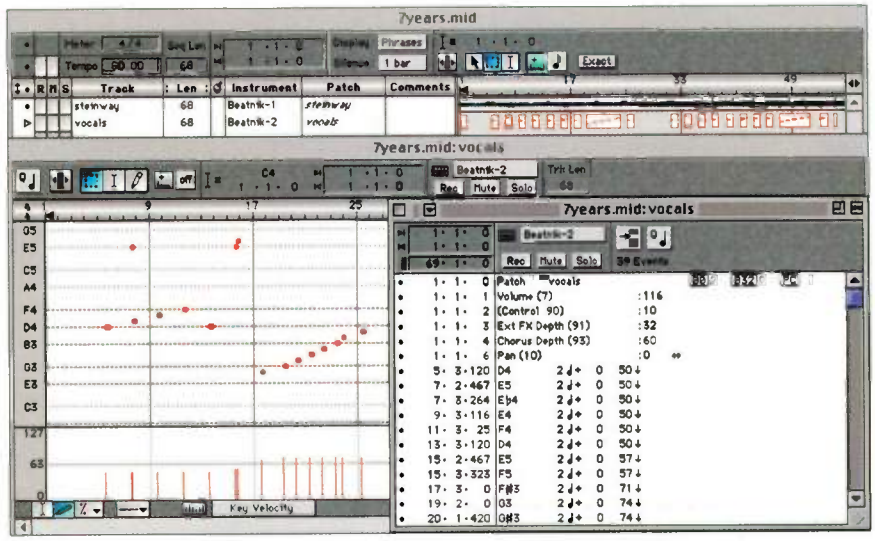

FIG. 3: In *Vision*, you use a MIDI file to control the samples. Notice that each vocal note is two beats long and is intended to be a trigger only. The top of the Event window shows the initialization of the controllers for the vocal patch.

MPEG COMPRESSION

At this point, the session file contained over 6 MB of samples, which is a bit too much for a 28.8 kbps modem connection to handle. Here comes MP3 to save the day! The *Beatnik Editor* contains an MPEG compression algorithm that can squeeze samples to less than a tenth of their original size with very little loss of character. I am continually amazed by how well this technology works; in a low-bandwidth world, it's an absolute

lifesaver. If your original audio is like a marble statue, then the compressed version is like a thin plastic cast of the sculpture—it looks the same, but it weighs a *lot* less! MPEG compression analyzes the frequencies present in certain bandwidths, then applies psychoacoustic principles to encode only the frequencies the human ear can hear.

The *Editor*'s Compression menu gives you a number of bit rates to choose from, and selecting the correct one requires a little trial and error. Caveat: there is currently no Undo for MPEG compression in the *Editor*. It's best to make a number of copies of the sample in question and to test the various rates on them. A 16-bit, 22 kHz mono file will frequently compress at the 48 kbps bit rate without causing audio artifacts, but this is heavily dependent on the content. Sharp transients like snare will usually require a higher rate, resulting in a larger file. Vocals, with their limited frequency range and smooth attack, generally compress like a charm at the lowest available rate (32 kbps), whereas noise (ocean surf, for example) will sound as though it's submerged in electronic soup at that level of resolution. Sometimes the compression algorithm produces a loud click at the end of the sample, which you can eliminate by adding about 30 ms of silence to the tail of the original audio. Of course, Beatnik has one major advantage over other systems: it remembers where your loop points are. Thus, I was able to squeeze almost 1 MB of looped piano sample data down to 140 KB.

CREATING THE MIDI FILE

Now that the instruments and samples were in place, I needed to make a MIDI file to play them. I did this by selecting Link to Sequencer from the *Editor* File menu. The command loads all the samples into RAM, where they can be accessed by the sequencer via OMS. You can then create 16 channels of Beatnik MIDI just as if the *Editor* software were an outboard synth. Setting up this link can be a little tricky, but the Beatnik site provides helpful documentation on connecting with *Vision*, along with some special tweaks that are required for users of *Performer*. Once the connection is in place, however, MIDI data from the sequencer is routed to the *Editor*, and you can hear your sequences played by the Beatnik instruments.

In *Vision*, I put the piano part I'd used

PRO TOOLS 24

views of 4 creation

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for the recording session on the first channel and put the vocals on another channel (see **Fig. 3**). Notice that the patch controller specifies which channel is assigned to the instrument. In the case of the vocals, the channel is "bank2, patch1." I initialized volume, pan, chorus, and reverb amounts, then used CC 90 to select one of the built-in Beatnik reverbs. Applied judiciously, this effect can help mask some of the audio artifacts introduced by MPEG compression; this is also true of the built-in chorus effect.

I then carefully entered trigger notes on a 32nd-note grid according to the layout I created when I cut up the audio in Pro Tools. When I played back the sequence, I could hear the piano and vocal tracks together, played by the instruments I'd created using the *Beatnik Editor*. After adjusting mix levels in both the MIDI and instrument definitions, I experimented with various chorus and reverb settings. Then I exported a Standard MIDI File, unlinked the *Editor* from *Vision*, and imported the file into *Beatnik Editor* by dropping it into the Songs window. I could then play the song from the *Editor* and enter copyright, credit, and other information.

EXPORTING THE RMF FILE

At over 800 KB, the file was still too large (I was shooting for under half a meg), so some tricks and compromises were necessary. Using one set of samples for both the first and second choruses saved a lot of space, and I was even able to use one sample of the words "we are" in two different lines. To pull that off, I had to re-edit some of the samples and "earball" the MIDI trigger notes to get the audio to line up seamlessly, but when I was done, I'd removed over 300 KB with minimal impact on the lyrical content.

When all the final versions of sample and MIDI data were in place, I selected the Export RMF command from the *Editor* File menu. That created a flat, cross-platform, 40-bit encrypted, copyright-protected RMF file that any Beatnik-enabled browser can download and play. The file can simply be embedded in a Web page or playback can be controlled by JavaScript code using the Music Object API, an interface protocol that provides the mechanism for Beatnik's powerful interactive features. You can also export a stand-alone application for Mac or PC that will play the song when you double-click on the file. That method bypasses any browser issues and is useful if you want to distribute a version of your tune on disc.

CREATIVE CHALLENGE

While producing this kind of RMF file can be technically challenging, the flexibility of the software lets composers incorporate any kind of audio into their online creations, limited only by their skill and imagination. Guitar chords, saxophone solos, drum loops, wolf howls, rude noises—anything is possible, and the file will sound as intended on any computer. With audio becoming a standard part of the Web, more and more people will be creating songs in the key of Beatnik.

Peter Drescher *is a composer and owner of Twittering Machine, a project studio in San Francisco. He has used Beatnik technology to produce sound effects for games, WebTV, the BeOS, Adobe, and Sonicopia.*

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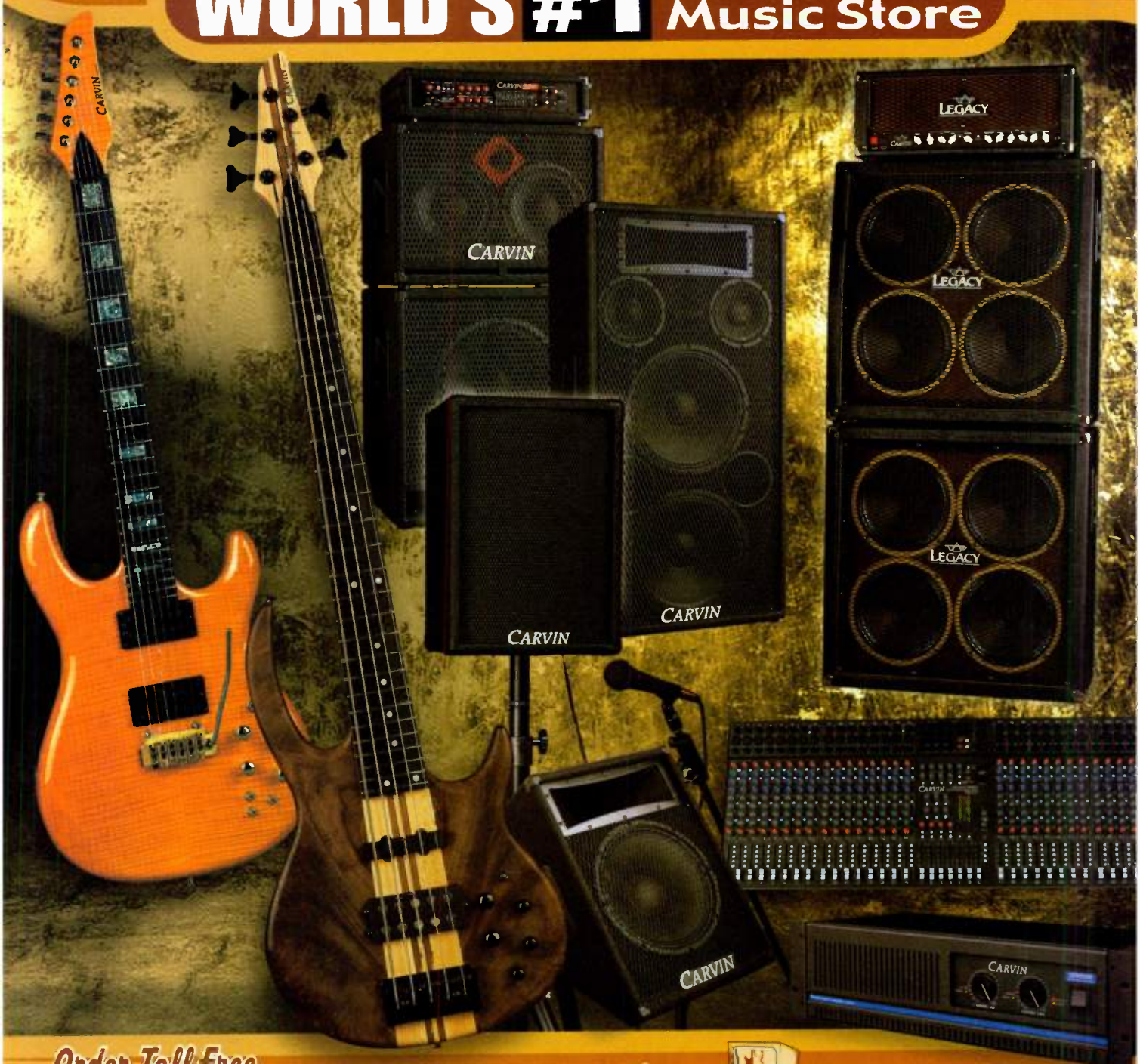

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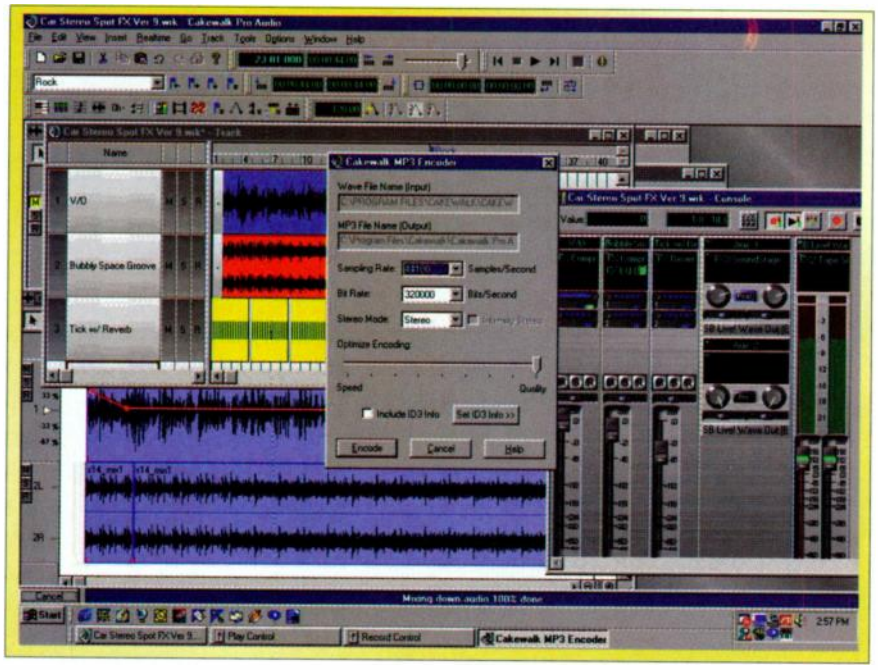
Expert Advice

A grab bag of useful tips and techniques.

Compiled by Mike Levine

Welcome to the latest edition of "Operation Help." Our main goal with this column is to help you get the most out of your favorite hardware and software. However, we've changed the format a bit and are now dedicating part of this column to answering reader questions about equipment and technical issues. Feel free to e-mail your questions to us at emeditorial@intertec.com.



In order to use Cakewalk *Pro Audio* 9's MP3 Encoder (or burn a CD), you must first convert all of your MIDI tracks to digital audio.

FROM THE MANUFACTURERS

Preparing MIDI Tracks for CD Burning and MP3 Encoding in Cakewalk *Pro Audio* 9

Because both CD burning software and Cakewalk's built-in MP3 Encoder require digital audio source files to complete their respective tasks, you must convert all MIDI files to digital audio before proceeding. You can accomplish this easily within Cakewalk *Pro Audio* 9 by using one or both of the following methods.

For recording any MIDI tracks that use the internal synth sounds of a sound card (such as a Yamaha SW1000 or a Creative Labs SoundFont-capable card), follow these steps:

1. Find an empty *Pro Audio* track. Set its Source to Stereo and arm the track.
2. If you have more than one sound card installed, make sure you designate the sound card that is playing your internal MIDI sounds as the Source. Just to be safe, make sure that no other *Pro Audio* tracks are armed.
3. Open the mixer device of your sound card by double-clicking on the yellow speaker icon on your Windows taskbar. Make sure you are adjusting the Recording Controls (Options → Properties → Adjust Volume for Recording → OK), not the Playback Volume Controls.
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The Korg Triton's Enter key makes it easy to edit many of the keyboard's functions.

the sound of the MIDI playback, make sure the MIDI or Synthesizer fader is the only option with a check in its Select box. That check indicates that the synth signal can now be recorded as digital audio. The fader will adjust the input levels into *Pro Audio*. To check recording levels, use the Audio Meters in *Pro Audio*'s Console view.

5. Press Record in *Pro Audio*, and a submix of all the MIDI tracks assigned to the internal synth will be recorded in the stereo audio track.

6. After you've successfully recorded the MIDI tracks as audio, mute them in the file. You'll be listening to audio track versions of them for now.

Recording MIDI tracks that are played on your external sound modules or instruments is even easier:

1. Connect the audio outputs of your MIDI instruments to the line inputs of your sound card.

2. Find an empty *Pro Audio* track. Set its Source to Stereo and arm the track.

3. Open your digital audio card's mixing software. Check its Record Properties, making sure to select the Line Input. Adjust the input levels into *Pro Audio* using the onscreen fader. To make sure you're recording at a good level, check the Audio Meters in *Pro* Audio's Console view.

4. Press Record in *Pro Audio*, and the MIDI tracks assigned to external MIDI instruments will all be recorded as a stereo audio track.

5. Mute the original MIDI tracks for the rest of this process.

You now have an audio version of all the tracks you need to record your CD or MP3. Only one step remains: exporting your final mix to a file. To do this, open *Pro Audio*'s Tools menu and select Mixdown Audio Export to File(s). This single command will combine your play-enabled (unmuted or soloed) audio tracks and export a CD-ready WAV file or a finished MP3.—*Courtesy Adam Burch, Cakewalk*

Accessing Hidden Functions with the Korg Triton's Enter Key

Between its sequencer, synth, and sampling functions, there's no shortage of editable parameters on the Triton. While the touch screen (called the TouchView Graphical Interface) is certainly the Triton's flashiest editing tool, the Enter key is also quite valuable for facilitating quick and easy edits. Here are some cool ways to use it:

1. When you're editing a drum kit in Global mode and you want to see information for a specific key, press Enter while holding down that key. The corresponding parameters—including MIDI note information—will appear on the display.

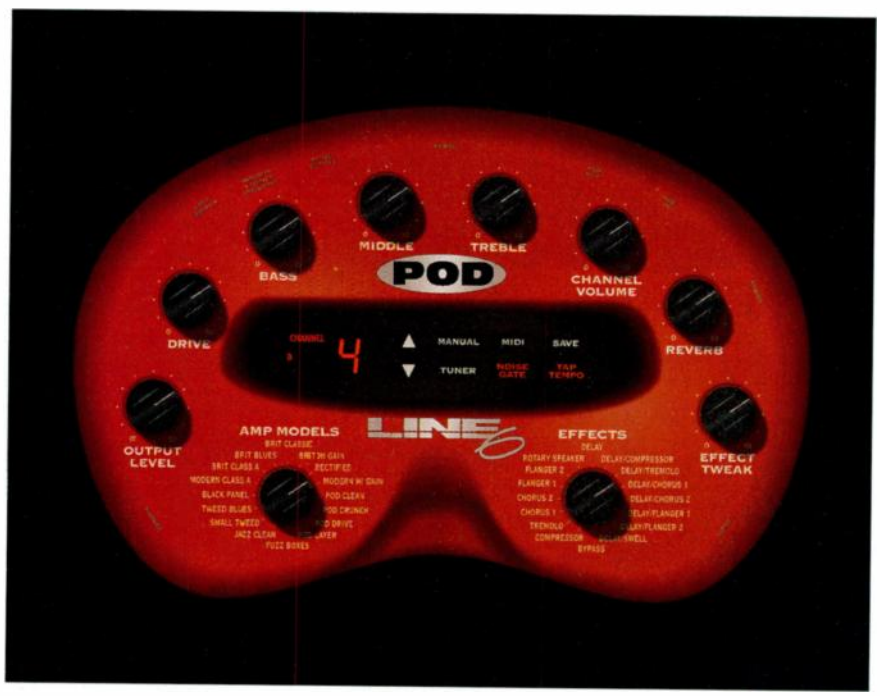
2. When setting up a split in Combi mode (page 4), hold down Enter and select a key to quickly set the upper or lower boundary of a zone.

3. When setting up Velocity ranges in Combi mode (page 4), hold down Enter and hit a key (as hard or soft as you'd like) to input the Velocity level.

You can also use Enter for RPPR assignment in Seq/Pattern mode, Key assignment in Sampling mode, and Index selection in Sampling mode (when the key range is not highlighted).—*Courtesy James Sajeva, Korg*

Patch Management Tips for the Line 6 Pod

When recording with Pod, make sure to note on your track sheet which patch and pickup combination you used. That way, if you have to revisit the project later and make changes to your part, you'll be able to re-create your



When programming Pod, it's important to keep the volume levels balanced between patches.

For manufacturer information, please see Contact Sheet, p. 227.

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original sound easily. Once you match the levels to those of the original tracks, you will get absolutely seamless punches with no variation in tone (unless, of course, you haven't changed your strings for three months).

When you're programming multiple patches for live performance, it's important to make sure the volume levels are balanced between them. Here's the easy way to do it:

1. Choose one of the factory patches as your "default" patch. You'll compare this patch to your new patches to check levels. All the factory patches are reasonably well balanced, so just choose one that you like.

2. Do the initial sound tweaking on your new patch. Then A/B it with the default patch and adjust the Channel Volume so that it sits where you want it.

3. Here's the important part: play along with some program material (if you have the tracks of the song you're designing the patch for, so much the better) at varying volume levels. Frequently a patch that sounds great by itself will disappear in a mix with other instruments, or interfere with other sounds. Remember that whether you're on stage or in the studio, you're usually trying to find a distinct sonic identity for every part so that you don't end up with mush.—*Courtesy George Van Wagner, Line 6*

Changing Tascam DA-38 and DA-88 Greeting Messages

When Tascam holds a retail sales product training or end user clinic on DTRS products, one question almost always comes up: How do you change the greeting message? Although it seems silly, people want to know.

To change the greeting message on a DA-38:

1. Power On while holding Ffwd, Stop, and Play.
2. Press Stop before the word "TASCAM" begins scrolling. This will put the DA-38 into Test mode. "tESt" will appear in the time code display.
3. Press and hold the Shift key while pressing the Down cursor button. The letter *A* will appear in the time code display.
4. Press the Up or Down cursor key to select a character.
5. Press the Shift key to store the characters (you can store up to 30 characters).
6. Press the Up and Down buttons simultaneously to enter the greeting into memory.
7. Power Off then On to see the greeting scroll across the meters.

To restore the DA-38's original "TASCAM" greeting:

Follow the previous instructions and enter the word "TASCAM," or initialize the unit like this:

1. Press Shift. The light above the key will flash green.
2. Push the Menu button repeatedly until the screen reads "init."
3. Press Up. The screen will read "rEAdY."
4. Press Up again. The screen will read "donE."
5. Press Shift.

To change the greeting message on a Tascam DA-88:

1. Power On while holding Ffwd, Stop, and Play.
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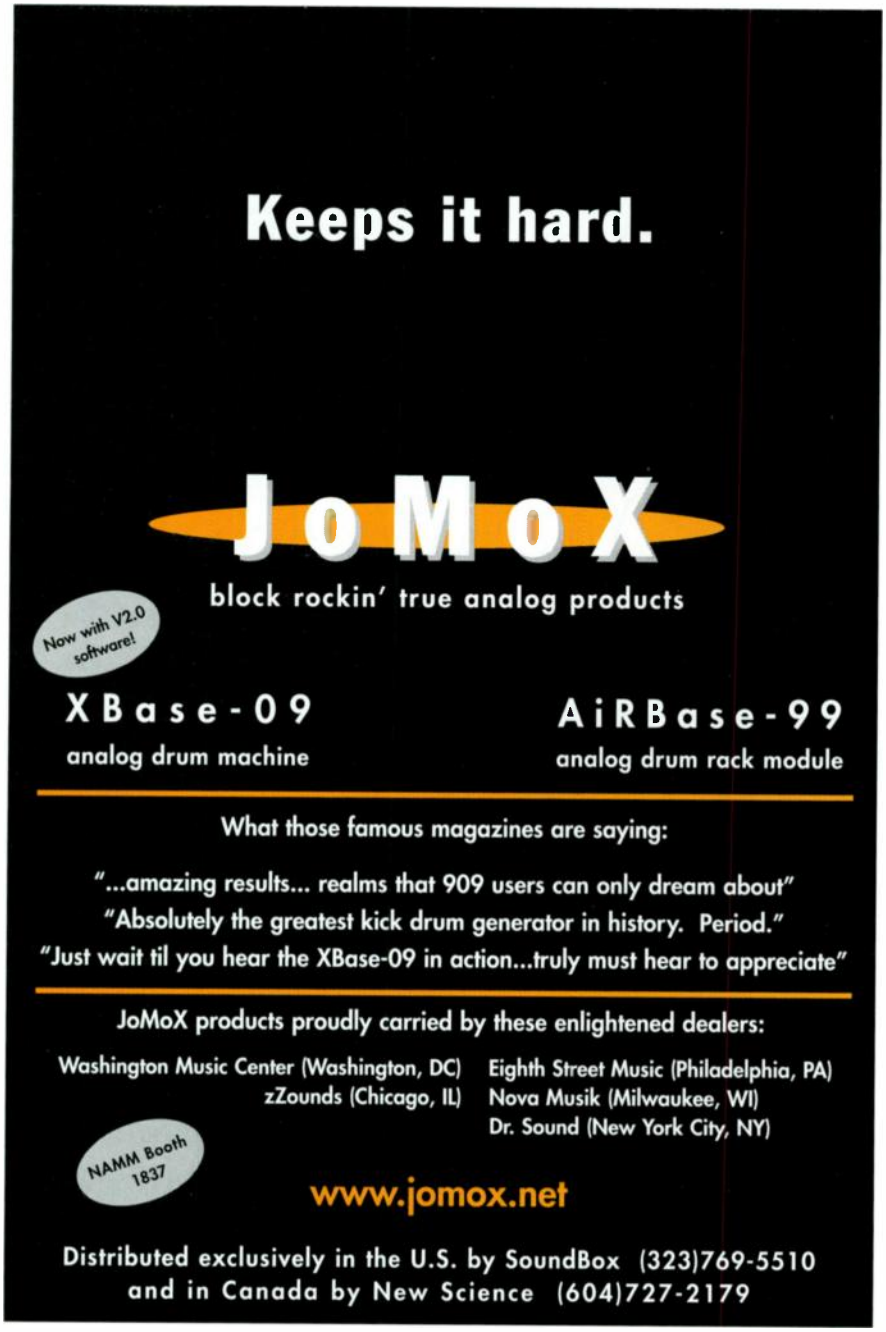
3. Press and hold the Up cursor,



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resides predominantly in the left or right channels is preserved. This is the approach used by Replay Technologies' *KaraokeMaker* (Win), for example.

Because the vocal track is traditionally centered in the mix, stereo cancellation is often (but not always) effective in removing the vocal part (although a shadow of the vocal part may remain). The accompaniment instruments, if they are panned left or right, are retained to varying extents. Keep in mind that if the bass or any other part happens to be centered, this method may eliminate it as well. The quality of the results, therefore, depends a great deal on how the piece was mixed.

The other approach to eliminating sounds, frequency filtering, relies on filters of various kinds. Programs such as Replay's *DeComposer* (Win) remove specific frequency bands to focus on an instrument's range. If the vocal part you want to remove is accompanied only by a bass, a flute, or high strings, this approach might work for you. Most of the time, however, the vocalist is surrounded by instruments that are clustered in the midrange frequencies. That makes it pretty hard to distinguish the voice from the instrumental parts.

Of course, these programs are all designed to accomplish the inverse of what you want. To effectively preserve only the vocal part, you would need a sophisticated algorithm that could identify and isolate vocal timbres even when they're mixed with other sounds. As far as I know, such a program has not yet been developed.—*David Rubin*

Studio Setup Scenarios

Q: I have decided to start a small home studio of my own. Unfortunately, I don't have the faintest clue as to how to proceed. I want to get a computer, but I don't know whether I need to get a Macintosh or not. I want to get a keyboard controller, but I don't know what's out there, and I obviously want software, but I'm without a clue. Your magazine is very informative but still a little ahead of me. Do you have any suggestions or any articles in the archives that would help me with such questions?

Thank you,
Nechesa Morgan
via e-mail

A: It's a little difficult to answer your questions without knowing more about what you want to do with your studio and what kind of music you play, but I'll give it a try. First, although Macintoshes are great computers for doing music production, there's no reason why you *must* use one. Plenty of good music software and hardware is available for Windows PCs (at the semipro level, there's actually a lot more for PCs than for Macs), and there are many good music programs that have versions for both platforms (for example, Steinberg *Cubase* and Emagic *Logic Audio*). You'll also need to take other factors into account when you're making your decision about a platform. What other software might you need? Do you use a Mac or a PC at your office? Is your budget very tight? (Although the price difference between Macs and PCs isn't as big as it was, Macs are still a bit more expensive.) Answering these types of questions will help you decide whether to go the Mac or PC route.

TECHNICAL SUPPORT
Got a question for "Operation Help"? You can e-mail us at emeditorial@intertec.com. Published letters may be edited for space and clarity.

As for a keyboard controller, a lot depends on your budget. Many reasonably priced synths offer a variety of sounds and multitimbral operation (the ability to receive on multiple MIDI channels at once), and have the necessary controller features. One important factor is whether you need to have weighted-action keys (like a real piano) or you can get by with the spongier action of a typical synth keyboard. Weighted-action controllers—which tend to be aimed more at performance than sequencing applications—are typically more expensive and are less likely to have multitimbral sound generators.

For further information, check out "Build a Personal Studio on Any Budget" in the July 1998 issue of **EM**. (You can find it online in the **EM** archives at www.emusician.com.) The article gives some sample studio setups at different price points, and could help you get started.—*Mike Levine*

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MACKIE DESIGNS

DIGITAL 8-BUS (D8B) V. 2

A professional digital mixing solution.

By Jeff Casey

The Mackie Designs Digital 8-Bus (D8B) was probably the most anticipated release in the digital mixer market since the Yamaha 02R. Not only is Mackie a giant in the affordable mixer industry, but the sheer hype that preceded the D8B's release had many people waiting with bated breath. The question is, now that the D8B has been out for a while (Mackie just released version 3.0 of the operating system) and people have had a chance to check it out, does the D8B measure up to the hype?

First of all, lest there be any confusion, the D8B is a *large* mixer. This is not a console for, say, a single-ADAT studio—this board costs just under $10,000. It offers 48 mixdown channels (split as 24 channel inputs and 24 tape returns), 8 buses, 16 internal effects returns, 12 aux sends, dynamic and scene automation, a full-size meter bridge, 4-band parametric EQ and dynamics processing on every channel and tape return, up to 16 internal multi-effects processors, transport controls, and a wealth of digital connectivity options.

But that's not all that comes in this box—the rack-mount unit is actually a CPU, which is the brains of the board. Inside are essentially the inner workings

With 48 channels, dynamic and scene automation; dynamics processing on every channel; built-in multi-effects; mouse, keyboard, and monitor ports; and a host of expandability options, the Digital 8-Bus is a full-featured professional mixing system.

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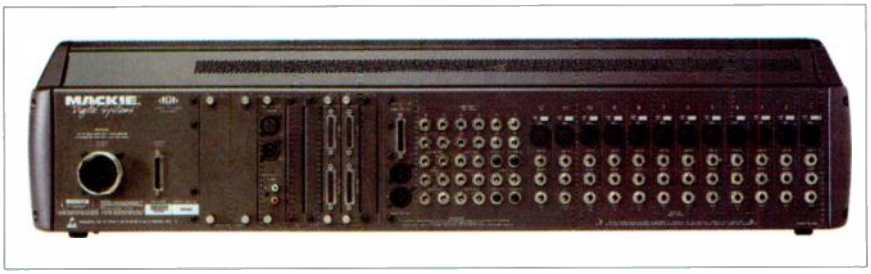

FIG. 1: Mic and line level connections are made via the D8B's rear panel. That's also the location of the card cage, where you can install optional I/O, effect, and sync cards.

of a PC, including a 166 MHz Pentium processor, internal hard drive, and 3.5-inch floppy disk drive. There are ports on the rear for connecting a PC-compatible monitor, mouse, and keyboard, so working with the console's rather small built-in display (6.5- × 1-inch, 40- × 2-character) becomes a nonissue. This arrangement provides much of the functionality that you'd expect from a DAW. It's important to note that all of the mixer's parameters are accessible right from the surface of the unit; however, I'd seriously recommend spending a few hundred dollars on the aforementioned peripherals. A separate, rack-mountable unit houses the power supply.

IN AND OUT

Analog I/O is abundant on the D8B. Channels 1 through 12 offer both XLR mic-level inputs and ¼-inch TRS line-level inputs. Each of these channels has individual mic/line switches on the front of the console. Phantom power is available, again on individual switches for channels 1 through 12, though the switches are on the rear of the mixer, a location that I found a bit cumbersome (see **Fig. 1**). Channels 13 through 24 are accessed via ¼-inch TRS jacks. All of the input channels (channels 1 through 24) have trim pots for adjusting the input gain, as well as a prefader LED meter.

In addition to a pair of XLR master output jacks, the D8B has several ¼-inch outputs, including a set of master outputs, a set of studio outputs, and two sets of control-room outputs (main and near field). The unit provides three 2-track inputs (also on ¼-inch jacks), as well as a ¼-inch input for connecting a talkback mic. You get two headphone jacks and a ¼-inch jack for connecting a punch in/out pedal. The 12 ¼-inch aux-send jacks are located here as well.

The eight balanced line-level bus outputs are analog, and they appear on a 25-pin D-sub connector on the rear panel (this port can also be used to output surround-sound mixes). Also included is a 2-channel digital I/O card, which provides AES/EBU and S/PDIF connections. The tape returns (channels 25 through 48) are accessed by installing I/O cards in the three dedicated expansion card slots. Cards are available in a number of formats, including ADAT (Lightpipe), TDIF, AES/EBU, and analog.

Besides these expansion options, the D8B has an additional slot, referred to as Alt I/O, that allows you to add another 8 inputs and outputs to the mixer's capacity via an additional analog or digital expansion card. There are also slots for four multi-effects cards (including one already occupied by the MFX card that comes with the mixer) and one slot for a sync card that handles ESAM II machine control, word clock, and SMPTE.

DIGITAL DAZE

The D8B's setup is similar to that of a split-style analog board, and once you get the hang of working with this console, you'll realize that it's quite user friendly. The D8B has 24 channel strips and a master section. Each channel strip contains a 100 mm fader; mute, solo, and channel-select buttons; automation edit buttons (Assign and Write); a Record Enable button; and an assignable soft knob, which controls a number of different parameters (pan pot, aux-send levels, and so on).

Like most digital boards, the D8B employs fader layers. This concept allows the console to handle a large number of input channels, tape returns, buses, and so forth, without being 25 feet long. On the D8B are four fader layers: Fader Bank 1 controls the 24 channel inputs; Bank 2 handles the 24 tape returns; Bank 3 controls the 16 internal effects returns and the 8 Alt returns; and Bank 4 services the 8 bus masters, 8 MIDI controllers, and 8 virtual subgroups. The fader layers are switched using corresponding buttons located in the Master section.

In addition to the fader-layer selection buttons, the Master section also contains the master fader, as well as assignment buttons for the soft knobs.

Digital 8-Bus Console Specifications

Mixer Configuration	48 × 8 × 2
Analog Aux Sends/Returns	12/16
Faders	(24) 100 mm motorized
Dynamics Processors	compressor and gate on every channel and tape return
A/D/A Converters	24-bit; 128× oversampling
Signal-to-Noise Ratio	115 dB
Frequency Response	20 Hz to 20 kHz ±0.5 dB
Total Harmonic Distortion	0.005% @ 1 kHz; +14 dBu output level (20 Hz to 20 kHz filter)
Crosstalk (0 dBu @ 1 kHz)	–90 dBu
Effects	(1) built-in effects board containing (2) 32-bit processors; slots for three more boards
DSP	32-bit (>190 dB dynamic range)
"Fat Channel" Display	vacuum fluorescent
Level Meters	(26) LED ladders; (24) LEDs per channel from –50 to 0 dBFS
Dimensions	37.6"(W) × 8.7" (H) × 27.1" (D)
Weight	73 lbs.

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WRH

Remote CPU Specifications

Processor	166 MHz Pentium
Storage	via floppy drive, internal hard drive, or 10BaseT ethernet network
MIDI I/O	In, Out
Dimensions	19" (W) × 5.25" (H) × 20" (D)
Weight	50 lbs.

Here is where you can assign a number of different parameters to the channel soft knobs, including pan, solo level, digital trim, level to tape, and the aux-send or effects-send levels.

At the top right of the console is what Mackie calls the Fat Channel. This section is where you access all of the D8B's EQ, dynamics, and multi-effects functions. You can also use the Fat Channel controls to edit things like file storage information, sync settings, and basic system data. Located below the Fat Channel is the monitoring section. Monitoring is comprehensive: you can pull signal from virtually any source within the board and send it to any number of destinations. For soloing, you can select both PFL and AFL, as well as a mode called Mixdown Solo, which acts as a destructive solo, muting all other channels to the main outputs. Of particular interest is the fact that you can copy the monitor mix to the selected aux-send controls. This lets you set up a basic cue mix without expending much effort.

COMPUTER SAVVY

So, if the D8B's functions are so easily accessible from the mixer, why would you need to use a monitor, keyboard, and mouse? Well, you don't, but they will make you feel at home if you've grown accustomed to working with DAWs or other recording software. You could literally put the D8B and your multitracks in another room and run the session right from your keyboard/monitor setup.

The main work area onscreen is the Channel Overview (see **Fig. 2**). It is laid out much like the D8B would be if it were an analog board. At the top of each channel strip is an assignment section, which allows you to route signal to any or all of the eight buses, to the L-R bus, or directly to the corresponding multitrack channel. Below that are four buttons for engaging a phase-reverse feature, and for calling up the compressor, gate, and EQ for that channel. A small graph below the EQ button displays the channel's current EQ curve. Next is the aux assignment section, which displays a horizontal meter next to each aux send, showing you the level of that bus. Below that are the automation-enable buttons; pan pot; select, solo, and mute buttons; and fader.

Clicking on the EQ buttons or gate and compressor buttons opens a display for the respective processor for that channel. At the bottom of the page are seven menu buttons for opening the Setup, Snapshot, Locator, Surround Sound, Event List, Mix Editor, and Fat Channel windows.

