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VETERAN ENGIN

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Here are some verbatim comments gathered by our roving Mackie video crew on a recent visit to Nashville and Los Angeles (call us toll-free for a copy of the finished epic production), interspersed with recent review excerpts.

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HR824

"Mackie asserts that the HR824s are 'smooth from 39 to 20kHz (±1.5dB)' and our tests corroborated the claim. This is no mean feat for monitors this size. The HR824s performed admirably, allowing us to distinguish very fine shades of tonal color and to establish subtle timbral and harmonic relationships between sounds. If you are in the market for a pair of compact active monitors and you are not afraid of the truth, do yourself a favor and give the Mackie Designs HR824s a critical listen."

"When I was tracking for Robert Redford's The Horse Whisperer, *I put a lot of low end musical instruments onto the tape. When it came time to mix, no way could I have thrashed it out without the Mackie speakers. They really saved my life. My next job is in Calgary, Canada. I'm bringing four Mackies."* **Brian Ahern, Engineering Legend**

"Very musical. Very accurate. We actually move them between our five rooms." **Glenn Meadows, TEC-nominated mastering engineer, Masterfonics**

"The most balanced pair of speakers I've ever had. I haven't heard anything better. The Mackies bring the full spectrum of sound into my room. They bring the full scope of the sound in an area that encompasses me AND my clients. You get subsonics — a terrific fullness of acoustic guitar, the lowest end of bass drum. When you have an upright bass you get low end that I normally don't get in a room like this." **Stephan Oberhoff, independent L.A. producer/engineer/keyboardist**

"Performance, features and a cost-not-barred design at a retail price of $1500 a pair* make this product a very good value. In the words of one person involved in these listening tests, 'I have a feeling that [the HR824s] will become the NS-10 of the late '90s and beyond' ...ubiquitous."

"I love the [HR824's] bottom end — it sounds real. You don't have to compensate or guess. It's nice to FEEL a speaker. Producers also say they feel really good." **Stanley Smith, feature films soundtrack composer, co-producer of Jordan Hill**

* suggested U.S. retail.

EERS AND REVIEWERS CONFRONT REALITY.

MONITOR RAVES BECOMES A TIDAL WAVE... AND OTHER MIXED METAPHORS.

"HR824s give systems costing twice as much a run for their money in terms of sound quality... they deliver a solid low end that's surprising for their size and a flat transparent response across the spectrum."

"[HR824s] sound incredible — I was extremely surprised by the low end response. Clarity, detail and reproduction in reverb tails is real good." Pat McMacon, Facility Director, Sony/Tree Studios

"Very tight bass... clean mids... crystal pristine highs. There's a truth to them once you hear you can't go back." Frank Serafine, Hollywood motion picture and television sound designer

"On material I've mixed using another monitor brand, I'm now hearing things I missed. Imaging is wide and very even. The whole spectrum is equally represented. Great frequency response... midrange is smooth... no low end hypiness." Bill Smith, Grammy-nominated recording engineer

"Very clean. Spectacular. Very impressive. You can listen to them for a long period of time. They work in a lot of rooms. What we get on these speakers comes out when we take the tapes other places." Milan Bogdan, General Manager, Emerald Studios (Billboard Magazine-rated "#1 Country Recording Studio")

"You can sit and listen to them all day long. You get exactly what you hear. They're totally natural — I can't say the word enough — NATURAL." Lee Roy Parnell, Grammy-nominated singer/songwriter/producer

"Their treble output is detailed and extended yet very smooth. Words like 'open' and 'silky' come to mind... and these adjectives apply to a very wide sweet spot. The Mackies put out the kind of deep, warm bass normally considered the sole domain of huge drivers and subwoofers. I would consider these speakers a bargain at twice the price, but at list they are a steal."

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Cover: Illustration by Boris Lyubner

Multiple Personality Disorder

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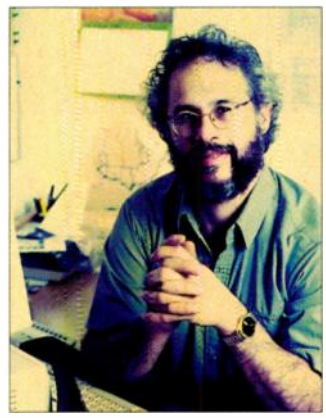

ANTHONY PIDGEON

Hardware, software...anywhere you look in our technology-driven industry, you see feature-laden production tools. Manufacturers constantly add new features and improve the old ones, and just when you think they can't possibly find anything to add, they show you three cool new features that you never anticipated. In many cases, the additions don't even increase the price of the product.

Indeed, we now have tools that can do way more tricks than most of us will ever use. The burning question is, are the features usefully presented? Although some companies have recently put more emphasis on designing a friendly user interface, the problem of putting a friendly face on products that have myriad possibilities remains daunting. These issues arise with both hardware and software, but this month we're going to talk about software user interfaces.

In this issue's cover story about 2-track audio editing programs ("Shaping Better Waveforms," p. 44), coauthors David Rubin and Dennis Miller note that in many cases, what distinguishes top-notch software applications from each other is not their feature sets but their user interfaces. "To a great extent," Rubin observes, "interface design is a matter of personal taste."

In his "Final Mix" column ("Under One Roof," p. 210), Larry the O takes this one step further. From his perspective, sometimes more is less in that a specific type of work often calls for only a limited feature set, and having every feature under the sun can be as much a hindrance as a help. Once again, the more features you put into a product, the harder it becomes to put a friendly face on it. In addition, huge, one-size-fits-all programs are more likely to be unstable than streamlined programs.

Larry's suggestion—specialized, task-specific versions of programs—is interesting and different. I don't know whether it would be financially attractive to developers and dealers or practical for designers, but it's certainly worth discussing. I once hoped that a component-software architecture such as Apple's Open Doc would provide a solution. Sadly, Apple let the technology stagnate.

So here's another idea. Manufacturers could develop user-interface editors for their programs, with which knowledgeable users could hide unwanted features, rearrange menus, and generally alter the entire look and feel of the program, saving the results as a Preferences preset. This would go beyond the flexibility of Steinberg's *ReBirth* (a program simpler than a pro-level audio editor) or the screensets in Emagic's *Logic Audio,* or even Cakewalk's CAL.

User-interface presets could be saved to disk or uploaded to a Web site. Programs could ship with several presets customized for tasks such as music tracking, mixing, mastering, post-production, and game-sound design. As with *ReBirth,* an online community of interface developers could be fostered.

The code for the whole enchilada would be hidden under the hood. Yes, the program would still be large, but you wouldn't have to wade through features you don't need. Dealers could offer a single version of a program that could become many different tools. It's ambitious, but think of the possibilities.

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Associate Editors Jeff Casey, Brian Knave, Dennis Miller, Gino Robair, David M. Rubin
Copy Chief Patricia Hammond
Editorial Assistants Carolyn Engelmann, Matt Gallagher, Rick Weldon
Contributing Editors Larry the O, George Petersen, Scott Wilkinson
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Human Resources/Facilities Assistant Lauren Gerber
Receptionist Carrie Gebstadt

National Editorial, Advertising, and Business Offices
6400 Hollis St., #12, Emeryville, CA 94608
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tel. (800) 843-4086 or (615) 377-3322; fax (615) 377-0525

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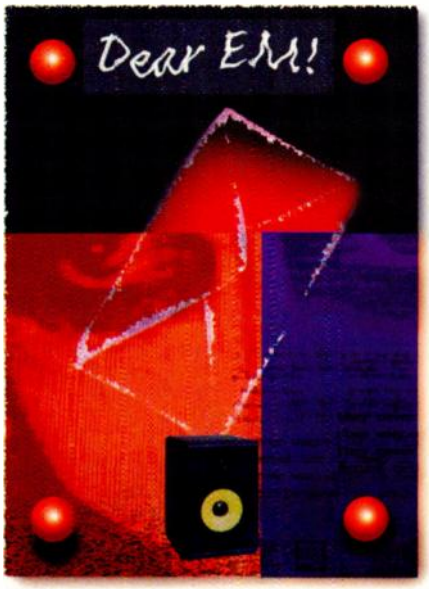

MONO MATTERS

Larry the O's "Final Mix: One Is the Loneliest Number" (January 1999) contains some extremely bad advice for those people who expect their music to get FM radio airplay. Not only are there still a substantial number of small mono FM radios around, but *every* car radio has a "program adaptive blend" circuit. This circuit senses the condition of the RF signal. If the signal is too weak or multipath contaminated to be received in stereo without objectionable noise or distortion, the radio will automatically blend its stereo decoder toward mono. This behavior is programmed into the radio and is out of the listener's control.

The bottom line is this: every "stereo" car radio is constantly varying its reception from full stereo to dead mono, depending on reception conditions. If your mix is not mono compatible, it will suffer in autos. Since most radio listening is done there, your mix will be at a substantial disadvantage.

Someday, when digital radio is standard and every FM radio has been retired, we can ignore mono compatibility. But today, it's still very important.

Robert Orban
Chief Engineer, Orban, Inc.
robeorba@orban.com

Robert—My mama didn't raise no fools, so I have no intention of arguing a point about broadcast audio with an esteemed authority such as yourself. In fact, your point—that the broadcast chain is still often mono—was discussed recently in "Mixing for the Small Screen" (November 1998 **EM***) and was raised to me before "Final Mix" went to press, so I acknowledged it with a few sentences to be inserted in the column. In strict accordance with Murphy's Law, however, that addendum was apparently devoured by a spontaneous crack in the space-time continuum and so did not make it into print. (In other words, the cosmic dog ate my homework.)*

To clarify my position, I do not advocate blithely ignoring mono compatibility; I'm just pointing out that there are now numerous situations in which it is no longer the imperative it once was. In nearly four years of doing computer game sound design, for example, I have never even heard mono compatibility mentioned.

Your comments are certainly significant for anyone creating mixes for broadcast (radio or TV), and readers would be well served to consider them carefully. One possible workaround for the problem is to do separate mono-compatible mixes for broadcast.

I believe the best course is to know the medium for which you're mixing, and then make an informed choice about whether to concern yourself with mono compatibility.

I must take issue, however, with your characterization of my column as giving "extremely bad advice." It is an opinion column; I am offering no advice, only giving my point of view. The essence of "Final Mix" is not informational but simply a perspective—and not even the magazine's, but mine alone.

Thanks for taking the time to send your comments.—Larry the O

A WRINKLE IN TIME

Let me get this straight. For 20 years, professional audio magazines and their advertisers have told me that using "time aligned" speakers was the way to avoid that 0.341 ms (I measured it) difference in phase between my woofer and my tweeter. Now you tell me that the propagation delay of "up to 2.5 ms" in digital audio mixers is acceptable ("Letters: Signal Delay?" January 1999)? Just whom am I to believe? I'll trust my ears. They tell me to stay forever in the analog domain.

Captain Analogue
cptanalog@aol.com

Captain—You could stay in the analog domain forever, but you'd be pretty lonely! There's a big difference between the delay that a digital mixer exhibits and one that exists between a woofer and a tweeter within a speaker enclosure.

Although the human ear can't discern a delay time as short as 0.341 ms or 2.5 ms on a single signal, it can pick out the difference in timing between two signals. If you're monitoring on a two-way speaker system, and the signals from the woofer and tweeter arrive at the monitoring position at different times, the result will be an unbalanced response.

You probably will experience this as frequency-dependent phase cancellation (comb filtering). Granted, you won't hear a discrete delay, but the slight offset will be enough to affect the quality of what you're hearing. This is why it's of the utmost importance for the elements within a speaker system to be time-coherent when you are mixing a project. (By the way, the term "time aligned" is copyrighted and refers to a specific type of design.)

On the other hand, when monitoring through a digital mixer, the entire signal is delayed equally, so all frequency components are sent to the speakers at the same time. This would be a concern if you were monitoring the same signal simultaneously through the console and directly from the multitrack. But how often does that occur? So even though a delay time of 2.5 ms is greater than a delay time of 0.341 ms, it's not enough to be audible unless it's compared with the original, undelayed signal.

However, that accounts only for the most basic processing delay in a digital mixer. If a signal is repeatedly sent in and out of the mixer in the analog domain (such as through effects loops to external processors), the cumulative propagation delay could be noticeable to a performer receiving a cue mix. In addition, if the mixer's CPU is being pushed to the wall because you are doing a lot of processing-intensive tasks, you could experience additional processing delay.—Jeff C.

DMITRY PANICH

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WINDOWS NOT OPEN

I would normally disregard a passionate letter from a misinformed **EM** reader, but Bruce Bullis's letter "Leery about Linux" (January 1999) contains some statements that need to be corrected. Bullis claims that "anyone who has the Microsoft Developer Studio compiler package gets the source code for all Microsoft Foundation Class (MFC) libraries, on which the OS is based."

MFC is a class library that gives software developers an object-oriented framework for developing Windows applications in C++. MFC is an object-oriented wrapper that sits on top of the application programming interface provided by the operating system. It most definitely is not the foundation on which the OS is built.

Given that **EM** is not a software-development magazine, Scott Wilkinson's article ("Tech Page: DIY OS," November 1998) was appropriate in addressing the needs of a much broader audience.

Arno
arno@channel1.com

HAVE YOUR CAKE

Although I can see the benefits of enticing prospective buyers of one's CD with little snippets on a Web page, to "charge very little" for a whole song file ("Desktop Musician: The MPEG Audio Craze," January 1999) seems detrimental to earning a living. Why would I want to charge very little for my music? Call me greedy, but after investing thousands of dollars in my home studio, I'll be damned if I'm going to sell my blood, sweat, and tears for 25 cents a song! Besides, if people are going to listen to these tunes outside of their computers (like on a car stereo or home system), they're going to have to burn them to CD anyway.

Dan S.
stecko@colba.net

Dan—If you want to make a living off of your music, you've got to get people to listen to it first. Unless you already have a deal with a label to cover your production and distribution, you might as well consider the Web as a great way to distribute your "blood, sweat, and tears" without incurring much additional expense. A 25-cent profit here and there (and more important, a new fan), when compared to a few hundred more dollars in the hole to press CDs of your music yourself, is nothing to sneeze at. Better to sell a song for a quarter than not at all.—Carolyn E.

PHANTOM SPIRIT

In the December 1998 issue, J.J. Jenkins mentions in his review of the Spirit Folio Powerpad that the mixer sends +48 volts down all the mic inputs and advises to keep that in mind when using condenser and dynamic mics simultaneously. What problems does or could this cause, and are there any solutions?

Bill Prentice
audioworks@yahoo.com

Bill—Generally speaking, combining everyday condenser and dynamic mics is no problem when using globally switched phantom power. However, you'll get into trouble if you hook up an older ribbon microphone or a tube power supply to +48V phantom power.

Many mixers have individual phantom-power switches on each channel, which allows the user to combine microphones at will. This is convenient, but it adds weight and cost to a mixer, which is why portable units often have global phantom power. For typical applications of lightweight, portable mixers, such as the Folio Powerpad, manufacturers assume that the unit will be used only with condensers and dynamic mics, and that the engineer knows enough to leave the vintage RCA ribbon mics at home when planning to use phantom power on all channels.

The easiest—though costly—way around this is to use an external phantom-power supply for each condenser. This allows you to leave the mixer's phantom power off so you can use other microphones safely.

Incidentally, never plug in or unplug a mic with the phantom power on, as this can damage a condenser mic. Also, never send phantom power to a ribbon mic. Although the newer ribbon mics are reportedly designed to withstand phantom power, contact the manufacturer to be on the safe side.—Gino R.

DO YOU READ ME

Having been a reader of **EM** since the *Polyphony* days, I think I can guess the answer to my question, but I'll ask anyway. Are the digital recordings made on the various multitrack digital recorders (such as Roland VS-880, Korg, and Akai) compatible with each other? That is, can I play or record new tracks using a Roland on a multitrack started on an Akai or Korg?

Bob Johnson
Homewood, IL

Bob—Sorry, no such luck. The Akai DPS12, Korg D8, Fostex FD-4/FD-8, and Roland VS-840/ 880/1680 portable digital studios have incompatible file formats. A VS-880, for example, cannot read D8 files stored on a hard drive. At one point, third-party software for converting VS-880 files to other formats (such as Digidesign Pro Tools *sessions) was under development, but the project apparently was canceled. Having dealt with electronic music gear since* Polyphony *days, you have seen this movie many times!*

The only way to transfer audio between portable digital studios from different manufacturers is to record the tracks in real time. Fortunately, as long as both machines have S/PDIF digital I/O, you can transfer two tracks at a time in the digital domain.—Steve O.

ERROR LOG

February 1999, "Letters," p. 10: The illustration was done by Audrey Colman, not Ben Fishman.

1999 Desktop Music Production Guide, Contact Sheet, p. 98: The correct contact information for Quantum Corporation is: tel. (800) 624-5545 or (408) 894-4000; fax (408) 894-3218; Web www.quantum.com.

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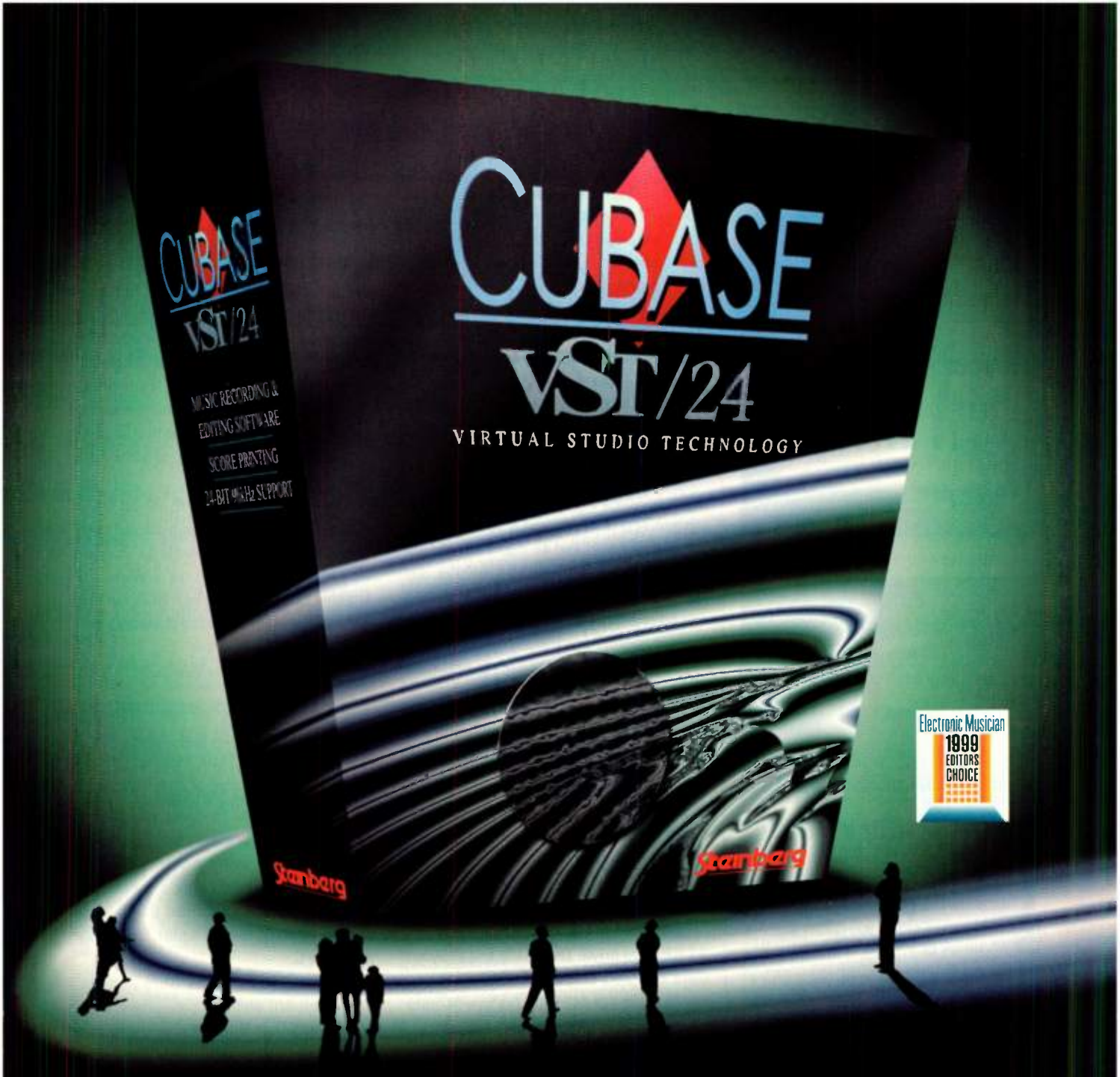

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The new AMX6 ($695) and AMX10 ($895) powered mixers from Akai could be just the ticket for an installation or for mobile sound reinforcement. These mixers come in molded heavy-duty flight cases with side handles and locking covers, and each weighs less than 17 pounds.

The AMX6 is a dual-mono mixer with six mono channels. You can send the two amplifiers' outputs to two mono mains, or to a mono main and monitor, or you can bridge them into a single mono output. The AMX10 is a stereo mixer with six mono and two stereo channels. This unit also has selectable amp modes, with options of stereo, mono main and monitor, or mono bridged output. The stereo channels have ¼-inch and RCA inputs and level, monitor level, and effects send knobs.

Otherwise, the two units are virtually identical. Each has balanced, mic/line inputs on both XLR and ¼-inch connectors for the six mono channels. Channel controls include rotary knobs for pan position, main level, 3-band channel EQ, monitor level, and aux send.

Both units also feature dual 7-band graphic equalizers on the main L/R buses and 5-step LED ladders that indicate signal level. The power amps deliver 200W/side into 4Ω. Power and phantom power are indicated by front-panel LEDs. Quarter-inch outputs for the unpowered mixer, monitor, effects send, and line out are located on the front, as are stereo RCA tape inputs and outputs. Four ¼-inch speaker outputs and the ¼-inch bridge output are on the recessed back panel.

Akai rates the units' frequency response at 20 Hz to 20 kHz (±0.1 dB), their THD at 0.5%, and their signal-to-noise ratio at >90 dB. Akai Musical Instrument Corp.; tel. (800) 433-5627 or (817) 831-9203; fax (817) 222-1490; e-mail akaiusa@ix.netcom.com; Web www .akai.com/akaipro.

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▶ GUYATONE

With their metal pots and switches, nonskid rubber bases, and chassis made from heavy-duty, stamped aluminum, Guyatone's effects pedals are designed to take a beating. At just 2¾ x 3⅛ x 1½ inches, these stomp boxes cover minimal square footage on stage, where free space is often hard to find. Each pedal can be powered by a 9V battery or with an optional AC power adapter ($24.95), and they all feature silent FET electronic switching and an on/off status LED.

The Guyatone WR-2 Wah Rocker ($89.95) is an envelope-controlled filter that features Sensitivity and Decay controls. The MD-2 Micro Digital Delay ($129.95) offers 30 to 800 ms of delay and has individual controls for delay time, effect level, and feedback. The HD-2 Harmonic Distortion ($79.95) pedal uses a circuit based on those used in vintage transistor distortion pedals. For those who want a heavier sound, the TZ-2 Fuzz ($89.95) is a retro-style fuzz pedal with gain and level controls. Finally, the MC-3 Micro Chorus ($99.95) introduces a slight level boost in addition to performing chorusing chores. It has chorus rate and depth controls.

All Guyatone pedals come with a three-year warranty. Godlyke (distributor); tel. (973) 835-2100; fax (973) 835-2100; e-mail godlykehq@aol.com; Web www.guyatone.com.

Circle #408 on Reader Service Card

▼ DOD

DOD's SR606 ($299.95) is a 6-in, 6-out line mixer/distribution amplifier housed in a single-rackspace chassis. In addition to master input and output level controls, the SR606 features an individual level and pan pot for each of the six channels. The unit can be used to mix six inputs into a stereo output, or it can be used as a buffer amplifier for simple level adjustment. The SR606 can also be used as a distribution amplifier. An LED indicates clipping for left and right channels when you use the unit as a stereo mixer.

The SR606 has an internal power transformer with a steel barrier designed to shield the internal electronics and reduce noise. Input and output are each on six balanced ¼-inch TRS connectors. DOD rates the mixer's frequency response at 20 Hz to 20 kHz, THD at 0.006%, and signal-to-noise ratio at >90 dB. DOD/DigiTech; tel. (801) 566-8800; fax (801) 566-7005; e-mail customer@digitech.com; Web www.dod.com.

Circle #409 on Reader Service Card

EMU Audio Production Studio

put power in your tower

EMU's Audio Production Studio (APS) is nothing you'd expect from a "sound card" and everything you'd expect from an EMU product – a professional quality audio system for your Windows® based PC.

ITS A POWERFUL SAMPLER

While other "sound cards" are based on game cards, the APS was designed as a professional quality, 64-voice musical instrument. Use up to 32MB of your computer's RAM to record your own sounds or play the hundreds of included SoundFont® samples – including original Proteus® sounds.

ITS A POWERFUL HARD DISK RECORDING SYSTEM

Other sound cards only let you record multi-track digital audio – we do that while we're a multi-channel sampler and an effects processor. Mix multiple analog (with 1/4" balanced I/O) and digital sources at the same time.

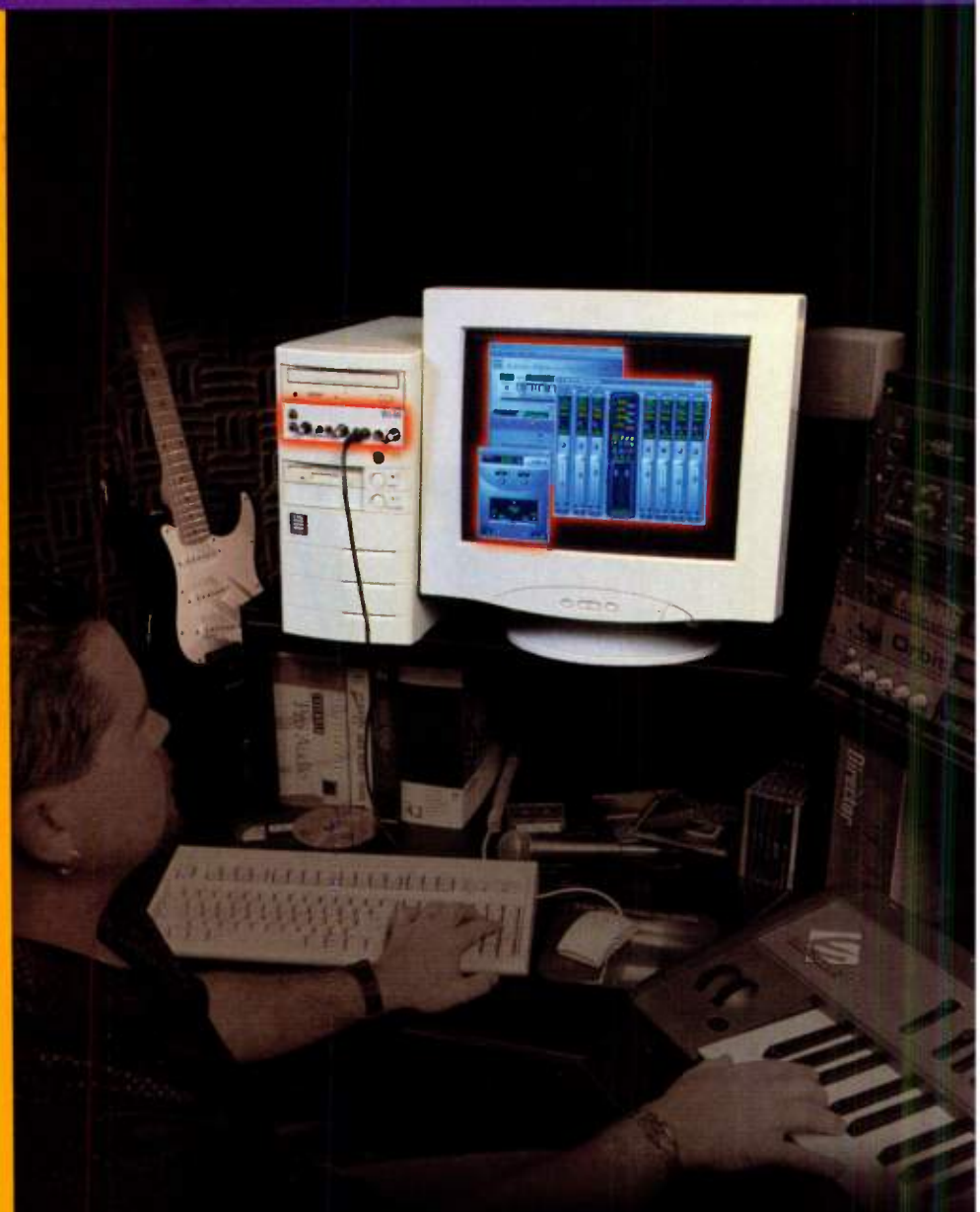
ITS A POWERFUL DIGITAL EFFECTS PROCESSOR

When other cards claim to replace "rack-mount" effects, all you get is a reverb with just a few controls. The APS's reverb is a full-featured effect with diffusion, hi & lo cut, early reflection and more. In fact, each of the 8 real-time effects and EQ's could stand alone as true studio quality devices – plus you can use all of the effects at the same time!

ITS A POWERFUL, COMPLETE, COMPATIBLE AND AFFORDABLE SYSTEM

The APS hardware consists of the E-Card (a Windows 95® PCI card with analog and digital I/O), the E-Drive (a drive bay replacement with microphone/line inputs and additional digital I/O), MIDI bracket, connecting cables, plus all of the basic software you'll need to sample, record, and process MIDI and audio. And, of course, the APS is compatible with most professional Audio/MIDI and multimedia software. Enjoy the Audio Production Studio's professional features and remarkable sound quality at the astounding price of only $699.00 – see your dealer today!

For complete technical specifications, please visit our website – **www.emu.com**



Electronic Musician 1999 EDITORS CHOICE

E-MU SYSTEMS

East Coast Office:
155 Great Valley Parkway
P.O. Box 3035
Malvern, PA 19355-0735
(610) 647-3930

West Coast Office:
1600 Green Hills Road
P.O. Box 660015
Scotts Valley, CA 95067-0015
(831) 438-1921

circle #507 on reader service card

Now Accepting Applications

Make Your Guitar Scream

Use the DDP to get the tone you've always wanted

Try this for a great guitar sound:

Gate:
- Threshold at -42dB
- Ratio at 1:4
- Attack at .1 mSec
- Hold at 40 mSec
- Release at 54dB/Sec
- TCM Time at 3 mSec

Compressor:
- OverEasy knee #3
- Auto attack and release - On
- Threshold at -10dB
- Ratio at 4:1
- Gain at 6.5

Parametric EQ:
- Band 1: 200Hz Boost 3dB
- Band 2: 8kHz Cut 2dB
- Band 3: 4kHz Boost 5dB
- Tape Saturation Emulation: Warm

Limiter:
- Threshold at 0dB
- Attack at .1 mSec
- Release at 130dB/mSec

Use the DDP to:
- Bypass the inferior A/D converters found in computer based recording cards
- Improve the quality of your tracks by recording "hotter"
- Gate noisy guitar rigs

Smooth Out Your Vocals

The DDP lets you set em on top of the mix, or blend em in

On your next vocal session try this DDP setup:

Parametric EQ:
- Band 1: 100Hz Cut 3dB
- Band 2: 25Hz Cut 12dB
- Band 3: 20kHz Cut 11dB
- Tape Saturation Emulation: Light

Compressor:
- OverEasy knee #4
- Auto Attack/Release: On
- Threshold at -17dB
- Ratio at 2:1
- Gain at 3.5

Gate:
- Threshold at -50dB
- Ratio at 1:2.6
- Attack at .1dB/mSec
- Hold at 38 mSec
- Release at 88dB/Sec
- TCM time at 1mSec

De-Esser:
- Frequency at 4.6kHz
- Amount at 45%

The DDP improves vocals by:
- Taming those harsh "esses"
- Controlling vocal levels
- Gating out background noise
- Providing comprehensive vocal processing in a single unit

Save The Planet  It's The Only Market We've Got

Apply Within.

Fatten Up Your Drums

Get that "fat track" sound you're looking for

Try this for a great kick sound:

Gate:
- Threshold at -32dB
- Ratio at 1:15
- Attack at .4 mSec
- Hold at 12 mSec
- Release at 92dB/Sec

Compressor:
- OverEasy knee #3
- Auto attack and release - On
- Threshold at -9dB
- Ratio at 5:1
- Gain at 6.5

Limiter:
- Threshold at 0dB
- Attack at .7 mSec
- Release at 120dB/mSec

DDP is better for drums because:

- Type IV™ allows you to capture the incredible dynamic range of a drum kit
- TCM™ Transient Capture Mode allows more accurate dynamics processing on percussive sounds
- Using the ultra-fast Gate improves drum track separation

DDP

Let's face it. 'Til now there were some audio processing chores (like compression) that just had to be done analog to sound right...right?

Please welcome to your rack the dbx DDP. It's the world's first 2 channel compressor/limiter that has all the warmth, life and mercy of an analog box with the precision converters you, (the modern recordist), MUST HAVE for your digital recording applications.

Finally, a 24 bit digital box that glows with the classic characteristics of dbx® compression that has been processing the hits for over 25 years. Take a run through the parameters, it's REAL easy... you'll see all the standard con-

Mix It Down

Bypass the on-board convertors on your DAT or DAW, and add sensible processing at the same time

When you're ready to finish it off:

Gate:
- Threshold at -60dB
- Ratio at 1:3.5
- Attack at .1 mSec
- Hold at 18 mSec
- Release at 100dB/Sec

Compressor:
- OverEasy knee #1
- Auto attack and release - On
- Threshold at -10dB
- Ratio at 2.4:1
- Gain at 7.0

Limiter:
- Threshold at 0dB
- Attack at .1 mSec
- Release at 160dB/mSec

During Mix-down the DDP can:

- Help you mix hotter with no "overs"
- Dither to your final format-16, 20 or 24-bit
- Preserve your stereo image using True RMS Power Summing™
- Add transparent processing to your entire mix

trols you'd expect, plus quite a few more. 10 steps of OverEasy® on the compressor, not just on/off. Transient Capture Mode™ (TCM), a fully parametric EQ, De-sser and Tape Saturation Emulation™ (TSE) are all standard on the DDP.

All this is hitched to world class 24 bit converters; converters that are found in boxes costing thousands more. Speaking of which, you can pay thousands more, but unless you get a dbx DDP you won't get the dynamic range afforded by our patented TYPE IV™ Conversion System.

Try the DDP on your toughest dynamics applications and see for yourself. Analog sound, Digital tracks, we're taking applications!

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circle #508 on reader service card

KEY CHANGES

Carl Martin effects pedals are now distributed in the United States by **European Musical Imports** (tel. 201/684-1212; fax 201/684-1213; e-mail euromusicimports@mindspring.com). There are several types of distortion pedals in the Carl Martin line, including the Hot Drive 'n' Boost, The Fuzz, Crunch Drive, and more. Other effects include the TremO'vibe (tremolo/vibrato pedal), Compressor/Limiter, Chorus xII, and Noise Terminator. Pedals range in price from $180 to $345...**Steinberg** is distributing **Mixman**'s *Studio Pro Deluxe* ($149) remix software for Windows PCs. The software also includes a copy of Steinberg's *WaveLab Lite*...**E-mu** has dropped the price of its Proteus 2000 sound module. The new price will be $995, down from $1,395...**Roland** is offering a free VS-880 operating system upgrade, downloadable from the company's Web site (www.rolandus.com). The version 3.102 upgrade features the ability to back up on CD-R, as well as improving the unit's microphone emulation and Voice Transformer effects... **BIAS, Microboards Technology,** and **Adaptec** have joined forces to release Jam Session ($749), a Mac-based software bundle that includes Microboards' PlayWrite 4080 CD recorder, Adaptec's *Jam* and *Toast,* and *Peak LE* from BIAS...**Opcode**'s OMS software will now support MIDI communication over Universal Serial Bus–equipped computers. In separate news, the company has released the VST FX plug-in bundle ($295). The bundle contains VST, Premiere, and DirectX versions of *fusion:Filter* and *fusion:Vinyl,* as well as VST-only versions of *Chorus, Flanger, Echo, Ring Modulator, REZN8,* and *Panner*...**Sonic Foundry** has reduced the price of its *Soft Encode* for Dolby Digital Surround Sound products. The 5.1 version of *Soft Encode* will now cost $995, down from $1,995, and the 2-channel version will be $495, down from $695.

—Rick Weldon

KORG

N5EX

MUSIC SYNTHESIZER

64 VOICE POLYPHONY
ARPEGGIATOR
DYNAMIC STEREO EFX DSP

DOES MORE. SOUNDS BETTER. COSTS LESS.

OVER 1700 UNBELIEVABLE KORG SOUNDS

The affordable N5EX packs 18 Mbytes of sound-generating power, delivering 1,671 sounds and 39 drum kits—sounds made famous in legendary Korg keyboards like the M1, 01/W, Trinity and SGproX. Plus the stereo piano, electric piano, organ and clav found in the N5EX's siblings, the N1 and N1R. Not to mention a pair of digital stereo multi-effect systems—each with 48 excellent effects—including resonance filter, chorus and delay.