HAVE YOU BEEN CONVERTED?

My production assistant and I put this console through the wringer. I used a pair of Genelec 1031A speakers to evaluate the D8B, and I also referenced on my Yamaha NS10m set. First, we checked out the converters. (Granted, with all the digital connectivity in today's world, the only place converters *really* matter is on the channel inputs, and with digital mic preamps hitting the streets, it's only a matter of time before the all-digital console is here.)

The first test involved miking an acoustic guitar with an Audio-Technica AT4033. I first checked out the D8B's onboard preamps by plugging the mic directly into the XLR jack on channel 1. The input converters really surprised me—in a positive way. The preamps were transparent, which works well for recording instruments like acoustic guitar, for which you usually want a crisp, clear sound.

I then patched the mic through a Neve 9098, with all processing, save for the preamp, disengaged. The transfer of signal into the D8B was also transparent through the line input, and the 9098 delivered the exact sound I was anticipating: a round tone with a lot of presence. From what I could gather, all the output converters performed well, too.

To test the onboard EQ, dynamics, and multi-effects, we ran an 8-track project off of my computer, with signal

FIG. 2: Using the D8B's remote CPU, you can install a monitor, keyboard, and mouse, and control your mixes onscreen. This screen is from the recently released OS version 3, which adds inserts and cross-patching.

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PROS: Extremely powerful and expandable. Warm, flexible EQ. Impressive dynamics processing, especially the limiters. Computer control gives it DAW-like feel. Excellent sound quality.

CONS: Small built-in display. Phantom power switches inconveniently located on back panel. Expensive.

transferred using an ADAT Lightpipe cable. The song consisted of a stereo pair of drum tracks (premixed), a bass guitar track, two acoustic guitar tracks, an electric lead guitar track, a vocal track, and a percussion track.

FOUR IS ENOUGH

The D8B features is 32-bit floating-point internal processing. It's worth noting that one of the men behind the D8B's design used to work at Trident in the '70s and '80s, where he designed a number of its high-end boards.

As mentioned earlier, every channel and tape return has a 4-band, fully parametric EQ. This is something usually found only on DAWs. Having four channels of band attenuation, each with adjustable Q control, lets you really tweak the tracks. A nice touch is an A/B feature, which lets you compare different settings.

I brought up the two acoustic guitar tracks and panned them hard left and right. First, I attenuated the low end by rolling off all frequencies below 100 Hz. I also boosted a little around 1.5 kHz to add some body to the tracks. The midrange EQ was warm, and even when I had the gain around +9 dB it still sounded natural. The EQ really shone in bringing out the upper frequencies, especially above 7 kHz. Although the tracks had been recorded with a rather bright mic, a Shure SM-81, I was able to coax even more definition out of the them with the D8B's EQ.

A stereo pair of drum tracks is one of the most difficult selections to equalize, but the D8B was more than equal to the task. Without much fuss I was able to get a decent sound for the drums, and I found the EQ to be just as flexible as the one on my DAW. The only caveat I'll issue is to be cautious when boosting lower frequencies: a small twist of the knob yields strong results.

HOME ON THE DYNAMIC RANGE

Next, we put the D8B's dynamics processing capabilities to the test. Like the equalization, compression and gating are available on every input channel and tape return. We tried the compressors on each track, starting with the bass guitar. I toggled between compression and limiting, and got satisfactory results with both. I was really impressed, however, with the limiting. The limiting action was superb: the onboard limiter in conjunction with an outboard tube compressor yielded some of the best results I've heard from a digital console. The compressors also worked quite well on both the vocal and drum tracks.

The gates were extremely easy to work with. Our percussion track consisted of a shaker during the verses and a pair of claves during the chorus. I engaged the gate to check out the action during the clave part. I found it was easy to dial in an appropriate threshold, and within a few seconds I had the parameters set. The presets are decent, and they provide good starting points for dialing in settings.

Although the dynamics processors performed admirably on a mix, I also wanted to test the compressors on a live signal being recorded to hard disk. For this, I again pulled out the AT4033, and recorded my assistant (who's also a singer) doing a heartfelt rendition of Janis Joplin's "Mercedes Benz." For a song as dynamic as that, the D8B's compressors held up nicely. I usually employ an outboard tube unit for this task, and although I don't think I'd change my practice in session with the D8B, the compressors effectively tamed the erratic vocal. Listening back to the track, I determined that a little extra compression during the mixdown (about a 2:1 ratio) would blend the track nicely with the other instruments.

AFFECTED BY THE EFFECTS

A stock D8B also ships with a single MFX Mackie-built effects card that houses two multi-effects engines. With it you get reverbs, as well as a variety of chorus and delay-type effects. The delays each have a 3-band EQ—a very cool touch.

As part of its system 3.0 release, Mackie Designs has introduced the UFX card, which gives you an additional 4 channels of DSP (up to four of these cards can be installed, for a total of 16 channels of DSP) and the ability to mount third-party effects plug-ins. A number of these plug-ins are already available from companies such as Drawmer, Massenburg, Antares, and TC Electronic, and more are planned. Of course, you can always patch in your own outboard

Optional Expansion Cards

AIO-8	8-channel analog	$395
DIO-8 (16-bit)	8-channel ADAT and TDIF (allows dubbing between formats)	$395
DIO-8 (24-bit)	8-channel ADAT and TDIF (allows dubbing between formats)	$450
Opt-8 (24-bit)	8-channel ADAT	price tba
PDI-8 (24-bit)	8-channel AES/EBU	$395
MFX	2-channel digital effects; (1) included with D8B	$495
UFX	4-channel digital effects with plug-in support	$495
Clock I/O	Word clock, SMPTE, and ESAM II sync card	$395

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Analog Inputs (channels 1–12)	(12) balanced XLR; (12) balanced ¼" TRS (accepts unbalanced signals)
Analog Inputs (channels 13–24)	(12) balanced ¼" TRS (accepts unbalanced signals)
Channel Inserts (channels 1–12)	(12) ¼" TRS channel inserts
Analog Outputs (channels 13–24)	(12) ¼" balanced line-level direct
Analog Bus Outputs (surround out)	(8) via (1) 25-pin D-Sub connector
Analog Master Outputs	(2) balanced XLR; (8) balanced ¼" TRS in 4 stereo pairs; (2) ¼" TRS stereo headphones
Analog Aux Outputs	(8) mono balanced TRS; (2) stereo pair balanced TRS
Digital Master Inputs	(1) XLR AES/EBU; (1) RCA S/PDIF
Digital Master Outputs	(1) XLR AES/EBU; (1) RCA S/PDIF
I/O via Optional Cards	analog and digital I/O for channels 24–48; additional 8-channel analog or digital I/O via Alt I/O slot; sync (word clock, SMPTE, and ESAM II)

processors via the D8B's 12 external aux sends.

MOVING PICTURES

The D8B offers scene and dynamic automation with moving faders. It gives you two automation modes: Auto-Touch mode automatically write-enables any parameter when you move its corresponding hardware controller, and Trim Level mode allows levels to be tweaked rather than rewritten.

Automating the mixes was a breeze. I was expecting to be up against an automation system as complex as an SSL's, but the D8B is simple and intuitive—I didn't even have to open the manual to figure it out. I typically found myself doing a pass or two manually, and then tweaking the mix using the Mix Editor screen. Once again, working with the monitor reminded me of working with a software sequencer, and editing the automation visually made it easy to tweak my original console moves.

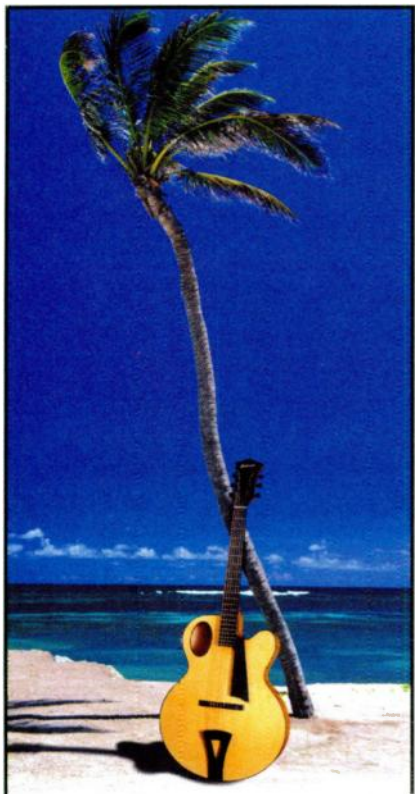
The console sports a complete transport section, which features traditional controls such as Play, Stop, Rewind, and so on, as well as a transport position indicator and a second numeric display. You can configure the time display for SMPTE or MTC, and the secondary display shows either snapshot memories or locator points, depending on the selected mode. You can sync the D8B to any MMC-equipped recorder or Sony 9-pin compatible device via the optional sync I/O card. Finally, an included numeric keypad accommodates data entry and locate functions, and a jog/shuttle wheel allows for scrolling the transport.

JUDGMENT

So did I like the D8B? Of course I did. Could I afford one? My wife would have to be the judge of that! Seriously, this is a console for professional studios. The weekend enthusiast probably doesn't need a board of this magnitude.

If you've got the need for one, though, the D8B is probably the most powerful and versatile digital console of its class. It's perfectly designed to accommodate a 24-track digital setup, and the ample I/O options and routing capabilities make it compatible with just about any arrangement. The effects are abundant, and the concept of third-party processing opens the door to a world of options. And the board *sounds* good. The compressors are powerful but smooth, the EQs are warm, and the entire signal path is noise free. If you have the means, take the D8B for a test-drive—I think you'll agree it's the Ferrari of affordable digital mixers.

Jeff Casey *would like to thank Steve Oppenheimer for the opportunity to spend two years at one of the finest music publications on the market.*



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SONIC FOUNDRY

VEGAS PRO 1.0A (WIN)

Multitrack media-editing software for the masses.

By Roger Maycock

Highly regarded for its *Sound Forge* and *Acid* digital audio applications, Sonic Foundry has released *Vegas Pro*, a "multitrack media-editing system" for Windows. *Vegas Pro* represents the company's foray into the realm of nonlinear multitrack recording/editing and media management. Targeted for professional musicians and broadcast and audio engineers as well as for multimedia and Internet-content developers, *Vegas Pro* combines a highly configurable work space with the ability to integrate into numerous production environments.

Vegas Pro supports 24-bit/96 kHz digital audio, and the number of tracks you can play back is limited only by your CPU and RAM. It can perform nondestructive edits during playback and run multiple plug-in effects, all in real time. It addition, it has the ability to import many file formats, including WAV, AIFF, MP3, AVI, and QuickTime. Similarly, it will export to WMA, MP3, WAV, and AIFF, and it also supports file authoring for Internet streaming applications, such as RealNetworks *G2* and Windows Media Technologies. As part of this capability, *Vegas Pro* has facilities for adding timeline metadata, such as URL flips (an embedded link to a URL) and captions.

Not only can *Vegas Pro* process multitrack audio, but it also allows you to replace dialog in multimedia files. The ability to open an AVI or QuickTime movie, replace the dialog, and add music and sound effects means you can produce very high-quality media files with surprisingly little effort. Moreover, *Vegas Pro* will work with virtually any Windows sound card, including those with multiple inputs and outputs.

Vegas Pro
Minimum System Requirements
Pentium 200; 32 MB RAM; Windows 95/98/NT

INSTALLATION ISSUES

Vegas Pro's minimum system requirements include a 200 MHz processor with 32 MB of RAM. The recommended configuration is a 400 MHz processor, 128 MB of RAM, and a 24-bit color display. My test system was a 266 MHz Pentium II, 128 MB of RAM, a 24-bit display, a Seagate Cheetah SCSI hard drive, and the Frontier Design WaveCenter digital audio card.

The application supports multiple processors (if available) when running under Windows NT, and employs asynchronous I/O whenever possible. Asynchronous I/O prevents the processor from stalling while reading from disk and can translate into significant performance gains over normal synchronous I/O.

The installation routine uses a combination of serial and activation numbers to ensure authorization. Entering my serial number authorized me to use the program for seven days, and then I was required to register online or via telephone to obtain a final authorization code so I could run the program beyond the initial period. I opted to register online and receive my code by e-mail. For whatever reason, I never received the e-mail with my authorization code, but a call to tech support immediately rectified the situation.

During my conversation with the technician, I was encouraged to visit the company's Web site and download the version 1.0a upgrade patch, as this would correct some minor bugs that had been discovered. Always wanting to have the latest and greatest, I downloaded and installed the patch and, upon launching the program, was *again* required to provide my authorization code. After entering the code a second time, I was up and running for good.

Some customers have experienced installation difficulties relating to the authorization code. A repair utility is now available for download from *Vegas Pro*'s Web site that should remedy this.

AN INVITING INTERFACE

Upon launching *Vegas Pro*, you are greeted with a graphic interface that is remarkably open and uncomplicated. The lower left portion of the screen provides an Explorer view for accessing and auditioning files without leaving the work area (see **Fig. 1**). Double-clicking on a file places it in the first available track slot in the upper area of the screen. To the right is the Mixer view, where you can see and control the various output and effects buses. (*Vegas Pro* supports 26 output buses and 26 aux sends.) The mixer's leftmost linear fader is a dedicated control for the program's Preview function, which

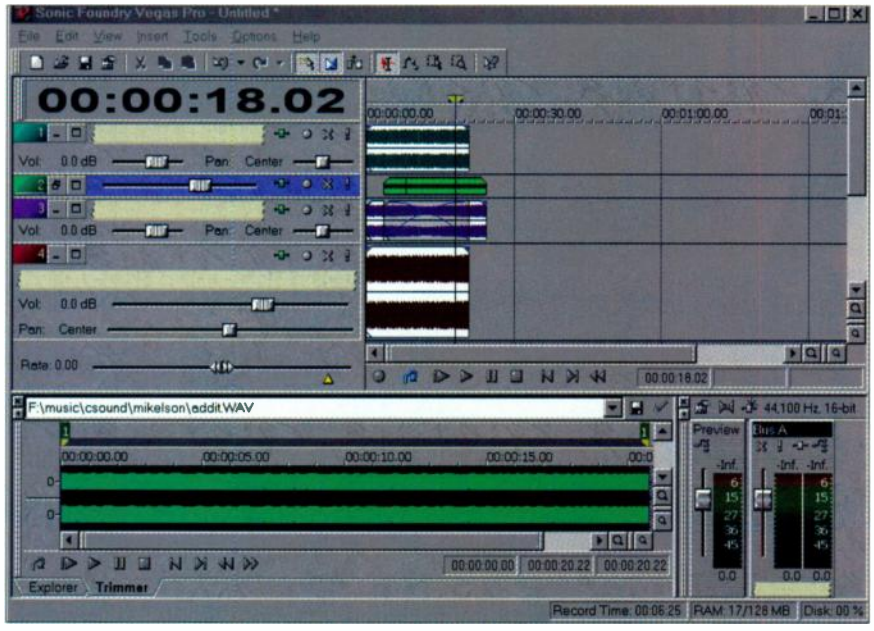

FIG. 1: *Vegas Pro*'s Explorer window (lower left) facilitates file previewing and loading from within the program.

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lets you adjust the level of individual audio files that you are auditioning while in the Explorer window. This is a very nice touch.

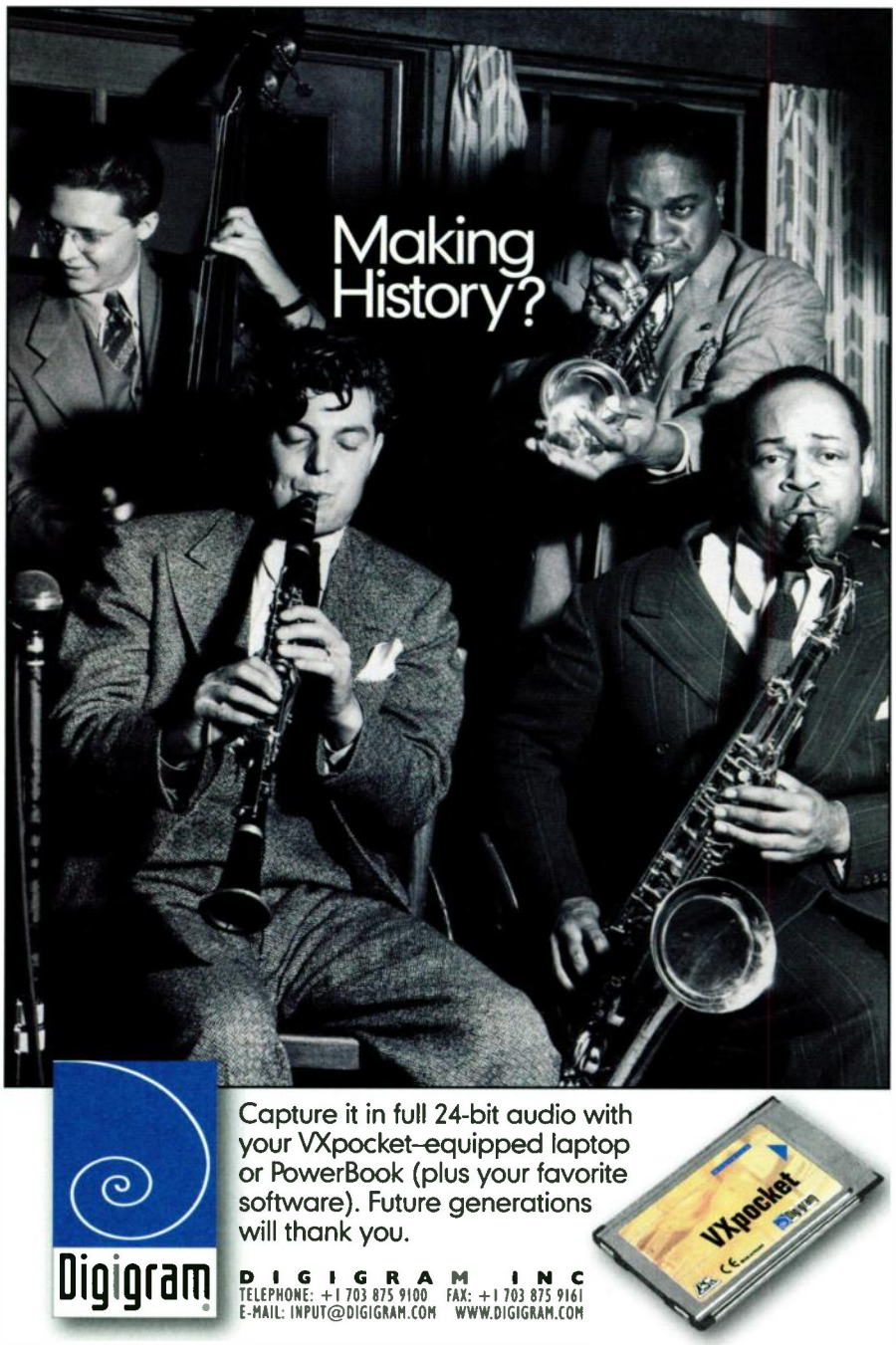
The lower left area can be toggled to display the Trimmer window. This is a separate work area where you view and manipulate Events, the term *Vegas Pro* uses to designate an audio segment. Dedicated transport keys control playback, and a hotkey launches your audio-editor software (the default is *Sound Forge,* if you've installed it). You can place data directly into the Trimmer from the Explorer or by right-clicking on an Event in a track and choosing the Show In Trimmer option. The value of this approach is that you are free to work on a track (or any segment thereof) without having to remember which tracks are muted or soloed. With its hot link to your audio editor, this work area functions as though you had a dedicated editor operating as a plug-in.

The upper area of the screen displays the Track List (upper left) and the Track View area (upper right). Each track sports a series of icons for toggling Mute, Solo, Arm, and other features. There's also a horizontal fader for track volume and a multipurpose fader for pan control, assignable effects, and aux-send levels. A ruler (timeline) with adjustable time increments (measures, measures and beats, frames, and so on) appears above the Track View. Both areas can be collapsed or expanded, providing a tremendous amount of flexibility in configuring the interface. The entire lower area of the workspace also can be resized to your liking (see **Fig. 2**).

The main transport controls are located just beneath the Track View. The transport bar has controls for Record, Loop, Playback from the beginning of a project, Playback from cursor position, Pause, Stop, Move cursor to project start, Move cursor to project end, Move cursor left at grid increments, and Move cursor right at grid increments.

To the left of the main transport area is the Scrub control. The normal playback rate is 1.0, but *Vegas Pro* can scrub audio forward or backward at a constantly variable rate from –2.0 (reverse) through 2.0 (forward). Scrubbing is accomplished by grabbing the Scrub control with the mouse and dragging right or left. It works very smoothly and produces excellent results.

One of the more useful interface



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CONS: No on-the-fly punching. No MMC transport and track arming. Does not respond to MIDI continuous controller messages.

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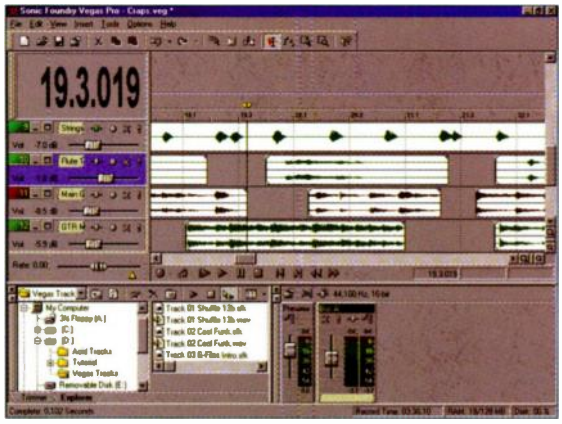

FIG. 2: Among the program's many customization options is the ability to resize and collapse the various work areas.

features is called Window Docking. Window Docking allows you to keep frequently used windows—for example, a video preview or the Trimmer—available yet out of the way while you are working. This is an efficient way to manage your work space. The Docking Area, which is the lower segment of the screen, can display up to three windows at a time.

In addition to its myriad onscreen buttons and switches, *Vegas Pro* provides a comprehensive list of equivalent keyboard commands. Though the point-and-click approach to operation is quite comfortable during the initial learning phase, I was pleased that I could control many aspects of the program from the keyboard. Among the keyboard commands are basic transport functions; Cut, Copy, and Paste commands; toggling the Explorer and Trimmer windows; resizing track height; and zooming in and out of Event views.

IN SESSION

Vegas Pro can record multiple mono or stereo tracks while simultaneously playing back existing tracks, up to the performance capability of your computer and audio hardware. The factor that has the most direct effect on the simultaneous-record capability is your audio card. My Frontier Design WaveCenter supports ten simultaneous signals: eight via ADAT Lightpipe and another two via coaxial S/PDIF. Though I did not attempt a full 10-track transfer, I had no problem transferring data to and from a Tascam DA-88 through a TDIF-to-Lightpipe converter. For the multitude of ADAT or DA-88 owners, *Vegas Pro* makes a compelling editing station and enables you to extend the functionality of those tape-based systems.

But the real crux of the matter is in using *Vegas Pro* as a stand-alone recording/editing system. In this context it's important to understand the difference between a track and an Event. A track is nothing more than a container for any number of Events. In **Fig. 2**, the string music in the first track is continuous, while subsequent tracks consist of numerous smaller "chunks," or Events. A track, therefore, can hold many Events, which can even be of different file formats or sample rates. The fact that *Vegas Pro* can mix and resample multiple file formats and sample rates in real time is nothing short of astounding.

Recording in *Vegas Pro* is nondestructive. Unlike tape-based systems, where every new punch wipes out the previously recorded material, *Vegas Pro* supports multiple takes or record passes that can easily be recalled, auditioned, and assigned to a track at a later time. To begin recording into an empty track, enable the Arm for Record button on the appropriate track, and a level meter appears monitoring the strength of your signal. Click the Record button in the main transport area (or press Ctrl-R), and the recording begins.

You can rerecord onto the same track (to create multiple Events), or even into the same Event if you like. When you rerecord into an Event, the display shows only the most recent (or "active") take, but if you right-click the mouse, you'll see a list of all the takes in the Event (see **Fig. 3**). Forgot which take was which before you had a chance to name them? Just open the Take Chooser and you can audition all the takes in the Event.

PUNCH AND LOOP

Punching in is fast and easy to execute. Select the Event you wish to punch into, then select the preroll and postroll time range around it by dragging the edges of the Selection bar. (If you want to punch into the middle of an Event, simply split it into two or more new Events.) Arm the track and click the Record button, and playback will begin from the preroll point. Recording begins and ends at the edges of the highlighted Event, and the program automatically stops at the end of the postroll (see **Fig. 4**).

Though the combination of owner's manual and online documentation is, for the most part, adequate, the subject of punch-ins is not clearly defined. For starters, I see little reason to reinvent the nomenclature; "punch-in" is a good term. Unfortunately, you won't find this term in the manual, and though the online index finds "punch-in," it merely gives you a definition. If you enter the term under the online help Search function, it will then call a link to "recording into an Event with a time selection." Once you get there, however, deciphering the process is far from clear.

Disappointingly, *Vegas Pro* has no provisions for "punch on the fly" recording—you must always tell the program in advance that you wish to record. Though this isn't likely to be an issue for everyone, it does nonetheless take some time to configure an automated punch. It would be more convenient to simply arm a track and then manually punch in and out of Record mode as needed.

You can capture multiple takes quickly and easily using the Loop record feature. After highlighting the region within an Event (or along the timeline if no Event exists) and arming the track, pressing L engages the Loop function. Upon activating Record in the main transport area, the program will loop in Record mode. For each iteration of the loop, a new, nondestructive

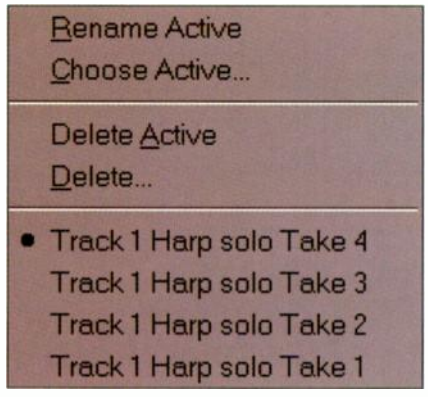

FIG. 3: *Vegas Pro* allows you to record multiple takes into a single event. The Take Chooser window helps you keep track of which take is which.

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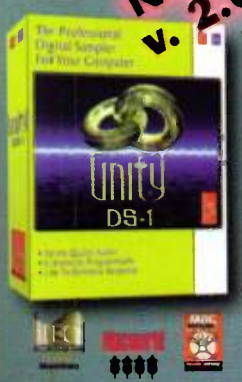

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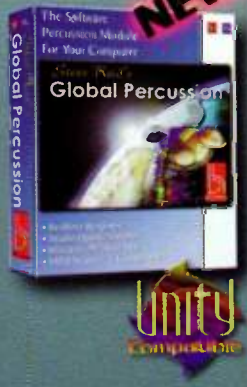

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FIG. 4: To punch in, just highlight an event and then drag the Selection bar to the preroll and postroll points.

take is created in the Event that you record into.

MANIPULATING THE MATERIAL

Vegas Pro has all the basic editing provisions you would expect, including Cut, Copy, Paste, and Delete. There's also unlimited Undo and Redo. The Undo and Redo commands have an associated event list in which you can select all or any number of recent actions. This feature makes it very easy to recall a series of actions, should you change your mind about something. The Automatic Crossfade function also works well and is a real time-saver. When enabled, it automatically creates a crossfade wherever there are two overlapped Events, and a graphic display of the crossfade length appears on the screen.

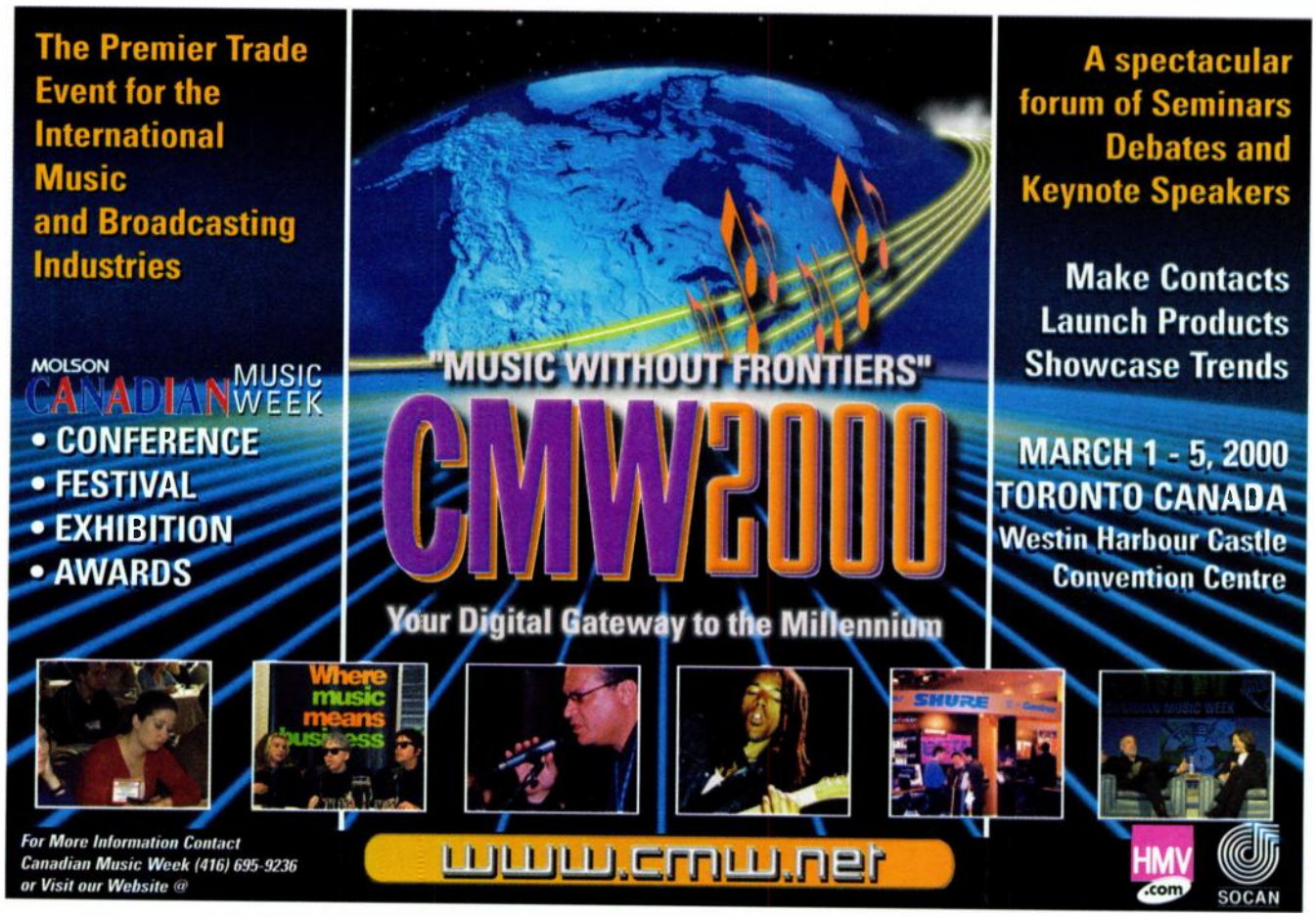
Vegas Pro includes several native effects that you can assign for each track independently. The noise gate, compressor, and 4-band EQ are found under the Track FX icon of each track. The EQ section provides high-shelf, band, and low-shelf options, along with controls for frequency, gain, and rolloff. (A bypass switch is provided.) The EQ sounds very good and is implemented in real time, but due to the buffering process the program uses, it exhibits a tad bit of delay as you adjust the parameters. Similarly, plug-in effects also exhibit a delay.

You access third-party (DirectX) plug-ins by choosing the Assignable FX option from the Insert menu. This opens a Plug-In Chooser window, which shows your available plug-ins, along with any effects chains that you have created. (*Vegas Pro* supports 32 assignable sends.) When you insert an effect, an effects-bus master slider appears in the mixer area in the lower right portion of the screen. (A scribble strip is included for identification.) Adjusting the level for this effect is done with the individual track's drop-down, multipurpose fader. As noted earlier, you can hot-link to an external audio editor if you need additional editing or processing options.

MIXING AND AUTOMATION

Vegas Pro uses breakpoint automation for level and pan control, and you can draw your automation data directly on the waveform display (see **Fig. 5**). (The primary level fader for each track serves as a coarse level control for adjusting the levels at the start of your mix.) The fact that *Vegas Pro* does not use a mixer interface for its automation didn't bother me at all.

Vegas Pro supports grouping tracks, but you can't simply mute or solo a



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group by selecting that group and clicking the Mute or Solo icon. Rather, you need to route the tracks within the group to a dedicated output bus. The entire bus can then be muted or soloed. Though this is easy enough, it seems like an unnecessary extra step.

I was particularly impressed with the program's internal mixing features. You can either mix down to a new track or use Mix to Preview. When you mix to a new track, *Vegas Pro* processes the entire project to a new stereo track that it places in the first available slot at the bottom of the Track List. This sure beats mixing to DAT or some other external media, only to dump the material back into the computer for eventual mastering. With the Mix to Preview function, you have the opportunity to try out various options, such as compression settings you might use for creating streaming media. Both mix options worked flawlessly.

I also liked the ability to "monitor" a project using the Edit Details window (see **Fig. 6**). This useful utility provides a precise means of working with your audio, such as inspecting Events by type, viewing Event start and end times, and viewing the number of takes that exist.

IN CONTROL

Vegas Pro will slave to incoming MIDI Time Code (MTC) and will output both MIDI Clock and MTC. I had no difficulty slaving a Yamaha MD-8 MiniDisc multitrack recorder to *Vegas Pro* and experienced equally successful results in slaving *Vegas Pro* to the MD-8. When slaving, location and lockup were instantaneous.

With *Vegas Pro*, an external mixer no longer has such a vital role in the tracking and mixing process, but one is likely to be used for routing signals into the computer and as a monitoring device. Hence, I was disappointed that the application provides no support for MMC (MIDI Machine Control) transport control. Compact mixers such as Roland's VM-3100Pro and Tascam's TM-D1000 are ideal companions to this type of desktop environment. Because both mixers issue basic transport controls through MMC, it would be nice if *Vegas Pro* would respond. Similarly, the program has no provisions for arming tracks via MMC.

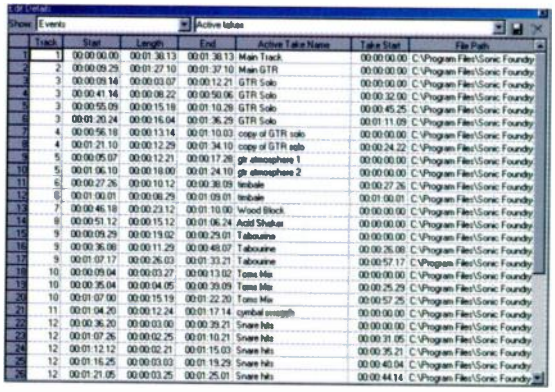

FIG. 6: A text-based representation of numerous aspects of a project is available in the Edit Details window.

As a growing number of compact digital mixers also output MIDI continuous controller messages for external fader control, it would be beneficial if *Vegas Pro* could respond to this information. The ability to control the output buses via MIDI controller messages, for example, is something Sonic Foundry should investigate.

IN A NUTSHELL

Sonic Foundry's description of *Vegas Pro* as a "multitrack media-editing system" is about as accurate as I could possibly imagine. I was extremely impressed with its ability to handle music and dialog-replacement tasks on a video file, and the program's support for dual monitors is a rarity on the PC. The interface makes sense, and I truly appreciate the freedom to configure the work space to your liking by way of its dockable windows.

For multimedia content creators, this program shines. Being able to preview various compression options for streaming media is extremely valuable, as is the internal mixdown capability. For the musician, audio professional, and broadcast engineer, *Vegas Pro* provides a wealth of tools that enable you to record, edit, and mix to just about any destination format imaginable. Everything, is accomplished in real time, minus some slight delays when adjusting EQ and effects, and those delays don't hinder the creative process at all. In addition, the program is remarkably stable; it crashed only once during the month that I worked with it.

It has some limitations, however. I consider the inability to respond to MMC or MIDI continuous controller messages to be among the application's few shortcomings. With the new generation of compact digital mixers that are perfect I/O companions to the desktop multitrack environment, I believe the ability to recognize basic start, stop, and level-adjustment commands would serve the program well.