INCREDIBLE REALTIME CONTROL

Whether you're gigging, recording, or just having fun, the N5EX's four front panel knobs provide real-time control of up to 16 sound parameters, including Attack/Release Time, Filter Cutoff and Effect Modulation. And with 32 memory locations in which to save favorite Performance settings, you can call back split, layer, arpeggiator and knob settings with the touch of a button.

FEATURES GALORE...

The N5EX is loaded with everything you'd expect—like 64-note polyphony and 32-part multi-timbrality. And some very cool stuff you wouldn't—like polyphonic portamento and a MIDI-syncable arpeggiator.

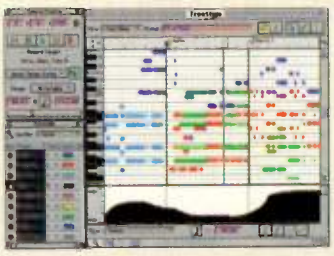
MORE MODELS TO CHOOSE FROM.

All the fabulous features of the N5EX come standard in the N1, a weighted-action, 88-key marvel that marries real piano feel and response to N™ level performance. And the N1R squeezes all that power and utility into a single rack space module.

DISCLAIMER: SHARP DUDS AND A GROOVY ATTITUDE HAVE NOT BEEN PROVEN TO ENHANCE KEYBOARD PERFORMANCE. (BUT YOU GOTTA ADMIT THEY LOOK PRETTY BITCHIN.)

MIDI-PHILES LOVE THE N5EX

The new N5EX fully supports General MIDI and includes GS & XG sound maps. That means it can speak the language of all commercially available



GM, XG, OR GS—THE N5EX PLAYS 'EM ALL BACK. PLUS, BOTH THE N5EX AND N1 COME BUNDLED WITH MARK OF THE UNICORN'S *FREESTYLE LE* SEQUENCING AND UNISYN EDITOR/LIBRARIAN SOFTWARE—A $500 VALUE!

MIDI file information. It also comes with a built-in computer interface that's both PC and MAC compatible.

SURFERS WELCOME...CHECK OUT WWW.KORG.COM

For more information on the N5EX and the rest of Korg's outstanding line of music products, make a point to drop in at Korg's home on the cyber-range.

*Producer/Remixer Doug Beck's remix credits include Salt-n-Pepa, The Rolling Stones and Shania Twain.

KORG
Super sonic.

circle #510 on reader service card

▼ BLUE MICROPHONES

Out of Latvia comes the Blueberry microphone ($1,295), from Baltic Latvian Universal Electronics (BLUE). The

Blueberry features solid-state, discrete Class A circuitry; hand-picked electrical components; and a transformer output that is powered by a 48V phantom supply.

The Blueberry has a hand-built gold-and-aluminum-sputtered Mylar film capsule measuring 1.25 inches in diameter. The Mylar film for the mic's capsule is tensioned to a handmade backplate and mounted with BLUE's internal rubber stem, designed to isolate the diaphragm from rumble.

The Blueberry is a cardioid condenser mic. Instead of a fixed diaphragm, however, the capsule has a movable, perforated brass element on the rear of the capsule backplate, which is tuned at the factory for the desired frequency response.

The mic includes a hand-built wooden microphone case. Optional accessories for the Blueberry includes the S1 shock mount ($149.50) and W1 pop filter ($99.50). A color-matched 20-foot microphone cable is available for $34.95.

BLUE rates the mic's frequency response at 22 Hz to 22 kHz and maximum SPL at 133 dB (at 0.5% THD). Signal-to-noise ratio is rated at 69 dB. Baltic Latvian Universal Electronics; tel. (818) 986-BLUE; fax (818) 784-7564; e-mail: blue@bluemic.com; Web site: www. bluemic.com.

Circle #410 on Reader Service Card

▶ FOSTEX D-108

Fostex emphasizes flexibility and compatibility with the D-108 8-track modular hard-disk recorder. The unit can record and play back all eight tracks simultaneously and comes with 16 virtual tracks. Multiple D-108s can be cascaded to create a larger system.

In addition to the standard D-108 ($1,195, without internal disk drive), the recorder is available in enhanced versions. The D-108TC ($2,145) includes the T/C Sync card, which enables the unit to slave to external LTC, sync to a video reference signal or word clock, or chase MTC and LTC.

The D-108B ($1,560) adds analog (+4 dBu) balanced I/O on a DB25 connector. You can also get a version of the D-108B that includes the T/C Sync card ($2,510), giving you the best of both worlds.

The D-108's internal drive caddy allows you to install any approved DOS-formatted hard drive, and you can record to external SCSI volumes. All models are available with an internal, 5.2 GB removable hard drive ($210 for the standard model and $300 for all other models). The D-108 incorporates Fostex's proprietary FDMS3 disk-management format, which allows for up to 1,548 track minutes (at 44.1 kHz).

New to the D-108 is a graphic preview function designed for intuitive block editing. A dot-matrix, 16-character display shows the program title, and a level-envelope display shows the sound level. The front panel is removable and can serve as a remote controller with a 15-

foot cable. A 99-point locate memory provides quicker editing.

The D-108 records uncompressed, 20-bit digital audio at sampling rates of up to 48 kHz. It uses 20-bit A/D and D/A converters. Analog I/O is on unbalanced RCA connectors. Digital I/O is via stereo S/PDIF optical and ADAT Optical ports. Fostex Corporation of America; tel. (562) 921-1112; fax (562) 802-1964; e-mail info@fostex.com; Web www.fostex.com.

Circle #411 on Reader Service Card

▼ RED SOUND FEDERATION BPM FX

The Federation BPM FX digital multieffects module from Red Sound Systems is available in two versions: the Federation BPM FX-DJ ($999), and the more feature-laden BPM FX-Pro ($1,250), structured for studio applications. The module uses a new version of the company's BPM engine, which ana-

lyzes audio for rhythmic elements and syncs the BPM FX's DSP effects to the input's tempo. The unit's 8-step sequencer can be used in real time or step time to record patterns for customized effects triggering.

The module includes four effects—Filter/LFO, Cutter, Delay, and Panning—which can be used simultaneously. A joystick on the center of the front panel allows you to adjust the blend of the four effects in real time.

Filter/LFO is an analog-style filter with 12 dB/octave and 24 dB/octave cutoff slopes. Controls include frequency, resonance, and envelope modulation. The Cutter can control the signal's volume in tempo by applying a BPM-synched square or sawtooth waveform to input-signal strength. Knobs control the depth and speed of each wave. The Delay section features three types and up to 1.5 seconds of delay. The Panning section includes Red Sound's Spatial Panning System, which splits the input signal into its constituent low, mid, and high frequencies. The separate signals can then be panned independently.

The BPM FX-Pro features an input and output connector for each of the four effects; the BPM FX-DJ has only a pair of connectors each for input and output. All connectors are ¼-inch jacks. The BPM-FX Pro also has MIDI In, Out, and Thru connectors, and all of its front-panel controls are MIDI adjustable. Tracoman, Inc. (distributor); tel. (954) 929-8999; fax (954) 929-0333; e-mail henri@tracoman.com; Web www.tracoman.com.

Circle #412 on Reader Service Card

The Birth Of A Legend

The Diaphragm

All GT Electronics AM Series mics use a super-thin 3-micron, gold-evaporated mylar diaphragm for the ultimate in sensitivity and transparent response. Over 1" in diameter, the extra-large diaphragm is precisely tensioned by hand to ensure perfect accuracy.

The Tube

The GT AM61 and AM62 maintain an all-tube signal path for preamplification. The tube, a military-spec GT5840M, is the most advanced audio vacuum tube ever made. It offers incredibly low self noise, a long life and nearly non-existent microphonics. The result...classic, warm, rich tone that you demand from a legendary tube mic.

What turns a studio microphone into a legend?

Natural **warmth**. Rich character. Crystalline clarity that perfectly captures the fine details of every **nuance**. Most importantly, it provides an indescribable intimacy that makes listening a deeply emotional experience.

Legendary mics are made by people who share a passion for the art of sound. So we gathered together some of the most **passionate** designers in the world to create GT Electronics, a new division of Alesis that's dedicated to the qualities of **legendary** audio equipment design. It all starts with the AM Series large diaphragm studio condenser microphones, which offer **everything** you'd expect from a legendary mic except the legendary price.

GT. The new legend has arrived.

Fixed Cardioid

AM51
CLASS A FET

Cardioid, Omni, Figure 8

AM52
CLASS A FET

Fixed Cardioid

AM61
TUBE

Cardioid, Omni, Figure 8, Super-Cardioid

AM62
TUBE

GT Electronics - A Division of Alesis Corporation

GT Electronics 1633 26th Street Santa Monica CA 90404 www.gtelectronics.com

the new legend

circle #511 on reader service card

SOUND ADVICE ▲ ▲ ▲ ▲

▲ BOLDER SOUNDS

Any sample user's library should include a good, usable supply of grand piano sounds. *Bolder Pianos* ($129), from Bolder Sounds, provides a comprehensive collection of piano basics with built-in variations. For tonal variety, Bolder uses two pianos, a Yamaha C7 and a Steinway D, each sampled with a mezzo forte and a fortissimo touch. Also offered are various banks of samples recorded with brighter or darker filters.

Looped samples at both dynamic levels cover the entire keyboard; the unlooped samples comprise around five octaves. For each piano, several programs feature Velocity-switching between the mezzo forte and fortissimo sample sets, with options for different filter settings. These programs are offered with switch points at Velocity values of either 110 or 99 to accommodate players with a lighter touch.

To make this collection even more useful, Bolder includes a program of the Yamaha's strings plucked with a guitar pick in a range of slow to sharp attacks.

The *Bolder Pianos* CD-ROM packs a total of 450 MB of samples in E-mu, Akai, and Kurzweil K2000/K2500 formats. The samples require 32 MB of RAM. You can check out audio demos at the Bolder Sounds Web site. Bolder Sounds; tel. (303) 440-4297; fax (303) 442-2025; e-mail boldersnd@aol.com; Web www.boldersounds.com.

Circle #415 on Reader Service Card

▼ KEYFAX SOFTWARE

Keyfax Software can help you compose genuine, human-sounding jazz sequences. Twiddly Bits, vol. 10, *Jazz—Brass, Guitar & Solo Instruments* ($39.95) is the second volume of jazz sounds in Keyfax's Twiddly Bits library of Standard MIDI File (SMF) patterns. As with the entire library, it's a collection of performances by professional artists captured as MIDI data. You can load these SMFs for copying, pasting, and editing in a sequencer.

Twiddly Bits, vol. 10, offers jazz grooves, licks, and melodic riffs performed on MIDI instruments for guitar, sax, trumpet, vibes, and organ. The disk consists of 838 SMFs grouped by instrument. It provides up-front melodic and solo ideas, as well as tonal colors, and gives you a variety of jazz styles, from traditional to adult contemporary and even free jazz.

The performers include saxophonists Jeff Kashiwa (The Rippingtons) and Gary Regina (Tranceport); guitarists Baird Miller, Nial Thompkins, and Bill Vallaire; vibraphonist Roger Beausolais (Chevalier Brothers); organist Dale Ockerman (Doobie Brothers); and trumpeter Steve Waterman.

The controllers used include Akai EWI and EVI wind controllers and Yamaha's G50 MIDI guitar system. All Twiddly Bits MIDI samples are available on floppy disks in Mac, PC, and Roland S-MRC formats. Keyfax Software; tel. (800) 752-2780 or (831) 460-0172; fax (831) 460-0173; e-mail us@keyfax.com; Web www.keyfax. com.

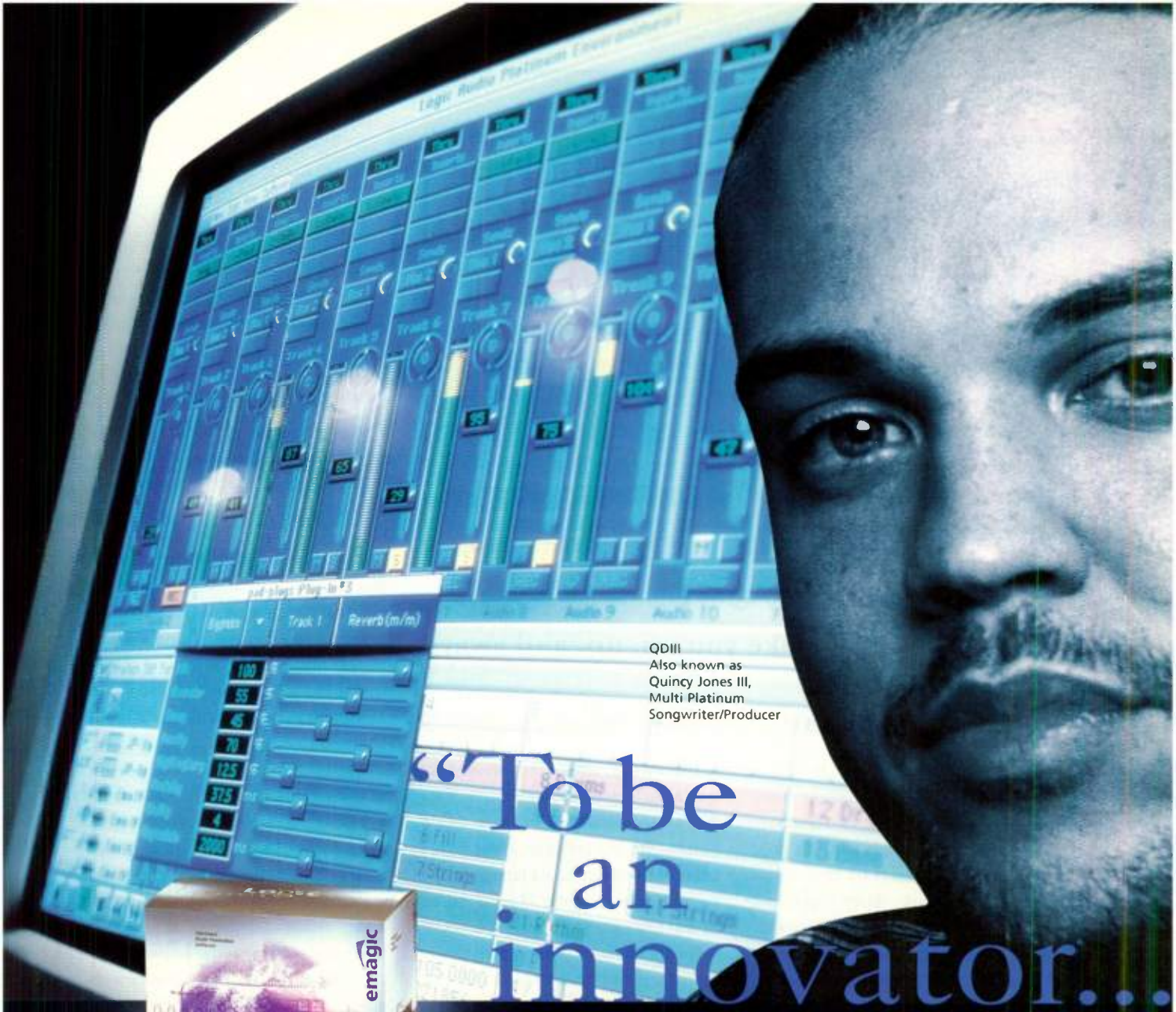
Circle #416 on Reader Service Card

▼ KID NEPRO

Kid Nepro has collected a wide range of drum hits, from vintage drum machines to new live samples, on a single disc for Akai MPC2000 and MPC3000 sampling drum machines. *Millennium* ($200) is packed with over 1,000 single-hit samples. There are 39 drum programs, with an average of 32 samples each. Programs include drum sounds from such classic machines as the Roland TR-707, TR-808, and TR-909; Oberheim DMX; Linn 9000; Alesis HR-16; and Yamaha RX5. A wide variety of programs feature complete kits customized for styles including techno, acid house, hip-hop, and jazz.

There are also sections of *Millennium* devoted to bass and vocal samples. You get four bass programs, with 20 samples per program, including sounds from the Roland Super Jupiter, JV-1080, and JD-800; Yamaha DX7; Moog Minimoog; Casio CZ-series; Prophet VS; and more. And lest you think the Kid has gone overboard with all these drum and bass samples, four more programs provide vocal sounds from Club Vocal Bytes to Assorted Funky Screams. Kid Nepro; tel. (718) 642-7802; fax (718) 642-8385; e-mail kidnepro@aol.com; Web www.kidnepro.com.

Circle #417 on Reader Service Card



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Quincy Jones III,
Multi Platinum
Songwriter/Producer

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...with unlimited creativity, the only choice is Logic Audio. Used in combination with my 24 bit hardware, I get superior power and flexibility when writing, producing and scoring. Nothing else even comes close."

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Technology with Soul.

PRO FILE

Just Too Sweet

Chantigs want to take you up, up, and away.

By Rick Weldon

The music of the Chantigs boasts generous doses of energetic melodies and Beach Boys–style harmonies atop peppy '60s and '70s pop/rock. The band's classic four-piece rock 'n' roll lineup—Elton Ridge and Greg Turner on guitars, Matt Slavnik on bass, and Josh Bevelacqua on drums—is just the starting point for compositions that include banjo, Roland Jupiter 8, turntables, and many other instruments. Their first release, *Up with Chantigs*, was recorded during an eight-month period at Global American, the band's studio in San Francisco.

During the making of the record, most tracks were demoed on a Tascam 424 4-track, then redone on a Studer A80 2-inch 16-track. The album was engineered by the Chantigs and a friend, Andy Boretto, who also played trumpet on a few tracks. "Before the band got together," recalls Ridge, "I used a Tascam 38 8-track in our studio. Greg and Josh came in and did a record on it. That's how we met.

"During that time," he continues, "I was out one day looking for road cases, and I found the Studer. It had belonged to Disneyland, where they used it for their Main Street Electrical Parade. They didn't want it anymore, because they'd gotten into digital gear. I had a guy come out, and two hours later he had it running. We bought a Mackie 8•Bus 32-track mixer and started recording."

For tracking, the band frequently routed vocals through Leslie cabinets and into a dbx 160 compressor. However, for their cover of Loretta Lynn's "Fist City," just one dbx wouldn't do, so vocals went through three compressors (a dbx 160 and two dbx 166s) and an Electro-Harmonix Big Muff distortion pedal before going to tape. Many of the guitar tracks were recorded similarly, going straight from the Big Muff and dbx 160 into the Mackie.

"During mixdown, it would usually be Matt, Greg, and me on the mixing board, each in charge of a group of tracks." says Ridge. "We'd listen to it in different configurations, with different tracks muted for sections of the songs, and we'd punch tracks in and out and ride the faders until we got the right combination. It was pretty hands-on for all of us, with everybody pushing buttons."