I'd also like to see "punch on the fly" recording implemented. Though I realize that a random-access system like *Vegas Pro* must allocate disk space in advance, it seems that a command of some sort could instruct the program to handle this common task. The documentation also isn't quite as comprehensive as I would have liked, but it is acceptable, and there's a useful tutorial that can get you off to a quick start (despite some missing instructions that may leave you guessing at times!).

Vegas Pro is an extremely versatile recording system that makes recording fun. Its ability to accommodate multiple file formats and sampling rates simultaneously can be a tremendous time-saver if you're grabbing music tracks and sound effects from multiple sources. For the company's first multitrack recording and editing venture to be so feature rich, intuitive, and remarkably stable is, in a word, terrific. Bravo!

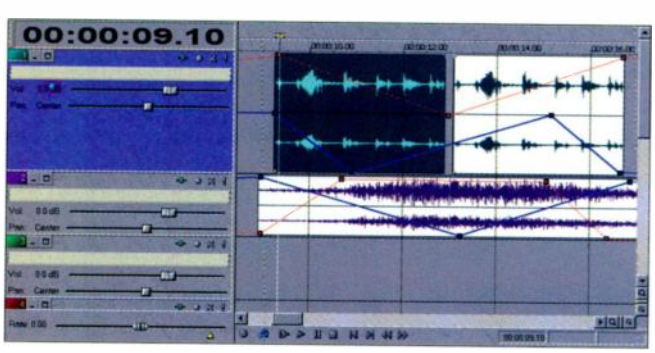

FIG. 5: Volume (blue) and Pan (red) automation data can be drawn directly over the waveform view.

Roger Maycock *is a Los Angeles–based consultant for digital audio and recording applications.*

For manufacturer information, please see Contact Sheet, p. 227.

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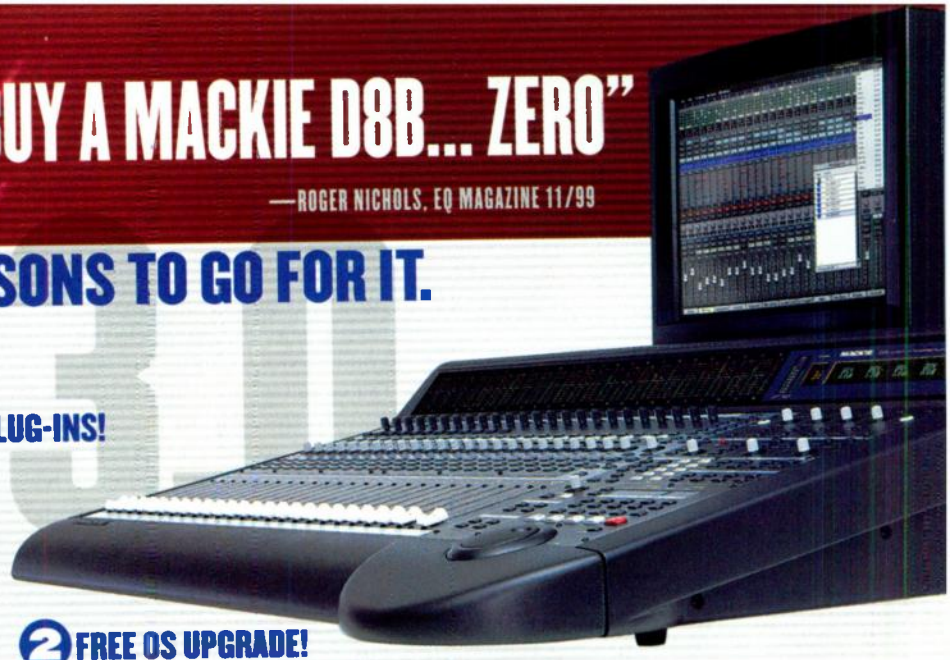

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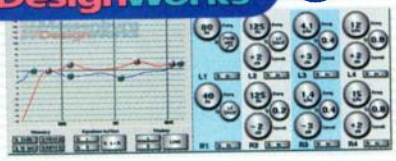

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JOEMEEK

VC6Q

A full-featured voice processor.

By Mike Levine

Getting a good, clean signal to tape (or disk) is perhaps the most critical part of the recording process. Unless you have a very high-quality mixing console, you're often better off bypassing the board and patching the source signal through a good mic preamp and then straight into your multitrack. But the problem with this approach is that a mic preamp alone doesn't provide EQ, dynamics processing, or the ability to insert effects. For that kind of tone-shaping flexibility, you might want to consider a dedicated voice processor.

Although best known for its retro-sounding optical compressors, Joemeek has also been a leader in producing quality, affordable voice processors. In designing the VC6Q, the engineers at Joemeek have made one major change from the design of the VC3 and VC6, their two previous models: they've replaced the enhancer (which was the least successful component of those units, anyway) with a 3-band EQ that's equivalent to one channel of the VC5 Meequalizer. By doing so, they've given the VC6Q more of the usefulness of an actual channel strip and thereby made it into a more versatile and functional unit.

SLEEK PHYSIQUE

Housed in a Joemeek-green, 1U chassis, the single-channel VC6Q sports an enhanced and more substantial look compared with the now discontinued VC6. Gone are the small rubber knobs, replaced with larger plastic ones. Compressor, Input Gain, and Output Gain are the largest of the ten front-panel knobs, and the latter two feature detents to make repeatable settings a breeze.

A series of six small, red switches on the front panel allows you to configure the signal path in a variety of ways. You can switch on the compressor and the equalizer, engage a 20-decibel pad, enable the line input, turn on the phantom power, and reverse the phase of your signal. The switches all have accompanying status LEDs, and another LED indicates peaks at the input stage. Metering is provided by two LED arrays: a nine-segment meter for monitoring input gain, and a four-segment gain-reduction indicator.

One of the more impressive aspects of the VC6Q is its flexible I/O. The back panel offers a balanced XLR mic input and a balanced ¼-inch line input. Also, if you want to use the unit as a direct box for guitar, bass, or other electric instrument, there's an unbalanced ¼-inch input conveniently located on the front panel. When you plug a jack into it, the XLR input is automatically disabled.

Another nice touch is the inclusion of dual ¼-inch balanced TRS outputs (you can use them with unbalanced gear, too), which put out identical signals. The dual outputs allow you to patch one output into your multitrack input and the other to your mixer for monitoring purposes. This is especially useful when recording into a computer-based DAW where signal latency is an issue.

The back panel also sports a ¼-inch TRS insert jack that allows you to patch other effects into the signal chain. The insert point falls after the mic preamp and before the compressor.

Unlike the VC3, the VC6Q uses an internal transformer, which means that it has a standard AC cord instead of a wall wart (hooray!). By simply rotating the fuse holder on the back panel, you can configure the unit to accept 230 VAC European power. (It is British made, after all.)

JOEMEEK
VC6Q voice processor
$599.99

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

PROS: Clean input stage. Smooth, warm-sounding compressor. Above-average EQ. Flexible I/O. Phantom power switchable from front panel.
CONS: Inadequate gain-reduction meter.

YOUR INPUT IS VALUABLE

The first place a signal goes upon entering the VC6Q is the five-stage microphone preamp, or "input stage," which accepts levels ranging from –70 to more than 0 decibels. As mentioned, you can also plug in electric instruments and line-level sources, so the VC6Q can be used for a variety of applications during both tracking and mixing.

To evaluate the sound of the preamp, I did my initial testing with the compressor and equalizer switched off. I recorded my tracks at 16 bits, 48 kHz, into a Mac with a Korg 1212 I/O card, running MOTU *Digital Performer* 2.6. For a microphone, I used an Alesis AM52, which is a large-diaphragm, solid-state condenser.

With this setup I recorded vocals, acoustic guitar, shaker, and bongos, and the VC6Q handled each quite deftly. Its overall sound was clean and present, and it added subtle warmth to the tracks. For perspective, I compared it to a more expensive mic preamp, and while the VC6Q wasn't quite as transparent, it held its own very well. I was also impressed with the amount of headroom on the input stage; I had to push it pretty hard to induce distortion.

The VC6Q combines an input amplifier, photo-optical compressor, and 3-band EQ in one unit.

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FEELING COMPRESSED

The VC6Q's preamp alone has a fine sound, but things really start getting interesting when you kick in the compressor. As with other Joemeek units, the compressor in the VC6Q is the photo-optical variety, and its controls differ somewhat from conventional units. Instead of a threshold control that you lower to bring in more compression, there's a compression depth knob (labeled simply Compressor) that you turn up to add more effect. To the right of that control is a knob labeled Slope (the British term for "ratio"), which offers values from 1.2:1 up to 10:1. (Oddly, the manual says the top ratio is 7:1.) There are also Attack and Release controls, with the latter offering a generous maximum value of five seconds.

When you engage the Compression In/Out button, the LED on the far right of the gain-reduction meter lights up blue. The four steps of the meter are yellow, so theoretically it should be easy to see when gain reduction is occurring. In practice, however, I found the four-segment meter to be too coarse. On plenty of occasions, the compressor was audibly kicking in, but I didn't see it reflected in the meter because there were less than 3 decibels of reduction, which is the minimum level that the meter displays. While this might seem like a minor quibble, I find it helpful to have accurate visual references when dialing in settings.

What's really important, though, is the compressor's sound, and from that standpoint, the VC6Q rocks. The minute you switch it into the circuit, you notice a big difference in the signal. For one thing, it gets louder. More importantly, it gets fatter and has what I can describe only as a warm sheen added to it. This is not a sterile compressor designed to simply tame excess dynamics; rather, it has a distinctive sound.

The VC6Q's rear panel features dual ¼-inch TRS outputs, a balanced ¼-inch line input, and a ¼-inch TRS insert jack.

ALL THINGS BEING EQUALIZED

Like a good mixer channel, the VC6Q allows you to switch the equalizer in and out, making it easy to A/B signals. When activated, the EQ section offers the standard three bands of control: the high and low bands, which provide approximately 15 decibels of boost or cut at fixed bands of 8 kHz and 100 Hz, respectively; and the midrange, which is sweepable from 600 Hz to 3.5 kHz. The Q (bandwidth) is variable and increases as the frequency is set higher.

▼

Things start getting interesting when you kick in the compressor.

I was thrown a bit by the British orientation of the EQ controls, which have the highs on the left and the lows on the right—the reverse of what we're used to here in the United States. Luckily, learning to equalize on the "wrong side of the road" is not nearly as dangerous as learning to drive that way, and I quickly adapted.

The EQ section has what I would call an old-style feel to it, reminiscent of what you might find on a large-format console in a commercial studio. The high band—or Treble, as it's referred to on the VC6Q—is voiced perfectly for dialing in some "zing" on top, and I used it to good effect on acoustic guitars, vocals, and even a sampled snare drum. The Bass control is effective at both cutting excess weight out of a signal and adding a little oomph to a bass guitar or kick drum. Although a bit trickier to set, the Mid controls are also quite musical.

THE VERDICT

From a sonic and design standpoint, the VC6Q is a very impressive product. However, I would be remiss if I didn't report that the first two units I received for testing were both defective—in different ways. The first unit had a faulty instrument input jack, and on the replacement unit, the compressor didn't work. Finally, on the third try, I got a completely functioning unit.

Quality-control issues aside, there's little doubt that the VC6Q is an impressive voice processor for the money, offering flexible I/O and a toolbox full of sonic goodies equally useful during tracking and mixing. Taken on their own, the three major components—the input stage, the compressor, and the equalizer—are all worthy; combined, they make for one heck of a useful processor.

Mike Levine *is an associate editor of* **EM** *and editor of* Onstage, **EM***'s new live-performance quarterly magazine. When he's not buried in his word processor, he also composes music for commercials.*

VC6Q Specifications

Inputs	(1) balanced XLR mic, (1) ¼" balanced line, (1) ¼" instrument
Outputs	(2) ¼" TRS line level
Insert	(1) ¼" TRS
Frequency Response	+0/–0.5 dB, 10–50 Hz
Harmonic Distortion	<0.01% (except where compression affects low-frequency wave shape)
EQ Frequencies	100 Hz (fixed); 600 Hz–3.5 kHz (sweepable); 8 kHz (fixed)
EQ Boost/Cut	±15 dB
Slope (ratio)	1.2:1 to 10:1
Attack	1–11 ms
Release	250 ms–5 sec
Dimensions	19" (W) × 1.75" (H) × 5" (D)
Weight	3 lbs.

For manufacturer information, please see Contact Sheet, p. 227.

We loved *Recording* magazine's SampleTrak review so much, we had to rip it off.

"Effects quality here is exactly what's needed for remix and dance music production. Filters and the ring modulator have a very "analog-ish" sound, and the time-based effects are clean and crisp."

"A lot of attention has been paid both to sonic details and to real-time effects control. Case in point: not only does the scratch effect sound very record-like, but rocking the Edit I wheel makes it behave that way as well."

"The ST-224's internal noise is virtually nonexistent."

"Resample allows you to take material already in the ST-224, route it through the machine's effects and alter it, then save the results to another pad without routing anything out of the box...This feature takes the ST-224 and puts it into a higher league."

DAC Crowell
Recording, September 1999

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BIAS

PEAK 2.04 (MAC)

BIAS dives into the code and overhauls its popular audio editor.

By Alex Artaud

When *Peak* made its debut four years ago, the primary standalone waveform editors for the Macintosh were Digidesign's *Sound Designer II,* Passport Designs' *Alchemy,* and Macromedia's *SoundEdit 16.* In their day, they did a great job of importing, recording, editing, and exporting audio, but their designs had not seen a serious upgrade in several years, and they were beginning to show their age. It's therefore no surprise that BIAS (Berkley Integrated Audio Software) created quite a stir when it introduced a new hard disk–based 2-track editor with high-quality DSP functions and support for Adobe Premiere plug-ins, CD audio importing, and hardware samplers.

In its current incarnation, *Peak* has been completely rewritten to further expand its substantial feature list while retaining the intuitive environment that initially drew people in. What has emerged is a more sophisticated and more versatile program that comfortably embraces the worlds of professional sound designing, CD mastering, and sample editing.

For this review I examined the $499 TDM Edition of *Peak* 2.04, which offers support for TDM plug-ins. If you aren't running a Pro Tools system, you can save quite a bit of money by purchasing the $299 standard version. It's the same as the more expensive version except that it lacks the TDM support.

THE MAIN SCENE

Peak's main Audio Document window displays a mono or stereo waveform where you can view position markers, loop markers, and selected regions (see **Fig. 1**). An Overview display shows the entire waveform, so you can quickly jump to different locations in the file and play back from anywhere in the recording.

Above the Overview display, a new toolbar provides access to a variety of editing functions, DSP commands, and transport operations. You can position the toolbar horizontally or vertically, and you can add or remove any of its myriad buttons to suit your needs. If the buttons get in your way, or if you prefer to use keystroke commands, as I do, you can always hide the toolbar.

Directly beneath the waveform display, a narrow information field displays the current file's sample rate, resolution, file format, and size. The adjoining scrollbar lets you move horizontally through the waveform. The "live" scrollbar is linked to the Overview display; as you drag the scrollbar, a rectangular frame moves across the Overview waveform, letting you see exactly where you are relative to the entire recording. That can be especially helpful when you're working on large files.

Another new feature is a floating cursor palette with four additional options. You get the familiar arrow cursor as a default, as well as a hand cursor to grab and move the waveform, a magnifying glass to zoom in and out, and a pencil tool that lets you draw on the waveform to correct glitches and clicks.

You can select audio regions in the waveform by dragging with the arrow cursor or Command-clicking between two markers. Pressing the Tab key lets you hop between regions and highlights each one in succession. In the current version, you can also highlight either the right or left track of an audio file for independent editing and playback.

Beneath the Audio Document window, a display indicates the current cursor coordinates and provides a progress bar during processing. You can configure the neighboring time display to indicate samples, seconds, bars/beats, or SMPTE time code. To the right of the time display, two thin horizontal VU meters, with clip indicators, extend across half the screen width. The meters let you specify a peak-hold duration (none, 3 seconds, or infinity).

And finally, if you like to play with colors, *Peak* lets you assign any color you want to many of the display elements in the Audio Document window, such as the waveform, the background, and different marker types. It also provides several preset color schemes.

FIG. 1: *Peak*'s Audio Document window is divided into an Overview section and the main editing display. Markers help you navigate the waveform, and a customizable toolbar and Cursor palette provide quick access to editing tools.

MARKING YOUR COURSE

Unlike some programs, *Peak* allows you to drop in markers on the fly while you're recording or playing back. Press Command-M to insert a new marker at the current location. Each marker appears in the waveform display as a vertical line with a small triangle at the bottom. Double-clicking on the triangle

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David Leach (Ben Harper)

Tito Puente ("The Mambo King")

Mike Malinin (Goo Goo Dolls)

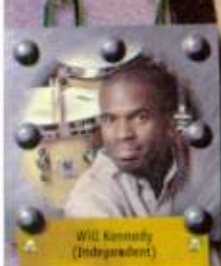
Giovanni Hidalgo (Master Conguero)

Vera Figueiredo (Solo Artist, Brazil)

Alex Acuña (Weather Report)

Luis Conte (Independent)

Drums - Jesus Diaz, David Garibaldi, Michael Spiro


Will Kennedy (Independent)

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WRH

opens a dialog box that lets you specify the marker's function and modify its default name. Markers can serve as beginning or ending loop points, or can function as anchored or unanchored reference points.

When a marker is anchored (the default setting in *Peak*), it remains locked to its position in the waveform and changes position in time as you delete or insert material. In other words, it stays with its designated sample in the waveform. If a marker is defined as an unanchored reference point, however, it represents a specific point in time rather than a place in the waveform. When you select and drag one of these reference markers, *Peak* indicates its distance from the next reference point. This can be quite useful for placing sounds at precisely timed intervals.

The easiest way to move markers is simply to drag them into the position you want. If you need to find a particular marker, you can type in the first few letters of its name and press Return; the insertion point will then jump to that marker.

Unfortunately, you can delete a marker only from within its dialog box. I'd prefer to manage markers by using keystrokes to highlight and delete them. On the other hand, the highly useful Delete Except Audio command clears the slate of all markers in a selected area while leaving the waveform untouched.

The Markers to Regions command is another great feature. It creates a region from the waveform area between a pair of neighboring markers (Markers 1 and 2 become Region A; Markers 3 and 4 become Region B, and so forth). You can then save the audio within each region as its own file—handy for extracting sound effects and sections of dialog from a long recording.

Peak
Minimum System Requirements
Power Mac; 32 MB RAM (more recommended); Mac OS 7.5 (8.5.1 or later recommended); Sound Manager 3.3; QuickTime 3.0; hard drive with average seek time of 18 ms or less

RECORDING AND PLAYBACK

Peak now features a new recording interface with separate Record and Recording Options dialog boxes. Recording Options lets you select the hard drive you wish to record to, assign the file format, set incoming audio levels, and choose whether to record through an Adobe Premiere plug-in. A new Split Stereo Files function allows you to record dual mono files rather than interleaved stereo—the default format in *Peak*. In addition to the Pro Tools system, programs such as Emagic *Logic Audio* and MOTU *Digital Performer* import only dual mono files, so *Peak* makes it easier to work with a variety of programs.

The Record dialog box consists of three sections: an Audio Source display, which shows the waveform as it is recorded; a Notepad section; and a Transport section, with displays for available recording time, sample rate, and resolution (see **Fig. 2**). The Notepad section lets you type in comments during recording. Each time you press the Return key, it creates a Notepad

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marker; the comments you type are attached to the marker as a label once recording is finished.

Aside from using the transport controls, you can play an audio file by double-clicking anywhere in the Audio Document window or by pressing the Spacebar to start and stop. The Return key takes you to the beginning of the recording. If you want to play just a selected area, simply drag to highlight the area and press Option-Spacebar to play the selection.

Peak allows several files to be open at once. The Audio Document windows can be stacked on top of each other or tiled to fill the screen. Each file has an assigned number, and you can trigger each file by holding the Command key and entering numbers in the order that you want the files to play. This is an excellent way to check out alternate sequences for your CD project.

Audio scrubbing functions have been well-implemented in *Peak* since its early versions. *Peak*'s Dynamic Scrubbing mode plays a short loop (selectable between 10 and 600 ms) at the cursor location. In addition to Dynamic Scrubbing, *Peak* also offers jog wheel–style scrubbing and tape-style scrubbing (which mimics the sound of a reel-to-reel deck).

Peak's new VU meters are clearly an improvement over the program's original meters, but unfortunately they are still not quite up to par. When I compared them with the meters on my A/D converter, the input levels registered a weaker signal in *Peak* by as much as 10 dB. (According to BIAS, this problem exists only with the Sound Manager drivers for certain cards, especially MOTU's 2408 system.) Another anomaly surfaced with long fades: The meters blipped inexplicably when there was essentially no level.

UNDO ME, REDO ME

Peak's nondestructive approach to editing is one of the program's greatest strengths. With *Peak*, your original audio file remains untouched until you save the edits. Furthermore, the program offers unlimited undo/redo capability between saves, so you can return to an earlier state without penalty. You can even toggle between edits while the audio is playing.

Being able to severely process a file without committing to the final mess is a real blessing and an essential tool for serious sound designing and music production. The Edit menu displays the most recent edits along with the Undo and Redo commands. *Peak* also provides a helpful Edit List that shows a history of all edits, the time they were made, and what sections of audio were affected. If you click on any item in the list and select Revert to Item, *Peak* jumps back to the selected edit point. In essence, the Edit List provides a kind of random-access Undo capability. Once you've saved the file, however, the current Edit list is cleared.

To hold audio that is cut or copied, as well as to perform undo/redo functions, *Peak* designates part of your hard drive as a scratch disk for storing a temporary file until you save your work. You can choose your internal or external drive as the scratch disk, or you can use a high-speed server if you're linked to one.

Peak's list of editing commands includes the usual suspects, such as Cut, Copy, Paste, Insert Silence, and Crop. Key combinations for selecting audio speed the editing process further. For

Peak 2.04 File Support

File Types	mono, dual mono, interleaved stereo
Resolutions	8-, 16-, 24-, and 32-bit
Sample Rates	48, 47.9521 (drop frame) 44.1, 44.056 (drop frame), 37.800, 22.25454, 22.050, 18.900, 11.025, 5.5125 kHz
File Formats	AIFF; AIFC; Sound Designer II; AU; WAV; QuickTime; raw; SND; RealAudio 5.0, 3.0, 2.0; System 7; Jam Image; Sonic AIFF; PAF; Shockwave; MP3
Compression Formats	MACE 3:1 and 6:1; QDesign Music; Qualcomm PureVoice; A-Law 2:1; 32- and 64-bit floating point; 24- and 32-bit integer; 16-bit Little Endian; 16-bit Big Endian; IMA 4:1, μ-Law 2:1
Plug-In Formats	Premiere, AudioSuite, TDM (TDM Edition only)

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FIG. 2: *Peak*'s Record window provides a real-time waveform display, a Notepad section, and transport controls. *Peak* lets you write notes on the fly, then places them with the associated markers throughout the file.

example, you can drop in a couple of markers while an audio file plays back, and then Command-click between the markers to select just that area. The Crop command removes the unselected audio on both sides of the markers and isolates the part that you want to work on. The whole process is quite efficient.

In some programs it can be a challenge to make seamless transitions across edit points, but *Peak* provides an excellent crossfade command called Blending, which can be applied automatically during cutting and pasting operations to smooth out abrupt splices. You can indicate the length of the crossfade and custom-design the in and out envelopes. You can then save these envelopes as files; the program includes several presets as well. Because Blending operates in the background, it's important to be aware of when it's enabled, or you may not realize that it's treating your audio.

I also found one minor bug that affects editing. If you select a region, apply the Change Gain command, then Undo the change, *Peak* highlights a region larger than what you'd originally selected. You therefore lose the selection and have to create it over again. This is a minor irritation, and I hope it gets remedied in future versions.

GETTIN' LOOPY

Whether you're producing a drum track or transferring rhythm loops to a sampler, *Peak* provides several approaches to creating and adjusting loops. For example, if you open a file and press Command-L, *Peak* automatically inserts Start and End loop markers at the beginning and end of the file. As the audio loops during playback, you can drag either marker to adjust the loop boundaries until you get the best result. You can select a waveform area, use the Loop This Selection command, and make adjustments from there. Or you can use the Threshold command to break up a rhythm track into its component parts by inserting markers where the audio level crosses a user-defined attack and release amplitude.

Peak's new Loop Tuner window (see **Fig. 3**) lets you compare and visually align a recording's beginning and ending loop points to create a smooth transition. Independent scrollbars and two zoom buttons help you align the waveform at the transition, and you can listen to the changes as you make them. If you need help in smoothing the transition, a Crossfade Loop window lets you blend the beginning and ending of the loop. Once you have the loop nailed down, Option-dragging one of the Loop Tuner's scrollbars moves both loop points together across the waveform. This is a wonderful way to check out different beat accents if you're working with rhythmic material.

Peak also includes Loop Surfer, an algorithm that automatically creates loops based on the number of beats and the bpm setting that you type in. If you don't know the bpm of your waveform, a Guess Tempo function handles that.

Unfortunately, you can't have more than one loop during playback. It would be great to Tab across a waveform from Loop A to Loop Z, for example, while the audio plays. For that matter, being able to toggle loops on and off during playback would also be a benefit. I hope we'll see these options in a subsequent release.

DSP POWER

Peak includes a large number of onboard audio-processing tools and also supports Adobe Premiere and Digidesign AudioSuite plug-ins. With DAE and the right hardware, *Peak*'s TDM Edition supports TDM plug-ins as well.

Common DSP operations include changing pitch, duration, and gain; converting the sample rate; fading in and out; reversing the waveform; and normalizing. With this version, you can also phase-invert a file and remove any DC offset that might be present. You can now convert stereo files to mono and vice versa, and a Panning dialog box lets you draw the left-to-right movement of sound. In addition, the Pitch Change algorithm has been greatly improved in this version and seems to produce virtually no artifacts.

Peak also offers a unique collection of weird and wonderfully original audio treatments, such as Convolve, which applies the spectral characteristics of one sound onto another. The resulting sonic mutations defy easy description. Modulate, a related command, functions like a ring modulator and multiplies two signals together. It's especially useful for creating complex, metallic timbres. Rappify is an unusual command that sounds like a resonating highpass filter. It adds a brittle, crunchy quality to many passages by applying what BIAS calls "extreme dynamic filtering" to a selection. The Phase Vocoder lets you independently adjust the duration and pitch of the audio, and Reverse Boomerang creates a reversed version of your file and integrates it into the original. If this isn't enough, you can Add sounds from the Clipboard at the insertion point or Mix signals together to thicken the soup.

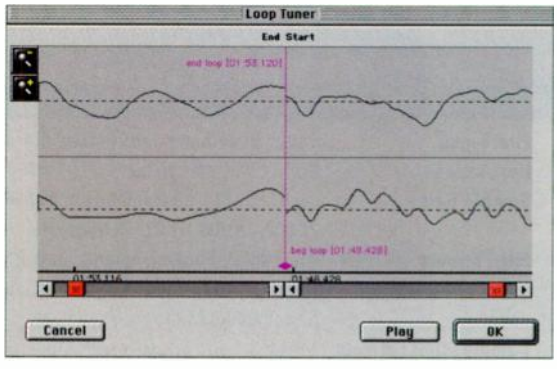

FIG. 3: The Loop Tuner window helps you home in on the perfect loop by coupling zoom-in and -out controls with independent scrollbars.

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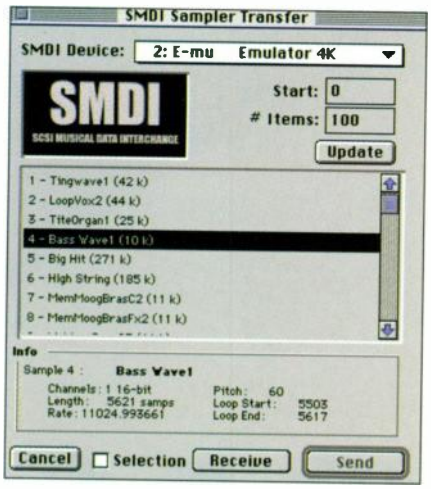

FIG. 4: *Peak* provides extensive sampler support for Akai, Ensoniq, Roland, and several SMDI samplers. The Sampler dialog box lets you quickly send and receive multiple samples in a single pass.

If you need to remove pops and clicks from audio files, the Repair Clicks command may help you get at them quickly—but only if you're working with digital recordings. Cleaning up passages recorded to hard disk from scratched vinyl records is another matter. Apparently, the ability of Repair Clicks to detect these pops and clicks is compromised by the analog-to-digital process. The manual offers some suggestions for working with scratched vinyl recordings, but I often find that I have to hunt down the clicks individually.

Peak's newly improved Batch File Processor is another powerful feature. Say you've recorded 20 live pieces in succession, saved them as separate files, and placed them in a folder. The levels aren't optimal, but you don't want to adjust each file individually. With the Batch File Processor, you can choose a DSP command, such as Normalize, and apply it to the whole group of files. Simply drag the folder to the *Peak* icon on your desktop, and the program automatically normalizes each file. The Batch File Processor can be scripted to perform a sequence of operations for more complex tasks and saves your files in a variety of formats. The main drawback is that batch processing can be slow, even on a powerful computer.

SAMPLE AND SYNC

Peak supports most major samplers; dialog boxes for Akai, Roland, Ensoniq, and SMDI samplers (such as E-mu, Kurzweil, Yamaha, and Peavey) let you take advantage of *Peak*'s editing and DSP capabilities (see **Fig. 4**). Keep in mind that for Akai, Roland, and Ensoniq samplers, you need a MIDI interface and Opcode's OMS; SMDI samplers require simply a SCSI cable between your Mac and the sampler.

A valuable tool that the manual doesn't emphasize enough is the ability to send and receive multiple samples within the sampler dialog boxes. The dialog boxes allow you to view the contents of the sampler that you're linked to. You can then select the samples that you want and fetch them in a single step. Conversely, you can send multiple files from *Peak* to any sampler, which saves a good deal of time.

Many people like to chop up rhythm tracks and play back the beats as individual samples for creating new rhythms. As I mentioned earlier, *Peak*'s Threshold command makes it easy to isolate the components in a drum track. You then simply export the individual beats (as separate files) to your sampler for playback.

If you work with video, you'll appreciate *Peak*'s ability to sync to SMPTE time code. Supported frame rates include 24, 25, 29.97, and 30 frames per second. In addition, *Peak* lets you scrub a QuickTime movie with full audio chase. Although you can't edit the QuickTime video within *Peak*, you can sync effects and music to picture, which makes *Peak* an excellent post-production tool for multimedia.

THE PLAYLIST

The hallmark of non-destructive, disk-based editing is the ability to move audio around into myriad combinations without altering the original file. *Peak* fully exploits this capability by offering a powerful Playlist window where you can organize and play back various selected Regions in any order you wish. The Playlist works equally well with short Regions (such as drum hits in a rhythm track) and with longer Regions (such as songs being prepared for CD burning).

Events are added to *Peak*'s Playlist window from the floating Contents palette (see **Fig. 5**). The Contents palette shows all the regions, markers, and loops in the currently open audio files. Each region is listed by title and location and can be dragged and dropped into the Playlist window. Within the Playlist, you can nudge the start and end times of Events, add gaps between Events, create crossfades, and adjust the individual gain settings. Even better, you can apply up to four Adobe Premiere plug-ins to each Event. You can even scrub Events in the Playlist. The Playlist is one of the most important enhancements in *Peak* and is well worth exploring.

Once you've completed a Playlist, you can save it as its own audio file, or you can burn a CD from the Playlist with Adaptec's *Toast* or *Jam*. *Toast* comes bundled with *Peak*, but I prefer working with *Jam*. *Toast* records only one track at a time and inserts a gap between each track, so crossfades between songs will be lost. *Jam* can write in Disk-at-Once mode and leaves the transitions intact.

One minor concern that I have is that there's always a slight delay before playback while *Peak* calculates the crossfades. Perhaps BIAS could find a way to bypass that lag time in a future update. And while I'm making my wish list, I'd also like the ability to move around Playlist Events during playback. That way, I could change parts around without having to stop each time. And I'd like to be able to loop sections of the Playlist instead of having to drag multiple Regions over from the Contents

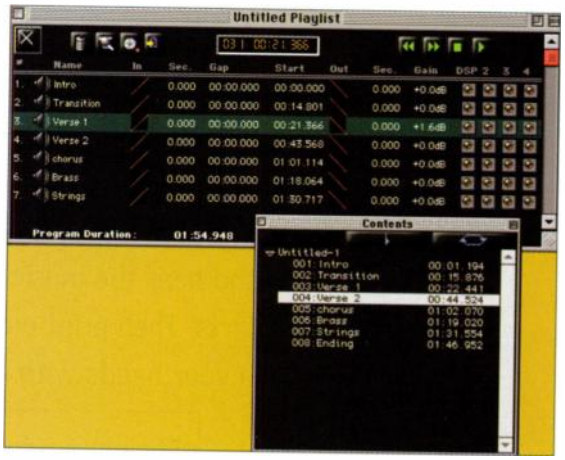

FIG. 5: The powerful Playlist window lets you organize regions—imported from the Contents palette—to rearrange a drum pattern or burn your next CD.

Yahoo! Site Matches (3 - 3 of 3)

- **Internet Breakthrough** - Yahoo! and Netscape emerge as instantaneous Internet giants, forever changing the way we communicate, play, and shop.
- **Gaming Breakthrough** - Sony Computer Entertainment releases the PlayStation®, ultimately selling over 100,000 units in the first weekend on the U.S. market.
- **Development Breakthrough** - The Game Developers Conference experiences record attendance, foreshadowing an explosion in the electronic game industry.

Coincidence?

1994

GAME Developers CONFERENCE '00

March 8-12, San Jose Convention Center, San Jose, California

www.gdconf.com

Miller Freeman Game Group

palette. That would be particularly useful for working with drum patterns.

FADE OUT

Much of *Peak*'s strength lies in its ability to provide different means of approaching editing tasks while retaining an intuitive, user-friendly interface. The program even helps you organize your work by including *FileMaker Pro* database templates for finding and auditioning audio files. And though you can explore much of the program without cracking the manual, the helpful documentation is thorough and well written, with excellent cross-referencing. BIAS's Web site also provides wonderful support and resources for the user.

Since it was first introduced, *Peak* has come a long way in fulfilling its potential as a top-notch professional-level audio editor. The strong Playlist and Batch File Processor have further cemented its position at the top of the heap. So has *Peak*'s support for hardware samplers; real-time recording through plug-ins; and a slew of file formats, including MP3 and Shockwave.

BIAS
Peak 2.04 (Mac) audio-editing software $299
TDM Edition $499

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

PROS: Wide assortment of editing tools. Unlimited Undo/Redo. Customizable interface. Good loop-editing capability. Powerful onboard DSP with plug-in support. Hardware sampler support. Good playlist editing and batch processing. CD-burning capability.

CONS: Occasional conflicts with Digidesign drivers. Slow batch processing. Inaccurate metering with some audio cards.

On the downside, however, *Peak* is still occasionally unstable in some hardware configurations—specifically when using Digidesign sound drivers paired with Audiomedia II and III cards. Granted, drivers exist in an uncertain universe that BIAS and other software developers have little control over. Nevertheless, some users have found that *Peak* works better when running under Sound Manager with the Mac's built-in audio I/O.

Overall, BIAS has made great strides in clearing up conflict issues, and DAE errors have been cropping up less and less. BIAS's responsiveness to end users has also helped build confidence in the product. With *Peak* slated to support ASIO drivers in version 2.1, concerns over stability are fading as anticipation for the added flexibility grows.

Peak does an excellent job of providing a complete editing environment for sound designers, audio post professionals, and musicians who record their music and burn CDs at home. It's not easy for a program to meet such wide-ranging demands, but with its strong editing and processing features, *Peak* is likely the best solution you'll find.

Alex Artaud *is editor of the Spanish-language edition of* Mix *magazine.*

For manufacturer information, please see Contact Sheet, p. 227.

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HAFLER

TRM6

A compact, more affordable version of the acclaimed TRM8.

By John Ferenzik

Hafler's TRM8 powered monitors, which were reviewed in the September 1998 **EM**, so impressed the reviewer that he saved up and bought a pair for his own studio. But good as they sound, at $1,650 a pair (formerly $2,400) the TRM8s are a bit beyond the budgets of many personal-studio buyers.

Now Hafler offers a solution in the downsized TRM6 ($1,250 per pair). These bookshelf-size, biamped close-field reference monitors sport impressively similar specs in a smaller package. Whether destined for the video post house, pro facility, or personal studio, the TRM6 is clearly designed and priced to compete with the increasing number of compact close-field active monitors available today. (For a discussion of the advantages of active over passive designs, see the sidebar "Why Get Active?" in the cover story "Power Stations" in the October 1997 **EM**.)

FACE VALUE

The TRM6 monitors are constructed of hearty MDF (medium-density fiberboard) and finished in semigloss black. Their substantial weight and slippery-smooth finish makes them a tad unwieldy, so care is in order when lifting and positioning them. An external handle or handgrip depression would be a welcome addition.

The front panel features a power switch located to the right of the tweeter. To the left of the tweeter is a status LED that glows green for on, a flashing red to indicate clipping, and solid red at thermal overload.

SPEAK TO ME

The TRM6 employs a 1-inch, soft-dome high-frequency driver, which is set back slightly in relation to the woofer and centered in a wave guide. Basically a horn-shaped structure, the wave guide's role is to smooth out sound waves emanating from the cabinet as they make the transition from a flat, planar shape to a rounder, more spherical shape, the goal being to produce a wider sweet spot for the listener.

The woofer comprises a 6.5-inch, polypropylene-cone low-frequency driver with an inverted rubber surround. A shielded magnet in the woofer assembly reduces the level of stray magnetic radiation—a potential hazard that can distort images and colors on your TV set or computer monitor.

The TRM6 has a narrow rear port that Hafler calls an *aerovent*. The port is radiused—that is, flared like a trumpet, without the squared edges found in the usual circular or elliptical port—in order to improve bass response and reduce turbulent fluttering.

The amplifier in the TRM6 features MOSFET circuitry in a proprietary design that Hafler calls *Trans-ana* (short for Transconductive Active Nodal Amplifier). Among its other qualities, MOSFET circuitry is known for its ability to mimic vacuum-tube operation and provide wide-bandwidth linearity. An active crossover sends frequencies above 3.2 kHz to a 35-watt amplifier driving the tweeter, and frequencies below 3.2 kHz to a 50-watt amp driving the woofer.

Hafler's TRM6 active, close-field monitors provide a wide sweet spot, excellent imaging, and a smooth sound.

ABOUT FACE

The rear panel of the TRM6 provides balanced XLR and unbalanced RCA inputs, as well as adjustments for input sensitivity and for customizing bass and treble response. The adjustments are grouped in four blocks of tiny DIP switches, with each block containing four switches. The first block provides the selector for balanced or unbalanced operation, followed by the first three input-sensitivity settings (+1 dBu, –2 dBu, and –5 dBu). The next block has two more input-sensitivity settings (–8 dBu and –11 dBu), followed by two bass rolloff switches set at 30 Hz and 60 Hz. The default input-sensitivity setting of +4 dBu is achieved by leaving all five input-sensitivity switches flicked to the left (off) position, for a total of six settings.

The third and fourth blocks of DIP switches are for adjusting bass and treble shelving, respectively, with each block offering settings of +4 dB, +2 dB, –2 dB, and –4 dB. Again, the "flat" setting is attained by setting all the switches to the left (off) position.

As the manual explains—and as should be obvious—only one setting at a time should be selected in each section (input sensitivity, bass rolloff, bass shelving, treble shelving). Obviously, too, the switches on the two monitors should be set identically.

This brings me to a couple of complaints. One is that the arrangement of switches in the four blocks could lead to some confusion, particularly because the input-sensitivity switches stretch over parts of two blocks. But the bigger problem—and the potentially harmful one—is that the switches are so small that it's difficult to switch only one at a time. On several occasions I accidentally moved a switch I didn't mean to, resulting in a nearly speaker-blowing leap in volume that had me lunging for the faders. Larger switches—or better yet, notched rotary ones—would provide an obvious improvement, and would accomplish the same tasks with less risk of error.

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IF YOU'VE BEEN FLIPPING thorough the pages of this magazine, you've almost certainly noticed the intense focus on microphones. From the proliferation of exotic new mics to the almost cult-like following of certain historical classics, never has the choice been greater. Or the prices higher. A perfect time, in fact, for Antares to introduce our new Microphone Modeler.

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Have It Your Way

The Microphone Modeler will initially be available as a plug-in for the TDM and MAS environments, with DirectX and Mac VST not far behind. And for those who prefer a self-contained solution, there will be the AMM-1 stand-alone rack-mount processor.

And best of all, whichever version you choose, you can expect to pay substantially less than even a single modestly exotic mic.

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THE SONIC PICTURE

Hafler recommends an eight-hour break-in period for the TRM6 woofers before commencing with critical monitoring, so I loaded up a bunch of CDs and let them play through the monitors for that amount of time. The manufacturer also recommends letting the TRM6s warm up for one hour before a critical monitoring session, so as to achieve "the best sonic performance and image stability from the internal amplifiers." This should present no problem in pro studios, where gear is typically left on for days at a time. However, for the personal-studio user, who may make it into the studio only sporadically, and then just for a few, precious hours, this could prove a bit of a pain.

After the break-in period, I carefully compared the TRM6s with two sets of monitors in my existing passive-monitor setup—Tannoy PBM 6.5s and E-V MS-802s—first by playing several of my own mixes and favorite CDs, then mixing some songs from a current project. Instrumentation included bass, drums, electric guitar, acoustic guitar, Hammond organ, piano, synth strings, and horns—a nice, broad palette for putting the monitors to the test.

What impressed me most about the TRM6s was their excellent imaging. Placement of instruments in the stereo field was noticeably clearer than on the other monitors, and the sweet spot was wider. This left me freer to move around while mixing—a nice change from the claustrophobic, frozen, deer-paralyzed-in-the-headlights position I typically assume with my monitors.

The TRM6s are quite easy on the ears, too, even throughout long sessions. I experienced little listening fatigue during three full days spent mixing on them.

As for frequency response, my immediate impression was that the TRM6s sounded brighter than the monitors in my current setup. Highs were well represented, though not harsh by any means. And given that the lows roll off fairly quickly below 60 Hz—not an unreasonable tendency for a 6.5-inch woofer—the representation of bass frequencies was impressive. These little cabinets really thump for their size. (For those needing extended low-end capabilities, Hafler also offers two stand-alone subwoofers, the TRM10S and TRM12S, which are priced at $695 and $795, respectively.)

HAFLER
TRM6 active monitors
$1,250 (pair)

AUDIO QUALITY ■■■
VALUE ■■■
1 2 3 4 5

PROS: Excellent imaging. Wide sweet spot. Solid construction. Good documentation.
CONS: Lacking in midrange detail. Input sensitivity and filter switches awkward to configure. One-hour warmup required for optimal performance.

It was the midrange response of the TRM6s, however, that troubled me. It seemed a bit shy, making the TRM6s sound somewhat hollow or scooped out in the middle. As a result, the first mixes I created using the TRM6s came out sounding "boxy" when played back on other systems. Evidently, I had simply slathered on too much "honk" (between, roughly, 1 and 2.5 kHz) to make up for the perceived lack of mids.

Of course, to get a handle on the characteristics of practically any monitor, one has to spend some time with it. To help acclimate my ear to the TRM6s, I used some mixes I had done on my existing monitors (recalled using my Yamaha 03D digital mixer) and listened carefully while switching back and forth between the TRM6s and my own monitors. This exercise paid off, helping me learn not to pump the mids while monitoring on the TRM6s. By the end of the sessions, my ears readily recognized what needed to be done, and I was able to mix confidently on the TRM6s without resorting to my familiar rig.

SECOND OPINIONS

Monitoring is a subjective experience, of course, so it seemed only fair to solicit some other opinions. I took the TRM6s to Maja Audio Group, a recording studio in Philadelphia where I had done some recent tracking, and set them up for more comparison testing. Maja has several active monitors in its various recording suites—including Genelec 1031As, KRK E8s, and Quested F11s—so the TRM6s were compared head-to-head with some well-regarded

TRM6 Specifications

AUDIO	
Frequency Response	55 Hz–21 kHz (±2 dB)
Peak Output	>119 dB
THD	<0.5%
AMPLIFIER	
Power Rating	35W RMS @ 6Ω (high frequency); 50W RMS @ 4Ω (low frequency)
Signal-to-Noise Ratio	>100 dB
Input Impedance	47 kΩ per phase
Input Sensitivity Range	500 mV–3V (unbalanced); 275 mV–1.5V (balanced)
SPEAKERS	
High-Frequency Driver	1" soft dome
Low-Frequency Driver	6.5" polypropylene cone
Input Connectors	(1) XLR (balanced); (1) RCA (unbalanced)
Input Sensitivity Adjustment	selectable: +4, +1, –2, –5, –8, or –11 dB
Treble Shelving Filter	5–20 kHz, ±4 dB (+4, +2, 0, –2, or –4 dB)
Bass Shelving Filter	30–200 Hz, ±4 dB (+4, +2, 0, –2, or –4 dB)
Subsonic Filter	30 Hz or 60 Hz (selectable) @ 12 dB/octave
CROSSOVER	
Crossover Frequency	3.2 kHz
Crossover Slope	24 dB/octave Linkwitz-Riley
ENCLOSURE	
Material	19 mm, medium-density fiberboard (MDF)
Dimensions	8.875" (W) × 13.25" (H) × 11.5" (D)
Weight	23 lbs.

For manufacturer information, please see Contact Sheet, p. 227.

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Although the TRM6s initially made a favorable impression on the listeners, they did not garner major raves. Comments were particularly aimed at the lack of midrange. As one Maja engineer put it, the frequencies between 700 Hz and 3 kHz seemed "underrepresented." Another staff member

▼

I slathered on too much "honk."

commented that the TRM6s would sound terrific in a home-theater system or bedroom studio, but he was a bit shy of recommending them as primary reference monitors for critical mixing. All of the listeners agreed, however, that the TRM6s worked nicely as auxiliary reference monitors.

THE ENVELOPE, PLEASE

Although I wouldn't recommend the TRM6s as primary critical-reference monitors, they'd certainly be a welcome addition to a system, serving admirably as auxiliary monitors—an important component of any serious studio. I could also see them excelling in settings such as broadcast, location recording, and home theater.

The TRM6 active monitors bring Hafler's MOSFET circuitry and reputation for quality within reach of the personal-studio operator. These compact monitors are attractive, well built, and, for the most part, well designed. The one feature that frustrated me was the DIP switch controls on the rear panels—and, for some users the recommended one-hour warm-up period might be a sore spot.

The TRM6s put out a big sound for their compact size, and the overall smoothness is easy on the ears. They also provide a generously wide sweet spot and exceptional imaging. My only sonic misgiving was over the slight deficiency in representation of midrange frequencies. But, most any monitor requires some getting used to, and once I was accustomed to this characteristic I really enjoyed mixing on the TRM6s.

John Ferenzik *would like to thank Maja Audio Group in Philadelphia for helping out. You can e-mail John at frnzk@pond.com.*

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Mike Sokol EQ Magazine, October 1999

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George Petersen Mix Magazine, September 1999

"The sound quality of Lucid converters is excellent. They give a sheen to the sound without artificially coloring it."
Marcus Miller Producer, Composer

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SEER SYSTEMS

SURREAL 1.0 (WIN)

Now you can have software synthesis in a low-calorie package.

By Allan Metts

As computer hardware has become more powerful, software synthesizers have become more plentiful. Seer Systems is no stranger to this field; its powerful *Reality* is a favorite among software synthesis aficionados.

But sometimes you don't want to spend hours tweaking parameters and plotting envelope curves to create a sound. Sometimes you just want to load sounds that other people have created, so you can make music with a minimum of technical gobbledygook. If that's what you're looking for, *SurReal* may be just the ticket.

SurReal is an easy-to-use software synthesizer that lets you play as many as 16 different sounds at once, with a total polyphony of up to 64 voices (depending on your computer). You can use sounds from SoundFont volumes or *Reality* Banksets. The program ships with more than 2,000 sounds and includes extra goodies for interfacing with other audio applications. You even get built-in reverb and chorus.

I tested *SurReal* on a 400 MHz Pentium II, using Lynx Studio Technology's LynxOne card for my audio. *SurReal* performs best if your card supports Microsoft's DirectSound technology, but the program can handle cards with plain old WAV drivers, as well. An excellent reference on the Seer Systems Web site lists cards that have DirectSound drivers; it also provides some hints on how your sound card will perform with this software.

A SURREAL EXPERIENCE

Installing *SurReal* was a snap: I was up and running in no time. The program ships with absolutely no printed documentation, which really isn't a big issue for a program as simple as this. At installation time, however, I was given the option of installing SeerMusic but had nothing to tell me what SeerMusic was. (As it turns out, it is Seer Systems' technology for streaming *SurReal* or *Reality* music over the Internet.)

Once I'd installed the program, I went through the Getting Started section of the help file and quickly learned what the program could do; all in all, the onscreen documentation is well organized and thorough. Nevertheless, when a company provides no printed documentation, it should provide printable PDF files as well as onscreen help. That way, you can print your own manual if you choose to.

Almost all of the *SurReal* experience takes place in a single window with no menu bar (see **Fig. 1**). The window includes 16 identical sets of controls that define the sounds you hear on each of the 16 MIDI channels. Seer Systems calls these modules *Picosynths*.

In the top left corner, above the Picosynths, four Command buttons provide access to files, the onscreen help, program preferences, and global synthesizer settings (such as tuning and transposition). The top right corner contains master controls for reverb, chorus, and volume, along with meters for the left and right channels and a handy CPU load indicator. The top of the window also includes a simple playback-only MIDI sequencer.

Each of the 16 Picosynths has its own controls for volume, pan, mute, and solo. Onscreen knobs let you adjust the amount of reverb and chorus, and a Vari knob changes the sound in a manner specific to the currently loaded patch. In many cases, the Vari knob simply adjusts the brightness of the sounds; however, some of the special effects change dramatically when you tweak this knob.

A display bar in the center of each Picosynth shows the currently loaded bank, Program number, and Program name. (*Program* is *SurReal*'s term for a single patch or sound.) If you click on the display bar, it opens a dialog box from which you can pick a new Program. Each Picosynth also includes a simple MIDI activity indicator.

In short, each Picosynth functions as a Program selector with Reverb, Chorus, and Vari knobs; Mute and Solo buttons; a Volume slider; and a horizontal, wheel-like Pan control. Global controls at the top of the window affect all 16 Picosynths, and that—along with a simple sequencer—is about all there is to it. After all, simplicity is the whole point of this program.

IN THE BANK

SurReal can have only a single Bankset loaded at any given time. A Bankset is a collection of Programs, MIDI sequences, and settings for each Picosynth and its effects. Because there are only 16 Picosynths, you can have only 16 Programs active at once, but you can load more than 1,000 Programs into a

FIG. 1: Nearly all of *SurReal*'s functions take place within the main window, which provides 16 Picosynths, a MIDI file player, and a master effects section.

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Bankset. This means you can pick other sounds with ease or switch sounds in the middle of a sequence by using MIDI Bank Select and Program Change messages.

SurReal can access Programs from only one Bankset at a time, but you can import other Banksets' Programs into the current Bankset. If a song requires Programs from several different Banksets, you simply open an existing Bankset (or create a new one), import the Programs you need, and save the Bankset under a different name. Because the bulk of a Bankset file consists of the underlying audio (sample) data, you can choose between saving the audio data in the Bankset file (which puts everything in one tidy package for portability) or in a common Wave directory shared by multiple Banksets (which avoids duplicate audio files and thereby saves disk space).

You can also load an entire SoundFont volume at once, although you can't import individual SoundFont programs. Furthermore, you can't save SoundFont volumes within *SurReal*, so the process of importing SoundFonts is essentially converting the SoundFont volume into *SurReal*'s Bankset format.

If you want to assemble a collection of SoundFont programs from several different volumes, you must first load each SoundFont volume into *SurReal*, save it as a Bankset, then import the individual Programs from each of these Banksets. It's a bit convoluted, but it's possible.

PLAYING THE NUMBERS

You may have noticed that I haven't described a function for assigning MIDI bank and program numbers to the Programs in a Bankset. That's because there isn't one. *SurReal* assigns all of the bank and program numbers automatically and tells you what the numbers are by appending them to the Program names.

SurReal offers a choice between 0- or 1-based bank and program numbers, and it changes the display of each Program in the Bankset as soon as you change your preference. I particularly appreciated being able to display program numbers in the Roland style (A11, B67, and so forth). I have a Roland A-80 controller, and it's always a pain to figure out which MIDI Program Change message will be sent when I enter "A75," for example. (The answer is 52, by the way.)

Automatic bank and program numbering seems like an inflexible approach, but it isn't so bad in practice. If you like to mix and match your Programs quite a bit, however, you'll probably want to dedicate a Bankset file to each song you create. Otherwise, when you replay a MIDI sequence at a later date, you might suddenly find that all the bank and program numbers have changed. Also, if you have entered program names (so the sequencer displays, for example, "Wild Swoosh" instead of "Patch 117"), it would be a hassle to reinput the names every time *SurReal* changed the Program numbers.

Fortunately, *SurReal* lets you export a Bankset's Program names into the formats used by many popular sequencers. At present, you can export into the formats used by Cakewalk *Pro Audio*, Steinberg *Cubase*, Voyetra *Digital Orchestrator Pro*, Passport Designs *Master Tracks Pro*, Emagic *Logic Audio*, and WinJammer Software *WinJammer*. When I selected the Cakewalk option, *SurReal* found my *Pro Audio* application and promptly opened a correctly formatted file right where it needed to be. Try doing that with a hardware synth!

Some people like to organize their sounds by MIDI bank and program numbers. You lose that capability in *SurReal*, but you gain a couple of new tricks in return. For starters, you can use the Bankset files as a means of organizing Programs. But within a Bankset, *SurReal* also provides 21 Categories.

The Categories are broken down into instrument classifications, such as Keyboards, Guitars, Brass, Reeds, Pipes, Mono Synths, Poly Synths, Percussive Noises, and Sustained Noises. Separate Categories are provided for sample loops and for sounds that are intended to be parts of other sounds. I couldn't think of a sound that didn't fit into one of the 21 Categories, but I would still like to be able to create my own Category list.

You assign Categories in the Picosynth's Program Selection dialog box (see **Fig. 2**), which actually serves many duties. In this box, you can view the Programs in a Bankset (organized by Category); rename, recategorize, or delete the existing sounds; and import new ones. Of course, this is also where you select the current Program for each Picosynth to play.

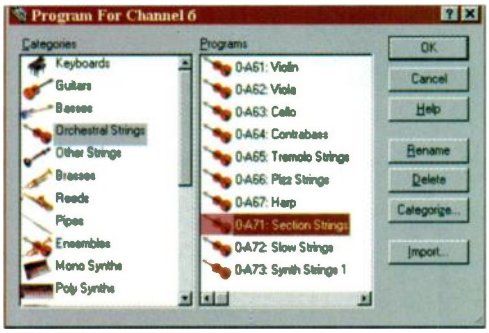

FIG. 2: The Program Selection dialog box provides a categorized list of the loaded Programs. From here you can select, rename, delete, categorize, and import your *SurReal* sounds.

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

PROS: Easy-to-use, straightforward user interface. Excellent sound quality. Good collection of sounds.
CONS: Limited effects. No printed documentation. SoundFont support is read-only.

SURREAL EFFECTS

SurReal includes a basic collection of preset effects that you select from the Reverb and Chorus displays at the top of the window. As mentioned earlier, each Picosynth has its own set of knobs to control the amount of reverb and chorus, and there are master controls as well, but at any given time, all of the Picosynths must use the same reverb and chorus presets.

Eight reverb and 12 chorus presets are provided, but the term *chorus* is a bit misleading, because these presets also include flanging, delays, and special effects. The reverbs aren't especially great. (With careful listening, I could hear a looping effect.) They're quite suitable, however, for casual use. The chorus, flanging, and delay effects sounded fine, and the lone special-effects program was, well, special.

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FINALE 2000 (MAC/WIN)

A venerable desktop notation program acquires more muscle and gets a face-lift.

By Rob Shrock

Among the many music-notation programs available, *Finale* has retained a loyal following by offering a multitude of high-end tools and capabilities that are simply not available in most other notation programs. While plenty of competing applications may be easier to learn, they usually fall short in a number of important areas—like font handling, note and symbol placement, and page layout options—that truly define a professional, publishing-level notation program. Although the market is filled with capable notation programs that do a fine job of creating simple scores, few rival the power and flexibility of *Finale*.

To experienced *Finale* users, the new *Finale 2000* at first will not feel much different than the previous version. There are, however, some significant changes and additions that help increase efficiency and user friendliness. The upgrade has added several new Tool palettes and merged a few older Tools. In addition, it has relocated some submenus and commands, which provides a better-organized work environment. The program also includes new plug-ins, and its new Setup Wizard makes it much easier than before to create a basic score layout from scratch.

Moreover, the upgrade features a completely new default music font, called Maestro. The font adheres more closely to long-established European traditions of notation layout, spacing, and appearance. *Finale 2000* also includes the excellent Jazz font—one of my absolute favorites—for creating parts with the look of handwritten notation. If you held off on upgrading because you felt *Finale 98* didn't offer enough significant changes to justify leaving *Finale 97*, it's time to reconsider. This time around, making the change is well worth it. (Upgrades range from $99.95 to $149.95; Coda also offers lab packs, site licenses, and academic and theological discounts.)

GETTING STARTED

Finale 2000 includes many features that are commonly found in MIDI sequencers, word processors, graphic-design applications, and page-layout programs. Although Coda has made it easier than ever to create great-looking notation with *Finale*, new users must have some experience with computers and must possess a basic knowledge of music notation.

Finale no longer ships with the more than 1,000 pages of printed documentation it did before *Finale 97*. All of the extremely detailed and well-written documentation comes in Adobe *Acrobat* format. (Registered users can purchase a bound, printed version of the documentation.) A 180-page installation and tutorial manual comes with the installation CD-ROM, along with an 8-page quick-reference card.

Eight step-by-step tutorials are an excellent way to become familiar with *Finale* and the powerful feature set the program is known for. The CD-ROM also contains several QuickStart videos that explain many of the program's main features. The video tutorials and onscreen documentation, combined with the newly reorganized menus, make *Finale* more approachable than ever for the novice. Although it still takes time to master *Finale*, the program seems less difficult to learn than earlier versions. It would be impractical to cover *Finale*'s extensive list of features in a single review, so we'll focus on *Finale 2000*'s new and improved capabilities. For those unfamiliar with the program, let's begin with a brief overview.

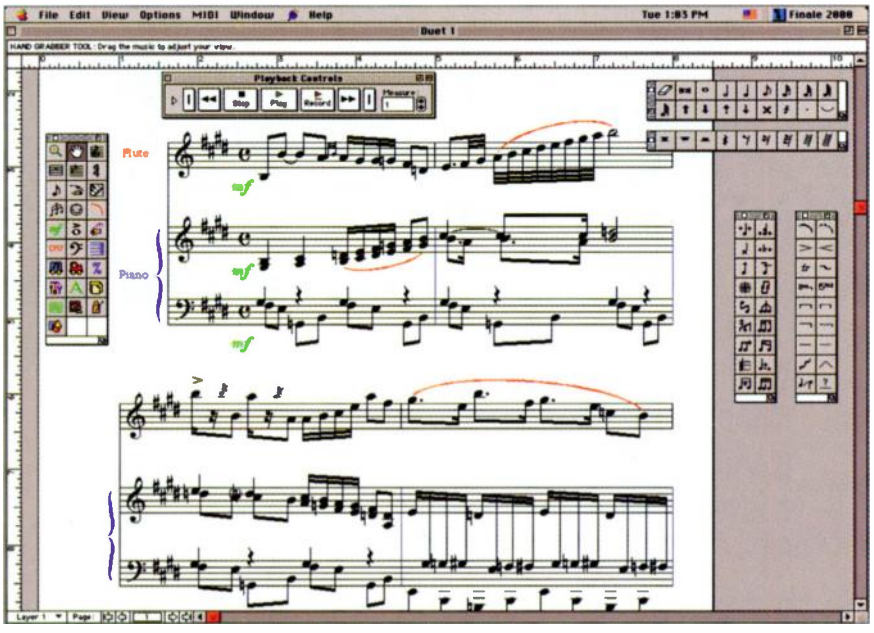

FIG. 1: *Finale 2000*'s main window is shown here with several of its tool palettes. The main tool palette, on the left, is now in color. The Simple Entry palette and the new Simple Entry Rests palette appear in the upper right.

OVERVIEW

Reshapable, floating tool palettes provide access to assorted menus, submenus, and dialog boxes that are specific to the individual tools (see **Fig. 1**). For instance, the Simple Entry tool lets you enter note values by directly clicking on a staff at the location you choose; the Mass Mover tool lets you edit sections of a score; the Chord tool lets you create chords; and so on.

When you click on a tool, a bar under the title bar displays the name and a brief description of the tool. That comes in handy if you're not good at memorizing what different icons represent. Any pertinent menus at the top of the screen appear with drop-down options that change as you select different tools. Depending on whether you're viewing the document

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in Scroll View mode or Page View mode, the measure and page number information is displayed at the bottom of the screen and can help you easily navigate the score.

A score can have an unlimited number of staffs. Each staff can have up to four independent layers, each layer containing two different voices. (Each layer and voice can have an unlimited number of notes.) Layers can be used to define independent lines sharing a staff with different stem directions, like Violin I and II. Piano music often makes use of multiple layers and stem directions to indicate the proper separation of melodic and harmonic content within a single staff. Since *Finale* lets you assign specific colors to just about anything (see **Fig. 2**), one cool trick is to apply different colors to different layers. This makes for easier identification on the screen while you work on a score.

Finale has always been good at helping you get raw notes into a score quickly. Simple Note Entry, the slowest method, allows you to select note values and other symbols from various palettes and add them directly into the score by clicking the mouse. Preprogrammed macros speed up this technique by enabling you to use the computer's number keys to select note values as you click the notes into the score. The Speedy Note Entry method lets you enter notes without a MIDI instrument (you can specify pitches by using your computer keyboard), but it is enhanced by the use of both a MIDI instrument and a computer keyboard to input notes in step time; that is the method I prefer for slamming notes into a score.

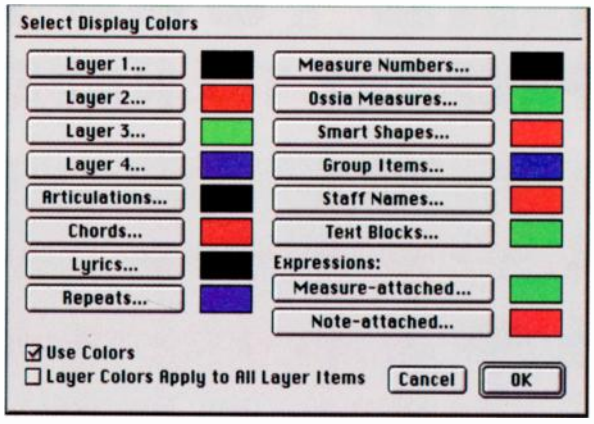


FIG. 2: *Finale 2000* makes excellent use of color. You can assign different colors to layers, symbols, text, and other markings to help differentiate various score elements during editing.

An equally fast way to input notes is with HyperScribe, which lets you input notes in real time to a metronome click or a tapped tempo. You can assign a note number (say, the lowest note on the keyboard) or MIDI controller (such as the sustain pedal) to advance the beat by a particular note division, letting you play a part more or less in time while tapping along with the beat. This method gives you the added flexibility to speed up or slow down without losing the proper placement of notes within a measure, which is not possible when inputting notes to a fixed click. The HyperScribe tool also allows you to rebar a rubato performance, in case you perform a big ritard at the end of a piece while a fixed click is banging away.

Notes can also be imported in Standard MIDI File format, and if you arrange your score layout to match the tracklist in your sequencer, you are well on your way to having a usable score. You can also create scores by importing files from Musitek's *MidiScan* and *PianoScan* applications or from Passport's *Encore*.

All of *Finale*'s note-entry methods take some getting used to, but you'd be surprised at how fast you become proficient at a particular technique after doing it for only a few hours. By the end of the first couple of days, most *Finale* users gravitate toward a favorite method or two of note input and quickly become competent and comfortable creating basic scores.

Once the basic notes are in place, *Finale* offers myriad options for adding expressions, articulations, chords, lyrics, and other graphic elements to the score, and it also provides numerous controls for part extraction and page layout. For a detailed look at *Finale*'s tools and editing capabilities, see the review of *Finale* 3.7.2 in the July 1997 issue of **EM**. Now let's take a look at the new and improved features in *Finale 2000*.

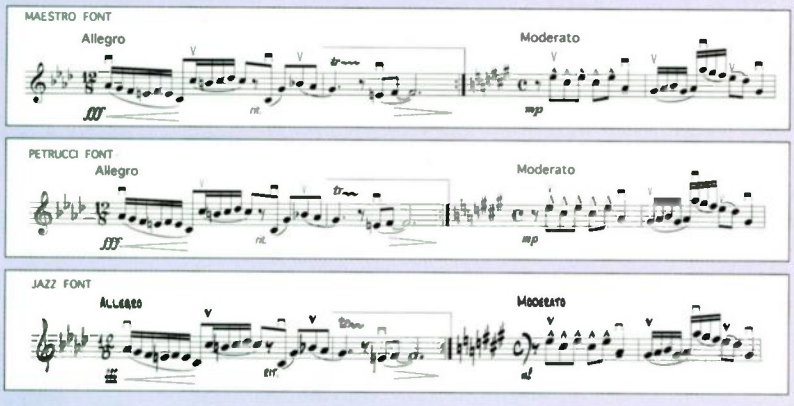
WHAT'S NEW?

Finale 2000 includes several important new tools and menus. You can create a new score from an empty page, a default file, a template (Coda provides more than 40 great templates for band,

FUN WITH FONTS

One of the most versatile aspects of *Finale* is its ability to utilize different fonts. Coda has been instrumental in developing fonts that have elevated desktop music publishing to professional levels.

The new Maestro font, painstakingly designed by Coda with the assistance of European classical music publishers, is now the default font in *Finale 2000*. Petrucci was Coda's original font for *Finale*, and it's still available for backward compatibility with older *Finale* files. The Jazz font emulates the look of handwritten copy, typically used for live performances and recording-session charts.



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choral, church, orchestral, and general scores), or the new Setup Wizard. With the Setup Wizard, you first give the score a title, provide the composer's name, and choose the paper size. Next, you select the instrumental staffs from a variety of instruments within several groups: woodwinds, brass, percussion, strings, plucked strings, keyboards, and vocals (see **Fig. 3**). The individual instrument positions can be reorganized, if necessary, to reflect how you'd like them to appear in the score. The wizard then creates the entire score layout—complete with correct transpositions

▼

***Finale* offers myriad options for adding graphic elements to the score.**

and spacing—and you're ready to go; it's very cool.

Several changes will be of particular interest to seasoned *Finale* users. For example, the main tool palette is now in color, and a new Rests palette has been added as an option for entering rests in Simple Entry mode (see **Fig. 1**). A new Beaming Options dialog box has been added to organize several beam-related parameters, and additions to the Special Tools feature let you adjust the width of beams and the alignment of stems on beamed notes. The Measure Number and Measure Attributes tools have been merged and are now accessed with a single Measure tool. The Measure tool's Measure menu provides the dialog box for creating multimeasure rests, and, best of all, you can now add measure numbers (showing

Finale 2000
Minimum System Requirements
Mac: Mac OS 7.1; 16 MB RAM (32 MB recommended); 20 MB hard disk space for program, 20 MB for documentation files
PC: Windows 95/98/NT; 16 MB RAM (32 MB recommended); 20 MB hard disk space for program, 20 MB for documentation files

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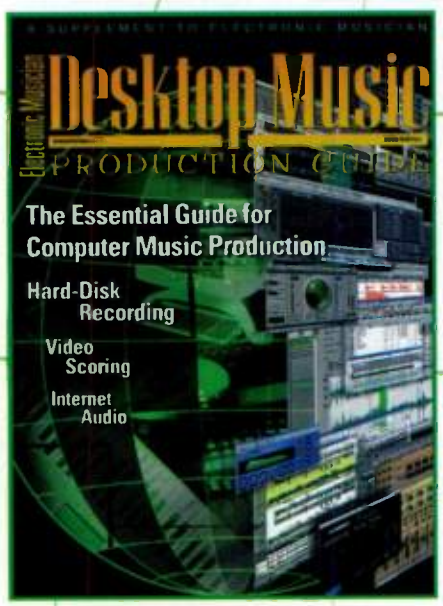

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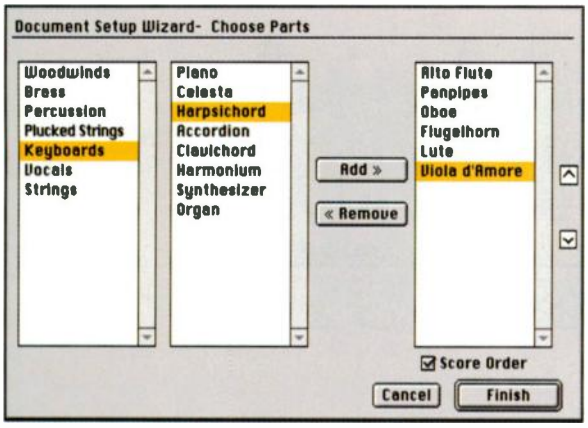

FIG. 3: *Finale*'s new Setup Wizard helps you quickly and easily create any kind of orchestral score layout from scratch.

the elapsed range of measures) to multimeasure rests.

Staff Expressions (markings that apply only to a specific staff) and Score Expressions (markings that apply to the whole score) are now combined in a single Expressions tool. Metatools (macros for selecting marks and symbols using the computer keyboard) now designate expressions as measure-attached, note-attached, or context-sensitive. A new command allows you to view all expression-mark grab handles for easier manipulation, and a new Swing marking has been added to the Expression library. The Smart Shapes palette offers several new tools, including Glissando, Tab Slide, and Custom Line (see **Fig. 4**). The Glissando tool is much improved, and the Custom Line tool can be used for pedal markings, ritards, runs, and other stretchable lines and brackets.

A new automatic music-spacing feature is applied to the score as you create it, which really helps keep the score looking clean as you work on it. Furthermore, you can now fine-tune music spacing by entering a single algorithm rather than through the creation of a complex table. A new spacing algorithm that incorporates the Fibonacci series is included as a default. Music-spacing options are now document specific and are saved with each file. Many items, including expressions, graphics, text blocks, measure numbers, and more, can be snapped to grids and guides you specify.

The new Staff Styles feature lets you quickly perform a variety of operations in a specified region. For example, you can change selected notes or measures to slashes or rhythmic notation, create 1- or 2-bar repeats, create one-line or percussion staffs, execute common transpositions (change an E-flat alto sax part to B-flat tenor sax), or create your own Staff Style. I really like this function, because it makes it easy to accomplish operations that used to take several mouse clicks.

A new Symbol option in the Text menu makes it easy to insert hard-to-find symbols in the current text font. (You can temporarily change the font if you need a specific symbol.) The Import MIDI File command can now import patch names as well as notes, and the Page View mode now allows scrolling playback, as in the Scroll View mode.

In the last several versions, Coda has been expanding its collection of plug-ins (mini programs that extend *Finale*'s capabilities). Twelve new plug-ins have been added to *Finale 2000,* including a very cool Piano Reduction plug-in that condenses a specified region of a score into a two-staff piano part. Another handy plug-in lets you move the split point in a piano staff over a selected region for easier editing of notes between the two staffs. Other plug-ins let you show or hide notes, rests, ledger lines, and other markings; change rhythms and pitches; and modify global attributes (see **Fig. 5**). *Finale*'s list of plug-ins has now grown to an impressive 42. Coda also offers free kits for third-party plug-in developers, and a growing number of developers now offer specialized plug-ins. (Check out www.rpmseattle.com/rpm/coda for more information.)

STYLISH NOTES

One of *Finale*'s many strengths is its ability to use any notation font anywhere in a score. Several alternate fonts are available, providing complete control over the appearance and style of your scores.