This on-the-fly approach extended to most aspects of the recording process. On "Raquel (Hey)," Bevelacqua played drums along with a beat from a Casio SK-1. His drum tracks were then sent to Fender Twin and Guild amplifiers for additional tremolo and overdrive effects. "We put that on tape and mixed it in with the Casio and another track of Josh doing some human beatbox stuff in the background," according to Ridge.

On "Punching Up a Photo from Tokyo," Slavnik used a pair of Motorola two-way radios for vocals. "Matt was about five feet away from the mic. He also had two other walkie-talkies facing the two-way radios, and each other, and they'd pick up the key clicks and get a really gnarly, distorted sound."

"We also used a Theremax, a PAIA-kit theremin that our friend Kevin Lindsay had built into a wooden shell that used to house an old radio," says Slavnik. "We'd been in the studio messing around and working on 'Tokyo' all night," Ridge recollects. "Meanwhile, Kevin was off in a corner soldering this kit together. He finished it around midnight, and we were like, 'OK, let's test it out.' We fired it up and got it working in time for 'Tokyo.' So, of course, it went on the record."

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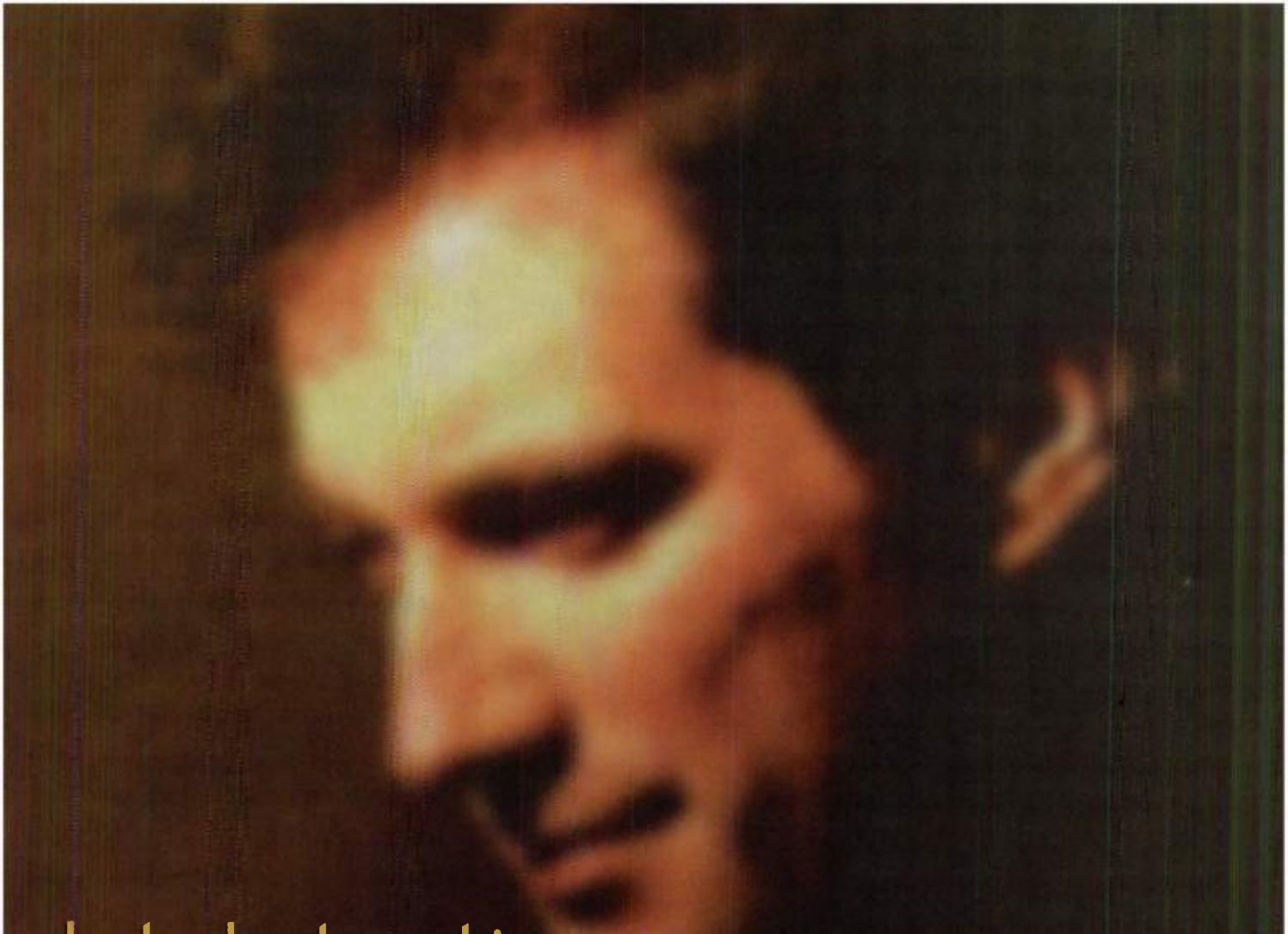


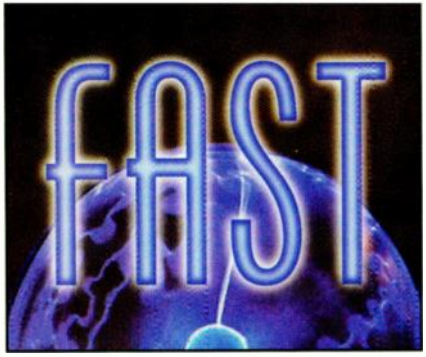
looks back on his career.

By Barry Cleveland

Just about every EM reader owes a little something to Larry Fast. A true pioneer in electronic music, Fast has been instrumental in developing the technology and the music that has shaped this genre.

His accomplishments over the past 25 years are impressive indeed: he assisted in the development of the Polymoog and Memorymoog and worked at AT&T Bell Labs on digital sampling and resynthesis, FM synthesis, direct-to-disk recording, and other nascent technologies. It's no exaggeration to say that, along with Wendy Carlos and several others, Fast created the vocabulary of analog synthesis. (If you doubt this, just audition the presets on the latest retro analog synth, and compare them to the sounds on Fast's mid-to-late-'70s recordings.) Fast has also authored his own music software and helped to develop the Universal Synthesizer Interface, which evolved into MIDI. More recently, he has designed and marketed a listening device for the hearing impaired and acted as a consultant in the development of digital audio watermarking. None of this should be surprising, coming from a guy who built custom synthesizer circuits for Rick Wakeman while still in college.

As a composer, Larry Fast was one of the first people to recognize that, by combining synthesizers with multitrack tape recorders, an individual artist could create an entire orchestra. Wendy Carlos blazed the trail in 1968 with *Switched On Bach,* and Fast, who called his one-man orchestra Synergy, followed her lead shortly thereafter. He released nine Synergy albums between 1975 and 1986, all of them featuring his signature sound: highly structured and richly layered orchestral-style compositions that are created entirely on synthesizers. (For more information about this music, check out the Synergy Web site at synergy-emusic.com.)



In addition to his Synergy projects, Fast has worked with an astonishing variety of artists—Kool & the Gang, Southside Johnny, Bonnie Tyler, Hall & Oates, Kate Bush, Barbra Streisand, Charlie Sexton, and the Dream Academy, to name a few. He scored the original "Laserium" light shows, Carl Sagan's *Cosmos* series, and several feature films, including *The Jupiter Menace*. Fast also recorded and toured briefly with the European progressive rock group Nektar, and his production credits include albums with Annie Haslam (Renaissance), FM, and Shadowfax. When Peter Gabriel left Genesis in 1976, he asked Fast to join his new band, initiating an extraordinary collaboration that flourished for almost a decade.

As if all this weren't keeping him busy enough, Fast also served as the director of A&R for the Audion Recording Company (a subsidiary of JEM Records) between 1986 and 1990, where he signed well-known artists like Wendy Carlos and Anthony Phillips, along with virtual unknowns such as (former **EM** author) Don Slepian and myself. To top it off, Fast wrote a series of articles for **EM** during 1985 and 1986, starting with our premiere issue (June 1985).

Larry was kind enough to share with us his thoughts about technology, his career, and the future of the industry.

You have said that you became interested in both electronics and music at an early age. What were the origins of these interests, and when did they merge?

Even at the earliest age, I was fascinated by things that lit up, and my first toys were robots. My grandfather on my mother's side was an electrical and mechanical engineer involved with the nuclear program, and he brought me bags of switches, alligator clips, and other electrical parts. We used to build radio and other circuits together, and that led to my involvement with tape recorders, speakers, and stereo equipment. My first serious tape machine was a ¼-inch mono machine he bought when I was born in order to record me as I learned to talk. It's a 1949 Wilcox-Gay, literally from the dawn of the American tape recording industry. I took it apart and put it back together, learning about things like mechanics and bias amplifiers. That recorder is the one that I learned on, and I still have it.

On the other side of things, there was always music around the house when I was growing up. My mom was an advanced amateur violinist, and my father had played trumpet in high school and college marching bands. They had records of Broadway shows and classical music, and made a big point of having us kids watch Leonard Bernstein young people's concerts on television. My grandparents were regular opera goers, and they were involved with an opera circle that served as a training ground for the Metropolitan Opera in New York.

I began taking violin lessons at the age of seven, then switched to piano when I was nine, and continued with private lessons through high school. I was not on a virtuoso track, but I received a good, solid grounding in classical music, with a little bit of jazz and pop. To be honest, I wasn't the most diligent student, but I was drilled in sight-reading and scales and all that, so I picked up a lot. When the Beatles hit, I struck out on my own and began playing guitar and bass, while continuing to take piano lessons, and I taught myself the rock pieces I wanted to know.

I was still building radios when I formed my first band, in 1966. At that time, less expensive transistorized oscillator and filter circuits had become available, and Robert Moog had begun producing synths. In 1967, I built my first pitch-controlled oscillators—which were not formal linear voltage-controlled devices by any stretch of the imagination—and *that* was the point at which suddenly the electronics stuff jumped to the music creation side. From there it was just a matter of collecting circuits, voraciously reading electronic hobbyist magazines, and keeping an eye on the Moog devices, which were still a little expensive for a high school kid. While the circuits I was building were becoming more sophisticated, the musicians of the psychedelic era were beginning to explore new sounds. I remember being blown away by "Good Vibrations" when it came out, and by *Switched On Bach*, which came out shortly after that.

Near the end of high school, I became a rock 'n' roll obsessive, buying all the records I could get my hands on. I traded my formal piano lessons and Gershwin for dating, a driver's license, and playing in a band. When I went off to Lafayette College in Pennsylvania, I reentered the traditional music world, but more as a composer, taking courses in theory, harmony, and orchestration. An electronic music project I did for a 20th-century composition course was made up of segments that later appeared on the first Synergy album as "Legacy." During those years, I also took a job as director of technical services with a Japanese audio importing company, which afforded me even more electronic knowledge, gave me more access to equipment and technology, and provided me with enough income

The godfather of electronic music, Larry Fast, circa 1976, around the time *Sequencer* was recorded.

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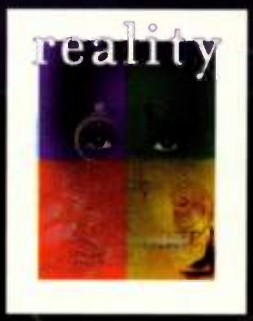

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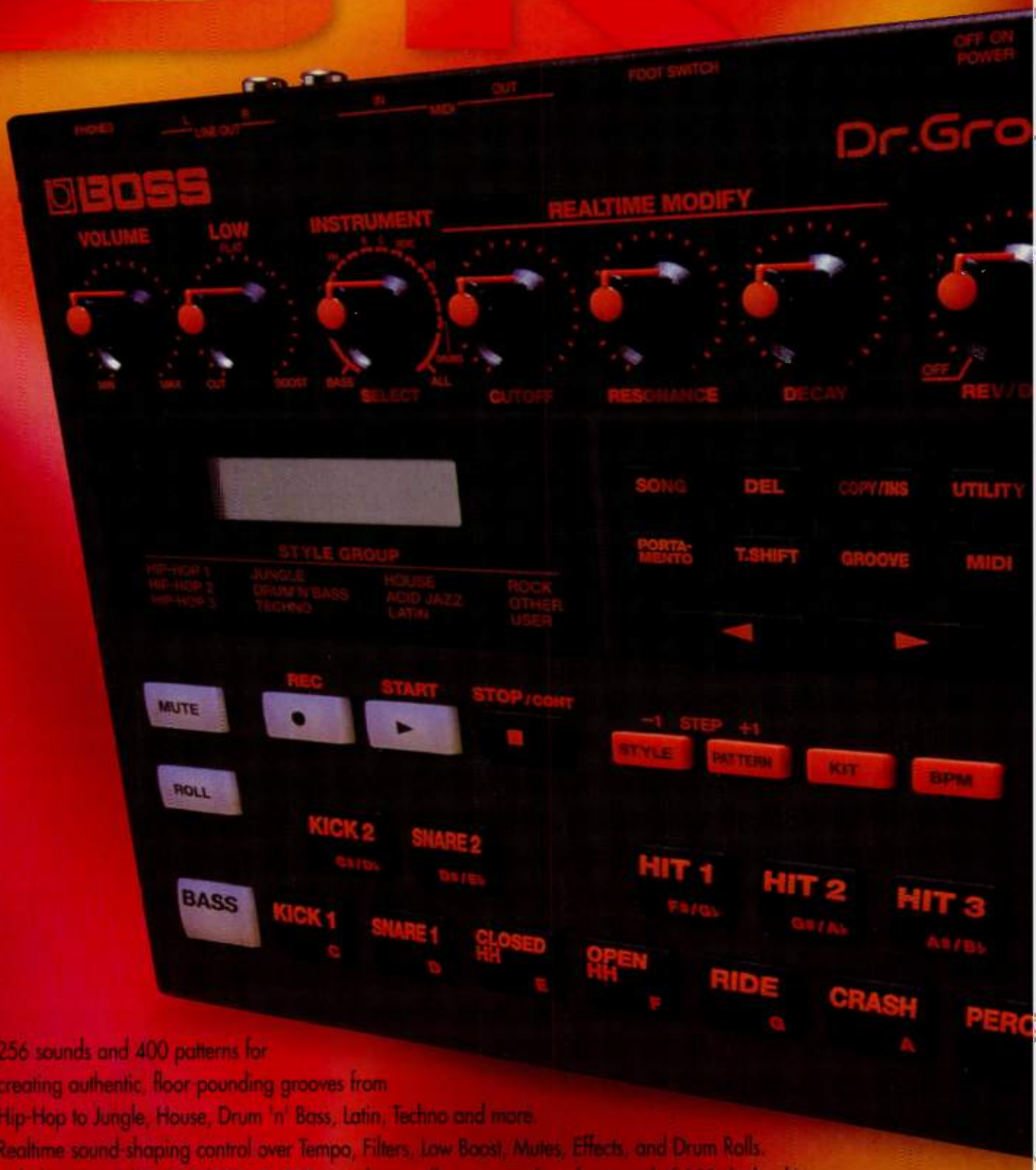

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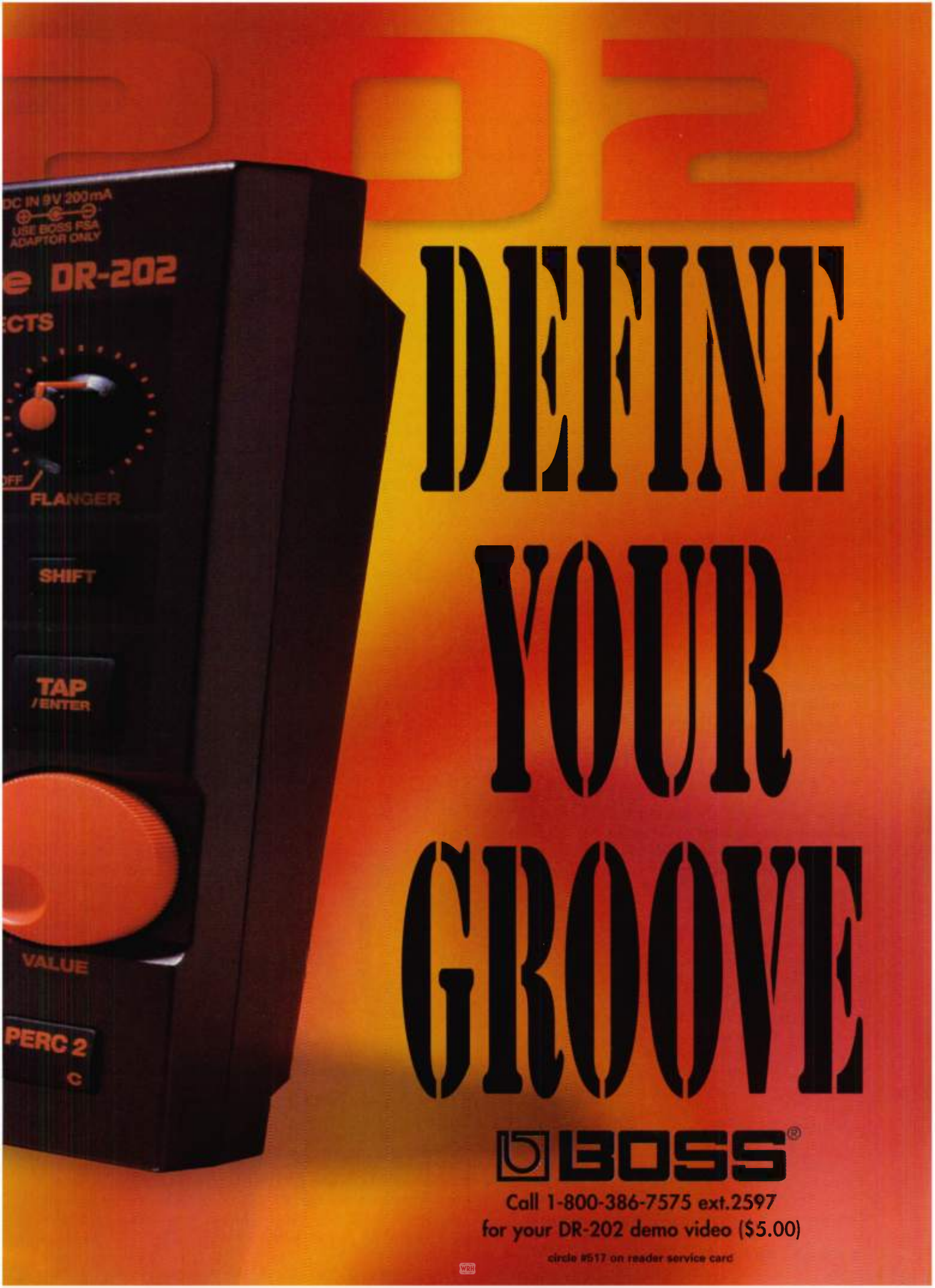
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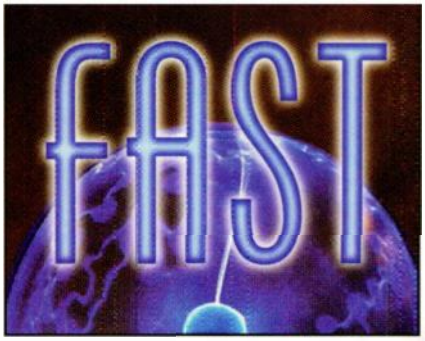


to purchase real Moog equipment. In fact, I was asked to teach part of my 20th-century composition class, as the staff didn't know much about synthesizers or electronic music.