After more than a year of research and development, Coda has replaced *Finale*'s lauded Petrucci font with Maestro as the default font. Enlisting the services of several reputable engraving houses in Europe, Coda designed Maestro from the ground up—an effort that ultimately met with the approval of the European engravers, who initially were skeptical of a computer's ability to create truly great notation output.

Provided in two versions—Maestro and Maestro Wide (with wider noteheads)—the new font has a cleaner look overall. Although at first it may not seem significantly different from Petrucci, Maestro may well be the best-looking traditional music font available to date for desktop notation publishing (see the sidebar "Fun with Fonts"). The note spacing appears to be better with Maestro than Petrucci. I prefer the standard Maestro font to the slightly larger noteheads of Maestro Wide, but in some situations, Maestro Wide works quite well.

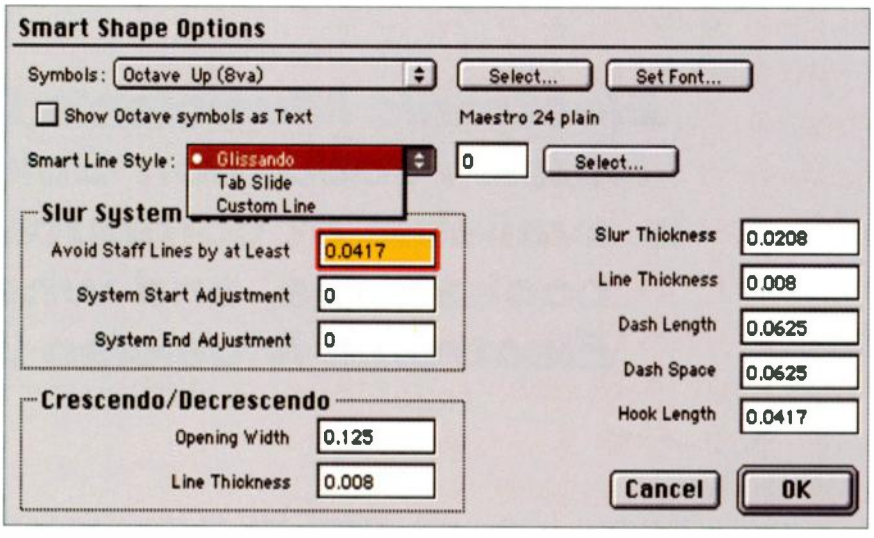

FIG. 4: The Smart Shapes palette now offers several new options for creating adjustable glissandos and custom lines.

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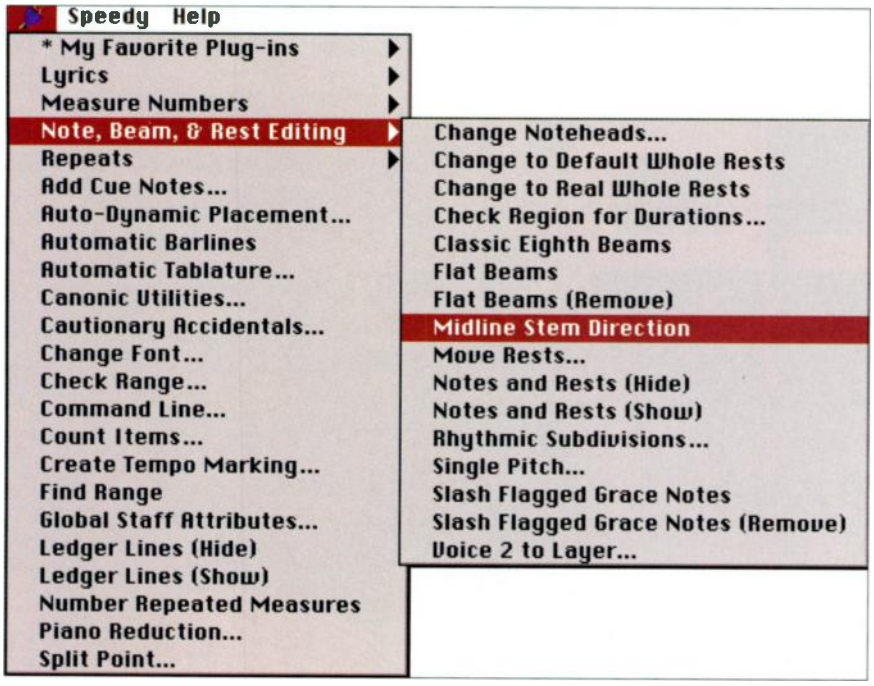

FIG. 5: *Finale 2000* adds a dozen handy new plug-ins to its already large collection.

As I mentioned before, *Finale 2000* features the new Jazz font; upgrades include the font, but if you're buying *Finale* for the first time, you'll have to download the font from Coda's Web site upon registering. (You can also order it on CD for a $5 shipping and handling charge.) The Jazz collection contains four separate fonts: Jazz (notation), JazzChord (chords); JazzPerc (percussion symbols), and JazzText.

The Jazz font is the closest I've seen to the style of handwritten notation, and it works well for sessions, live charts, and other less formal musical styles. David Crigger and I created Burt Bacharach's entire live performance book for rhythm section and symphony orchestra using the Jazz font, and it looks great. I have also done several charts for Dionne Warwick over the years with the Jazz font. Several musicians have expressed their delight with the computer output and have commented on how easy the charts are to read; most people just assume that they're reading handwritten charts.

MINOR GRIPES

All is not perfect with *Finale 2000*, however. The Ties command is still buried in the Simple Entry palette rather than being next to the Slurs tool in the Smart Shapes group. Most of the time I find that I have to use slurs instead of ties for better legibility and flexibility. And speaking of Smart Shapes, some of them don't seem to be all that smart. Slurs still have to be dragged into the proper arc direction as many times as not, especially when more than one layer is present. This can be aggravating and time-consuming when you're notating piano and string parts that use multiple layers and lots of ties and slurs (as most do).

I still wish there was a better link between scores and individual parts. The way the current program is designed, extracted parts are completely separate files. Any changes or corrections made to a part as it is optimized for page layout are not reflected in the full score, which means that you must make the same changes again in the score or risk discrepancies. A feature called Special Part Extraction creates a single part that is dynamically linked to the score, but you lose the link if you extract another instrument using this same method. Of course, you can always resave the entire score after each Special Part Extraction (that's how we did Burt Bacharach's charts), but that can be slow and cumbersome with large scores, and the files for each part end up being much larger than necessary. I would prefer having multiple Special Part Extractions available for each file.

CODA MUSIC TECHNOLOGY
Finale 2000 music-notation software
$545

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

PROS: Added features and better organization aid productivity and user friendliness. Setup Wizard easily arranges new scores from scratch. New Maestro font sets the standard for desktop music publishing. Automatic Music Spacing works well. Detailed onscreen documentation.
CONS: Requires a powerful computer for serious work. Ties and slurs don't adjust automatically when multiple layers are present. Needs additional options for linking extracted parts to score.

FINAL CADENCE

Minor complaints aside, *Finale 2000* is a significant upgrade to an already powerful notation application. It is still a big chunk of code that could benefit from a little slimming down, and you really need a fast computer for it to work most effectively. However, the feature set is exhaustive and provides one of the only true publishing-quality outputs available in a desktop-level package. The newest features have made the program friendlier, and the tutorials and quick-start video tips help ease the initial dive into the world of noteheads, beams, and articulations.

The new Maestro font is wonderful, and the Jazz font is a great bonus. The Setup Wizard and Staff Styles feature work great, making initial score setups a breeze, and the onscreen documentation is well written and thorough. For high-end, professional-level notation features and the flexibility of working with a variety of music fonts, *Finale* is the top choice in my book.

Producer and songwriter **Rob Shrock** *is the musical director for Burt Bacharach. He has also worked with Elvis Costello, Dionne Warwick, and LeAnn Rimes and is currently working on the Island Records debut of Mikaila.*

PLUG-iN SOME REAL DRUMMERS

In a perfect world Bill Bruford, or Gavin Harrison, or Paul Kodish descends on your studio in person to lay down some rhythm tracks. You sit sipping non-fat lattés and discussing the finer points of the material while a crew of smiling but monosyllabic assistants assemble the drums. The session is a blast: the tempos perfect, the feels peerless. You can use everything.

But then Bill/Gavin/Paul slips you an envelope. S***, the invoice: You open it with trembling fingers to read the words 'No Charge,' and you look up into Bill/Gavin/Paul's smiling eyes and waving finger as he says "But next time, man, you're gonna play on my record, OK? Deal?"

You both laugh, knowingly, as only fellow and equal artists can do. And then sushi arrives.

In an imperfect world you've just spent another lousy hundred bucks on another sample CD. It's got some loops you can use but, heck, you've heard a lot of these a zillion times on the radio. When did this come out? 1997. You curse the clerk at BigBucks Megastore.

But by lunchtime you've got a groove loaded and found a workaround to incompatibility issues between your sequencer and digital audio package. The tempos are kind of limp, which you can fudge. Still you wish you could change the sound of the snare. You wish you could program decent drums yourself. At the end of a hard day you fill in some sample clearance forms and toss a pizza into the microwave.

In a smart world you reach up for the Jewel-Case marked Twiddly•Bits Vol 8 MIDI BreakBeats and flip open the lid. You insert the disk into your PC (or Mac), open Cubase (or Cakewalk, or Performer..), and load a file. You Solo one of a dozen tracks containing exuberant 2-bar drum 'n' bass loops, and hit play. Geez! Are those sounds coming out of *my* gear? Still in shock, you loop the groove over 16 bars and snip out the final bar, substituting it for a death-defying fill currently residing on Track 14. You switch to an ambient drum kit. Yea! the groove becomes even more intoxicating, especially when you hit the gas and effortlessly take the tempo up to 155. The track already has life, energy, and your own slant on things. You wonder how many grooves are on this disk. You look. About 700. For how much? $39 bucks? Why haven't I bought any of these before? Food comes in and you don't even notice.

GET CONNECTED

Drummers we use include Gavin Harrison (Level 42, Incognito), Bill Bruford (Yes, King Crimson), Shane Meehan (Us3), Alfredo Dias Gomes, Paul Kodish (Chemical Brothers, Appollo 440), Chronic Music's The Beat Professor, Ron E. Beck, Hugo Degenhardt (Womack & Womack, Steve Hackett), Dave Spiers, Andrew Small, and T.E.T (Anthill Mob, Doug Wimbish), and Al Eaton (Queen Latifah, Ice-T).

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MINDPRINT

EN-VOICE

A versatile voice processor with a tube-based compressor and flexible I/O.

By Rob Shrock

The En-Voice is an elegant, single-channel voice processor, from the German company MindPrint (distributed in the United States by Steinberg), that combines a high-quality mic preamp, 3-band equalizer, and tube compressor in one unit. The En-Voice offers a wide variety of tone-shaping options and is designed as both a front end for digital recorders and a processor for prerecorded analog and digital signals.

GET INTO IT

You have plenty of choices when it comes to inputs and outputs on the En-Voice. The back panel includes a balanced XLR mic input, as well as XLR and ¼-inch input jacks for connecting balanced or unbalanced line-level sources (see **Fig. 1**). Phantom power is available for the mic input, but the button that engages it is inconveniently placed on the back panel. A switch on the front of the unit toggles between the mic and line inputs.

Guitarists and bassists can plug directly into the ¼-inch instrument input jack located on the En-Voice's front panel. The input impedance of this jack has been optimized to prevent overdamping of the pickups, thereby keeping the sound as bright as possible. Inserting a cable into the instrument jack overrides the rear-panel mic and line inputs.

A switchable bass cut allows for filtering out frequencies below either 50 Hz or 100 Hz, at a slope of 6 dB/octave. A 12-segment LED meter can indicate either the input or output level. (Care must be taken not to boost the input to the point that the red LED lights up, because the sound gets nasty rather quickly.) Another button toggles between analog and digital input when the optional DI-MOD 24/48 digital interface is installed (see the sidebar "The DI-MOD Digital Interface"). The unit I reviewed did not contain the DI-MOD, so I was unable to test it.

The output of the En-Voice is at line level, and the balanced XLR and ¼-inch outputs are simultaneously active. If a mono ¼-inch cable is inserted into either the line input or output, the jack automatically switches into unbalanced mode and terminates the signal coming through the XLR connector.

THE SHAPE OF THINGS

The En-Voice's EQ section, consisting of semiparametric high and low bands and one fully parametric midrange band, is capable of both subtle shaping and drastic warping of sounds. Each band provides up to 15 dB of boost or cut and has its own on/off switch with an LED to indicate when the section is engaged. As is the case with all of the on/off switches on the En-Voice, bypassing a particular section actually removes it from the signal path to ensure the cleanest possible audio route.

The bass EQ covers a frequency range of 20 to 300 Hz. The bandwidth is preset to be wider on boost and narrower on cut, which is generally considered to be the most musical approach to equalization. Although not as precise as a fully parametric low band, the bass EQ works well in most cases, especially with microphone signals.

The fully parametric mid EQ covers a very broad range, from 100 Hz to 11 kHz. The bandwidth is variable from a third of an octave to six octaves for either boosting or cutting frequencies. Unfortunately, the bandwidth markings are a bit confusing: the Q settings are labeled 0.15 to 3, with the smaller value corresponding to the broadest bandwidth and the larger value corresponding to the narrowest. If this doesn't seem to make sense, just use your ears and turn the knobs until it sounds right.

The high EQ band covers a frequency range of 1.6 to 22 kHz and intentionally employs a fixed, wide bell-shaped filter rather than a shelving-type EQ. The engineers who created the En-Voice did it this way to allow high-frequency boosting without affecting

THE DI-MOD DIGITAL INTERFACE

The DI-MOD 24/48 ($249) is a 24-bit digital interface for MindPrint's En-Voice, Para-Q, and T-Comp processors. The DI-MOD's high-quality 24-bit D/A converters give you a direct connection between your digital recorder and the analog circuitry of the En-Voice.

The DI-MOD 24/48 can handle sampling rates of 44.1 or 48 kHz, and it automatically syncs to the rate detected at the digital input. It comes equipped with S/PDIF I/O as well as analog I/O on ¼-inch balanced jacks. This allows you to plug a second En-Voice into the converter to send a pair of signals back to the recorder.

—Mike Levine

The En-Voice's preamp, equalizer, and tube compressor sections offer a wealth of tone-shaping options.

10 XDR MIC PREAMP CHS • 4 STEREO LINE CHS • 4 SUBS

The 1642-VLZ PRO: midsize luxury for $999*

10 XDR™ mic preamplifiers (on mono mic inputs Chs. 1-10) with the finest sound quality (and specifications) ever on a compact mixer. 0dB to 60dB gain range.

75Hz low cut filters on all 10 mic channels. Sharp 18dB/oct., phase accurate circuitry cuts infrasonics caused by stage rumble, wind noise and P-pops.

Sweepable midrange EQ on Chs. 1-8 with incredibly wide 100Hz-8kHz sweep range. Fixed shelving HF EQ at 12kHZ and fixed shelving LF at 80Hz.

Overload and ultra-sensitive, -20dB **Signal Present LEDs** on every channel.

4 aux sends per channel. Auxes 1 & 2 are pre/post switchable; Auxes 3&4 are fixed post-fader.

4 stereo line inputs. Unity summed w/mic-in chs 9-12, ±20dB chs 13-16.

8 mono line inputs (Chs. 1-8), with +15dB to -45dB gain range. **Bal./unbal. direct outs** on chs 1-8.

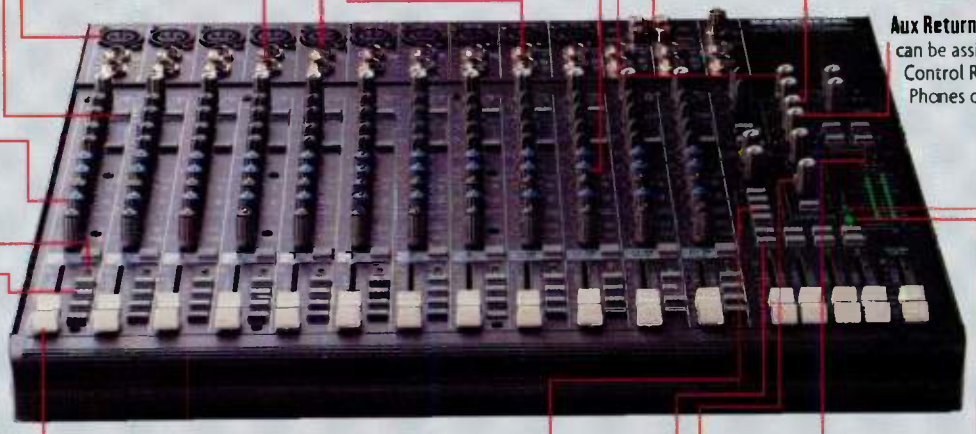
Inserts on the first 8 chs.

Effects to Monitor controls on Aux Returns 1 & 2 let you fold EFX back into stage monitor mixes independent of main PA.

4-band EQ on Chs. 9-16. With 12kHz HF, 3K Hi-Mid, 800Hz Low-Mid and 80HZ LF.

RCA inputs and outputs with tape input level control.

Aux Return 3 can be assigned to Main Mix or Subs 1 & 2 or 3 & 4.



Aux Return 4 can be assigned to Control Room/ Phones only.

60mm logarithmic taper faders with ultra-long-life resistance elements provide linear volume change from full-on to -∞.

On the back: Direct outs (Chs. 1-8, bal./unbal.), TRS mono-main output with level control, XLR stereo main outputs with recessed mic/+4 line level switch.

Control Room/Phones Section with separate headphone and control room level controls. Source Matrix selects any combination of Main Mix, Subs 1 & 2, Subs 3 & 4 or Tape for exceptional studio monitoring flexibility. Also lets you create a third live stage monitor mix or separate feed.

True 4-bus configuration with ch and master LR assigns. Each bus has 2 outputs, letting you hook up all 8 chs of a recorder without constant repatching

Master Aux Return Solo switch.

Tape to Main Mix switch.

RUDE solo LED in bright ecologially-correct green.

Level-set LED + channel strip in-place stereo solo buttons make initial level setting fast and accurate.

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LOWEST NOISE, HIGHEST HEADROOM

0.0007% THD

130dB DYNAMIC RANGE TO HANDLE HOT 24-BIT/192kHz OUTPUT FROM DIGITAL AUDIO WORK STATIONS

FLAT WITHIN 1/10dB ACROSS 20Hz TO 20kHz AND DOWN ONLY -3dB AT 1Hz and 192kHz

ULTRA-LOW IM DISTORTION & E.I.N. AT REAL-WORLD OPERATING LEVELS

IMPEDANCE INDEPENDENT

BEST RF REJECTION OF ANY COMPACT MIXER AVAILABLE

LIVE SOUND

8-TRACK RECORDING

You asked. We listened.

The 1642-VLZ PRO is packed with goodies including sweepable midrange EQ, 75Hz low cut filters to cut room rumble and drum vibrations, Control Room/ Phones switching matrix with individual level controls, four aux sends per channel, constant loudness pan control and in-place stereo solo.

Recording: The new 1642-VLZ PRO gives you the finest mic preamps ever offered on a compact mixer. Two dedicated channels for tracking. Eight for monitoring. And two stereo channels for effects. Plus "double-bussed" submix outputs so you can feed all 8 channels of your recorder without having to re-patch.

Live and Alive: Mixers aren't always sitting calmly on the side of the stage anymore. Often, they're out front. They're instruments. The 1642-VLZ PRO has plenty of mic inputs for vocals, guitars and drums – plus 4 stereo channels for DJs and Keyboards.

Call toll-free or visit our web site for complete information on the new midsize luxury 1642-VLZ PRO. Learn why it's the best compact studio or live sound mixer (and rip-roarin' Electronica sound collage board) on the planet.

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FIG. 1: With the exception of the ¼-inch instrument input, all connections are made through the XLR and ¼-inch TRS jacks on the back panel.

the midrange frequencies as drastically as a shelving EQ might.

Overall, the EQ in the En-Voice is musical and quite capable of enhancing most signals. It can be harsh and hard sounding with certain microphones, so it is best used judiciously when recording. I was pleasantly surprised by how good a direct bass guitar sounded when recorded through the En-Voice with small amounts of the bass and mid EQ sections applied to the signal.

PUT ON THE SQUEEZE

The tube compressor section is the heart of the En-Voice. Using the Tube Saturation knob, you can set the degree to which the 12AX7 tube saturates signals. Oddly, the LED that indicates the saturation level is not in the compressor section, but to the right of the output section. The Tube Saturation LED color is normally green, turns yellow as saturation begins, and becomes red as distortion occurs.

A 12-segment LED indicates the amount of gain reduction the compressor introduces. If you want to just add tube coloration to a signal without compressing it, leave the compression ratio at 1:1 and adjust the Tube Saturation knob to taste. As with the EQ, the compressor's markings are somewhat confusing, with the ratios indicated in reverse of U.S. norms and the reference 1 designation omitted altogether. For instance, the compression ratios 2.5:1 and 5:1 are indicated as :2.5 and :5, respectively.

The attack and release times of the compressor are preset to either fast or slow envelope settings. A single button toggles between the two speeds, which affect the attack and release simultaneously. At the fast setting, the attack time is set to 15 milliseconds and the release to 60 milliseconds. Activating the Slow button increases both envelope times by a factor of ten. The preset envelope settings worked well on most of the signals I compressed.

The En-Voice also employs a fixed-frequency sidechain filter that, when engaged, causes frequencies under 300 Hz to have less influence on the compressor. This helps prevent dulling in the mid and high frequencies from overcompression.

An Effects button in the output section engages or disengages all of the effects. The Output Level knob adjusts the amount of processed signal, allowing you to compare the original and processed sounds at the same relative level. When the Effects button is disengaged, the Output Level knob is bypassed. Once again, the markings are not as clear as they could be; they're simply numbered 1 through 10, with 5 being center-detented. I would have preferred decibel markings, but the end result is the same: the En-Voice allows you to tweak the output level to match the recording device of your choice.

En-Voice Specifications

Frequency Range	10 Hz–22 kHz, ±1 dB
Dynamic Range	mic input, 112 dB; line input, 92 dB; instrument input, 90 dB (unweighted)
THD	0.04% (with Tube Saturation at 0)
Dimensions	19" (W) × 1.75" (H) × 9.4" (D)
Weight	7.8 lbs.
INPUT/OUTPUT	
Line Inputs	(1) XLR; (1) ¼" balanced
Mic Input	(1) XLR
Instrument Input	(1) ¼" unbalanced
Line Outputs	(1) XLR; (1) ¼" balanced
Bass Cut	50 or 100 Hz selectable; –3 dB @ 6 dB/octave slope
EQ	
Bass	20–300 Hz adjustable; +15 dB @ 6 dB/octave; –15 dB @ 12 dB/octave
Mid	100 Hz–11 kHz adjustable; ±15 dB; 3–24 dB/octave adjustable slope
High	on/off; 1.6 kHz–22 kHz adjustable; ±15 dB; 6 dB/octave slope
COMPRESSOR	
Threshold	+2 to –28 dB adjustable
Ratio	1:1 to 1:∞
Attack/Release (preset)	switchable between Fast (15 ms attack/60 ms release) and Slow (150 ms attack/600 ms release)
Filter	fixed sidechain EQ, 300 Hz @ 6 dB/octave
Tube Saturation	0.1% to 10% adjustable

CHAIN, CHAIN, CHAIN...

In the personal studio, entire multitrack projects are often recorded through the same signal path. The more tracks you record, the more the character of your recording chain—whether good or bad—becomes apparent.

One of the cool things about the En-Voice is its ability to change its sonic signature through the amount of processing applied to a signal. Because you can remove each effect component from the signal path altogether, the En-Voice suffers much less from that "everything sounds alike" vibe that you get with other voice processors and channel strips. The En-Voice can sound cool or warm, bright or dull, even big or small depending on the settings (especially in the compression/tube saturation section).

The En-Voice can sometimes impose

For manufacturer information, please see Contact Sheet, p. 227.

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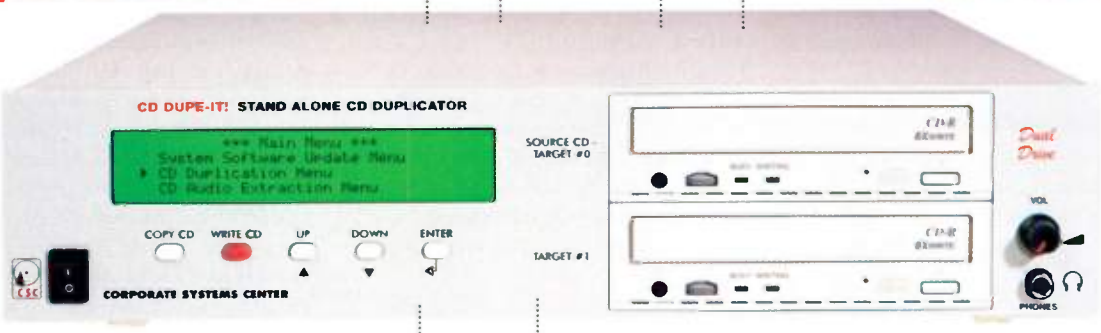

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Dual Drive Model is pictured above.

too much aural personality. I noticed that certain microphones sounded really good matched with the En-Voice, while others didn't work as well. In particular, using a tube mic with the En-Voice was never pleasing to my ears; all those tubes just seemed to be too much of a good thing.

VOCAL WARM-UPS

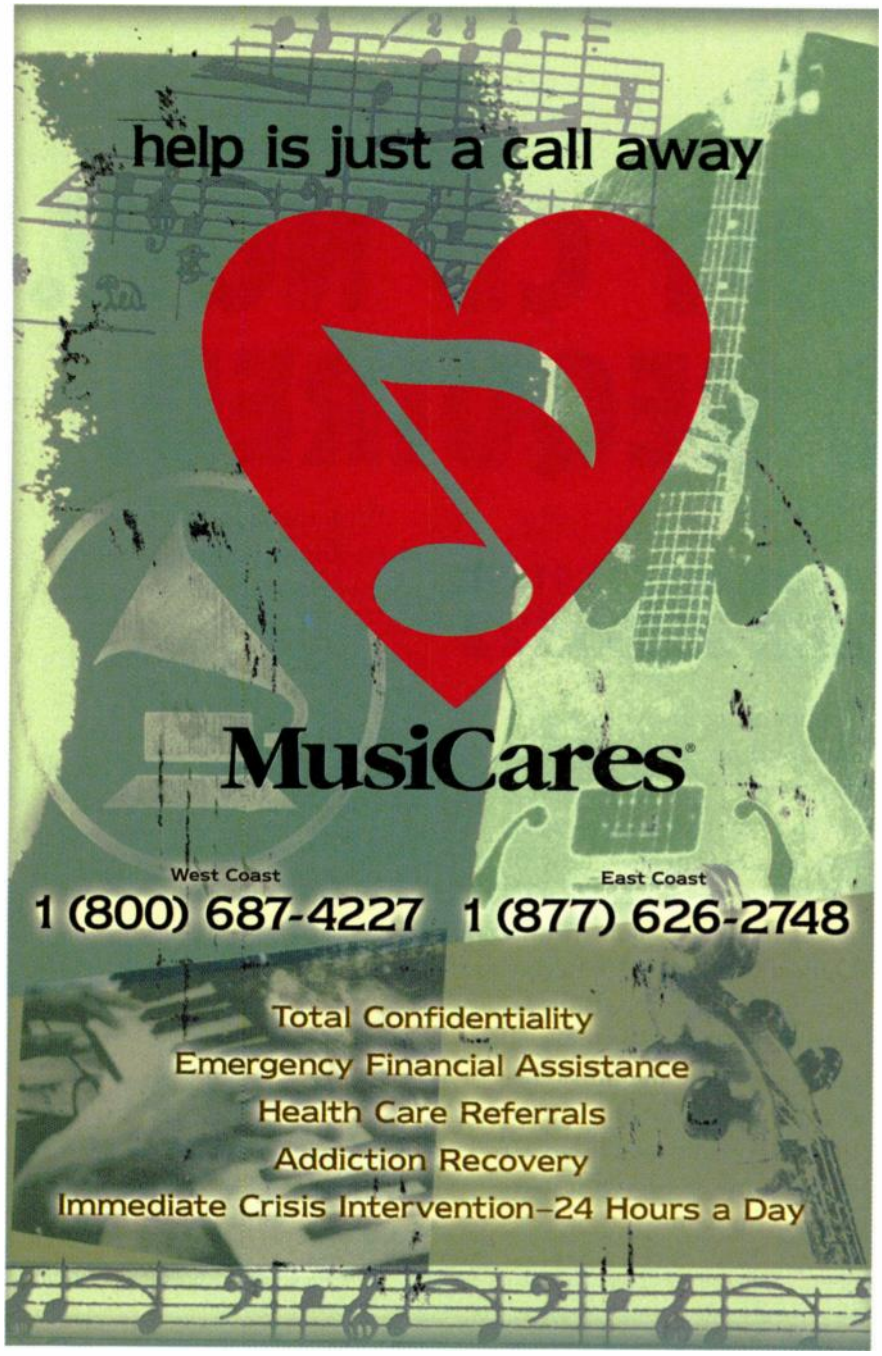
One of the primary purposes of the En-Voice is to record vocals. The signal path is indeed clean, even with low saturation levels selected. However, I noticed that there is not much headroom in the preamp section, and hitting any of the red LEDs at all creates ugly distortion. At first, I struggled to keep the LEDs out of the red while recording a very dynamic male singer. Once I backed off the Input Gain, though, things went smoothly. Fortunately, the En-Voice signal path is quiet overall, so lowering the level didn't hurt the signal-to-noise ratio, even though the meters read a little lower than I would have liked.

Once you get the input level set properly, the rest of the En-Voice is easy to use. I found the preset bandwidths for the bass and high EQ modules to be perfectly acceptable for vocal recording, and I never had a problem with them. The fully parametric mid band is more than capable of adding any necessary filtering, but as long as I was using decent microphones, I was able to make most of my subtle EQ tweaks with the bass and high bands.

The compressor's preset envelope speeds also posed no problems for recording vocals. Depending on the transient nature of the vocal performance, one of the two settings always worked well. In most cases, it's a good idea to take it easy on the compression while actually tracking vocals. When used judiciously, the En-Voice tames the peaks and allows the tone of the voice to blossom while maintaining the dynamic nature of the vocal performance.

In situations in which I had to utilize heavier doses of compression, I often found it helpful to engage the sidechain filter. This restored some life to the performance by not dulling the highs as much.

The Tube Saturation function can be both a blessing and a curse. To my ears, it goes from subtle to extreme coloration rather quickly, so you'll have to get a handle on when and how



MINDPRINT
En-Voice voice processor
$749

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

PROS: High-quality preamp, EQ, and tube compressor. Accepts instrument-, mic-, and line-level signals. Components can be removed from the signal path. Tube saturation adds nice coloration. Metering is easy to read. Optional digital I/O.

CONS: Low input headroom. Phantom power button located on rear panel. Compressor has minimal settings. Output is line level only.

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THIS MAJOR NEW UPGRADE TO BAND-IN-A-BOX INCLUDES OVER 50 NEW FEATURES! We've added a full featured digital audio track, so you can add live vocals or guitar playing to your song. There's also an intelligent style selection wizard which shows you what styles would work best in your song, highlighting all styles that have a similar tempo, genre, and feel. Guitarists will love the guitar enhancements, tablature display, and a great automatic feature that creates a pro quality guitar chord solo to any melody, displayed perfectly on the guitar fretboard. There's a new ***Big Lyrics Window*** with selectable font and size, and a ***Big Piano Window*** that displays a piano with large size keys and optional note names. ***And much more...***

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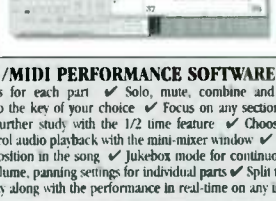

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to apply it. Of course, the first time I recorded a vocal through the En-Voice, I poured on the saturation to check it out. Later, I determined that I had overdone it—a little goes a long way. Luckily, I was recording a scratch vocal at the time, so there was no harm done.

There is not much headroom in the preamp section.

DIRECT INJECT

I recorded some mono keyboard parts through the En-Voice and found that it worked well on certain sounds. Samples of oboes, French horns, and synth leads all matured with a combination of EQ, compression, and tube saturation. Polyphonic instruments like piano and organ, however, didn't fare as well. These instruments tended to overdrive the input too easily. Even when the input level was set properly, I wasn't crazy about the results.

The instrument input on the front panel makes it a snap to process guitar or bass. You can run an electric guitar through your pedal effects and straight into the En-Voice. You're likely to get enough sonic improvement to make simple setups—such as a clean Fender Stratocaster with chorus and delay—sound good going directly to the recorder.

I really liked the way the bass guitar sounded when plugged directly into the En-Voice. The compressor and tube stage gave depth to the tone, while eliminating that typical undesirable DI sound. If you need the bass to take up a little more space in the recording, you can dial in a touch of tube saturation. Take care not to use too much, though, as it can remove the focus of the bass tone. I sometimes wished for more control over the envelope parameters when using the compressor on the bass, because the preset speeds didn't work well with many styles of bass playing.

Electrified acoustic guitars sound really good through the En-Voice as well, because the processor restores some of the life that can get lost through the guitar's pickups. The EQ works well for tone shaping, and the saturation stage gives the guitar sound added body and character.

EN-VOGUE

The En-Voice packs a lot of processing into a single rackspace. The unit is well built, and the signal path is top-notch. The EQ sounds good and is easy to operate. The compressor's tube stage adds character to the signal, especially when tracking with microphones to a digital recorder. The extra fullness it imparted to female vocals was very appealing, and I liked dialing in just a taste of saturation to smear the details a little. Although I would have liked more control over the compressor's envelopes, the presets worked well for most applications.

The En-Voice's ability to handle mic-, line-, and instrument-level signals makes it flexible and convenient to use. And with the addition of the optional digital I/O, you can process tracks that are already digitized. The En-Voice is a clear winner in the field of voice processors.

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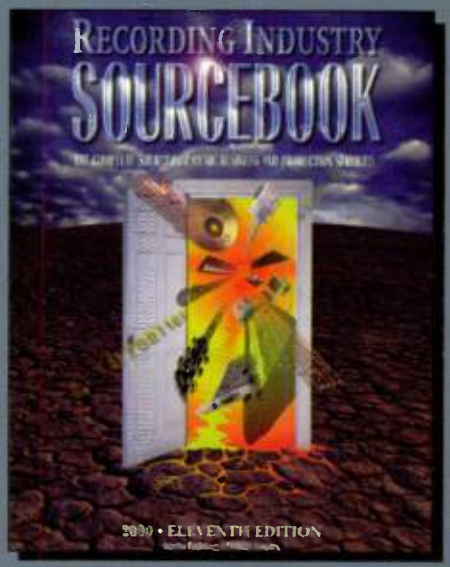

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AUDIO SOFTWARE

AUDIO ARCHITECT 4.01 (WIN)

Re-create analog modular synthesis on your PC.

By Scott R. Garrigus

Over the past few years, software synthesis has become a major craze on the desktop. Shareware and commercial developers alike have flocked to this new technology, releasing myriad products ranging from basic playback synths and emulators to full-blown, real-time virtual synthesizers. In many cases, these software synths rival their hardware counterparts.

Audio Architect 4.01 from Audio Software is a powerful application that lets you re-create many different synthesis systems by using basic building blocks like those found in analog modular synthesizers—with a few new digital twists thrown in. The graphical nature of the program makes it easy to create systems, from a simple 1-oscillator analog synth to a complex FM or additive circuit. An extensive toolkit of modules provides a wide range of flexibility. These modules are "patched" together in the program's work space (called the "design sheet") to form a network. The program then calculates the sound and lets you hear it in real time or save it as a digital audio file.

You might say that *Audio Architect* is a real-time modular synth, a digital and virtual-analog synth, a synth construction kit, a professional sound-design system, and an array of classic synths, all in one software package. But because of a few limitations, the program's strengths lie in synth construction and sound design rather than in real-time virtual synthesis.

DESIGNING A NETWORK

Designing a network in *Audio Architect* is actually quite easy thanks to its graphical interface. A wide range of examples—from complex additive networks to simpler Hammond organ emulations—is available for you to study. (A number of additional free networks are available for download from the Audio Software Web site, with more promised in the future.)