To what extent do you feel that formal musical training influenced your music, for better or worse?

As I mentioned before, I took piano lessons at an early age, but I didn't put in the hours that my teachers would have liked, and my hands were just a little bit smaller than would be required to become a virtuoso. Also, I would drive my teachers crazy, in a good and a bad way, because I didn't like the children's arrangements of some of the classical pieces. I would develop my own. I would be berated for not doing my homework, yet at the same time, I'd be told that what I'd done was very good. But what sparked me was the arranging and other creative aspects of music making, rather than just performing somebody else's creative achievement. The overall skills of creation have always been more important to me than developing technical, muscular skills.

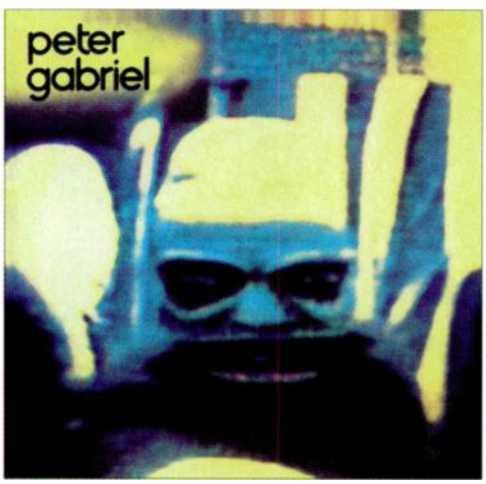
You've worked with a wide variety of producers throughout your career. Which ones were able to inspire you to do your best work, and why?

That's a very tough question. I've always tried to keep my eyes and ears open, and I've gleaned a bit of knowledge from almost everybody I've bumped into over the years—producers like Bob Clearmountain, Hugh Padgham, Steve Lillywhite, Jim Steinman, and Bob Ezrin. Not to mention those producers who are known more as artists, such as Robert Fripp. In many cases, I was brought in to fill gaps in the producer's own production knowledge, which put me in an interesting relationship with them.

As for people who showed me *really* different ways of approaching things, Peter Gabriel immediately comes to mind. Peter's a creative person, and he's an artist, but there's a producer's mind-set that he carries with him. I'm not talking about things like techniques for getting a better drum sound, or even about layering and orchestration on a pop record as opposed to some other kind of record; it's a way of hearing and thinking and perceiving what should go into the mix.

For example, when working with Jim Steinman—who, incidentally, is a wonderful character—I knew that, if he asked me for something, he might want to tweak it a little bit, but he would take pretty much what I offered him. With Peter, very often I would come up with what I thought was the right approach, but he would be coming at it from such an oblique angle that what I came up with was not at all what he wanted. Sometimes it could be a little frustrating, but when I'd finally grab onto what he did want, I would think, "Wow, what a great way of looking at it." That kind of thing happened all the time. So working with Peter was a continual learning experience, and that's one of the qualities that makes him such a unique artist.

The other person—and this is ironic because we haven't worked together on musical projects that have seen public light—would be Wendy Carlos. She started out as something of a mentor, but over the years we've become good friends and had a lot of exchanges. Wendy wrote the book on what many of us in electronic music were trying to accomplish from the earliest days onward, and she established a set of standards. Again, she has a somewhat oblique way of looking at how to create, which is uniquely her own. It's hard to put into words because it's sort of an amorphous concept, but Wendy's been more of an inspiration for my own work than most of the straightforward rock and pop music people I've worked with.



Fast worked with Peter Gabriel for almost a decade. Their partnership culminated with the recording of *Security*, considered by many to be one of Gabriel's best works.

Having had the occasion to listen to a wide range of Synergy music over the last few weeks, I decided to revisit the first four Peter Gabriel albums, as well. In retrospect, it became obvious to me that your role in Gabriel's "sound" was increasingly pronounced, culminating in *Security*, which to my ear might be more appropriately called a Gabriel/Synergy album. Just how much Larry Fast are we hearing on *Security*?

I guess there's a fair amount on there. *[Laughs.]* David Lord, who was really more of a classical producer and a great audio engineer, produced *Security*, and it was recorded at Peter's own studio. David acted as a coordinator, making sure that things got done right but giving Peter far more space than he'd had before with other producers, and I think it shows in the recording.

The producers on Peter's first two albums had very strong personalities and very clear visions of where *they* thought the recordings should be going. Bob Ezrin is an extremely strong personality in the studio, and he acted as something of a cheerleader. Back in those days, he dressed like a gym coach, complete with a whistle around his neck. He would dance around in the studio, and if he didn't like what somebody was doing in a rehearsal take, he'd blow his whistle in their face. Peter was just coming off the Genesis experience, and he took a bit more of a passive role than he would later in his career. Peter's certainly no passive flower by any stretch of the imagination—he was fighting to get some things done his own way—but Bob had a vision of how he made records, and he went on to great success with Pink Floyd, so obviously it worked. However, it meant that Peter was fighting for his little place in the sun on his own record, and I was one of many people, including Robert Fripp and Tony Levin, who are known for what they do individually but were submerged into

background positions. [For Ezrin's take on producing Peter Gabriel, see the interview in the August 1996 **EM.**] Robert Fripp produced the second record, and of course he's an artist and a visionary in his own right, so he and Peter had different visions of how it should go. That meant that any artistic jousting was going to be between those two guys.

Steve Lillywhite produced the third record, with Hugh Padgham engineering, and he wisely gave Peter much more free rein on the creative end of it. Everybody, including me, did their best to let Peter bubble to the surface. For example, Peter wanted to experiment with not having any cymbals on the record, and he took all of the cymbals away from the drummers. That was an idea he had spoken about before the first record, but it didn't happen until the third. Peter also wanted to bring out the electronic instruments, rather than the guitars and more traditional instruments, so by default I was in the limelight. We ended up working on that album for quite an extended period. The rhythm section was recorded fairly quickly, and most of the guitar overdubs happened in the first several weeks. After that, Peter and I worked on the album for months and months.

The *Security* album was done in much the same way: the basic tracks were recorded first, and then Peter and I continued to work on it for quite a while. One thing about working with Peter is that he is a very creative keyboardist on his own. At that period, he didn't have quite the depth of technical knowledge about the instruments that I did, but he was good at using the knowledge he did have to spark interesting ideas. Because of his unique way of making the sound-mind creative connection, he would find ways to make use of things that might have been overlooked by most other people, including me.

Also, in the earliest days of sampling with the Fairlight, he had a really good ear for listening to some fairly mundane sound and imagining what it would sound like if it was, say, sampled and shifted down in pitch. He was good at that. I was coming into it knowing a little more because I had already done some work at Bell Labs with digital recording and synthesis, but he took to it instantly. So we had a good, cooperative method of working.

I suppose that I had some influence on him, but it's so hard to say. I spent months and months on *Security;* I was literally living with the family. Some days were very productive, and some days nothing got done; or a lot of work got done, but nothing survived. I remember we were recording in the summer, and I flew home for Christmas. So it was a long project, and I suppose that just by being there I had some influence. There were times when one of us would be playing something, and the other one would say, "I've got an idea; move over," and play the next couple of bars. Peter continued to work on the album even after I came back to America, so when I heard some of the finished mixes, I'd say, "That's me, that's me—whoa, where did that part come from?"

When interviewers ask you about your split with Peter Gabriel, you usually respond by saying that Peter decided to go in a new direction, where electronics played a far less significant role. You are also credited with "tracks not used" on the *So* album. What was on those tracks, and what or who, from your personal perspective, precipitated such a change in direction?

Peter doesn't like anything to become static or boring, whether it's eight bars of music or his entire life; he always makes big changes. He left Genesis for creative reasons, at a point when a commercial breakthrough was within their grasp, and it shot him off in a new direction. The band that I was involved with lasted for nearly ten years—longer than even the Genesis period—so I think he needed to shake things up and invigorate the music with something new. The eventual split was entirely amicable, and there were no harsh words or lawsuits. *[Laughs.]* I have nothing but good feelings about all of the work that I did with Peter, and about him as a person and a friend.

When he was initially planning to go out on the road for a couple of dates in 1985, he wanted to do something different. He was becoming thoroughly immersed in African music at that point, and he talked about possibly working with African musicians and changing everything. When it came time to do the shows, it wasn't practical to "change everything," so Tony Levin and David Rhodes stayed on. Production on *So* was continually postponed over an 18-month period. At that point, I had

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Metropolitan Suite (Audion)
Semiconductor (Passport)
Sequencer (Passport)

Soundtracks:
Birdy (with Peter Gabriel; Geffen)
The Jupiter Menace (Passport)
The Music of Cosmos (RCA/BMG)
Netherworld (with David Bryan; Moonstone/Sony)
Streets of Fire (MCA)

With Nektar:
A Tab in the Ocean (Passport)
Magic Is a Child (Polydor)
Recycled (Bellaphon/Passport)

With Peter Gabriel:
Peter Gabriel (#1; Atlantic)
Peter Gabriel (#2; Atlantic)
Peter Gabriel (#3; Polygram)
Plays Live (Geffen)
Security (Geffen)

With others:
Kate Bush *The Kick Inside* (EMI)
FM *City of Fear* (Passport)
Hall & Oates *H2O* (RCA)
Annie Haslam (Epic)
The Roches (Warner Bros.)
Charlie Sexton (MCA)
Shadowfax *Watercourse Way* (Passport/Windham Hill)
Southside Johnny & the Asbury Jukes *At Least We Got Shoes* (Atlantic)
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been off the road for two years, and I was doing a lot of work with Jim Steinman, including playing on Bonnie Tyler's *Total Eclipse of the Heart* album. I was offered the position of associate producer on her follow-up album, and since I couldn't get a start date out of Peter, I took the gig. Then, halfway through the album, Peter called to say he was ready, but I was under contract, so I asked him to send me tapes to work on. I had little or no involvement with the rhythm tracks or overdubs, and it was sort of my fade-out period. I was sent several tracks, one of which was "Big Time," and several more that just had working titles. I think one was called "This Is the Road."

On "Big Time" I'd done an edgier, more pushed sort of synthesized horn section, as there were no actual horns at that point. Interestingly, the horn section and some of the background vocals were recorded at the Power Station A while I was in Power Station B doing overdubs on Bonnie's album, so I heard the horn section go down. I remember thinking that it was a little straighter or more radio friendly than what I had come up with, but not wholly unrelated. It was an obvious thing to do with that track, so to this day I don't know whether the person who did the horn arrangements ever heard what I had come up with. I didn't have bad feelings or anything about his making those changes; it seemed like a perfectly logical thing to do.

Daniel Lanois seemed to have a stronger vision of how to take the record to somewhere that was going to be commercially successful, and given songs like "Sledgehammer," of course, it was. *So* was far more successful than anything Peter had done while I was involved with him. However, the changes that Peter was making began before he hooked up with Daniel Lanois. In fact, he had been working with Nile Rogers on tracks that were more tribal, rhythmic, and urban. Peter was very busy with Amnesty [International] and WOMAD, and Daniel may have had to step in to fill the void with his own vision, just in order to get the record done.

You said that, when you went back to the original tapes of your early albums to prepare them for rerelease, you were pleasantly surprised at how good they sounded. After listening to the resulting CDs, I agree, which brings me to the question: where do you stand on the current trend toward higher bit resolution and sampling frequency in general, and the 24-bit, 96 kHz trend in particular?

I have kind of a split answer on the 24/96 question, because there is very solid psychoacoustical data to support the view that higher sampling frequency shouldn't make a difference—or, if it does, only to hairsplitting academics and engineers, and even then those differences should be almost imperceptible. Yet there's such strong anecdotal evidence from people whose ears I trust, and from the bit of listening I've done, suggesting otherwise, that I think it's worth exploring further. It's possible that even higher frequencies make sense.

The fact that there's such controversy about it leads me to say, why not just go ahead with it, particularly in terms of 24/96? Storage is getting cheaper, converters are getting better, DVD audio is a natural as a consumer format, so I'm sort of scratching my head, saying, "Let's do it anyway." Why not go for the best of the given technology? I'm going to have to do more critical listening in my own controlled environment—my studio does not currently support 24-bit audio—before I will be able to really decide for myself.

There's such a groundswell around Internet audio. I was at the Plug-In '98 conference in New York, and there were discussions about all of the emerging Internet audio technologies. So much is accepted with, say, the Liquid Audio downloads, which are near CD, but really more like MiniDisc, quality. It seems there was some sort of a threshold in getting a "good enough" sound over to the public (roughly equivalent to a good-quality audio cassette or LP), and once that threshold was crossed, everything beyond it was just gravy for everyone but the audiophile elite and the recording community. It seems a given that compressed audio, at this point, is "good enough." We'll continue to improve it, but that's not the determining factor in whether it's usable. And of course, there are many economic considerations involved in all of this.

The Synergy reissues are the first commercial CD releases to contain digital watermarking. Explain briefly what digital watermarking is, and why it is important.

I have been doing test listening and consulting with MusiCode, from Aris Technologies, one of several companies working in this area. Digital watermarking involves streaming some form of information into the digital audio datastream. The key is to make it indelible so that it can't be stripped out, but avoid doing damage so serious as to render the recording unusable. It must also be robust enough that, if the watermarked recording is compressed digitally, transmitted through various coding schemes, then decompressed or even transferred to analog, the information is still retrievable. And those are two tough tasks because they are at odds with each other. Of course, this robust and deeply embedded data must also be inaudible so it is acceptable to producers and artists who have argued passionately about such things as a quarter-dB boost at 8.5 kHz.

Watermarking is important because

As Synergy, Larry Fast released nine albums between 1975 and 1986. Although Fast has endured a long legal battle over the rights to his catalog, he says a new Synergy album is in the works.

A Kurzweil K2000 is the centerpiece of Fast's current studio. His arsenal also includes an E-mu Proteus and Emulator II, a Yamaha SY-77, and several vintage synths, such as the Memorymoog and Prophet-5.

most composers and recording artists make money primarily from public performance of their works, and it's very hard to keep track of music use. It was hard enough during the past 75 years, as radio and television grew up, when there were between 11,000 and 12,000 broadcast outlets; now, with the Internet, there's audio all over the place. Performance rights organizations like ASCAP, BMI, and SESAC try to keep track of all those performances, but it's mostly done manually. And the system is far from being entirely satisfactory, even at the current usage level.

There are very well-thought-out copyright and intellectual property laws to compensate the rights holders, but the reality is that they simply can't deal with the Internet at this point. As watermarking becomes the standard, every piece of music will have this indelible code in it that identifies who wrote it, who owns it, and so on. The code can be read whether the music is played on the radio, used on the local TV news, picked up by a scanner with a computer attached to it, or any other way. Infobots can be used to sniff files on the Web, very much like the Webcrawlers used by search engines. They would be generating a music-specific indexing system, and a file could be sniffed out and identified even if the name of the file said it was something else.

Watermarking has to do with the economic engine that runs the music business. I don't mean the six or seven big record companies; I mean the broader picture of how any individual who sits down at a computer, creates a piece of music, and puts it out to the public can get paid. It's not an antipiracy thing—it won't prevent piracy in and of itself, and it doesn't prevent people from making copies; it just ensures that you know who owns the intellectual rights. Most people are honest and most uses are legitimate, but keeping track of who is supposed to get their individual 7.1 cents performance royalties is going to be a huge task in the 21st century. This makes it possible. It is not there to protect the status quo of the big powers. It is there to democratize, the same way that the Web and many other things have helped level the playing field in the creative community in recent years. There's a populist spirit behind it, which I like, and which will be helpful to all of us. I'm very excited about it.

Your first album, *Electronic Realizations for Rock Orchestra*, was mixed and released in quad. What sort of mixing scheme did you employ for that, and how does that experience affect your view of multichannel or surround mixing as it is being developed?

It's sort of déjà vu all over again. The quadraphonic soundfield is very closely related to Dolby Surround and is largely based on the same phase-encoding technologies. In 1974, there were two subtly different, yet incompatible, quad "encode matrix" schemes: QS and SQ. They were similar in that you were folding left-minus-right and right-minus-left information into the stereo pair so that you would get all the information on a stereo player, but with the appropriate decoder, the information that had been folded in could be teased back out into the rear speakers. The only things that have really changed in creating Dolby Surround Sound or Pro Logic is that there's a subwoofer channel, a center speaker, and mono rears. When we were originally mixing for quad, it was left and right in the front, with split stereo rears, and no center channel. In films, the center channel, for dialog, is much more important than stereo and sound in the back.

One interesting result of folding the rears into the front was that it created a much wider stereo effect, with sort of phantom extreme right and extreme left speakers, and that's a little bit of the sound of that record, even in stereo. By the way, that encoding just stays there, so when I remastered the original stereo mixes for the CD version, it was retained. And when you play it through a Dolby Pro Logic home-theater decoder, it comes back pretty well. It's a little weird and twisted because one of the rear channels is coming out of the middle, and the other one's coming out of the two speakers in the back. But it still makes an interesting effect, and it's remarkable that it has survived.

The mixes were done simultaneously through an encoder to a stereo version and also to a 4-track discrete version. The latter version was sent to, I believe, RCA, to be made into a quad discrete version of the "8-track" tape format, with a total of 16 tracks. Now there's a format that nobody remembers! *[Laughs.]* Those discrete masters, unfortunately, were never recovered, and to this day I don't know where they are. I have one copy of a completed, manufactured, Q-16 quad discrete cassette, and no player for it. It's in my own little personal museum.

For mixing, it was wide-open territory. It was right in the middle of the whole quad thing, and nobody knew what the rules should be. The fad was important enough that the API console I mixed the first album on at Media Sound in New York did have joystick controllers and a 4-bus output. In my case, I was trying to be conscious of the fact that the record could end up sounding like those ping-pong and locomotive stereo-effect records. I wanted to use quad in a subtle and dignified way, which meant creating a fairly conventional stereo soundfield across the front, creating a sense of depth to the rear using reverberant fields, and putting the occasional interesting musical phrase to the rear, all the while constantly monitoring for stereo and mono compatibility.