By selecting the icons that represent the modules you need from the Module Toolbox and dropping them onto a design sheet, you can create a network within a few minutes (see **Fig. 1**). A basic network needs an input module, a sound generation module, and an output module.

For example, you might use the MIDI module for input, the Oscillator module for sound generation, and the Real-Time module for real-time output. After placing these modules on the design sheet, you create control and audio connections between them by right-clicking the mouse on one module and dragging and releasing the mouse on another. In our simple example, three connections are made: an audio connection from the Oscillator to the Real-Time module and two control connections from the MIDI module to the Oscillator (one for controlling pitch and another for turning the oscillator on and off).

Each module also comes with its own group of adjustable parameters. Double-clicking on a module brings up its corresponding parameter window. For example, the MIDI module lets you specify the MIDI port and channel, the gate mode (retrigger or legato), and two user-defined controllers. Basic controllers, such as Modulation, Pitch Wheel, Aftertouch, and Volume, are predefined. You can set up more user-defined controllers by adding more MIDI modules to the network and assigning them to the same MIDI port and channel.

Once you've added modules, made connections, and set parameters to complete a network, selecting the Modules/Calculate menu computes the sound that the network is designed to make. You can then play the sound with any MIDI device. Calculation never took more than a few seconds on my PC, even with very complex networks. (I'll address real-time performance issues a bit later.) And after a network has been calculated, you can still make changes such as altering module parameters and connections, or even adding and deleting modules, as the network is being played. This is where the real-time capabilities of *Audio Architect* come in handy; you can tweak a sound as you listen to it.

Of course, to design sounds in *Audio Architect,* you have to know something about how synthesis works—this program won't teach you. Fortunately, the included documentation is quite good, and a printed manual and online help file both explain the workings of the program very nicely. The manual includes a number of tutorials to get you started.

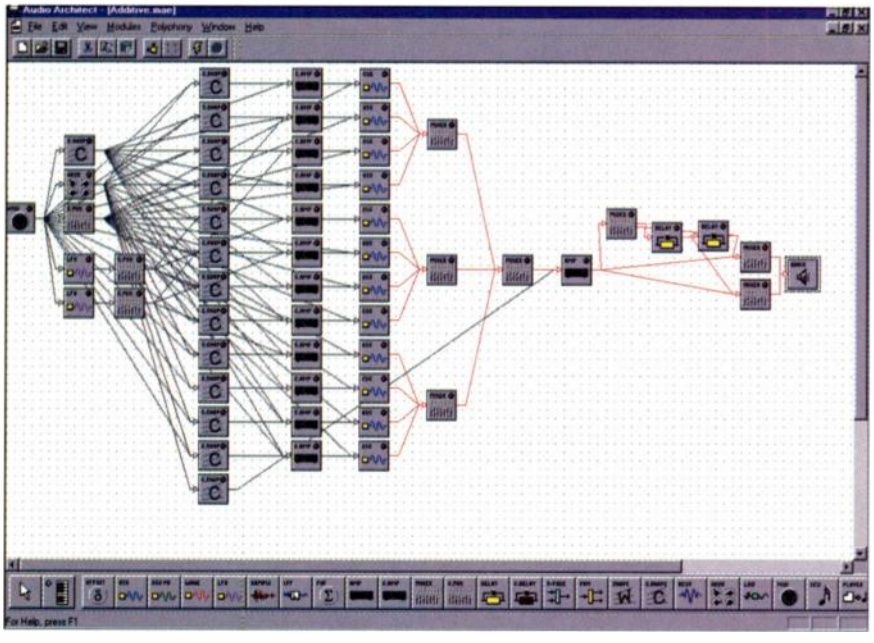

FIG. 1: Because of its graphical interface, designing a network in *Audio Architect* is a simple matter of selecting module icons and dropping them onto a design sheet.

BASIC MODULES

As you work with *Audio Architect,* you begin to realize just how much power is

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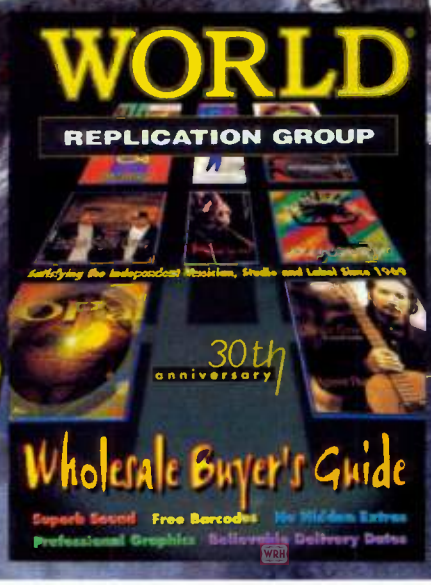

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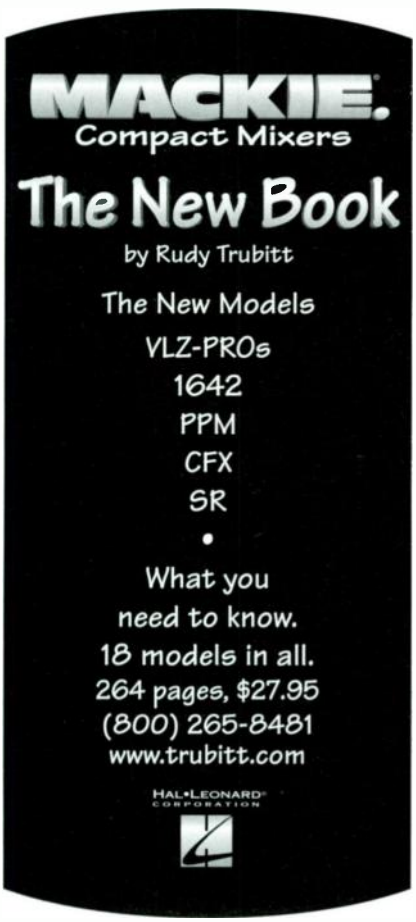

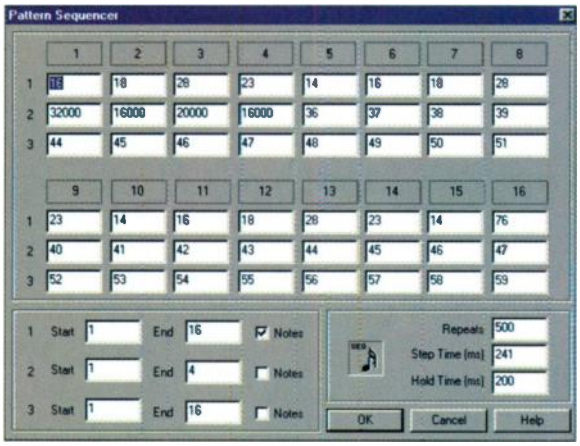

FIG. 2: *Audio Architect*'s Sequencer is based on analog pattern-based sequencers and provides 16 steps for each of three channels. You can use this module to create numerous types of dynamically changing sounds.

possible with software synthesis. This is especially true with this program because of its modular approach. By giving you access to the basic building blocks of synthesis, *Audio Architect* lets you create sounds using a variety of methods, including subtractive, additive, FM, phase distortion, and sample playback.

In addition to the MIDI module, the Sequencer and File Player modules can be used to drive a network. The Sequencer is modeled after the old analog riff-based sequencers and provides three channels of 16 values each (see **Fig. 2**). It steps through the values at a user-defined rate (in milliseconds) and sends them to three control output connections.

Because the values sent are numerical, they can be used to represent notes as well as any kind of control data. For instance, you can use one channel to send note values to an oscillator, another channel to send filter parameters to a lowpass filter, and the third channel to set the volume of an output module. This makes the Sequencer extremely flexible and useful for creating all kinds of dynamic sounds. The File Player is the same as the Sequencer except that it lets you output five values and provides an unlimited number of steps via a text file that you must construct by hand.

For sound generation, *Audio Architect* provides Oscillator, Phase Displacement Oscillator, and Sample Player modules. You can produce many basic waveforms with the Oscillator, including sine, square, sawtooth, triangle, and noise. The Oscillator can be controlled via its note, detune, and amplitude control connections. It can also be hard-synched and modulated by another oscillator. The Phase Displacement Oscillator is basically the same as the Oscillator, but it has a distinct sound because it is based on the phase distortion synthesis method. This lets you create networks that mimic the old Casio CZ hardware synths.

The Sample Player module is one of the best tools in the kit, because you can use it for sample playback as well as to modulate an Oscillator. This provides the means for some very complex FM synthesis simulations, although you can use the Sample Player only as a modulator and not as a carrier. The Sample Player is also limited to mono files. To get around this, you can set up two Sample Players, each containing half of the stereo signal. The Sample Player can also loop and play a sample in reverse.

Some of the other basic modules included in *Audio Architect* are the Low Frequency Oscillator, Low-Pass Filter, Amplifier, ADSR Envelope, Mixer, Delay, Pan, Crossfader, Lag Time Processor, and WAV. Most of these provide the same functions as their hardware counterparts. Amplifier, for instance, is the same as a voltage-controlled amplifier in an analog synth. The exceptions are the Lag Time Processor and WAV. WAV is simply an alternative to the Real-Time output module and is used to save the sound generated by a network to a 16-bit mono or stereo WAV file. This lets you create complex networks that might not be playable in real time, and you can use the audio output in another sample playback device (or as the starting point for a new network). The Lag Time Processor provides a portamento function when used to control the note input of an Oscillator or Sample Playback module.

One grievance I have with some of these basic modules is that there are not enough detailed parameter settings. The Low Frequency Oscillator,

For manufacturer information, please see Contact Sheet, p. 227.

for example, provides LFO depth, modulation frequency, and depth parameters that can be set via sliders, but there aren't any numerical readings showing what values the sliders represent. Although the parameters for the Low-Pass Filter and ADSR Envelope do include numerical readings, it would be nice to see a graphical representation of the filter and envelope and to have the option of editing them graphically as well.

ADVANCED MODULES

In addition to the basic sound generation and processing modules, *Audio Architect* boasts some more advanced functions. These include the Wave Oscillator, Finite Impulse Response Filter, Waveshaper, and Sine Shaper. There are also various modules available for manipulating control signals the same way as audio signals. These include the Control Amplifier, Control Mixer, Control Delay, and Control Shaper.

The most interesting module is the Waveshaper (see **Fig. 3**). It takes an audio input and passes it through a wavetable. The wavetable is derived by using the Wave Analysis function, which performs a set of Fourier transforms on a WAV file and uses the harmonic information to construct the wavetable. With the Waveshaper, you can create new sounds based on the characteristics of existing ones. For example, if you perform a Wave Analysis on a violin sound and then use the resulting wavetable on a vocal sample being passed through the Waveshaper, you'll end up with a vocal sound that has violin-like qualities. It makes for some very interesting experimentation. The Wave Oscillator and Sine Shaper are similar to the Waveshaper except that the Wave Oscillator uses a sawtooth wave as its audio source at all times, and the Sine Shaper is permanently set to simulate resonance.

I should also mention the Finite Impulse Response Filter. This module is a digital filter that uses mathematically based settings to perform its function.

Audio Architect
Minimum System Requirements
Pentium 133; Windows 3.x/95/98/NT 4.0; Windows-compatible sound card

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By setting up a kernel of up to eight coefficients, you can create very complex filtering algorithms that can strengthen certain frequencies and weaken others at the same time. Personally, I find it a bit confusing, but there's plenty of room for experimentation here, and I plan to delve further into this function during future sound-designing sessions.

REAL-TIME ISSUES

So just how well can *Audio Architect* substitute for your favorite hardware synth? Here are some comments about my own experience.

As mentioned previously, networks can be played in real time via MIDI. I tested the program's real-time capabilities extensively and found that even on my Pentium II 300 with 64 MB of RAM, *Audio Architect* exhibited quite a bit of latency. This happened even with the simplest networks. Luckily, the program lets you fine-tune your sample and control-rate settings to minimize problems.

In addition to latency, polyphony is another important consideration. Networks can be designed for either monophonic or polyphonic performance, and you can limit the polyphony of a network to achieve more responsive playback. On the other hand, the program has a hard limit of ten polyphonic voices, which may or may not be adequate for your needs.

Though you'll often be using a MIDI controller to play the program, there might be times when you want to control a network from a sequencer running on the same computer. *Audio Architect* doesn't come with built-in virtual MIDI-routing capabilities, but you could use a third-party virtual MIDI router, such as the one that's bundled with Sonic Foundry's *Sound Forge.*

Using this router, I was able to direct the MIDI output from Cakewalk *Pro Audio* into *Audio Architect.* At first I got very choppy performance—digital distortion in the form of clicks and dropouts kept interrupting the sound. Then I discovered *Audio Architect*'s High Priority mode. This feature forces your computer to provide *Audio Architect* with more CPU power than any other program running at the same time. Turning High Priority mode on caused sluggish interface response in all of my other programs, but it also eliminated any anomalies in playback, allowing *Pro Audio* to drive *Audio Architect* with no problems at all. The High Priority mode would also be the preferred one to use if you were writing the program's output to disk and wanted to make real-

AUDIO SOFTWARE
Audio Architect 4.01 (Win)
modular synthesis software
$149

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

PROS: Modular synthesis design. Graphical network construction. Real-time update capabilities. Unlimited network design complexity.
CONS: Limited polyphony. No standard multitimbral support. Slightly limited real-time performance. Missing parameter details in some synthesis modules.

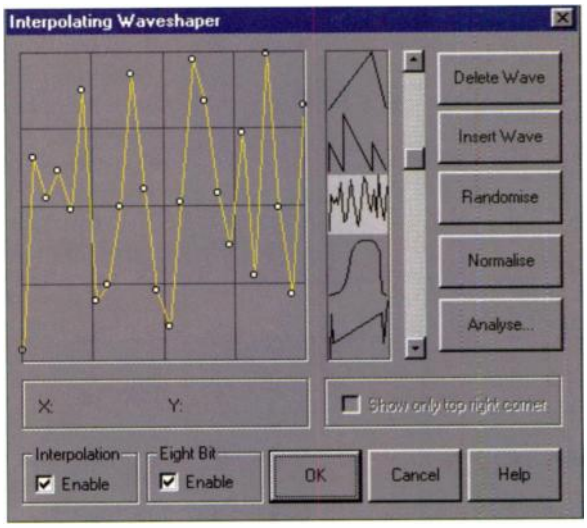

FIG. 3: The Waveshaper accepts an audio input and passes it through a wavetable. This module allows you to create new sounds based on the characteristics of existing ones.

time changes in parameters while doing so.

Most musicians are accustomed to multitimbral capabilities in their hardware. Though you can have more than one network open at once in *Audio Architect*, they can't share the same sound-card output. This means that to play two or more networks simultaneously, you have to use more than one sound card or use a card that has multiple outputs. Even so, I'm a bit skeptical about how the program would perform with more than one network open in real time. (I wasn't able to test this option.)

Audio Architect's limited polyphony and lack of multitimbral support limit the program's usefulness as a real-time playback synth. However, being able to tweak a sound as it plays, even with a bit of latency, definitely comes in handy when designing your own networks. (And don't forget that this is a $149 product.)

ENDLESS POSSIBILITIES

As you can see, *Audio Architect* is a powerful program. With the basic building blocks of synthesis at your disposal, you can create networks that mimic the sounds of classic synths. And because you can add as many modules to a network as your CPU allows, you can also create new sounds limited only by your imagination.

The only real misgivings I have about the product are the limited polyphony, somewhat limited real-time performance, and lack of multitimbral capabilities. If these three aspects were improved, *Audio Architect* would shine not only as a synth construction kit and professional sound-design system but also as a real-time multitimbral playback synth for compositional purposes. The High Priority mode definitely improves *Audio Architect*'s real-time performance, but it adversely affects the program's responsiveness and that of other programs running simultaneously.

In either mode, the real-time capabilities of *Audio Architect* are most helpful in the construction of new sounds, and the program's numerous synthesis modules cry out for experimentation. One thing is certain: if you're interested in sound design and synthesis, you could quickly become addicted to this program. *Audio Architect* is one tool that every serious synthesist should check out.

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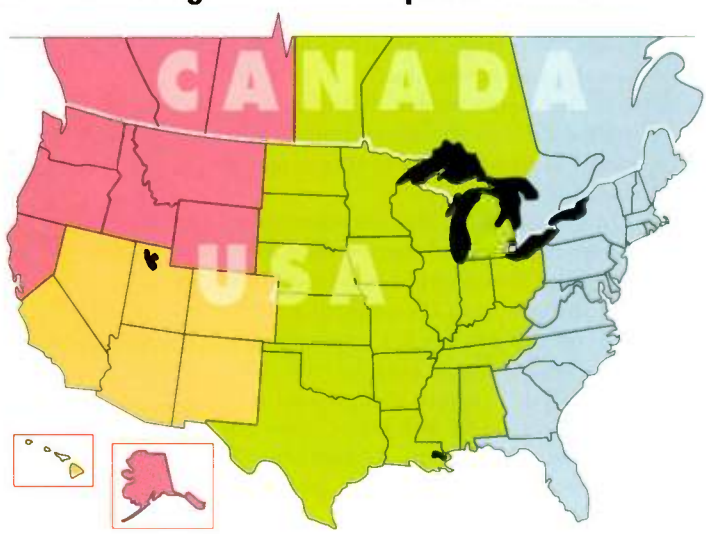

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Hexadecimal Conversion Chart

Decimal	Hex.	Decimal	Hex.
0	H00	64	H40
1	H01	65	H41
2	H02	66	H42
3	H03	67	H43
4	H04	68	H44
5	H05	69	H45
6	H06	70	H46
7	H07	71	H47
8	H08	72	H48
9	H09	73	H49
10	H0A	74	H4A
11	H0B	75	H4B
12	H0C	76	H4C
13	H0D	77	H4D
14	H0E	78	H4E
15	H0F	79	H4F
16	H10	80	H50
17	H11	81	H51
18	H12	82	H52
19	H13	83	H53
20	H14	84	H54
21	H15	85	H55
22	H16	86	H56
23	H17	87	H57
24	H18	88	H58
25	H19	89	H59
26	H1A	90	H5A
27	H1B	91	H5B
28	H1C	92	H5C
29	H1D	93	H5D
30	H1E	94	H5E
31	H1F	95	H5F
32	H20	96	H60
33	H21	97	H61
34	H22	98	H62
35	H23	99	H63
36	H24	100	H64
37	H25	101	H65
38	H26	102	H66
39	H27	103	H67
40	H28	104	H68
41	H29	105	H69
42	H2A	106	H6A
43	H2B	107	H6B
44	H2C	108	H6C
45	H2D	109	H6D
46	H2E	110	H6E
47	H2F	111	H6F
48	H30	112	H70
49	H31	113	H71
50	H32	114	H72
51	H33	115	H73
52	H34	116	H74
53	H35	117	H75
54	H36	118	H76
55	H37	119	H77
56	H38	120	H78
57	H39	121	H79
58	H3A	122	H7A
59	H3B	123	H7B
60	H3C	124	H7C
61	H3D	125	H7D
62	H3E	126	H7E
63	H3F	127	H7F

MIDI Continuous Controllers & Standardized Functions

Controller#	Function
0	Bank Select (sometimes CC#32)
1	Modulation Wheel or Joystick Up
2	Breath Controller (Yam/K25), Joystick Down (Korg), Controller 2 (XP-60/80)
3	Undefined
4	Continuous Foot Controller
5	Portamento Time
6	Data Slider (K2) , Slider A (K25)
7	Main Volume
8	Balance
9	Undefined
10	Panning
11	Expression Controller
12	Effect Controller 1, Slider A (QS8), Knob. F(FIZMO)
13	Effect Controller 2, Slider B (QS8)
14	Undefined
15	Undefined
16	Gen. Purp. Contr. 1, Knob 1 (EX5), Controller 1 (XP-10), Ribbon (Triton)
17	Gen. Purp. Contr. 2, Knob 2 (EX5), Controller 2 (XP-10), Knob 1 (Triton)
18	Gen. Purp. Contr. 3, Knob 3 (EX5), Slider (Triton)
19	Gen. Purp. Contr. 4, Knob 4 (EX5), Knob 2 (Triton)
20	Knob 5 (EX5), Knob 3 (Triton)
21	Knob 6 (EX5), Knob A (P2000), Slider A, (E-Synth), Knob 4 (Triton)
22	Slider B (K25), Ribbon (EX5), Knob B, (P2000), Slider B (E-Synth)
23	Slider C (K25), Knob C (P2000), Slider C, (E-Synth)
24	Slider D (K25), Knob D (P2000), Slider D, (E-Synth)
25	Slider E (K25), Knob E (P2000)
26	Slider F (K25), Knob F (P2000)
27	Slider G (K25), Knob G (P2000)
28	Slider H (K25), Knob H (P2000)
29 - 31	Undefined
32	LSB for CC# 0
33	LSB for CC# 1, Controller 1 (XP-60/80)
32 - 63	LSB for Controllers 0 - 31
64	Sustain (Damper)
65	Portamento Switch
66	Sostenuto Pedal, Thumby Button (E-Synth)
67	Soft Pedal, Leslie Speed (K25)
68	Legato Footswitch
69	Hold 2
70	Sound Controller 1 (Sound Variation)
71	Sound Controller 2 (Timbre/Harmonic Content), Knob I (FIZMO), Filter Resonance (XP-60/80)
72	Sound Controller 3 (Release Time), Filter, Decay (XP-60/80)
73	Sound Controller 4 (Attack Time), Filter, Attack (XP-60/80)
74	Sound Controller 5 (Brightness), Knob Z (FIZMO), Filter Cutoff (XP-60/80)
75	Legato Control (K2/K25)
76 - 77	Sound Controllers 6 - 7
78	Sound Controller 8 , Knob I (P2000)
78	Sound Controller 9 , Knob J (P2000), Knob M (FIZMO)
79	Sound Controller 10, Knob O (FIZMO)
80 - 83	Gen. Purpose Controller (5 - 8)
84	Portamento Control
85 - 90	Undefined
91	FX 1 Depth (Reverb), Knob K (P2000), Slider C (QS8)
92	FX 2 Depth (Tremolo), Knob L (P2000)
93	FX 3 Depth (Chorus), Slider D (QS8)
94	FX 4 Depth (Detune)
95	FX 5 Depth (Phaser)
96	Data Increment (+)
97	Data Decrement (-)
98	Non-Registered Parameter Number LSB
99	Non-Registered Parameter Number MSB
100	Registered Parameter Number LSB
101	Registered Parameter Number MSB
102 - 120	Undefined
120	All Sounds Off
121	All Notes Off
122 - 127	Channel Mode Messages

Tempo/Note Length to Delay Time (milliseconds)

BPM	4/4 bar	1/4 note	1/8th note	1/16th note	1/32nd
60	4000	1000	500	250	125
65	3692.30	923.07	461.53	230.76	115.38
70	3428.57	857.14	427.57	214.28	107.14
75	3200	800	400	200	100
80	3000	750	375	187.5	93.75
85	2823.52	705.88	352.94	176.47	88.23
90	2666.66	666.66	333.33	166.66	83.33
95	2526.31	631.57	315.78	157.89	78.94
96	2500	625	312.50	156.25	78.12
97	2474.22	618.56	309.28	154.64	77.32
98	2448.98	612.24	306.12	153.06	76.53
99	2424.24	606.06	303.03	151.51	75.75
100	2400	600	300	150	75
101	2376.23	594.06	297.03	148.51	74.25
102	2352.94	588.23	294.12	147.06	73.53
103	2330.09	582.52	291.26	145.63	72.82
104	2307.69	576.92	288.46	144.23	72.11
105	2285.71	571.43	285.71	142.86	71.4
106	2264.15	566.04	283.02	141.51	70.75
107	2242.99	560.75	280.37	140.19	70.09
108	2222.22	555.55	277.77	138.88	69.44
109	2201.83	550.46	275.23	137.61	68.81
110	2181.81	545.45	272.72	136.36	68.18
111	2162.16	540.54	270.27	135.13	67.56
112	2142.86	535.71	267.85	133.93	66.96
113	2123.89	530.97	265.48	132.74	66.37
114	2105.26	526.32	263.16	131.58	65.79
115	2086.96	521.74	260.87	130.43	65.22
116	2068.96	517.24	258.62	129.31	64.65
117	2051.28	512.82	256.41	128.21	64.10
118	2033.89	508.47	254.24	127.12	63.56
119	2016.81	504.20	252.10	126.05	63.02
120	2000	500	250	125	62.50
121	1983.47	495.87	247.93	123.97	61.98
122	1967.21	491.80	245.90	122.95	61.47
123	1951.22	487.80	243.90	121.95	60.97
124	1935.48	483.87	241.93	120.97	60.48
125	1920	480	240	120	60
126	1904.76	476.19	238.09	119.05	59.52
127	1889.76	472.44	236.22	118.11	59.05
128	1875	468.75	234.38	117.19	58.59

BPM	4/4 bar	1/4 note	1/8th note	1/16th note	1/32nd
129	1860.46	465.11	232.56	116.28	58.14
130	1846.15	461.54	230.77	115.38	57.69
131	1832.06	458.01	229	114.50	57.25
132	1818.18	454.54	227.27	113.63	56.82
133	1804.51	451.13	225.56	112.78	56.39
134	1791.04	447.76	223.88	111.94	55.97
135	1777	444.44	222.22	111.11	55.55
136	1764.71	441.18	220.59	110.29	55.15
137	1751.82	437.96	218.98	109.49	54.74
138	1739.13	434.78	217.39	108.69	54.35
139	1726.62	431.65	215.83	107.91	53.95
140	1714.28	428.57	214.28	107.14	53.57
145	1655.17	413.79	206.89	103.45	51.72
150	1600	400	200	100	50
155	1548.38	387.09	193.55	96.77	48.39
160	1500	375	187.50	93.75	46.88
165	1454.54	363.63	181.81	90.91	45.45
170	1411.76	352.94	176.47	88.23	44.12
175	1371.43	342.86	171.43	85.71	42.86
180	1333.33	333.33	166.66	83.33	41.66
185	1297.29	324.32	162.16	81.08	40.54
190	1263.15	315.79	157.89	78.95	39.47
195	1230.77	307.69	153.85	76.92	38.46
200	1200	300	150	75	37.50

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Mac Shortcuts

File Commands

Shortcut	Function
Cmd + S	Save
Cmd + P	Print
Cmd + N	New
Cmd + O	Open
Cmd + W	Close
Cmd + Q	Quit

Editing Commands

Shortcut	Function
Cmd + C	Copy
Cmd + V	Paste
Cmd + X	Cut
Cmd + Z	Undo
Cmd + A	Select All

During StartUp

Cmd + Opt	Rebuilds the Desktop file.
Shift	Extensions off.
Cmd + Opt + P + R	Zaps PRAM, resets Chooser and Control Panel settings stored in Parameter RAM.
C	Starts computer from a CD-ROM.
Cmd + Opt + Shift + Del	Bypasses startup disk when starting up.

Getting Out of Freezes

System Key (Upper right key)	Turns computer on and off. Work will be saved before shutting down.
Cmd + .	Cancels an operation in progress.
Cmd + Opt + Esc	Forces a program to quit. Unsaved changes will be lost.
Cmd + Opt + Shift + System Key	Forced Shutdown. Unsaved work is lost.
Cmd + Ctrl + System Key	Forced Restart. Unsaved work is lost.

Working with Icons

Up, Down, Left, Right Arrows	Selects icon above, below, to the left or right of selected icon.
Letter keystab	Selects next icon alphabetically.
Shift + Click icons	Selects all clicked icons.
Drag across icons	Selects all icons in group.
Opt + Double Click icon	Opens icon, then closes enclosing folder.
Opt + Drag icon to a folder	Copies icon to folder.
Return	Highlights name of selected icon.
Cmd + Drag icon	Does opposite of the Snap-to-Grid preference.
Cmd + Opt + Drag icon	Creates alias of icon.
Cmd + delete	Moves selected icon to trash.

Working with Mac Windows

Opt + Click close box	Closes all disk and folder windows.
Opt + Click collapse box	Collapses all disk and folder windows.
Cmd + Shift + W	Closes all open windows and converts them from pop-up to normal finder windows.
Opt + Click zoom box	Enlarges a window to the full size of the screen.
Opt + Switch programs	Hides the windows of the previous program.
Cmd + Drag window	Moves a window without making it active.
Cmd + Press window's title	Displays a pop-up menu of parent folders to which the current folder belongs.
Cmd + Right Arrow	In a List view, expands the contents of the selected folder(s).
Cmd + Left Arrow	In a List view, collapses the contents of the selected folder(s).
Cmd + Expand folder	In a List view, expands the contents of the selected folder and all contained within it.
Cmd + Collapse folder	In a List view, collapses contents of the selected folder and all contained within it.

Screen Snapshots*

Cmd + Shift + 3	Takes a picture of the screen.
Cmd + Shift + 4	Takes a picture of a screen selection.

*By default, snapshots are saved to your start-up drive and named Picture 1, 2, 3, etc. Also, pressing **Ctrl** will copy the picture to the clipboard.

Windows Shortcuts

File Commands

Shortcut	Function
Ctrl + S	Save
Ctrl + P	Print
Ctrl + N	New
Ctrl + O	Open
Ctrl + F4	Close
Alt + F4	Quit

Editing Commands

Shortcut	Function
Ctrl + C or Ctrl + Ins	Copy
Ctrl + V or Shift + Ins	Paste
Ctrl + X or Shift + Del	Cut
Ctrl + Z or Alt + Bksp	Undo
Ctrl + A	Select All

Function Keys

F1	Get help on a selected window.
F2	Rename a selected item.
F3	Find a folder or file.
F5	Refresh the display of an active window. (My Computer or Windows Explorer)
F10	Activate or deactivate a menu bar.
Ctrl + F6	Switch between Windows in application.

Getting Out of Freezes

Ctrl + Alt + Del	Displays Task list to end programs or restart.
Ctrl + C	Ends program (in older applications).
Alt + F4	Program end command.

Keys

Alt	Activate or deactivate a menu bar.
Alt + Enter	Display properties of a selected item.
Alt + Esc	Activate another application's button on the taskbar.
Alt + F4	Quit an active application, including Windows 95 - or- Close an active window.
Print Screen	Copy a picture of the active window to clipboard.
Alt + Spacebar	Open the Control menu for an active window.
Alt + Tab	Switch to another running application.

Windows Explorer & System Keys

Ctrl + Esc	Open the Start menu.
Ctrl + G	Open Go to Folder dialog box while in Explorer.
Ctrl + Alt + Del	Bring up task list (to force quit a program) -or- hit again to restart machine.
Shift	Disable AutoPlay while inserting a CD-ROM.
Shift + Del	Delete file without placing it in the Recycle Bin.
Ctrl + Drag icon	Copy a file.
Ctrl + Shift + Drag icon	Create a shortcut to that file.
F8	Display boot options. (After "Starting Windows")

Moving and Editing

Ctrl + Home	Move cursor to the beginning of a document.
Ctrl + End	Move cursor to the end of a document.
Ctrl + Left Arrow	Move cursor left one word in a document.
Ctrl + Right Arrow	Move cursor right one word in a document.
Ctrl + Shift + End	Select text from cursor to the end of a document.
Ctrl + Shift + Home	Select text from cursor to beginning of document.
Ctrl + Shift + Left Arrow	Select the previous word in a document.
Ctrl + Shift + Right Arrow	Select the next word in a document.
Backspace	Delete characters to the left of cursor - or - Delete highlighted text in a dialog box.
Delete	Delete characters to the right of cursor - or - Delete selected text or object.
Down Arrow	Move cursor down one line.
End	Move cursor to the end of a line in a document.
Home	Move cursor to the beginning of a line in a document.
Left Arrow	Move cursor left one character in a document.
Page Down	Move cursor down one screen.
Page Up	Move cursor up one screen in a document.

Note: The "+" symbol indicates that the keys are to be pressed simultaneously.

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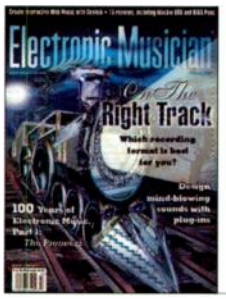

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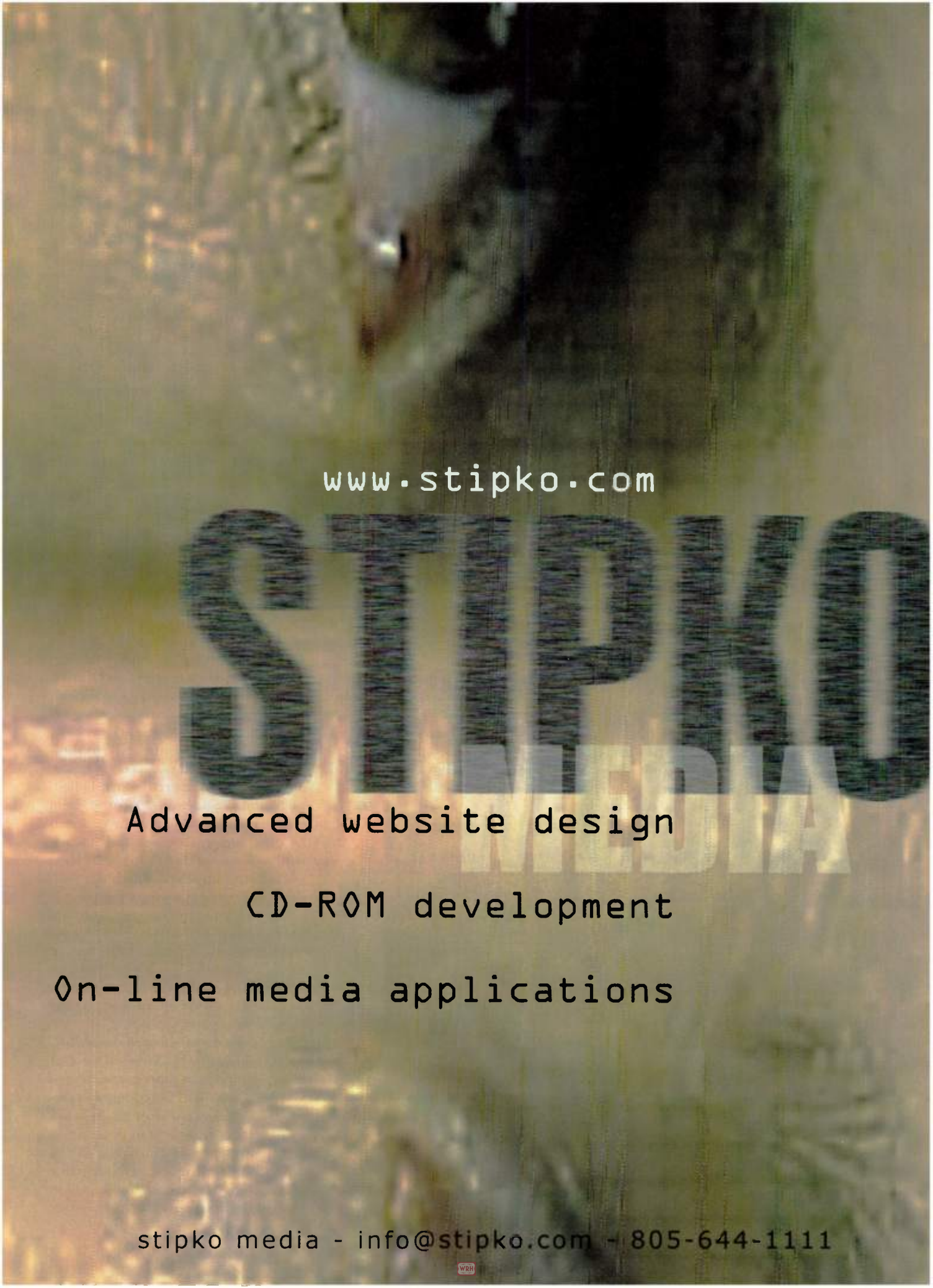
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SUZUKI

Q CHORD QC-1

Is this "MIDI Autoharp" more than a toy?

By Jeff Obee

Sophisticated instruments, such as keyboard workstations, can be wonderful, but sometimes you want to play an instrument that is simple, immediate, and fun. When I first saw the Suzuki Q Chord QC-1, I thought I had found such an instrument. The inclusion of MIDI and a playback-only GM synth gave me high hopes that it would serve as an alternative controller. However, the more I played the Q Chord, the more I realized that while it might be a nice songwriting tool or performing instrument, it is not the controller of my dreams.