In fact, the problems that we had mixing for quad back then were more related to the physical LP cutter heads, which couldn't do particular phase-related moves. We had to watch certain things, mostly having to do with where you put bass and percussive elements below 150 Hz. If you tried to pan them in certain positions, they would create mirrored, out-of-phase versions of themselves for the matrix encoding, and when the cutter head saw that, it would freak out, burn out, or simply do nothing. The same dangers that existed before are still there, and the same precautions are applicable, except in cases in which you particularly wish to have the ping-pong/train effect. In general, a good song is a good song, so don't screw it up with gimmicks.

What's your gear of choice these days, and are any new technologies on the horizon that you find particularly promising?

I'm using a variety of things and will probably be doing some upgrading, but my central instrument of choice for the past several years has been a fairly fully loaded Kurzweil K2000. Going back to the Minimoog days, I've always chosen to get to know a few instruments very, very well, and to try to extract the most out of them. The Kurzweil has been the latest recipient of that treatment. I still occasionally use some of the Moog modular stuff from the earliest days, a Prophet-5 and a Memorymoog from a later period, a Yamaha SY-77 (that I keep around for the library of sounds I created for the DX series), and some Roland D-50/D-550-generation stuff. I also have an Emulator II, some E-mu Proteus modules, a Korg Wavestation, and a couple of drum boxes. I haven't moved up to the Kurzweil K2500 yet, but it's very likely that I'll be getting a rack module version of that.

The mind-set of the music I've done over the course of my career has been generated from things I could hear in my own head that I want to express in a recording. I have a certain electronic orchestral palette of sounds that I like to work with, and I've reinvented them about a dozen times over the past 20-odd years. They get me to the same place, and that's, I think, as it should be. I don't want to be driven by the equipment. It occurred to me, when reflecting on my earlier recordings, that the tools were really primitive in the early '70s, but the end effect, while more difficult to arrive at, was not much different than what I can generate with the Kurzweil. So even if I go to all-software synthesis, and there are some wonderful products on the horizon, I'll probably take it to the same place.

Other than that, I will probably outfit my studio for surround mixing in the next few years, which means I'll need more speakers. I've been using a pair of JBL 4311's, which were de rigueur when I started. I've heard lots of good, small, powered speakers lately, from Event, Genelec, Meyer, Mackie, and many more, so I'll try to arrange to listen to them all in the same room and choose the best ones for me. Oh, and I'll also probably be getting one of those little Roland Sound Canvas–type modules to carry around with my PowerBook.

I recently heard an interview with Philip Glass in which he was played some music by new artists who claim him as an influence. He was intrigued initially, but after listening for a while, his interest turned to something more like bemusement. What are your feelings on electronica, ambient, and other genres that often take more than one page from the Synergy book?

I have generally positive feelings because electronic music has gone

Fast today, pictured at the helm of his personal studio.

through so many phases. Early on, there was a lot of incompetence with the equipment. There are always great masters doing great work, like Wendy Carlos, followed by hordes of hack artists. After *Switched On Bach*, there was "switched on" everything for a while, and most of it was awful. There was so much bad electronic music, used so superficially and terribly on movie scores and commercials, that it led to a backlash. It was robotic and stupid and had no life to it. That was hard to get over.

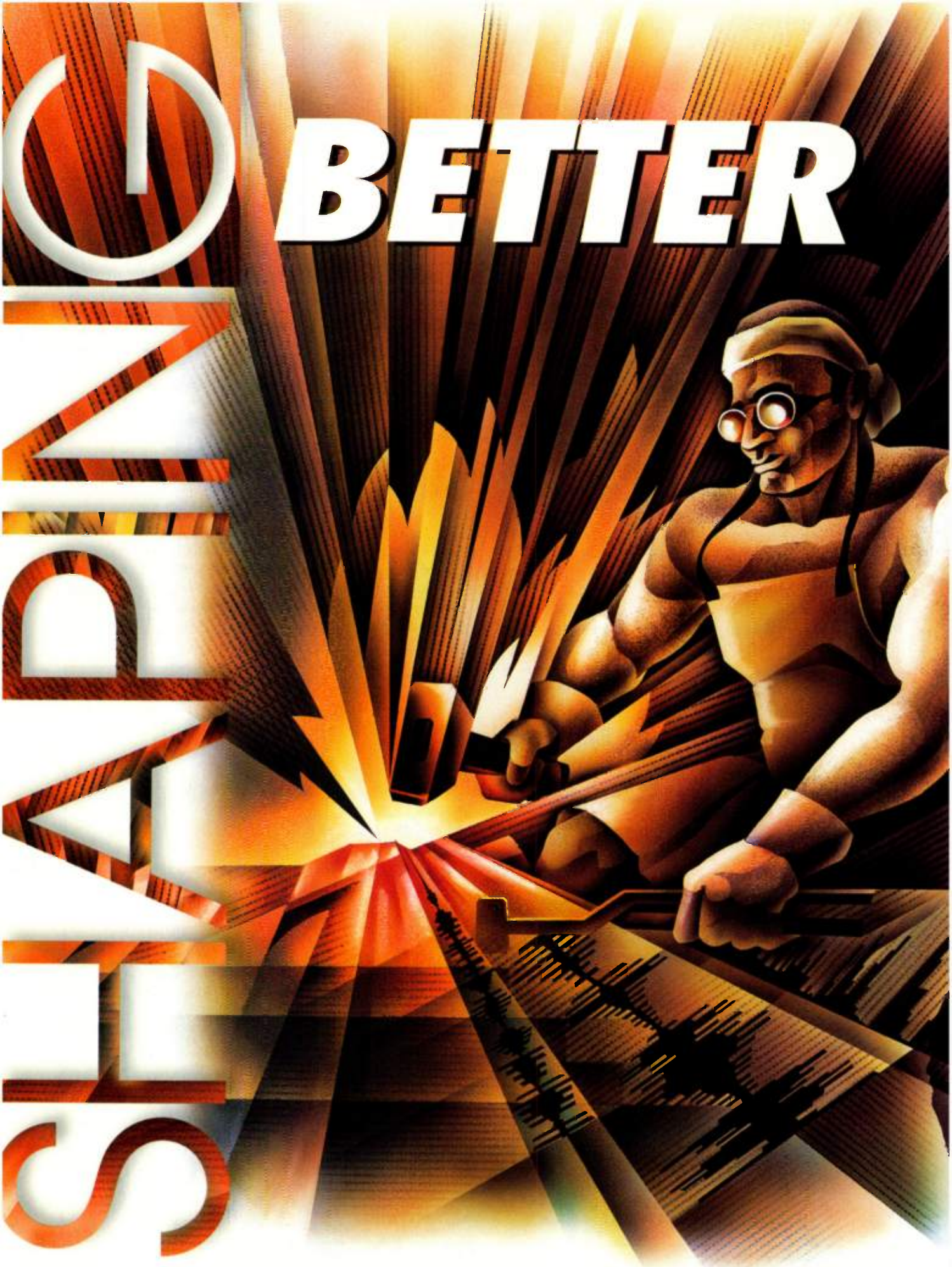
I remember that, around 1992, when techno and electronica was beginning to rise up, particularly in Europe and New York, it felt really good. I didn't like all of the music, but I liked the idea that there was a focus on music created with technology. Now that these forms have become more mainstream, I feel almost like a proud grandparent or uncle or something, saying, "Good. Look what the kids are doing. I'm glad this is working out." There are things about electronica that I like very much, and some things that I either don't like or don't understand, which I can choose not to listen to. I'm just glad that people are using technology creatively. I've been sampled on some of the records, like on the *ISDN* album by Future Sounds of London; there's a track called "Snake Hips" that contains a huge section of one of the pieces on my *Audion* album. So I've found myself being sampled almost as a sort of roots music, which is flattering when viewed from that perspective.

Last but not least, the same old question: when are we likely to hear a new Synergy CD?

I have ducked that question in the past few years while my catalog was tied up in court. It was hard to sit down and do new music when I had just been burned on the music from the first 18 years of my career. Now it's the opposite of that. With all the reissues, and the preparation of the digital masters, and all of the related stuff that went into them, there are just so many hours in a day.

Typically I would record Synergy albums after coming off the road, when I'd suddenly be left with this wide-open expanse of time, and I'd jump right into them. What I'm attempting to do now is to clear the decks so that early in 1999 I'll be left with a nice bit of time. Fortunately, I won't be coming in cold, because conceptually I've been working on many ideas for new pieces; a lot of things that have been started but not completed. Recently I organized my work files, which consisted of thematic concepts written down on paper, cassettes of snippets of things played on the piano, MIDI notes, and so on. Everything was transcribed into General MIDI files and cataloged. I have many, many megabytes of information codified and indexed, which will serve as the core of future albums. Some of the material harks back to my first album, although the pieces show more sophistication on my part as a composer, and obviously a lot more sophistication on the part of the technology.

Barry Cleveland *is the editor of* **EM***'s* Personal Studio Buyer's Guide, *as well as an engineer, producer, recording artist, and guitarist with the improvisational quintet Cloud Chamber.*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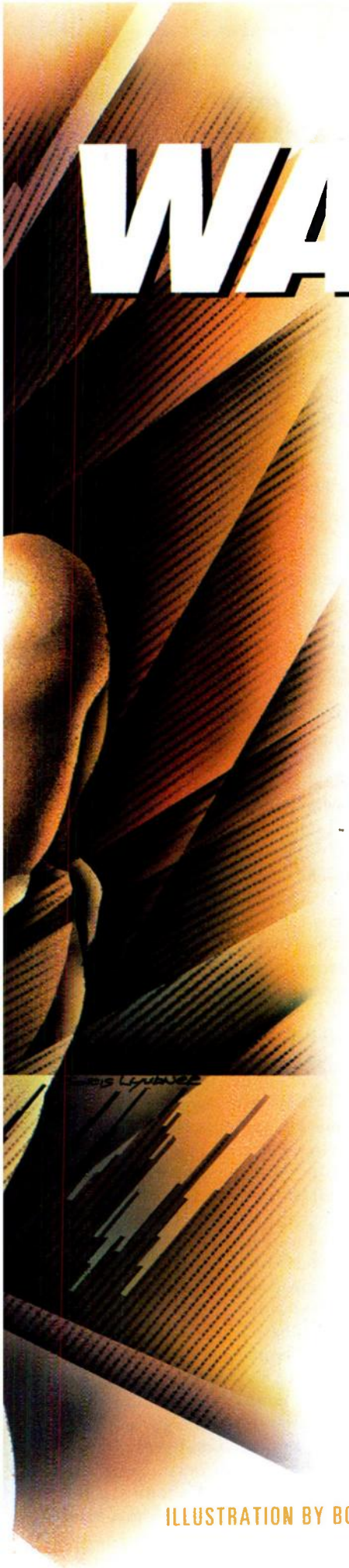

WAVEFORMS

BY DENNIS MILLER AND DAVID RUBIN

EM SURVEYS THE WORLD OF COMMERCIAL 2-TRACK AUDIO EDITORS FOR MAC AND WINDOWS.

Many types of software include audio editing capabilities. Whether you're working with your favorite digital audio sequencer, a video editor, or one of the many utilities that come with your sound card, you're likely to find the familiar Cut, Copy, and Paste editing options on hand. So why would you need to spend even more money on a dedicated audio editor?

The answer is that dedicated, 2-track audio programs are often designed for serious, in-depth editing. They provide a superior environment for such work, and most have plug-in architectures. Of critical importance, they support a wide selection of file formats and offer many specialized editing tools that are unavailable in other types of programs, including most multitrack editors.

During the past few months, we have looked at the top commercial stereo audio editors for the Mac and PC. In this article, we provide you with a detailed summary of our findings. Several of these programs have also been reviewed in **EM** (see the sidebar "Stereo Audio Editors in Review"), so once you have read this overview, you can refer to those reviews for in-depth coverage of programs that you find especially interesting.

We emphasize their differences as well as similarities, because we know that one size does not fit all. For example, you might be a Web site developer adding music to your home page, or you might be a multimedia producer creating soundtracks for a CD-ROM. Perhaps your goal is to get your music mastered for release on CD. Regardless of your situation, a dedicated audio editor is an essential tool.

ILLUSTRATION BY BORIS LYUBNER

SECTION

1 Waveshaping Software for Macintosh

By David Rubin

Many of us still remember those antediluvian times when the Macintosh first caught the public's attention and revolutionized music production with its built-in multimedia capabilities. Unlike the PC of that era, which could muster only an annoying alert beep, the Mac regaled us with sound effects and entertaining snippets of dialog. Because of the Mac's audio capabilities, several handy audio-editing utilities sprang up to support it.

Two of these applications—*Sound Designer* from Digidesign and *SoundEdit* from MacroMind (later Macromedia)—evolved into powerful commercial products, and their file formats acquired the stature of de facto standards. But the initial burst of energy that spawned these early Mac programs stalled in later years, just as high-end editing applications for the PC started to appear.

Sound Designer, having reached its apogee as *Sound Designer II,* has now fallen by the wayside as the company turns its attention to its multitrack hardware/software systems. However, old as it is, some sound editors still prefer *Sound Designer*'s familiar user interface and features. The once popular *Alchemy* (originally from Blank Software and later from Passport Designs) has also pretty much disappeared. (G-Vox recently acquired Passport's software line, but the company has not indicated whether there is a future for *Alchemy*.) *SoundEdit,* now marketed by Macromedia, gained support for 16-bit audio and hard-disk recording as it evolved into *SoundEdit 16* v. 2. This old trooper is a bit overdue for a face-lift, although there is still much to recommend it.

Fortunately, several recent programs offer a range of options for different budgets and editing needs. One bright spot for pro-level users comes from Berkley Integrated Audio Software (BIAS). BIAS's *Peak* audio editor has just been released in version 2.0 with a colorful, intuitive user interface and a raft of powerful high-end features. (An entry-level version, called *Peak LE* 2.0, is also available.)

Prosoniq offers a program with a new approach to editing. Its *SonicWorx PowerBundle* (distributed by Steinberg) combines the capabilities of its *Artist* and *Studio* audio editors, which emphasize audio processing over more traditional editing operations. (*SonicWorx Artist* is also available as a standalone product.) And finally, we must not forget MicroMat's *SoundMaker,* another new kid on the block, which packs a remarkable number of features into an affordable and easy-to-use program.

After 15 years of built-in audio capability on the Mac, the Darwinian forces of the marketplace have thus narrowed the field to four commercial programs (and their related versions): *SoundEdit 16* v. 2.0.7 ($299), *Peak* 2.0 ($499), *SonicWorx PowerBundle* ($699), and *SoundMaker* 1.0.3 ($150; currently available for an introductory price of $49.95). These programs represent a wide range of prices and offer distinctly different feature sets, so there should be enough diversity to satisfy everyone's needs. Here are some things to consider when shopping for a Macintosh stereo editing program.

ROOM TO MANEUVER

An audio editor's user interface is far more than a collection of cosmetic considerations. The way a program is designed and its appearance onscreen profoundly affect its editing capabilities and significantly structure the way in which individual tasks are accomplished. That can make the difference between quick and efficient edits and frustrating wastes of time. Finding your way around a waveform display, gaining access to tools, and having enough options for manipulating selected regions all come into play, especially when the clock is ticking and you're up against a deadline.

To a great extent, however, interface design is a matter of personal taste. For example, some users like being able to select the colors for the waveform display and its background. In this group of audio editors, only *Peak* and *SoundMaker* let you choose both display and background colors. *SoundEdit* is unique in letting you assign colors to selected regions individually in each waveform, so you can have several colors in a single file to mark sections of music or fragments of dialog, for example (see **Fig. 1.1**). Of course, you can also color the whole waveform in a single shade.

Taking control. Transport controls are another area of personal preference. You might prefer a control panel that is located unobtrusively in a fixed

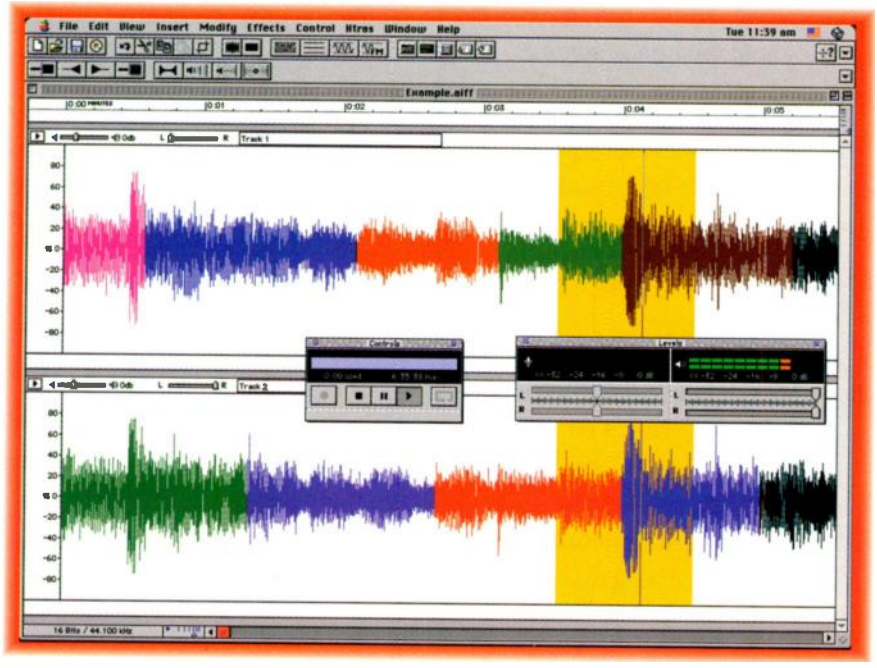

FIG. 1.1: *SoundEdit*'s intuitive user interface lets you individually color different regions.

Sound Design.

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WAVESHAPING SOFTWARE for Macintosh

markers can be a great aid in aligning sound effects and music to individual QuickTime frames when working with video clips.

Drop by drop. Drag-and-drop editing capability is another powerful feature for an audio editor, but in this group, surprisingly, only *SoundMaker* supports it. With *SoundMaker*, you can select an area of a waveform and drag it directly onto another waveform to paste it wherever you want. You can drag within a single document, or you can drag between windows. You can even drag a selection onto the Desktop to create an independent sound clipping.

Although *Peak* and *SoundEdit* don't support drag-and-drop editing, they allow you to open an audio file by dragging the file's icon onto the *Peak* or *SoundEdit* application icon. In fact, with *Peak*, you can drag a folder onto the *Peak* icon, and the program will open all the supported audio files. That's pretty cool if you do a lot of batch processing.

All the Mac programs let you open more than one audio file at a time, which makes it easy to copy and paste between files. With *SoundEdit* and *SoundMaker*, you can also import multiple files into a single window and mix down to stereo with control over panning and levels (see **Fig. 1.5**).

View masters. Waveform displays offer a great way to view audio files, but they don't always provide enough information for making editing decisions. For that reason, most audio editing programs provide alternate displays to show audio data in a different light. In this group, *Peak* is the only program that relies exclusively on its waveform display. Both *SoundEdit* and *SoundMaker* provide three-dimensional FFT (fast Fourier transform) displays that show frequency content as it evolves over time (see **Fig. 1.6**). They also provide two-dimensional spectrum displays showing relative harmonic content through the use of color. *SonicWorx* doesn't include an FFT display, but it does offer an excellent 31-band real-time spectrum analyzer and a stereo correlation display. In fact, you can use these real-time displays, unlike the FFT displays, with any source you bring into the Mac.

PLAYING AROUND

As you might expect, playback and shuttle controls vary from program to program. For example, *SoundMaker*'s transport controls lack a Rewind button, but its Play button can be assigned to always play from the beginning of the sound file or from the current insertion point. *SoundEdit* and *Peak* include Rewind buttons, and all three programs provide a Loop button that repeats a selected area indefinitely.

The *SonicWorx* Audio menu offers several Play options. Aside from the usual Start and Stop commands, it allows you to play the end of a selection with a user-defined preroll and has the unique option of playing the last version of a sound just before the current edit was made. That gives you the opportunity to compare the sounds before you proceed with further edits. *Peak* lets you open several audio files and trigger playback sequentially by pressing keys on the computer keyboard, which can be useful for live demonstrations.

Scrub-a-dub. Only *Peak* provides a scrubbing function, allowing you to pinpoint a spot by dragging the cursor slowly back and forth over the waveform while listening. Moreover, *Peak* offers several versions of scrubbing, including jog-style, tape-style, and its unique Dynamic scrubbing. *SoundMaker* has a Fast-Forward control that lets you hear the sound file in Scan mode as you advance. It's not as useful as scrubbing, but it's a helpful alternative. Two of the programs, *SoundEdit* and *SoundMaker*, also provide an onscreen keyboard so you can play a sound at different pitches by clicking with the mouse.

Gettin' loopy. As I mentioned earlier, most audio editing programs include a Loop button or command. Out of this group, however, only *Peak* offers serious tools for creating and fine-tuning loops. If you know the tempo and meter of a rhythm loop, for example, *Peak*'s Loop Surfer automates the process of finding the right region for creating a loop of the proper length. *Peak*'s Loop Tuner provides a close-up view of the loop point so you can make minor adjustments while listening to the transition. The program even includes a crossfade function to smooth out difficult loop points. Although you can create loops in almost any audio editor, those who work a lot with drum loops or samplers will greatly appreciate *Peak*'s tools.

Makin' a list. *Peak* also stands out in the crowd as the only one to offer true playlist editing. *SoundMaker*'s Chunk List window resembles a playlist in some ways, but the similarity is just superficial. The Chunk List window can list a number of selected regions, which you can arrange in any order. You cannot, however, have *SoundMaker* automatically play through the list, which makes it more like a Markers window than a playlist.

On the other hand, *Peak*'s Playlist window is well designed and powerful. It supports *Sound Designer II* regions and allows you to add, subtract, and rearrange entries in an intuitive environment (see **Fig. 1.7**). Each playlist event has an editable crossfade in, crossfade out, and gain setting. You can also apply up to four DSP effects plug-ins (depending on your CPU) to each event. That makes *Peak* a great program for mastering and demo production. In fact, you can burn a CD straight from *Peak*'s playlist by using Adaptec's *Toast* software (which is bundled with *Peak*).

Peak's playlist is even more noteworthy because it also supports SMPTE time

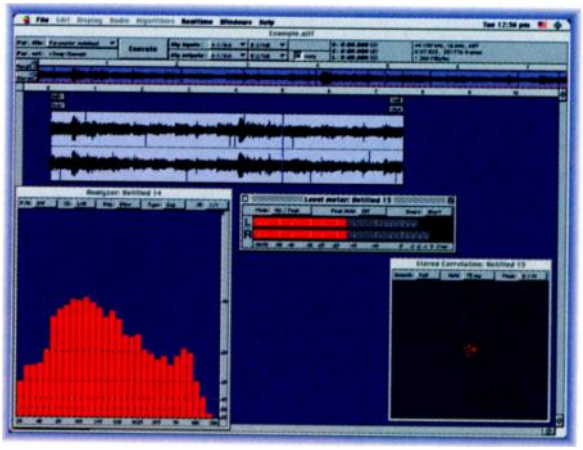

FIG. 1.3: *SonicWorx* provides an overview display that shows the entire audio file. The real-time spectrum analyzer and stereo correlation displays appear below the main waveform display.

For manufacturer information, please see Contact Sheet, p. 179.

code. That enables it to trigger events at specific SMPTE times—an essential tool for post-production work. By synching *Peak*'s playlist to incoming time code from a video deck, for example, you can trigger sound effects, snippets of dialog, or musical cues at the appropriate places in the video. It's a cinch to make adjustments in timing once you hear the sounds against the picture. None of the other programs support time code or synchronized playlist editing. *Peak* is also the only program that can trigger a MIDI message. The program includes a MIDI Meters function that you can set to send a MIDI Note On message via OMS every time a specified amplitude threshold is passed.

ON THE RECORD

Having a good set of audio-level meters is an absolute must when recording into an editing application, and all the programs in this group provide VU-style displays for monitoring input levels. Of course, some are better than others. The meters in *SonicWorx* and *Peak* are especially good: they're long, easy to read, and well marked (although *SonicWorx* forces you to change your monitor setting to 256 colors, which could be a problem if you're working with graphics or video). Moreover, they allow you to specify how long the peak-hold segments remain visible. That lets you customize the meters for the type of recording you do. *SoundMaker* and *Peak* provide a small waveform display, which shows incoming audio as you record.

In most audio programs, the level meters respond during recording and playback, as is the case with those in *Peak* and *SonicWorx*. *SoundEdit* provides separate meters for recording and playback levels. Only *SoundMaker* offers no metering during playback.

Of course, input meters are of little use if you have no way to adjust the levels, so all the programs except *SonicWorx* provide a pair of onscreen faders to adjust the left and right input gain. With *SonicWorx* you'll have to adjust the output levels at the source to optimize recording levels. That's much less convenient than having onscreen controls. In *SoundMaker* and *Peak*, the left and right faders can be adjusted individually or they can be locked together to keep the two channels the same.

Aside from the usual recording functions, some programs offer unusual options. In *Peak*, for instance, you can type notes into a Notepad display and drop them into the recording on the fly. The notes then appear as labeled markers in the waveform display when you're done recording. *SoundMaker* is unique in this group for offering voice-activated (Vox) recording, with a recording mode that turns on or off when a user-defined amplitude threshold is crossed.

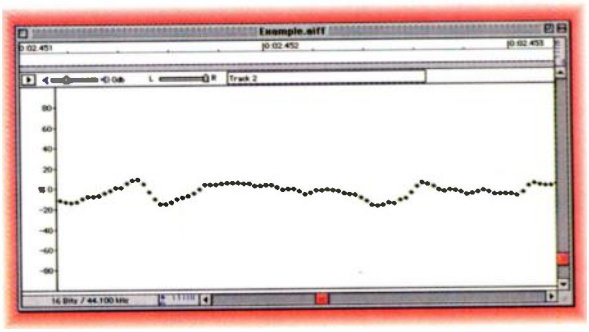

FIG. 1.4: At *SoundEdit*'s highest zoom level, you can see the individual samples, which appear as small diamonds. You can easily grab them with the mouse and move them up or down.

THE X FILES

The versatility of an audio editing program is significantly affected by the types of file formats that it supports. *SoundMaker* and *SoundEdit* support only 8- and 16-bit files. *SonicWorx* supports those as well as 24-bit files, and *Peak* adds 32-bit resolution to the list. (Keep in mind that you must have the proper audio hardware to make use of these higher resolutions.) *SoundMaker* supports sampling rates as high as 48 kHz, *SonicWorx* up to 50 kHz, *SoundEdit* up to 64 kHz, and *Peak* as high as 65 kHz.

On the Mac, AIFF (Audio Interchange File Format) has become the most widely accepted file format, so the fact that all these programs support it is no surprise. In spite of its displacement from the audio software market, the memory of *Sound Designer II* lives on through the widespread use of its file format (SDII). In fact, all these programs support it; *SoundMaker* and *Peak* even recognize Sound Designer regions. All the programs except *SonicWorx* support the Mac's own System 7 format, as well.

The Macintosh is noted for its cross-platform capabilities, and to that end, all the programs except *SonicWorx* support the Windows Wave (WAV) format and the NeXT/Sun AU format. *Peak* and *SonicWorx* can also open unformatted raw (headerless) files. And if the Internet is an important part of your musical activities, *Peak* should be especially appealing: it alone supports the hot new MPEG-3 format, as well as RealAudio (2.0, 3.0, and 5.0). *Peak* and *SoundEdit* also support Macromedia Shockwave audio. In addition, all the programs except *SonicWorx* support a variety of compression schemes.

If you frequently work with large numbers of files, a batch-processing function can save you a great deal of time and trouble. In this group, only *Peak* and *SoundEdit* offer such capabilities. *Peak*'s full-featured batch processor even runs in the background, so you can continue working in *Peak* or another program as your files are processed. *SoundMaker* doesn't have true batch processing, but its Custom Effects feature enables you to cascade several effects and editing commands and apply them to a sound file with a single click.

QuickTime. Multimedia developers have become an increasingly important segment of the audio-production field, which explains why support for QuickTime movies is now considered de rigueur. All these programs except *SonicWorx* allow you import a QuickTime movie, view its frames one at a time, extract and edit its soundtrack, align sound clips or markers to specific frames (with at least single-frame accuracy), and lay the results back to the QuickTime video.

When you import a QuickTime movie into *SoundMaker*, *SoundEdit*, or *Peak*, it appears in a standard QuickTime window. You can use *Peak*'s scrubbing capabilities to scrub sound and picture together. *SoundMaker* and *SoundEdit* also offer a second option for viewing and editing: you can view the individual movie frames above the waveform display. That makes it especially easy to align sound effects and musical cues with onscreen actions.

In *SoundMaker*'s dedicated QuickTime window, you can view all of the movie's audio tracks and drag them with the mouse to offset them or align them to specific hit points. That makes it easy and intuitive to align audio start times,

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because as you drag the soundtrack (represented onscreen as a long film strip), the QuickTime visuals scrub along with you.

CD connection. Editing sound effects, drum loops, or music segments from an audio CD is much easier if your editing program can directly import audio CD tracks using your computer's CD-ROM drive; doing so also helps you avoid the potential loss of fidelity that occurs when converting to and from analog ins and outs. Only *SoundEdit* and *Peak* can convert directly from audio CD tracks into their own formats for immediate editing (although not all CD-ROM drives are supported). Both programs provide a dialog box that lets you select an entire track or part of a track for importing, and both also enable you to downsample the file during the process. Only *Peak*, however, allows you to import and convert several files at once.

Peak is also the only program in this group that provides CD-burning capability. You can burn a CD-R in Track-at-Once mode directly from *Peak*'s Playlist window. When you initiate the CD recording procedure, *Peak* automatically launches Adaptec *Toast* to complete the process. You can also use *Peak*'s Playlist to create a Jam Image file for producing Disc-at-Once-mode CDs with Adaptec *Jam* (not included). Most of the popular CD-R drives are supported.

EDITING SUITE

Audio editing programs typically center on a collection of basic editing tools, which are now largely standardized. For example, regions are selected by dragging over the waveform display with the mouse, and once a region is selected, you can apply any of several traditional editing commands, such as Cut, Copy, Paste, and Delete. All the programs except *SoundMaker* also offer a Crop command to eliminate everything outside of the selected area.

Most audio editors also include commands for increasing a waveform's amplitude; normalizing, reversing, or inverting a waveform; and adding a section of silence. *Peak* and *SoundMaker* are the only programs that also include a Zero Crossing function, which adjusts selections to ensure that edits occur at zero-crossing points (to avoid unnecessary clicks and pops).

All the programs include Fade In and Fade Out commands, but some offer more flexibility over the shape of the fade curve. *Peak*, *SoundEdit*, and *SoundMaker* provide the equivalent of do-it-yourself kits to create any type of fade by dragging grab handles on an amplitude-envelope graph. *SonicWorx* provides only four preset fade shapes. *Peak* is the only program that offers a true Crossfade function (also with adjustable envelopes), which blends two regions to smooth over an edit point. It also offers a Pencil tool, which lets you redraw the waveform to eliminate a single-cycle spike, for example, or to smooth out a bad splice.

The types of edits mentioned so far are destructive edits—that is, they alter the data in the waveform. But destructive edits aren't what they used to be; audio editors now commonly offer multiple-undo capability, which lets you back out of a series of edits if you find yourself somewhere (sonically speaking) that you don't want to be. In fact, of our group of programs, only *SoundEdit* lacks this feature.

Programs that offer multiple levels of undo keep a running history of editing actions so that you can retrace your steps. *SoundMaker*, however, doesn't provide direct access to the edit history the way that *Peak* and *SonicWorx* do. The latter two allow you to view and select previous edits and return directly to a specific point in the sequence. In other words, you get a kind of random-access undo capability. *Peak* shows its history in a list; *SonicWorx* offers a more elaborate, treelike graphic display that shows the type and size of the edit. Different colors and outlines provide additional information (see **Fig. 1.8**). *SonicWorx* also lets you keep two Snapshots, which appear in the History display, as well. Snapshots let you save a particular version of a sound and return to it quickly by clicking a button in the main display.

IN PROCESS

In addition to the usual editing commands, all modern audio editing programs include an assortment of DSP effects. In some cases, such as in *SoundEdit*, they're a part of the program; in other cases, such as in *SoundMaker*, *SonicWorx*, and *Peak*, the effects exist as proprietary plug-ins that come with the editing software. *SoundEdit* offers the fewest effects; *Peak* offers a modest collection. *SoundMaker* and *SonicWorx*, on the other hand, come with dozens of effects. In fact, *SonicWorx* is designed primarily as a tool for processing sounds. For many users, its weaknesses as a simple editor are more than compensated for by its large collection of unusual high-end effects and powerful sound-design tools.

Although common DSP effects such as reverb, EQ, delay, and flange are widely available, they vary considerably in quality and flexibility. *Peak* doesn't even have

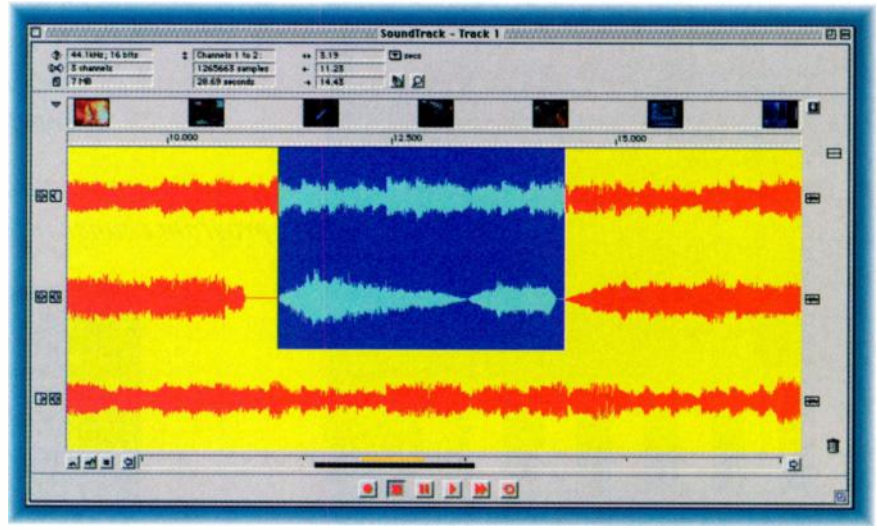

FIG. 1.5: In *SoundMaker*, you can import more than one audio file into a single window. QuickTime movies appear as a string of frames above the main display.

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its own reverb; instead, version 2.0 comes bundled with Waves' entry-level Easy Waves plug-in package, which includes reverb, EQ, and compression. *SoundEdit*'s reverb is easy to use, but some users may find it a bit too rudimentary for many applications. The reverb in *SoundMaker* offers a bit more user control, but it doesn't sound good enough for serious high-end production. *SonicWorx*, however, includes a *Virtual Room* plug-in with four high-quality algorithms and sliders for adjusting and customizing the effects. What's more, *SonicWorx* includes a unique and surprising *De-Reverberation* plug-in that removes reverb from a recording.

All the programs include some kind of EQ tool. (As mentioned, *Peak*'s is supplied in the Easy Waves package.) *SoundEdit*'s 7-band equalizer is one of my favorites. You can adjust its bandwidths by dragging the dividers with the mouse, which makes it a semiparametric equalizer. *SonicWorx* also includes a 7-band graphic equalizer, but with fixed frequency bands. It also includes a *Rubberband* EQ plug-in that lets you change the EQ of a sound with an envelope graph and grab handles. *SoundMaker* includes highpass and lowpass filters but no graphic equalizer. It does offer flexible EQ capability with an undocumented *Poles and Zeros* plug-in that uses an interesting but inscrutable graphic interface.

All the programs have some kind of noise-reduction tools. *SoundEdit* offers only a Noise Gate command with Threshold and Attack sliders. *SoundMaker* includes both a *Remove Broadband Noise* plug-in and a *Noise Gate* plug-in. All the Mac programs except *SoundEdit* include a declicker effect for removing pops and crackles. *SonicWorx* also has a couple of sophisticated neural-network-based denoising algorithms.

All the programs can change the pitch of a selection without changing the duration and can change the duration without changing the pitch. *SonicWorx* lets you choose one of four "quality" settings. *Peak* is the only one that lets you specify a new tempo in beats per minute, which helps greatly when working with rhythm loops.

Only *SoundMaker* and *SonicWorx* include dynamics compression capability as part of the program. (*Peak* supplies the compressor in Easy Waves.) *SoundMaker* offers a typical compressor with Attack and Release sliders, as well as a separate Instantaneous Compressor that acts at the sample level. *SonicWorx* offers a 2- or 4-band multiband compressor.

EXTEND YOURSELF

As packed with features as these programs are, there's always a need for more customization and future extensibility. They all offer simple options, such as letting you use key commands as an alternative to certain menu selections, but some go far beyond that by allowing you to add features through macros and plug-ins.