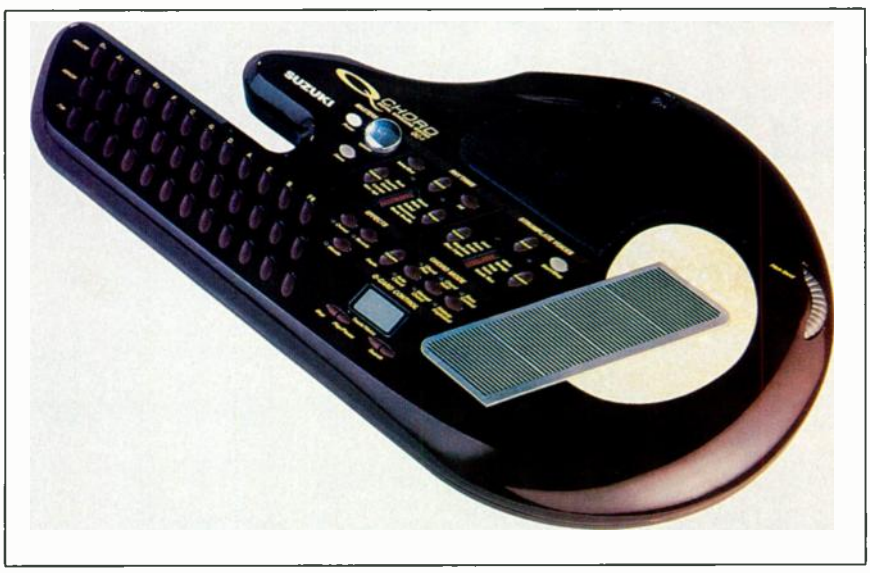
Although Suzuki calls the dark burgundy, pear-shaped Q Chord a "digital songcard guitar," it's more like an electronic Autoharp, complete with chord buttons and a Strumplate that lets you "strum" the chords. The "neck" has 36 rubber chord buttons that are laid out in three rows of 12. These trigger major, major 7, minor, minor 7, augmented, and dominant chords in all 12 keys but also have other functions. The front panel presents a 5-inch speaker with bass porting, a volume dial, and numerous plastic buttons for selecting modes of operation. The pitch-bend wheel is located on the upper right side of the instrument.

On the side of the unit are MIDI In and Out ports, a ¼-inch audio output that doubles as a headphone jack, and an AC adapter jack. A Q-card cartridge port at the end of the neck allows you to play along with popular song sequences and rhythm patterns. Underneath is a compartment for eight C cells. Among the numerous optional accessories are an AC adapter ($12.50), a DC car adapter ($12.50), a strap ($19.95), and a case ($24.95).

STRUMMIN'

The main draw of the Q Chord was the Strumplate, which spans four octaves and is played by stroking with the tip of the fingers. You can tap as well, but the response is poor: even the response to slow taps can be uneven unless you hit the small sweet spot.

The Strumplate triggers the chord tones using one of ten sounds selected from the front panel: Guitar, Piano, Strings, Vibes, Organ, Voice, Flute, Harp, Synth, and Sound FX sounds. If these sounds won't do the job for you, you can select from 100 other GM sounds using the Strumplate Select button and the Q-Card Control window or MIDI Program Changes. You can also control relative volume and sustain.



When viewed as a sort of electronic Autoharp, the Suzuki Q Chord QC-1 is a fun toy. However, it is not a good MIDI controller.

THE SECTIONS

The Q Chord is clearly intended to be a "home" instrument, not a professional-caliber musical instrument. The focus is on playing along with chord, bass, drum auto-accompaniment, and melodic fill. Q Chord sections control rhythm, Strumplate voices, effects (vibrato and reverb), Chord mode, EZ Play (for quick auditioning of sounds), and Q-card. Except for the drums, unfortunately, each of the accompaniment sections can be switched off individually.

Chord mode has six buttons that let you set up your accompaniment. Auto Chord provides basic comping, Chord Hold sustains the chord, Chord Plus adds incidental auto-accompaniment parts, Manual Chord triggers a consistent chord without any other audible accompaniment (some accompaniment MIDI data is still sent), and Bass Control adds the appropriate patch and bass line. You can use various combinations to create a mix.

The Melody Keyboard feature in Chord mode lets you perform single notes with the chord buttons. The notes are identified using a plastic "keyboard" overlay on the lower two rows. In this mode, the top row of buttons provides Transposition (in semitones), Tuning, MIDI Ex (which lets you play the internal voices from an external controller), Octave, and Voice Ex (for selecting additional onboard GM voices).

There are ten onboard rhythm-section styles: bossa nova, country, jazz, dance, new age, march, waltz, ballad, rock, and blues shuffle. Most of them groove reasonably, despite the expected "cheese" factor. However, the new age rhythm is more akin to Latin, the ballad works better up-tempo, and blues shuffle is preferable at a slower tempo.

You can alter the tempo (from approximately 62 to 240 bpm) and control the relative volume of the rhythm track. You can trigger a 4-bar intro or ending, and a 1-bar or shorter fill that ends on the downbeat of the next bar regardless of where you start.

In addition to its onboard accompaniment features, the Q Chord lets you play along with popular tunes in the form of GM Standard MIDI Files on Suzuki's proprietary Q-cards ($19.95 each). As of this writing, there are at least nine cartridges and companion books, including *Rhythm Styles* (30 generic styles, including salsa, reggae, rap, folk, and R&B) and collections of Beatles, pop, country, religious,

and children's songs. That's not a bad starting selection for a home singalong. You can't create your own cards or load MIDI files via the MIDI input, though, so you can't take advantage of third-party song sequences.

MINOR DISCHORD

Playing the Q Chord is uncomfortable no matter how you hold it. If you lay it flat on its back (it has rubber feet) and play the Strumplate right-handed, the pitch wheel's location is very inconvenient, but you can reach the chord buttons with your left hand. This is the playing position shown in the manual. However, the chord buttons seem oriented toward being played upside down, as if holding a guitar neck. After all, this is a "digital songcard guitar."

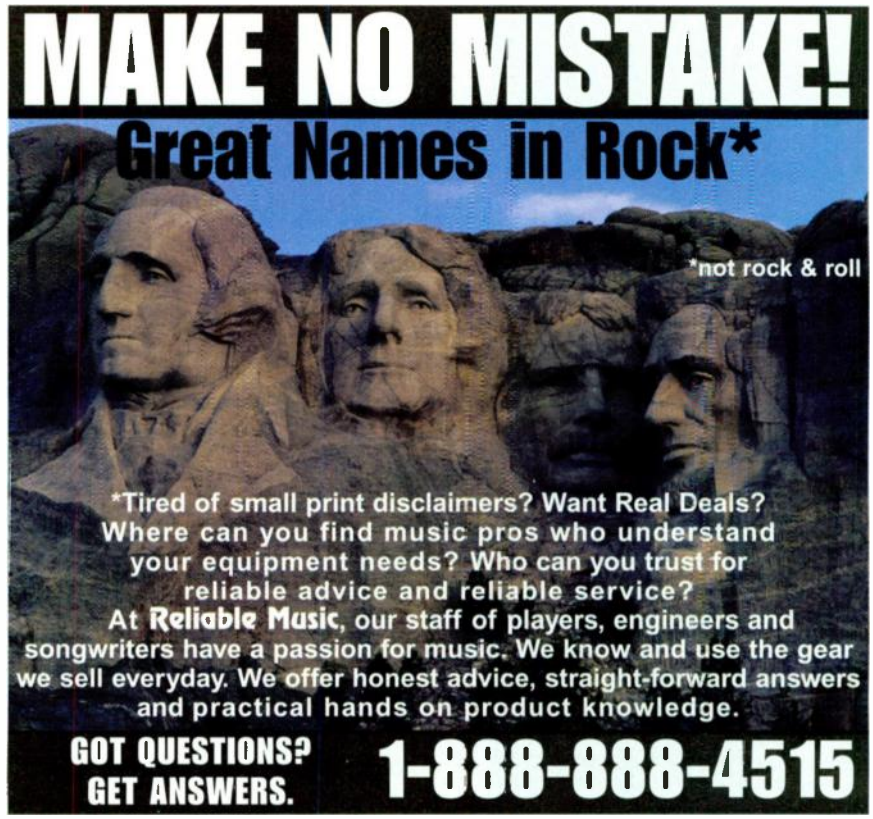
Indeed, if you hold the instrument like a guitar (rested on your knee or with the optional strap), you can fairly easily strum and reach the pitch wheel with your right pinkie finger. The chord buttons are oriented correctly for left-handed playing. But an intrusive plastic "horn" and narrow "cutaway" (obviously intended to make the Q Chord appear guitarlike) prevent you from comfortably playing the chord buttons with your left hand. Laying the unit flat seems to be the better of two poor choices.

MIDI OVERBOARD

The Q Chord receives and transmits MIDI in Omni mode only. It transmits its various parts on 12 separate channels. For instance, the Melody Keyboard is on channel 1, Chord Plus on channels 3 and 4, and the Strumplate on channels 14, 15, and 16.

As noted previously, most Q Chord sections can be turned off, but not drums—so MIDI data is constantly output on channel 10. Strangely, the Q Chord regularly sends MSB, LSB, and Pitch Bend value 64 (the middle, "neutral" position on a pitch wheel) messages on all accompaniment channels, even those that are supposed to be turned off. Presumably this data is intended to reset synth voices on all channels, but when a part is off, it ought to send no data.

To top that off, when you change chords with the buttons, the Q Chord sends unexpected Pitch Bend messages in order to shift sustaining Strumplate notes to the proper pitch. (Remember, the Strumplate triggers chord tones determined by the buttons.) These Pitch



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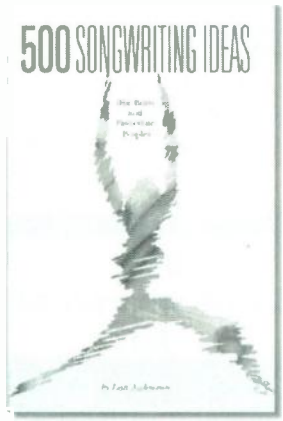

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For manufacturer information, please see Contact Sheet, p. 227.

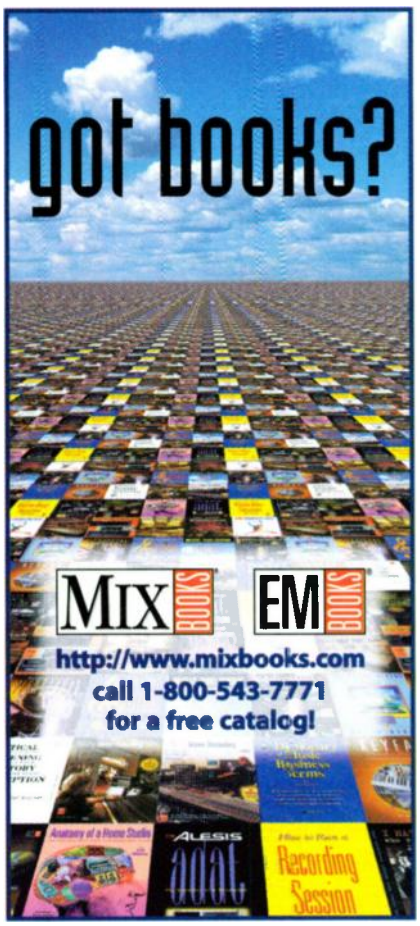
Q Chord QC-1 Specifications

Synth Engine	GM 1-compatible sample playback
Melody Keyboard Sounds	109 GM (not editable)
Strumplate Voices	100 GM (not editable)
Strumplate Range	4 octaves
Chord Buttons/Chord Types	36/84 (major, minor, min7, maj7, dom7, aug, and dim in 12 keys)
Accompaniment Parts	Drums, Bass, Chord, and Chord Plus (with individual controls)
Effects	vibrato, reverb (with adjustable depth)
Rhythm Styles (onboard)	rock, country, dance, lounge, new age, waltz, ballad, march, bossa nova, blues shuffle
Sound System	(1) 5" oval speaker; 7W power amp; bass ports
Displays	(1) 2-digit LCD; (2) LED light bars (Rhythm Select and Strumplate Voice); (12) status LEDs
Ports	¼" TRS headphone/stereo line out; MIDI In, Out; Q-Card; AC power in
Power	12 VDC (8 C cells or external AC adapter)
Dimensions	21¼" (L) × 11¾" (W) × 2⅛" (H)
Weight	3.25 lbs.

Bend messages can make a non-GM synth sound drastically out of tune. Add the three channels for Strumplate output, and you have enough extraneous data to annoy the average sequencer jockey.

I connected the Strumplate with several GM-compatible modules (an EVS, Yamaha MU5, and Korg NS5R GM set) and found that the auto-accompaniment and Strumplate triggered the GM modules correctly. But using it with a GM sound bank in my K2000 resulted in very off-pitch notes. In addition, the tails of ringing notes were often truncated on playback, even with GM modules.

With some effort, you can sequence Strumplate parts, even in odd meters. To sequence the Strumplate on its own, I had to turn down the drum part (turning down the Rhythm volume on the Q Chord sends CC 7 messages to the GM module) so I didn't have to listen to it. But I was still forced to remove the superfluous drum, Pitch Bend, and other data recorded to the sequencer.



SUZUKI
Q Chord QC-1 digital songcard guitar
$199

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

PROS: Innovative Strumplate interface. Convenient, Autoharp-like chord buttons. Sounds good for instrument in this price range.

CONS: Playing comfort is diminished by ergonomic problems. Drums can't be disabled. Extraneous MIDI data reduces value as controller.

THE LOST CHORD

The Q Chord is a deeper product than I initially thought. It's fun when used as a stand-alone instrument, seems well built, and sounds good as low-end home instruments go. In conjunction with a GM module, it makes a viable songwriting tool for basic sketches.

However, the odd selection of MIDI data it sends, the fact that you can't disable the drums, and the ergonomic problems convinced me that the Q Chord is not the MIDI controller I had hoped for. Basically, it's a nice home-entertainment instrument with limited MIDI features.

Jeff Obee *is a San Francisco Bay Area–based composer and producer who plays the synthesizer and fretless bass.*

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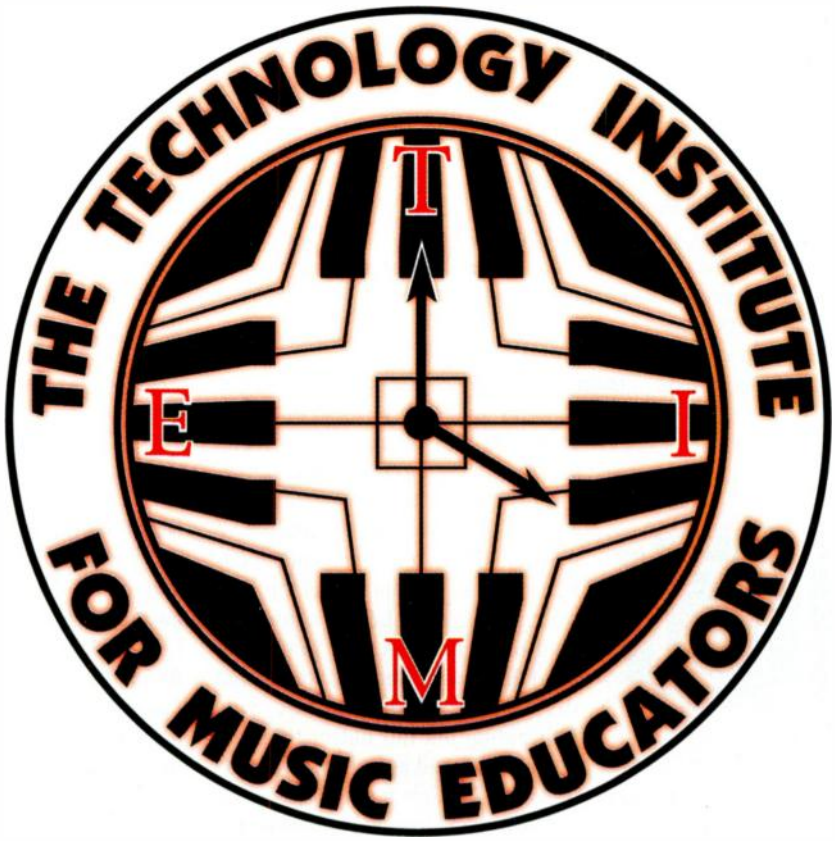

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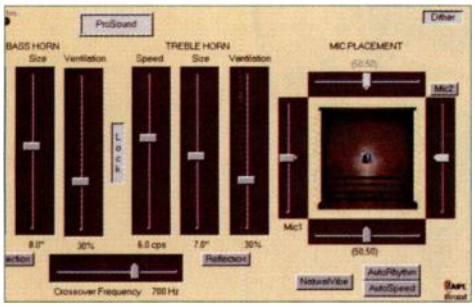
QUICK PICKS

AIPL

SpinCycle (Win)

By Phil Darg

It seems that companies everywhere are making audio effects software these days. Many products offer standard effects such as reverb, delay, chorus, and various types of filtering. AIPL's *SpinCycle* ($59 for the standard version and $99 for the professional version) is a Microsoft DirectX plug-in that bucks this trend by offering vibrato, tremolo, and rotary speaker effects for digital audio tracks.



AIPL's *SpinCycle* offers numerous settings you can use to create vibrato and rotary speaker simulations.

SpinCycle is a complex piece of software with many adjustable parameters. The software revolves around settings for bass- and treble-horn speaker effects. The most important settings are Speed and Ventilation, which control the speed of the spin/vibrato and the amount of wet mix. Other controls include an overdrive gain, speaker size, an adjustable crossover setting (from 100 Hz to 1 kHz), and buttons for Reflection, NaturalVibe, and AutoSpeed. The plug-in also includes a graphic display of microphone placement for producing deep stereo effects: just click and drag the virtual mic to simulate a wider field.

Spinning Wheels

I tried using *SpinCycle* on a number of sounds, including electric guitar and organ. You can also use *SpinCycle* on vocals or synthesized sounds for special effects. For example, the AutoRhythm feature models the classic Leslie speaker effect and can produce interesting results depending on your material. I also like the vibrato effect, and when I compared it with a hardware vibrato effects unit, I found that the *SpinCycle* sound was cleaner and more pronounced. The vintage flavor was definitely there: the guitar and electric piano sounds were reminiscent of some tracks from the *White Album*.

SpinCycle really shines when applied to rock-organ sounds. I processed an organ track consisting of chords and solo notes with various settings and was quite impressed with the results. *SpinCycle* changed the sound from stiff to colorful and dynamic. The sound was extraordinary—I could hear strains of Yes, Deep Purple, and Boston in my humble track. I also thought that the stereo effect worked particularly well here.

Slowing Down

There are some drawbacks to *SpinCycle*. First, the screen display would not completely fit into my computer screen view, which is normally set to a resolution of 800 × 600 (a resolution of 1,024 × 768 or larger is required to view the GUI in full). This made it difficult to see and adjust all of the controls easily, and I had to constantly shift the window around to operate all of the sliders. Second, I found that the *SpinCycle* tremolo effect was interesting but not better than the sound produced by my hardware effects unit, at least for electric guitar.

Finally, even though the application runs in real-time mode, it requires considerable processing power. Depending on your computer's speed and the host audio application, *SpinCycle* may not run very well in real time. For example, my 233 MHz Pentium II could run only one stereo track; as expected, my 600 MHz Pentium III had an easier time handling multiple tracks. AIPL recommends a minimum of a 133 MHz Pentium II for a single mono track, so be sure that your hardware is up to the task.

Spin Doctor

SpinCycle is available only through AIPL's Web site (as a mere 678 KB file). Users can download a free trial copy and then upgrade to the Standard version or ProSound version for $59 or $99, respectively. I recommend the ProSound version because it uses a different processing algorithm that can produce better results. However, $99 for a single effect does seem a bit high.

Overall, *SpinCycle* is useful for simulating a number of vibrato and rotary sounds, and it's a good solution for those looking to add some vintage qualities to their digital mix. Although this plug-in is not something to be used on all tracks, it's especially useful on organ and keyboard sounds and as a special effect for vocals, synth sounds, and electric guitar.

Overall EM Rating (1 through 5): 3.5

POWERFX

The Funk Master

By Jeff Obee

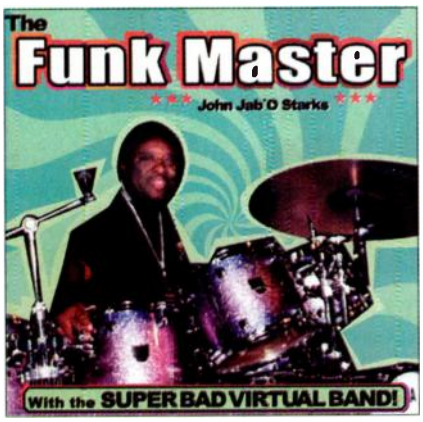
Do you like authentic funk? *The Funk Master* ($99.95; audio CD) from PowerFX aims to provide loops with the sort of funk popularized by James Brown in the late '60s and early '70s. It features John "Jab'o" Starks, the drummer who laid down the original grooves for "Sex Machine," "Get on the Good Foot," and other hits. Take it to the bridge!

Mastering the Funk

The Funk Master presents two groups of musicians. The Super Bad Virtual Band performs the full-band loops; this outfit includes Richard "Pistol" Allen (Marvin Gaye, Temptations, Stevie Wonder) on congas; Henry Gibson (Aretha Franklin) on percussion, Chuck Anthony (Evelyn Champagne King) on guitar, Josh Harris (Whitney Houston) on sax, and Jair Rohm Parker Wells (James Blood Ulmer) on bass. The second group performs "alternative takes" and incorporates top-notch Swedish session musicians Kjell Segebrant on guitar and Anders Molin on bass. If this disc is any indication, there are some serious funk/soul/R&B players abiding in that Nordic realm.

The first 38 tracks comprise 2-bar loops in a variety of keys. Tempos range from 80 to 130 bpm in increments of 10 bpm. There are several grooves at each tempo, and each track has five or six loops. The loops start with the entire group and follow with individual parts: drums, bass, guitar, alto sax, and percussion. Tracks 39 and onward consist of the alternative takes. These are loops of individual instruments, most of which are recorded at the same tempos mentioned earlier. There are usually 12 takes per track, plus an abundance of single hits from Jab'o's vintage Gretsch and Ludwig kits. The remainder of the disc

For manufacturer information, please see Contact Sheet, p. 227.



The Funk Master **from PowerFX gives you earthy loops laid down by John "Jab'o" Starks, the drummer behind the James Brown classics "Sex Machine," "Super Bad," and "Make It Funky."**

includes a few bongo, conga, and tambourine hits.

The bass, alto sax, and guitar parts are all in the key of C. This is a limitation, but you can eke out a workable range if you need a different key.

Observations

This disc does a great job of walking the fine line between digital clarity and the lo-fi sound of a bunch of funk musicians getting down in a live room. You get high-quality audio, plus a sense of earthy, soulful playing, which is what a CD of this kind should be all about. The musicians played in a live wooden room, and producer Bil Bryant recorded the tracks to 2-inch tape for extra warmth.

The centerpiece of the disc is, of course, Jab'o himself. His drumming has the force of a veteran funk drummer, and his patterns work not only in traditional styles but also as processed loops in contemporary dance styles. His drumming exhibits a driving assertiveness that also lies in a relaxed pocket.

Likewise, the guitar parts are precise yet have that essential "dirty" funkiness in the chordal comping, wah-wah licks, and single-note chunks. The alto sax is from the R&B school, full of bite. Anders Molin takes a traditional finger-style approach to the bass playing—no slapping and popping here. He is a very solid player with a palette of bass lines that fit the drum parts perfectly.

The 2-bar loops in the full-band section sometimes felt too brief, and I would have preferred 4-bar phrases. The individual players' 2-bar loops work together well, as the bpms are consistent.

We Want the Funk

So, do you like authentic funk? If you do, I recommend that you check out this CD. The genuine funkiness of these musicians, along with the quality of the audio, make *The Funk Master* a worthwhile addition to your collection.

Overall EM Rating (1 through 5): 4

ENTERTAINMENT PUBLISHERS

Automated Contracts for the Music Industry (Mac/Win)

By Michael A. Aczon

Have you tried to put a music deal in writing but were at a loss about where to begin? *Automated Contracts for the Music Industry* ($199.95), created by entertainment lawyer Jonathan Earp and published by Entertainment Publishers, may be your do-it-yourself solution.

The software requires Windows 3.1 or later (including NT 4.0) or a Power Mac and a JavaScript-capable Web browser (Netscape *Navigator* 4.08 or later or Microsoft *Internet Explorer* 4.01 or later). In order to use the Royalty Calculator function, you must have Microsoft *Excel* 97 or later or a spreadsheet program that can read *Excel* 97 files. I tested this program using a Power Mac 8100.

The contracts are stored as HTML files, so you can read them using your Web browser. To get started, you open the program's Index file and get a split screen that has a table of contents on one side and text on the other.

Contracts to Go

The table of contents is well organized and logically lists a variety of contracts designed to meet a range of musicians' needs, from record and publishing contracts to band partnership contracts. Choose a contract from the table of contents, and a number of fill-in-the-blank questions appear on the text side of the screen, along with Commentary and Glossary buttons. After providing all of the answers, you can then preview or print the contract from your browser or paste it into your word processing program for further editing.

Earp's experience as an entertainment lawyer representing both artists and labels clearly shows in the Commentary feature, in which he answers basic questions pertaining to each contract. The Glossary function opens up an alphabetized list of music industry terms and explanations. The publishers made serious efforts to make sure that the Comments and the Glossary sections are very clear and written in plain English, so you don't have to be a lawyer or an industry veteran in order to understand them.

The Royalty Calculator feature of *Automated Contracts* allows you to factor in royalties when making music business decisions. For example, if you are contemplating a record deal, this feature allows you to project how many records you have to sell to break even and then calculate your artist, publishing, and producer royalties. There is also a Forms feature that has a number of useful forms in Portable Document Format (PDF), including copyright and trademark forms.

Caveat Emptor

I would caution those who use this program to be knowledgeable about how the music industry works: having the forms available is no substitute for experience and understanding. With that caveat, I highly recommend this program to anyone in the industry, from novices in need of a solid foundation for their businesses to entertainment lawyers who need to beef up their form files. For about the price of an office consultation, you can have a variety of legal forms at your disposal that would take hundreds of hours of time to amass or draft. While this program is not sending the entire entertainment law community running for the hills in search of a new profession, it does have a few of them lacing up their shoes.

Automated Contracts **offers fill-in-the-blank forms for all types of music industry deals, from publishing royalties to partnerships.**

Overall EM Rating (1 through 5): 4.5

QUICK PICKS

STEINBERG/PROSONIQ

Dynasone 1.03 (Mac)

By Rob Shrock

Prosoniq's *Dynasone* 1.03 ($199) is a mastering/finalizing VST plug-in designed to provide professional results. *Dynasone* incorporates several modules that can be used individually or simultaneously, including a 4-band dynamics compressor, peak limiting and dynamics leveling functions, a high-frequency exciter, a subharmonic synthesizer, and an Automix feature that automatically adapts your mix to one of several specific musical styles.

Dynasone performs internal processing at 128-bit resolution, the highest afforded by PPC processors. As a result, the quality of the sonic transformations you can perform is stunning. This high level of DSP requires a lot of horsepower from your computer—I found that *Dynasone* used about half the CPU resources on a 233 MHz Power Mac G3 with 192 MB of RAM while I processed stereo mixes in *Cubase VST/24* with several modules turned on. However, *Dynasone* is specifically designed to process finished mixes rather than multiple tracks at the same time. Save *Dynasone* for your finished mixes and you'll be pleased with the results.

You can adjust input gain over a 30-decibel range either by dragging a fader or by using the numeric display. An input button lets you toggle between the processed and unprocessed signals.

Steinberg/Prosoniq's *Dynasone* includes a number of features that can do wonders for your mixes. The Refresh Synthesizer function is especially good at clarifying and enhancing the high end of your sounds.

Band on the Run

One of the secrets of great mastering is the use of multiband compression. This technique allows you to compress certain frequency ranges in different amounts, which is great for tucking in a vocal that's too loud or filling out a sound's low end. *Dynasone* lets you set the crossover frequencies of the four bands as well as adjust each band's threshold, release, and volume. You can also isolate each band, which is extremely helpful for homing in on a frequency range that needs attention. An amount slider determines the degree of compression applied to your mix, and each band displays a meter indicating its gain reduction. An overall gain makeup is provided for level matching with the original signal.

For more immediate results, the Automix function "learns" your mix and compares it with a selectable frequency response curve of different musical styles. Choose a style (Rock, for instance) and hit Reset; after a few seconds of playback, *Dynasone* sets up the multiband compressor for you. When Automix is engaged you cannot adjust the crossover frequencies, which are preset within each musical style. As with the multiband compressor, an amount slider determines the degree of the Automix frequency curve applied to your mix.

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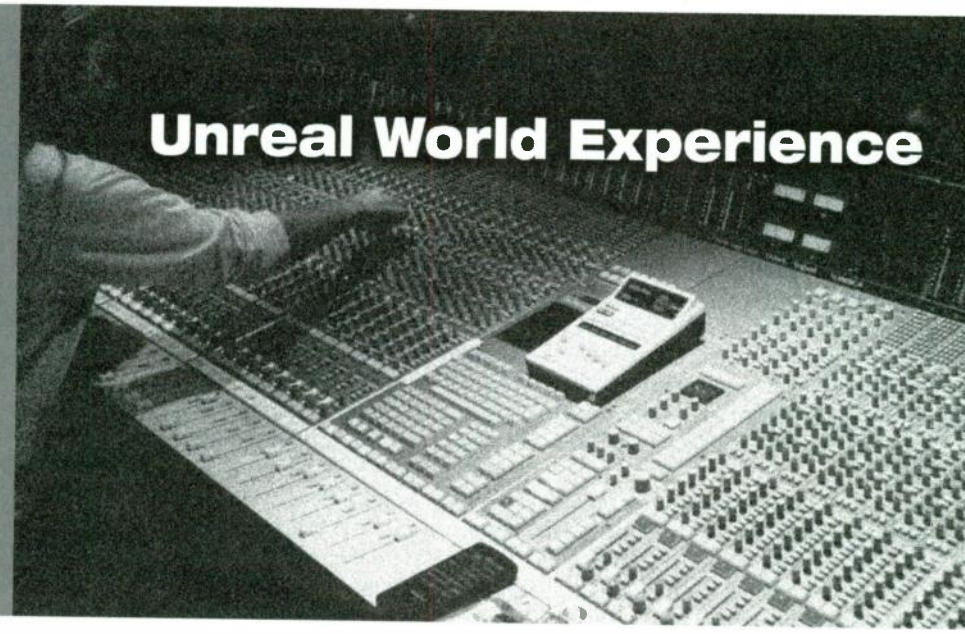

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Special Effects

The Energizer section provides a peak-stop limiter that increases overall level by hard limiting peaks and transients. A Leveller control acts as an additional full-bandwidth compressor with moderate attack and release times designed to smooth out the overall level of the mix.

Dynasone's Subbass Synth generates an artificial subharmonic an octave lower than the original signal, and it provides level and center frequency controls. I found this feature to be the least effective because generating subharmonics from a full mix creates a muddy, unfocused sound. This technique is better left for processing a specific instrument such as bass or kick drum. When used in this manner, *Dynasone* performed splendidly, although the program eats up quite a bit of processing power even if only one module is activated.

The Refresh Synthesizer acts as a high-frequency exciter and actually generates new spectral content. It incorporates a special anti-aliasing algorithm developed by Prosoniq and is the best-sounding exciter I've ever heard. The Refresh feature can create a pleasant-sounding high end, even on material with very little high-frequency content. Gain and frequency controls determine the amount and middle frequency generated.

The remaining controls are an output fader, Left/Right balance, and the Media Select function. With Media Select, you choose the target medium and *Dynasone* optimizes the output accordingly. You can choose from Linear, which performs no optimization; CD, which maintains 0.2 decibels of headroom with no digital overs; Tape, which uses a high-frequency phase spread to compensate for possible azimuth misalignment; and Vinyl, which compensates for low-frequency phase.

Last Words

Although *Dynasone* sounds incredible, it has a few weaknesses. Unlike with some plug-ins, settings cannot be saved directly within the *Dynasone* interface (though you can store settings within one host application and reuse them in any other host). The overall user interface is a bit cluttered and small—especially within the multiband compressor—and the graphics are not elegant, only functional. However, with a little practice, *Dynasone* can make your mixes sound like they were mastered on $10,000 worth of hardware.

Overall EM Rating (1 through 5): 4

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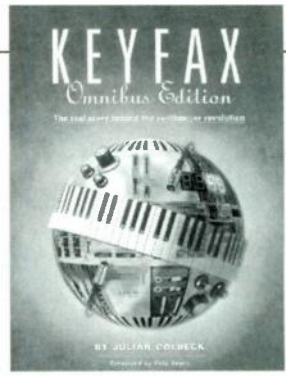

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FOREWORD BY PETE SEARS

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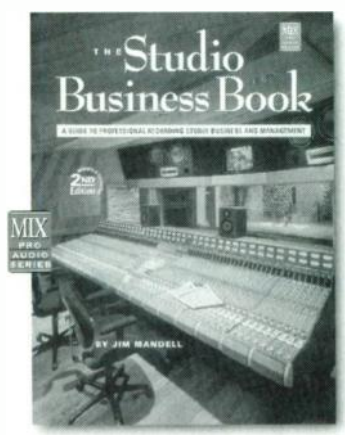

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DIGITAL MULTI-TRACK RECORDERS

TASCAM

DA-78HR Modular Digital Multitrack

Expanding on their industry standard line of DTRS multitracks, Tascam has just unveiled their latest DTRS recorder, the true 24-bit DA78HR, at the most recent AES show in NYC. Not only is the DA78HR the first true 24-bit MDM it also has a host of standard features that make make this DTRS not only cutting edge but cost effective. These standard features include SMPTE and MIDI Timecode as well as a built-in digital mixer and S/PDIF digital I/O that will allow you to do a quick mix right to DAT or CD or for doing track bouncing. The DA-78HR is also compatible to all of the other DTRS machines in the DTRS sync line.

- Selectable 16 bit or 24 bit High Resolution audio
- 24 bit A/D and D/A converters
- >104dB Dynamic range
- 20Hz - 20kHz frequency response ±.5dB
- 1 hr. 48 min. recording time on a single 120 tape
- On-Board SMPTE synchronizer - chase or generate timecode
- On-Board support for MIDI Machine Control
- Internal digital mixer with level and pan for internal bouncing, or for quick mixes
- Track slip from -200 to +7200 samples
- Expandable up to 128 tracks (16 machines)
- Word Sync In/Out/Thru
- Analog output on DB25 balanced or RCA unbalanced
- Digital output on TDIF or 2 channels of S/PDIF

ALESIS

Studio Pack ADAT Recoding Bundle

The ADAT Studio Pack has everything you need to get you up and running with tape based digital multitrack recording. The Studio Pack is based around the LX-20 8-track digital multitrack tape recorder that uses Alesis' renowned ADAT type II tape format, offering true 20-bit recording and playback using inexpensive and readily available S-VHS video cassettes. Also included in the Studio Pack is the S24 24 channel inline mixer as well as the NanoVerb effects processor and NanoCompresser dynamics processor.

ADAT STUDIO PACK CONTENTS–

- LX20 20-Bit digital audio recorder
- Studio 24 recording console with inline monitor
- NanoVerb digital effects processor featuring 16 programs (halls, rooms, plates, chorus, flange, delay multieffects and rotary speaker simulation
- NanoCompressor stereo compressor/limiter w/ threshold, compression, attack, release and level controls
- Two 8-channel phono (RCA) cable snakes (for ADAT to Studio 24 connection)
- Two dual 1/4 in. stereo 1/4 in. cables for NanoVerb
- Two 1/4 in. insert cables for NanoCompressor

CD RECORDERS & DUPLICATORS

MICROBOARDS

StartREC Digital Audio Editing/ CD Duplication System

The Microboards StartREC is the first digital audio editing system combined with a multidrive CD recordable duplication system for professionals. Audio is recorded to the internal 6.2 GB IDE hard drive using analog or digital inputs. Sample rate conversion is automatic. Tracks can be edited and sequenced using the StartRECs user friendly interface and up to 4 CDs can be recorded simultaneously. StartREC is the ideal solution for studio recording, mastering, post production or any pro audio environment requiring digital audio editing and short run CD-R duplication.

Features–

- 2X, 4X, or 8X recording speeds
- 6.2GB IDE hard drive
- Editing functions include move, divide, combine or delete audio tracks, add or drop any index or sub index, and create track fade in or fade out
- Coaxial SP/DIF or AES/EBU digital input plus optical S/PDIF I/O
- XLR balanced and RCA Line inputs and outputs
- Automatic sample rate conversion from 32 and 48kHz
- Automatic CD Format Detection feature anc user friendly interface provide one touch button operation
- Front panel trim pot and LCD display provide accurate input signal and time lapse metering
- SCMS (Serial Copy Management System) is supported, regardless of the source disc copy protection status
- **StartREC Models Include:** ST2000 (2) 8x writers, ST3000 (3) 8x writers and ST4000 (4) 8x writers

HHB CDR-850 CD Recorder

The new HHB CDR850 is one of the most comprehensive CD-R, CD-RW recorders available today. It delivers the outstanding sound quality that HHB is known at a lower price than previous models. Equipped with a complete range of analog and digital I/O and easy to use one touch recording modes make the CDR850 suitable for any audio environment no matter how sophisticated or demanding.

- CD-R, CD-RW compatible
- All functions accessible from front panel menu
- 4 one touch recording modes; 2 manual, 2 automatic
- Sample rate converter accepts any digital signal from 32kHz to 48kHz including varispeed
- Copies all CD, DAT, MD, DVD and DCC track starts
- Complete user control over SCMS
- Balanced XLR analog I/O, Unbalanced (RCA) phono analog I/O, AES/EBU digital input, coaxial & optical S/PDIF digital I/O

TASCAM CD-RW5000 CD Recorder

The CD-RW5000 is a cost effective Audio CD Mastering system that is powerful and functional. Great for mastering sessions and will write to all currently available media.

- CD-R, CD-RW Applicable • Parallel Control of most transport functions • AES/EBU Digital Input • Balanced XLR Analog Input
- Balanced XLR Analog Output
- Sync Start (All or 1 Track) • Erase (Disc or Track)
- Auto or Manual Track Increment • Repeat Play

PROCESSING

Lexicon MPX1 Multi-Effects Processor

The MPX-1 is truly an outstanding multi-effects device. Using Lexicon's Lexchip, it offers outstanding reverb or ambience as well as a separate processor for effects for awesome power in the studio or on the road.

FEATURES–

- Intuitive user interface for easy editing, built-in help
- Balanced Analog I/O (1/4" & XLR)
- 56 effect algorithms
- Digital Inputs & Outputs (S/PDIF @ 44.1KHz)
- 18 Bit A/D; 20 Bit D/A Conversion, 32-bit processing
- >90dB of Dynamic Range
- Intelligent Sorting by Name, Number, Application, etc.
- Parameter Morphing
- Dynamic MIDI® patching & MIDI automation

ANTARES ATR-1 Intonation Processor "Perfect Pitch in a Box"

By comparing the incoming signal of a vocal or solo instrument with a target pitch defined by a preset or user defined scale, the ATR-1 miraculously corrects out of tune pitch, in real time, without unwanted distortion or artifacts. Balanced I/O, 20-bit A to D conversion and 56-bit processing ensures that the nuance and expression of the original performance is preserved. Additional parameters such as adjusting the speed at which pitch correction takes place, tailor the response of the ATR-1 to match the characteristics of a specific performance or musical style. Ideal for use in the studio or live!

FEATURES–

- Corrects the pitch of a vocal or solo instrument, in real time, without distortion or artifacts
- 20-bit data path, 56-bit internal processing
- Balanced I/O
- Factory Programs for chromatic and standard diatonic scales or customize your own scales
- Individual Scale notes can be bypassed. Bypassed notes will not be pitch corrected.
- Scales can be specified in real time via a MIDI keyboard or sequencer. Specify an exact melody via MIDI
- Completely controllable via SysEx
- Processing delay is no greater than 4 milliseconds

t.c. electronic M3000 Professional Reverb

Incorporating TC Electronic's new VSS-3 technology, the M3000 is a great sounding, versatile reverb that is easy to use. Combining ultimate control of early reflections with a transparent reverb tail, the art of reverberation is brought to a new level. Whether it's a phone booth, cave or concert hall, the M3000 delivers high-quality ambience.

FEATURES–

- VSS-3, VSS-3 Gate, C.O.R.E. & REV-3 reverbs as well as Delay, Pitch, EQ, Chorus, Flanger, Tremolo, Phaser, Expander/Gate, Compressor and De-Esser
- 300 high-grade factory presets including Halls, Rooms, Plates, Ambience, Gated Reverbs, and more
- Up to 300 user presets in internal RAM and 300 more using an optional PCMCIA card.
- Dual engine configuration featuring 24-bit A/D/D/As.
- Connections include AES/EBU, Coaxial S/PDIF, Optical Tos-Link/ADAT & analog XLR I/Os, MIDI IN/OUT/THRU, Clock Sync and External Control.

dbx QUANTUM Digital Mastering Processor

24-bit/96kHz mastering processor with a 48-bit digital signal path and the dbx TYPE IV Conversion System that retains the warmth and body of your signal while adding punch and depth. The intuitive user interface puts several high-end mastering tools at your fingertips including Tape Saturation Emulation (TSE), compression, EQ and more.

FEATURES–

- 96 kHz, 24 bit A/D/A, and Digital I/O on AES/EBU or S/PDIF • 48 bit internal signal path for increased head room and low level resolution • Type IV A/D Conversion system with TSE • 4 band stereo compressor-gate-limiter • 5 band EQ Hi and Lo shelves, 3 band fully parametric • Normalizer • Stereo adjust controls stereo image • Sync I/O using dbx's own proprietary clock chips for extremely low jitter sync • Dither outputs to 16, 20, or 24 bits • Sample rate conversion • Software updateable via Internet and MIDI • 4 band crossover with variable slopes

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MICROPHONES & PREAMPS

SHURE

KSM-32SL Cardioid Condenser Mic

The reviews are raving about Shure's new "classic" microphone. The KSM32 features Class A, transformerless preamplifier circuitry, low self-noise and increased dynamic range, all necessary for critical studio recording. It has a 15 dB attenuation switch for handling high SPLs, making it suitable for a variety of sound sources including vocals, acoustic instruments, ensembles and overhead miking of drums and percussion. For studios, the **KSM32/SL** has a light champagne finish and includes an aluminum carrying case, shock and swivel mounts and a velvet pouch. For live applications, the **KSM32/CG** has a charcoal grey finish and includes a swivel mount and padded zipper bag.

- **Frequency response 20Hz - 20kHz**

JOE MEEK

TRAKPAK TP-47

JM-47 MIC/ VC-3 MIC PRE KIT

The new Joemeek TP47 TrakPak is an ideal front end to go between you and your digital multitrack. It includes the VC3 mic-pre, compressor, and enhancer, and the new Joemeek JM-47 "Meekrophone" (microphone). This all in one system is all you need to get the warm and punchy vintage sounds of the 60's on to your digital recordings.

JM-47 MEEKROPHONE FEATURES-

- 1" Gold 6 micron hand assembled true condenser capsule
- FET pre amplifier with transformer output
- Low noise, minimalist electronics
- 10dB Pad, switchable
- High pass 100Hz filter
- Quality shockmount
- Classic and full bodied sound
- Frequency response, substantially flat 20Hz to 20KHz
- Output impedance, 200ohms balanced, earth free floating
- Power supply, 48V phantom

VC-3 FEATURES-

- Superlative Mic input with ultra low noise and vast headroom.
- Input gain control with 60dB range on mic and 30dB range on line.
- Phantom power (switched on/off) with LED indicator.
- Compression attack speed switch high/low.
- Compression depth control with LED indicator.
- Compression release speed control.
- Compression in/out switch.
- Enhancer drive control with LED indicator.
- Enhancer depth control.
- Enhancer resonance control (Q).
- An accurate peak reading meter.
- Output volume control
- XLR type microphone input, standard jack line input.
- Standard jack Insert point after the mic amp and pre compressor.
- Standard jack additional mix input port pre compressor
- Dual line level outputs.
- Compact 'half of 1U' size.

ALSO INCLUDES-

- Heavy duty road case • 5m Meekrophone cable

ART

APPLIED RESEARCH AND TECHNOLOGY

Pro Channel

Tube Mic Pre/ Compressor/ EQ

The Art Pro Channel is an all-in-one mic/line channel strip featuring a tube mic preamp, compressor and four band parametric EQ. The compression section utilizes the coveted variable mu design found in vintage broadcast limiters that is distinctively fat sounding with a fast aggressive attack. Like all other ART products, the Pro Channel is also affordable. Ideal for professional recording channels for professional recording, project and home studios as a DI box for Instruments, as a front end for Digital Audio Workstations & Computer-based Recording as well as Voice-Over, Broadcast, and Edit Suites.

- Professional Tube-Based Microphone/Line Recording Channel featuring a tube mic pre, switchable optical/ variable mu compressor, and tube
- Dynamic Range >100dB (20-20KHz)
- Frequency Response 10Hz to 20KHz (± .5dB)
- Low-Cut Filter Variable: -3dB@10Hz to 250Hz
- XLR balanced & 1/4" unbalanced Inputs and Outputs
- 1/4" unbalanced Insert Connections Between Preamp and Compressor, and Compressor and EQ
- Phantom Power +48v DC (switchable)
- Three Hand-Selected Vacuum Tubes
- Optical/ variable mu Tube based compressor with, variable threshold, compression ratio, attack and release controls • Four-band parametric equalizer with selectable Q for the two sweepable mid-bands
- Selectable VU Metering (mic pre out, compressor out, or Main Out)
- Five-Year Warranty

audio-technica.

AT4047SV

Cardioid Condenser Mic

The AT4047 is the latest 40 Series large diaphragm condenser mic from Audio Technica. It has the low self noise, wide dynamic range and high sound pressure level capacity demanded by recording studios and sound reinforcement professionals.

- Side address cardioid condenser microphone for professional recording and critical applications in broadcast and live sound
- Low self noise, wide dynamic range and high SPL
- Switchable 80Hz Hi Pass Filter and 10dB pad
- **Includes** AT8449/SV shockmount
- **Also Includes a limited edition tweed flight case while supplies last!**

GT

AM-52 Class A FET

The GT Electronics AM52 uses a super-clean Class A FET circuit. It amazingly sensitive large diaphragm is capable of handling extremely high sound pressure levels and offers a choice of three polar patterns, for unsurpassed versatility. A perfect choice for virtually any recording application...from vocals to acoustic and amplified instruments.

- Class A FET preamp for extremely transparent, low-noise performance
- Cardioid, Omni and Figure 8 polar patterns
- Large-diameter, super-thin 3 micron gold evaporated Mylar diaphragm
- Switchable -10dB attenuation pad and 80Hz low frequency roll-off filter
- High SPL handling for very loud sources
- Includes hard-shell case and hard mount
- **Frequency response 20Hz - 20kHz**

AM-61 TUBE

The GT Electronics AM61 offers classic tube performance in a fixed cardioid, large diaphragm condenser mic. An outstanding addition to any project studio or large commercial recording facility seeking rich, warm tube sounds and unsurpassed value.

- Groove Tubes military-spec GT5840M vacuum tube preamplifier
- Large-diameter, super-thin 3 micron gold evaporated Mylar diaphragm
- Fixes cardioid polar pattern response
- Switchable -10dB attenuation pad and 80Hz low frequency roll-off filter
- Includes hard-shell case, shock mount, hard mount, 6-pin cable and external power supply
- **Frequency response 20Hz - 20kHz**

- **ALSO AVAILABLE** AM-51 cardioid class A FET condenser mic
- **ALSO AVAILABLE** AM-62 multipattern tube condenser mic

AKG

C4000B

Electret Condenser Mic

This new mic from AKG is a multi polar pattern condenser microphone using a unique electret dual large diaphragm transducer. It is based on the AKG SolidTube design, except that the tube has been replaced by a transistorized impedance converter/ preamp. The transformerless output stage offers the C4000B exceptional low frequency response.

FEATURES-

- Electret Dual Large Diaphragm Transducer (1st of its kind)
- Cardioid, hypercardioid & omnidirectional polar patterns
- High Sensitivity
- Extremely low self-noise
- Bass cut filter & Pad switches
- Requires 12, 24 or 48 V phantom power
- Includes H-100 shockmount and wind/pop screen
- **Frequency response 20Hz to 20kHz**

STUDIO MONITORS

Hafler

TRM-6

Bi-Amplified Studio Monitors

Offering honest, consistent sound from top to bottom, , the TRM-6 bi-amplified studio monitors are the ideal reference monitors for any recording environment whether tracking, mixing and mastering. Supported by Hafler's legendary amplifier technology providing a more accurate sound field, in width, height and also depth.

FEATURES-

- 33 Watt HF & 50 Watt LF amplification
- 1" soft dome tweeter &6.5" polypropylene woofer
- 45Hz - 21kHz Response
- Magnetically Shielded
- Electronically and Acoustically Matched

KRK

V-6

Bi-Amplified Studio Monitors

These bi-amped studio monitors from KRK supply 90 watts of clean power. Their 6" woofer & 1" silk dome tweeter ensure consistency from top to bottom with crystal clear highs and a solid bass response.

FEATURES-

- 58Hz - 20kHz frequency response
- 1" silk dome tweeter and 6" long stroke, polyvinyl woofer • Magnetically shielded
- 30 Watt HF & 60 Watt LF amplification
- Variable system gain +6dB -30dB
- Neutrik XLR - 1/4" TRS combo connector

MACKIE.

HR824

Bi-Amplified Studio Monitors

These close field monitors from Mackie have a wide deep response with exceptional detail. Each pair of these biamplified speakers has been clinically matched to ensure optimum performance.

FEATURES-

- 8.75" polypropylene woofer, 1" aluminum dome tweeter
- 150W HF & 100W HF amps
- Full space, half space and quarter space placement compensation • 1/4" and XLR inputs
- Hi frequency adjustment, lo frequency roll-off switch
- Frequency Response 39Hz to 22kHz, ±1.5dB

ALESIS

M1 Active

Bi-Amped Ref. Monitor

The new M1 Actives feature custom designed dual amplifiers and an internal active crossover fro accurate response. The specs are outstanding with a 1" silk dome tweeter, a 6.5" woofer and 8th order high and low pass electronic crossover filters, perfect for both project and pro recording applications.

FEATURES-

- 75 watt LF and 25 watt HF amps
- 150Hz crossover point for low midrange coloration
- Dual front mounted ports • Magnetically shielded
- Combination XLR/1/4" connectors with input level control.

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MOTU AUDIO Hard Disk Recording Systems

The MOTU Audio System is a PCI based hard recording solution for the Mac and PC platforms. At the heart of the system is the PCI-324 PCI card that can connect up to three audio interfaces and allows up to 72 channels of simultaneous I/O. Audio interfaces are available with a wide range of I/O configurations including multiple analog I/O with the latest 24-bit A/D/A converters and/or multi channel digital I/O such as ADAT optical and TDIF I/O as well as standard S/PDIF and AES/EBU I/O. Each interface can be purchased separately or with a PCI-324 card allowing you to build a system to suit your needs. Includes drivers for all of today's hottest audio software and AudioDesk, multitrack recording and editing software for the Mac.

THEY ALL FEATURE–

- Mac OS and Windows compatible
- Includes software drivers for compatibility with all of today's popular audio software plus AudioDesk, MOTU's sample-accurate audio workstation software for Mac OS
- Host computer determines the number of tracks that the software can record and play simultaneously, as well as the amount of real-time effects processing it can support
- Front panels display metering for all inputs and outputs
- **AudioDesk Audio Workstation Software** for Mac OS features 24-bit recording, multi-channel waveform editing, automated virtual mixing, graphic editing of ramp automation, real-time effects plug-ins with 32-bit floating point processing, crossfades, support for third-party audio plug-ins (in the MOTU Audio System and Adobe Premiere formats), background processing of file-based operations, sample-accurate editing and placement of audio, and more

2408 FEATURES–

- 7 banks of 8 channel I/O: 1 bank of analog, 3 banks of ADAT optical, 3 banks of Tascam TDIF, plus stereo S/PDIF
- Custom VLSI chip for amazing I/O capabilities
- Format conversion between ADAT and DA-88
- 24-bit internal data bus for full 24-bit recording via digital inputs
- 20-bit A/D and D/A converters on analog ins & outs
- Standard S/PDIF I/O for digital plus an additional S/PDIF I/O for the main mix
- Sample-accurate synchronization with ADATs and DA88s via an ADAT SYNC IN and RS422

1224 FEATURES–

- 24-bit analog audio interface
- State-of-the-art 24-bit A/D/A
- Simultaneously record and play back 8 channels of balanced (TRS), +4 dB audio
- Stereo AES/EBU digital I/O
- 24-bit balanced +4 XLR main outputs • Word clock in/out
- Dynamic range of 116 dB (A-weighted)
- Front panel displays six-segment metering for all inputs and outputs
- Headphone jack with volume knob

308 Features–

- 8 channels of coaxial S/PDIF using 4 RCA input and 4 RCA output connectors
- 8 channels of optical S/PDIF using 4 toslink input and 4 toslink output connectors
- 8 channels of AES/EBU using 4 XLR male and 4 XLR female connectors • Word Clock I/O allows the 308 to synchronize with digital audio environments

24i Features–

- 24 high quality 24-bit analog inputs
- Balanced 1/4" analog outputs
- Optical and coaxial S/PDIF outputs • Word Clock I/O
- Front panel headphone output with level control
- Connect up to three 24i rack I/Os to a PCI-324 audio card for a total of 72 inputs and six outs

Also available with MOTU's award-winning Digital Performer audio sequencer software package

Lexicon CORE 2 Recording System

High quality, true 24-bit computer based audio system at an affordable price. Easy to use interface offers 4 analog inputs and 8 outs as well as coaxial S/PDIF and and 8 channels of ADAT optical digital I/O. Dedicated hardware takes on the burden of CPU intensive tasks putting less strain on the computer's processor.

FEATURES–

- Ultra wide-range 24-bit A/D and D/A converters
- Four channels of analog in, eight channels of analog out.
- Eight channels of ADAT™ digital I/O and a stereo S/PDIF pair.
- Selectable dbx Type IV™ soft-knee limiting on every input channel to simulate tape compression and provide 4dB of improved headroom.
- Ships with Lexicon Drivers and Control Panel for Win 95/98
- Includes Syntrillium's Cool EditPro SE, providing as many as 64 mixing tracks.
- An optional MP-100 daughterboard will be available soon and will include all of the effects found in the Lexicon MPX 100 Dual Channel Effects Processor: Chorus, Flange, Pitch, Detune, Delay, Echo, Rotary, Tremolo and Lexicon Reverb and Ambience

NEW LOWER PRICE

SONORUS STUDI/O 24-bit Audio Card

The Sonorus STUDI/O is a 16-channel plug-n-play digital audio card for Mac and PC. It's based around two ADAT compatible toslink connectors that support 24-bit audio at 44.1 and 48khz sample rates. The toslink connectors are software switchable between ADAT lightpipe and standard optical S/PDIF I/O. The hardware specs are enhanced further by the ease at which this card is configurable as well as its compatibility to today's leading Mac and Windows software.

FEATURES-

- Two optical inputs and outputs ('lightpipe' connectors) software selectable between ADAT(8-channel) & S/PDIF
- 18-bit 1/4" headphone/monitor output
- 16-channels, phase-locked and in sync. No ground loops, no noise
- 24 bit audio is supported- ready for the latest generation of digital audio hardware
- Software configurable so there's no jumpers to mess with
- Comes with its own Control Panel software that makes setup simple and allows you to customize & save your settings
- PCI Plug-n-Play Cross-platform compatibility
- Full Windows audio drivers for PC and Cubase VST and Logic Audio (PC & Mac) • Onboard sample rate converter

SOFTWARE

Digital Performer MIDI/AUDIO Software for Mac

Their second major update this year, with a relentless stream of new advanced features, like sample-accurate editing, sample-accurate sync and MOTU's innovative RAM-based loop recording tool called POLAR. DP is packed full of features you won't find anywhere else.

FEATURES-

- Includes over 50 real-time MIDI & audio effects plug-ins
- POLAR window - Interactive audio loop recording the way it should be
- 24-bit recording and editing
- 32-bit native effects processing - incredible sounding EQ and other FX
- 64-bit MasterWorks™ Limiter and Multiband Compressor plug-ins included
- Advanced waveform editor
- Sample-accurate - the most reliable editing and tightest sync you can get
- OMF export - transfer your entire session, crossfades and all, into Pro Tools
- Samplers window - drag & drop samples between your Mac and your Sampler
- PureDSP™ stereo pitch-shifting and time-stretching
- Unlimited audio tracks, real-time editing, full automation and remote control • QuickTime digital video support, and much more • Compatible with Pro Tools|24, the MOTU 2408 and today's other popular systems
- Digital Performer is an entire recording studio inside your computer

Vegas Multi-track Recording Software

From the company that brought you Sound Forge and Acid Pro comes Vegas Pro, the non-linear multitrack recording and editing software, for Windows. Whether you need better than CD quality 24-bit/96kHz file support for tracking your next album project or are authoring content for streaming audio on the internet, Vegas Pro's got you covered.

FEATURES–

- 24-bit/96kHz file support • Unlimited Tracks (dependent on CPU speed and RAM) • Non-destructive Editing
- Supports multiple file formats and sample rates on a single track • DirectX plug-in support with 32 Assignable FX sends • 26 Aux outputs • Unlimited Undo/Redo
- Multiple I/O support • Dual monitor support
- MIDI Timecode support
- 4-band EQ and compressor inserts on every channel
- Audio/Video Scrub
- Direct internet streaming file authoring 9Windows Media Technologies and Real Networks G2)

Unity DS-1 Digital Sampler

Turn your computer into a full featured digital sampler with the Unity DS-1 from BitHeadz. Recreate the sounds of acoustic instruments or any other audio source. All of the features of dedicated hardware samplers are here- 16 part multi-timbrality, 64 voice polyphony , a complete synth engine and the ability to create layers and splits all with full MIDI control. Compatible with Akai SampleCell, .WAV and .AIFF and CD audio files that can all be edited using the integrated audio editor.

TC WORKS SPARK 2-Track Editing For Mac

ULTIMATE SOFTWARE MACHINES

Intuitive, easy to use 2-track editing software for the Power Macintosh. 24 and 32-bit file support is ideal for music mastering. SMPTE synchronization and quicktime movie import capabilities for editing audio for film and video. A host of compression algorithms such as QDesign make editing audio for the web a snap. Most major professional samplers are also supported and the Loop Tuner helps create perfect loops every time.

FEATURES-

- Browser View- File database, audio editor and play list all in one easy to use display with movable border lines- Eliminates the need for surfing several windows to access and edit files
- Wave Editor- Perform off-line editing, processing, and create markers and non-destructive regions
- Supports AIFF, SoundDesigner, WAV and QuickTime file formats
- DSP Processing Includes- Normalize, Reverse, Fades, Crossfades, and Sample Rate conversion and **realtime Time Stretching**
- VST Plug-In compatible
- Supports file swapping with most major samplers and any sampler that supports SMDI
- Batch Processing
- Bundled with Adaptec's Toast Pro you can burn your audio on CD
- Extract audio from a quicktime movie for editing and then export the audio along with the video into a new file

WAVES Pro-FX Bundle Plug-ins For Mac or PC

The latest Bundle from Waves has some of the coolest sound design plug-ins available for the Mac and Windows platforms.

SuperTap- Six taps of mono or true stereo delay (up to Six seconds) • Global LFO modulation • 2 feedback modes • Q10-style filtering for each tap • rotation (stereo panning) • Delays are adjustable in milliseconds and note values • Tap out delay times or patterns using the Tap Pad.

MetaFlanger - Vintage tape-flanging, phaser-emulation, and special effects • True dual-delay flanging sounds • Wet signal include filters so you can flange or phase just part of the signal • Factory presets of vintage emulations (Mutron, MXR, Itchycoo Park) and more.

MondoMod - AM, FM, and Rotation (stereo panning) modulators • Gentle wandering guitar solo panning or bizarre destructive effects

• Single LFO drives all modulators with independent phase offsets between the modulator signals.

UltraPitch - Formant-corrected pitch shifter with 5-voices

• Excellent gender-bending

• Independent stereo panning and delay • Animator delay-randomizer. Set the pitchshift by musical intervals (with 5 cent resolution)

• Manual formant mapping as well as presets that perfectly match instrumental formant responses • Creates huge and thick stereo chorusing, doubling, parallel harmonies, excellent vocal slap/spread effects, and much more.

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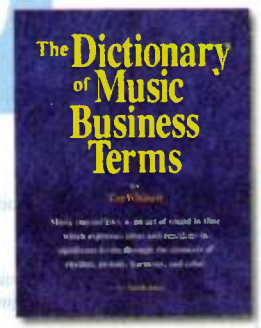

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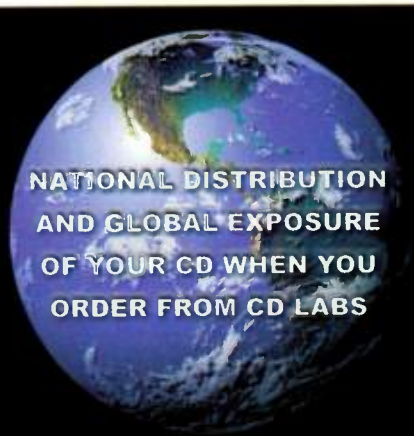

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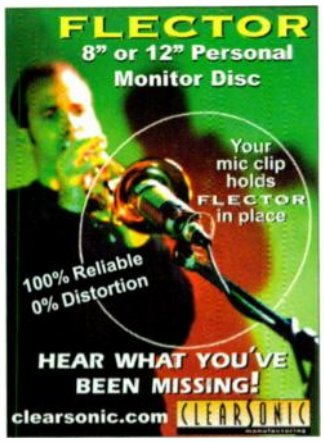

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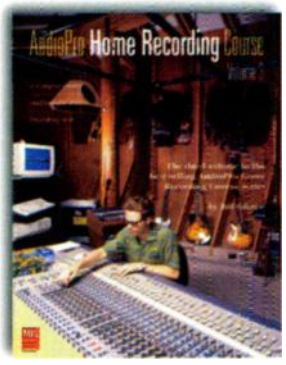

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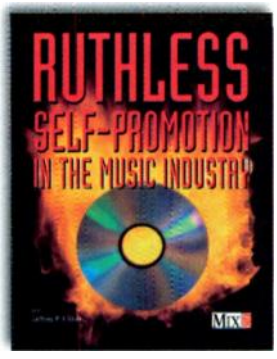

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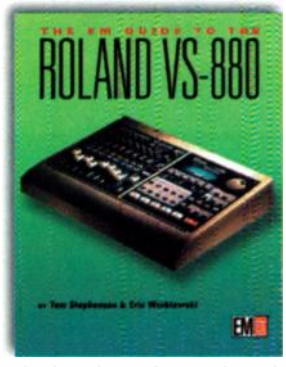

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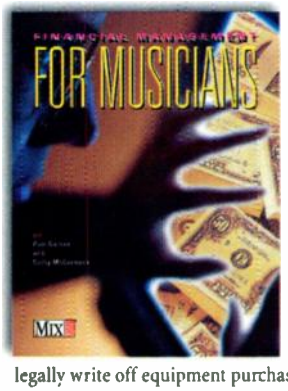

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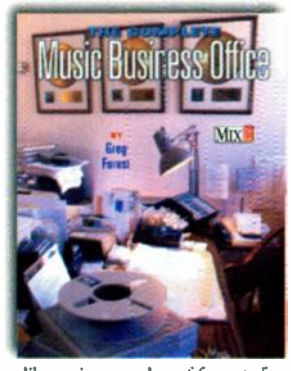

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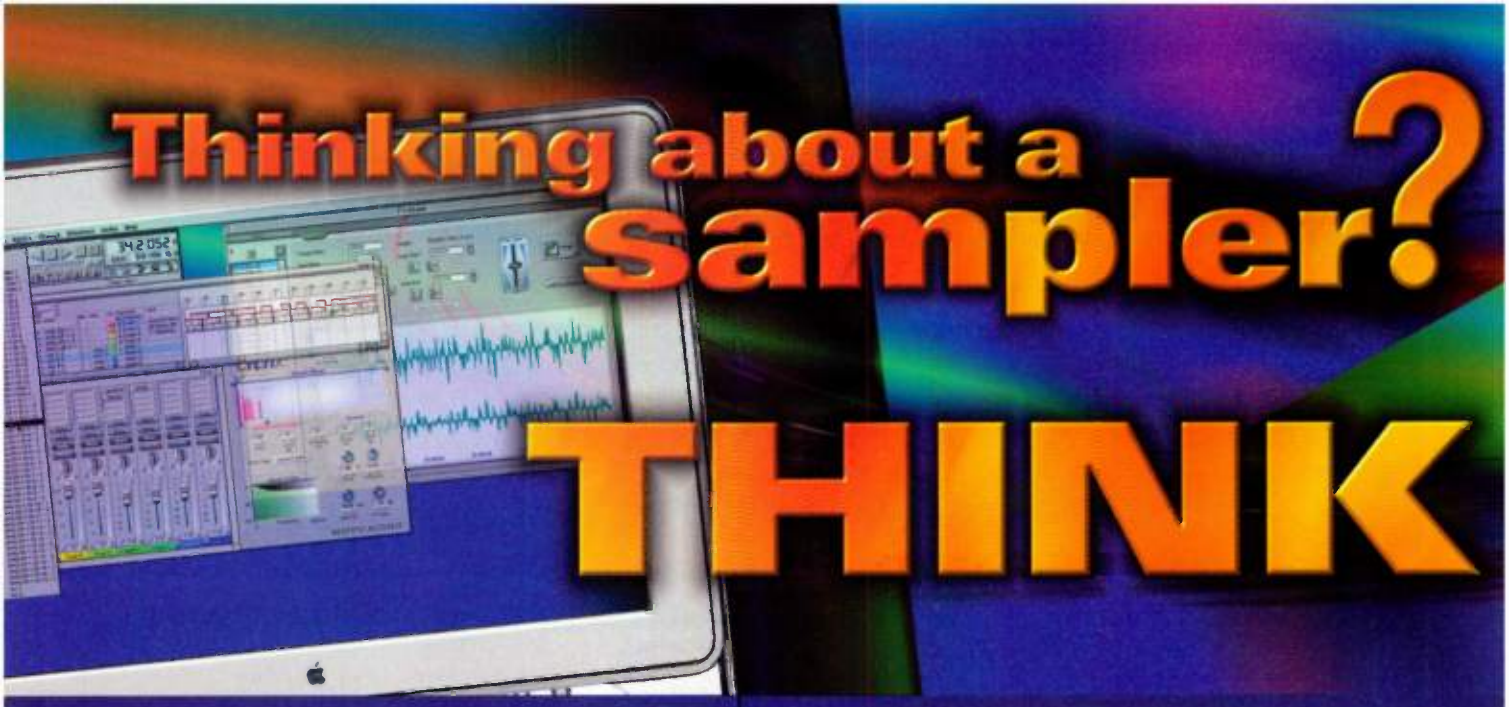

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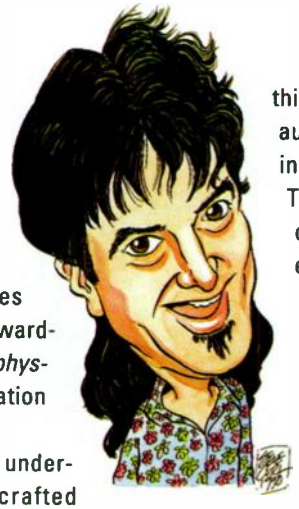
Musical WYSIWYG



Imagery and visualization have long been potent tools in the pursuit of music. What kind of impression would Debussy have left had he not summoned up pictures of fawns and the sea? During my years of drumming live and engineering in the studio, I've developed some images for performing and recording that I find rewarding. These aren't simply visual images, but *physical* ones, and they give me a basic orientation from which to approach my work.

With the performing image, you need to understand that I really love playing a well-crafted arrangement. Long, smooth-flowing turns of phrase connecting nicely developed sections... Dude, that's *fun!* But one miscount and you'll have The Great American Train Wreck on your hands.

The image that materialized while I was finding my way through many such arrangements with bands is that of a toboggan team. The music whips around tricky transitional corners, then flies into a long straightaway of thematic expansion, all of the team's members huddled together as they hurtle along at a fantastic speed. The audience stands above, watching the sleek toboggan streak by, thrilled at the end by its triumphant return to theme, seeming to come out of nowhere, yet now clearly a logical path.

Playing blues or reggae gives me a very different image. Both have a timeless quality—they're walking music with no beginning or end, just eternal moving along. When I play them, I'm hiking through the space-time continuum.

Working in the studio is, in most ways, the diametric opposite of performing live. Whereas live performance is in linear real time, the studio disassembles and reassembles time in countless ways. Whereas the stage is one side of an energy circuit completed by the audience, the studio involves a certain kind of focus best found by working in isolation.

Studio work, then, is more akin to sculpture. Certainly this is not a new image, but the rise of digital audio—and in particular, DAWs and their plug-ins—has raised the concept to a new level. The concern in this environment is not staying on the edge every second, but making sure each individual stroke contributes to the vision of the whole.

With every overdub laid on an album project, another tiny chip is chiseled away, bringing a bit more form to what often starts as bare bass and drum tracks. To make it all work, the new track must be considered not only in terms of how well it works with the existing tracks, but with the tracks you expect to lay in the future. An overdub may even move the work in a new direction. There is a process of cogitation and fine tuning that can happen only out of real time and, often, nonlinearly. It reaches full fruition when conducted within the image in the "mind's ear" of what the finished sound should be.

These images can translate more broadly and functionally than in the contexts I've named. For example, the ability to navigate through rough-and-tumble projects can develop from the immediacy and terror of live gigs. I find the toboggan image applies equally well in live performance whether I am playing or mixing the sound. The sculpting picture comes to mind when I am planning an involved project as well as when I am executing it.

For me, it is my "virtual" physical images, not literal visual pictures, that provide the most vivid experience. I've worked out intricate drum stickings by closing my eyes, thinking about the part, and "feeling" what it is like for my body to perform it. I've even done this sitting on a bus, looking at a part I could score but not yet play.

The final arbiter in all of our sound and music work is our ears, but mind and body harbor many more tools for getting where we want to be. Marshal all your senses and connect them, and you'll be amazed at how your inspiration flows. Got the picture? ●

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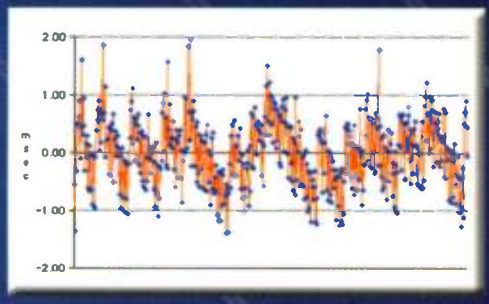

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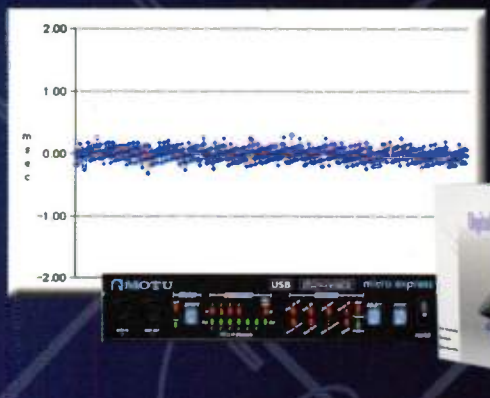

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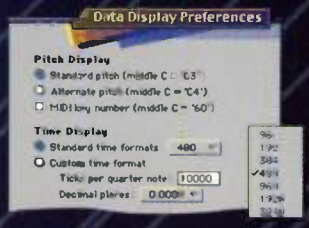

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