All of these programs incorporate some type of plug-in architecture, and only *SoundMaker* lacks support for third-party plug-in formats. *SoundMaker* uses only its own proprietary plug-in format, which detracts a bit from its overall flexibility. However, *SoundMaker* includes tools for creating custom effects, and several third-party developers already offer packages of interesting new processing plug-ins for designing sounds. Moreover, anyone can use the Custom Effects Editor to cascade existing effects and commands, which provides macrolike capabilities and enables you to combine effects to create new ones.

Aside from its own plug-ins, *SonicWorx* now supports the VST plug-in architecture, and Prosoniq offers new *SonicWorx* plug-in modules on its Web site to expand the program. *SoundEdit* supports the popular Adobe Premiere plug-in format as well as Macromedia's Shockwave Xtras. *Peak* also supports Premiere plug-ins, and with version 2.0, you can now use Premiere plug-ins in real time. (Even Adobe *Premiere* can't do this.) *Peak* is also the only program to support TDM and AudioSuite plug-ins, which should especially appeal to high-end users.

The only program in this group to support hardware samplers is *Peak*. It can transfer data back and forth to a number of samplers from Roland, Ensoniq, and Akai. It also supports SMDI transfers, which works with samplers from Kurzweil, Peavey, Ensoniq, Yamaha, and E-mu. In addition, *Peak* supports the slower MIDI Sample Dump Standard for use with older instruments.

BY THE BOOK

As audio editing applications grow in complexity and offer increasing numbers of effects and capabilities, it becomes ever more important to have thorough, well-written documentation. *Peak* and *SoundEdit* take top honors in this category. Their user's guides are clearly written, well organized, and intelligently and thoroughly indexed. They explain how to use the programs, not just what everything does.

SoundEdit includes an excellent tutorial to acquaint you with the program. And both *Peak* and *SoundEdit*

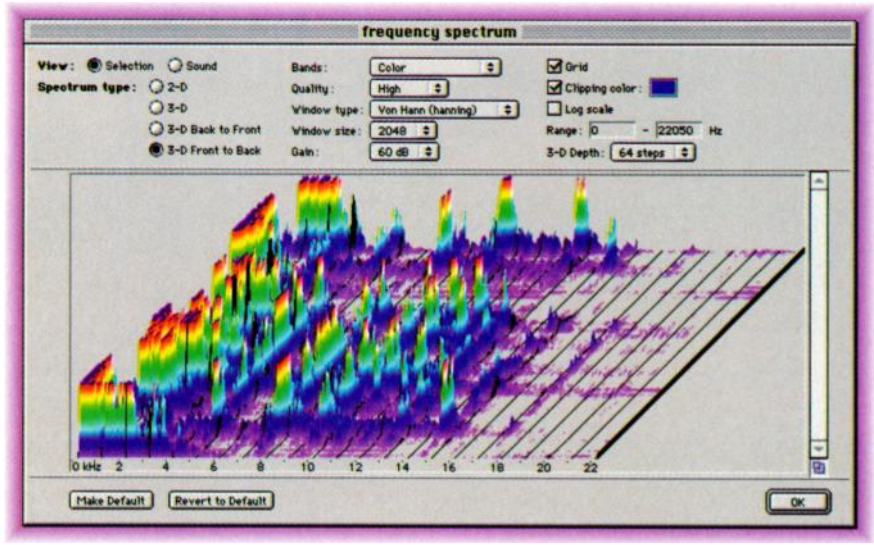

FIG. 1.6: *SoundMaker* provides a colorful 3-D FFT display that shows the harmonic content of a sound as it evolves over time.

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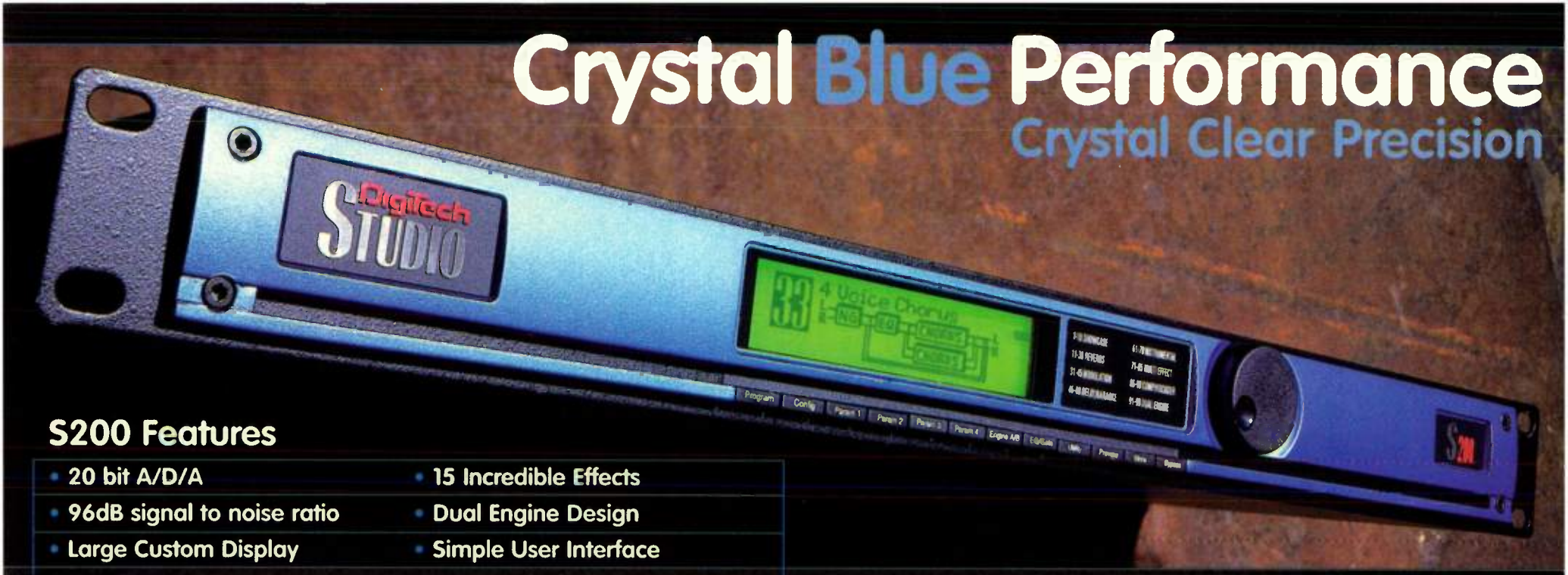

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provide clearly explained general background information and step-by-step instructions for using their tools. These programs also provide Balloon Help and a separate Help menu. *SoundEdit*'s online help is exemplary, with full explanations and even audio clips that illustrate various DSP effects.

SoundMaker's owner's manual is similar in many ways to *SoundEdit*'s and *Peak*'s, but it's not of the same caliber. It, too, includes a glossary and some general background information, but the book is not as well organized and several of the program's features are not covered. Furthermore, the manual lacks an index, so looking up a particular function is more trouble than should be necessary, and there isn't any online help. Overall, however, the documentation is adequate.

In spite of the complexity and uniqueness of many of its functions, *SonicWorx* includes by far the shortest and least helpful manual in this group. The pages appear to have been reproduced on a photocopying machine and are bound with a comb binding. It has no index and little in the way of general background information or step-by-step instruction. The program does, however, include very good online Balloon Help.

SUMMING UP THE PROGRAMS

Having compared the features of the Mac stereo audio editors, let's take a look at each one individually. As noted earlier, **EM** has reviewed most of them, so refer to those reviews for a more in-depth analysis (see the sidebar "Stereo Audio Editors in Review").

***SoundEdit 16* 2.0.7.** With a lineage that extends all the way back to 1988, *SoundEdit* is the oldest program in this group, and it's still a favorite among multimedia developers. The intuitive user interface emphasizes simplicity and elegance, and the software offers tools not commonly found in other programs.

For example, *SoundEdit* lets you import multiple audio files into a single window for playback and editing; each file appears as a waveform with its own volume and pan controls. Imported QuickTime movies appear frame by frame above the waveforms (as well as in a dedicated QuickTime window) for easy alignment of dialog, music, or sound effects. A separate Deluxe Mixer window allows you to combine tracks into a single mono or stereo file using envelope graphs with grab handles for precise control over volume and panning in the final mix.

SoundEdit comes with a basic set of commands and DSP effects, such as reverb, fade in/out, pitch shift, noise gate, and a simple FM synthesizer. The 7-band equalizer is a personal favorite of mine, and I still turn to it when I need to try something in a hurry. Unfortunately, *SoundEdit*'s effects haven't kept up with the times, and many—such as the reverb and delay—seem too bare-bones by today's standards. However, *SoundEdit* supports Premiere plug-ins, so you can expand its arsenal of editing tools with more sophisticated options.

Although it still has no unlimited undo capability, and its waveform displays look a bit dated, *SoundEdit* holds its own in the crowd by offering an assortment of powerful tools, including 2-D and 3-D spectrum displays, the best zoom controls around, audio-CD capture capability, and the ability to view and manipulate individual samples in a waveform.

***SoundMaker* 1.0.3.** MicroMat's *SoundMaker* is a recent creation of Italian programmer Alberto Ricci. The program's user interface is a model of simplicity, and it's the least expensive product in this group. That might lead some people to believe that it lacks editing capability, but nothing could be further from the truth. Aside from *SoundEdit*, *SoundMaker* is the only program in this group that lets you import, play, and edit multiple sound files in a single window. It, too, provides a separate Mixer window (although without the envelopes and grab handles) for mixing down to a single stereo file. Unlike *SoundEdit*, however, *SoundMaker* offers multiple undo capability—a big plus.

SoundMaker is also the only other program that lets you view individual QuickTime frames above the waveform display. And its separate QuickTime editing window makes working with QuickTime soundtracks a breeze. *SoundMaker*'s 3-D spectrum display is more sophisticated (and more colorful) than *SoundEdit*'s, and its recording options include voice-activated recording, which none of the other programs offer.

SoundMaker's strongest suit is its Effects menu, which is virtually bursting at the seams with more than six dozen effects, ranging from the ordinary (reverb, lowpass filter, flanger) to the exotic (ring modulator, Synth-O-Matic, Robotize). What's more, *SoundMaker*'s

FIG. 1.7: *Peak* is the only program in this group that offers true playlist editing. You can apply up to four plug-in effects per event and sync the list to incoming SMPTE time code for post-production work.

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Custom Effects Editor lets you create your own effects by combining the existing effects in a variety of ways. Unfortunately, *SoundMaker*'s collection of effects are a mixed bag; some are definitely better than others. For example, the reverb offers a long list of presets, not all of which are gems. And some effects, such as the 3-D Localizer and the Declicker, fall a bit short of the mark.

Nonetheless, *SoundMaker* offers so many toys for such a reasonable price that it's well worth considering, especially if you're on a restricted budget. And *SoundMaker*'s support for drag-and-drop editing, a wide range of file formats, and multiple compression schemes makes it all the more attractive.

***SonicWorx PowerBundle* 1.51.** Prosoniq's *SonicWorx PowerBundle* is not your ordinary audio editing program. Although it does have many of the characteristics of a typical editor (such as a waveform display and cut, copy, and paste editing), it's more of an audio-processing tool. The new *SonicWorx PowerBundle* is a combination of Prosoniq's *SonicWorx Artist* (also available separately), which is intended mainly for sound designing, and *SonicWorx Studio*, which is primarily for post-production work. The distinction between these two programs lies in their respective collections of (proprietary) plug-ins.

SonicWorx's capabilities are centered on two main windows: the Wave Editor, with its waveform display and markers, and the Parameter Editor, which shows the parameters and controls of the currently selected DSP algorithm. All editing is disk based, so edits are destructive. Nonetheless, *SonicWorx* provides unlimited levels of undo, so you can change your mind if you don't like what you hear. In fact, the program's graphic undo history is one of its best features, making it easy to return directly to any previous edit. Other great tools include the 31-band, real-time spectrum display and the stereo correlation display.

The markers in *SonicWorx* are unlike their counterparts in other editing programs. In Prosoniq's program, the two sets of markers indicate where in the waveform the current processing will occur. The *SonicWorx* effects employ a dual-channel routing configuration, and the markers represent the in and out points for the two channels.

Many of *SonicWorx*'s DSP algorithms are based on neural-network processing, wherein the selected algorithm performs intelligent multipass analysis of a waveform (or selected region) as part of the processing. The program comes with dozens of sophisticated and often arcane effects, which are organized into groups: Mathematic Operations, Envelope & Dynamics, Frequency Domain Filters, Spatial & Phase DSP, Timebase & Pitch Conversion, Special EFX/Sound Design, Post Production/Mastering, and others.

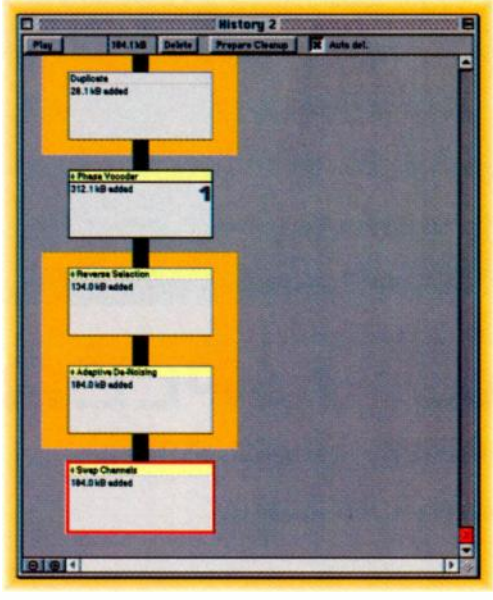

FIG. 1.8: *SonicWorx* includes a graphic undo/redo History window, which provides random-access undo capability.

SonicWorx PowerBundle is not always as intuitive as the other products in this group, but it is unique in its offerings. If you're interested in serious sound designing and audio manipulation, this program should keep you busy for a long time.

***Peak* 2.0.** When Passport's *Alchemy* faded from the market and Digidesign began to require its own audio hardware to run *Sound Designer II*, the marketplace was ripe for a new stand-alone, high-end, Mac-native audio-editing program. Fortunately, BIAS stepped in and filled the void nicely with *Peak*. The program's early potential has now been largely realized with the release of version 2.0, which adds a customizable toolbar, support for 32-bit files, and a dedicated QuickTime window with scrubbing capability, among other features.

However, what elevates *Peak* into the ranks of truly professional-level audio editing is its ability to synchronize to SMPTE time code and its powerful playlist capabilities. *Peak*'s playlist is a model of elegance, allowing the user to adjust crossfades, gaps, and individual gain. Moreover, you can apply up to four real-time effects to each event, and you can even scrub the playlist. And that's not all: *Peak*'s playlist can now be used for recording CDs; the program enables you to burn a CD directly from the playlist by operating in tandem with Adaptec *Toast*.

Peak's user interface is a joy to work with. You can select your own display colors, dock the toolbar anywhere you want, and zoom in to the single-sample level. A Pencil tool lets you redraw the waveform, the Loop Tuner provides a close-up view of loop points, and the Crossfade function blends edit transitions.

Although its list of effects is rather modest, *Peak* offers the most extensive hardware/software support of the programs in this group, so reaching out to the rest of the world is easy. Aside from the usual formats, *Peak* supports RealAudio and MPEG-3 files, which makes it a natural for Web developers. *Peak* also supports several plug-in formats, including Premiere (with real-time processing), AudioSuite, and TDM. Its DAE support means that *Peak* can run with most Digidesign hardware, and it also supports a long list of hardware samplers. As noted earlier, *Peak* is bundled with Adaptec *Toast* and Waves' Easy Waves plug-in package.

With its excellent documentation, customizable interface, high-end editing capabilities, powerful playlist, and time-code support, *Peak* 2.0 is poised to become the program of choice for sound designers, music editors, and post-production workers.

Associate Editor **David Rubin** *lives in the suburbs of Los Angeles.*

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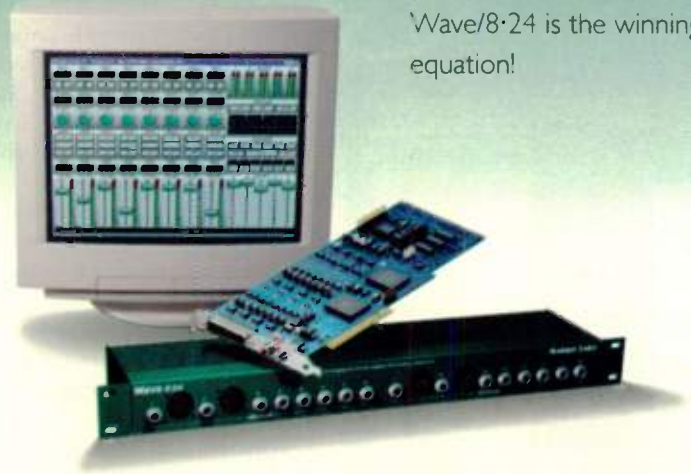

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SECTION 2

Waveshaping Software for Windows

By Dennis Miller

Today, no fewer than four mature digital audio editors for Windows coexist, each offering a viable solution to musicians demanding professional performance. Long-time favorite *Sound Forge* 4.5 ($499), from Sonic Foundry, is still the best-known Windows audio application, but the other three are closing fast on its heels. SEK'D's *Red Roaster 24* 5.0 ($399; the 2-channel version of *Samplitude 2496*), Steinberg's *WaveLab* 2.0 ($499), and the dark horse, dissidents' *Sample Wrench 24/96* 5.0 ($259), have all received major upgrades lately and have much to offer.

I spent dozens of hours putting these programs through their paces and found that they are all top-notch performers. Although each has its own specialties, they all have much in common. Moreover, these programs are remarkably stable: there was no significant crash, malfunction, or failure during the review period. You can feel secure that these programs will carefully and dutifully manage your most precious audio projects and enable you to reach your goals in a timely manner.

I tested the Windows programs on two machines, although not all tests were performed on both machines. The first computer I used was a Pentium II/266 MHz PC with 128 MB RAM that was running both first-generation Windows 95 and Windows NT 4.0. An Antex StudioCard A/V supplied the audio I/O. The second computer I used for our tests was a Pentium II/400 with 128 MB RAM, which was running Windows 98. E-mu's new APS system performed all audio duties on that platform. Most of the roundup was conducted using Windows 95 or 98, but I also did occasional testing under Windows NT 4.0, with which all the programs proved compatible.

The following is an examination of the main features provided by the four Windows programs. After the general overview, you'll find additional information about each application.

ROOM TO MANEUVER

When you're hot in the middle of a recording session or closing in on a killer ending for your latest opus, you want your software to offer up its main features in a way that works well for you. I was impressed that all the Windows applications in this group allow you to customize much of their look and feel. This ensures that you'll find the commands you're looking for right where you want them, not hidden in some obscure layer of a cascading menu.

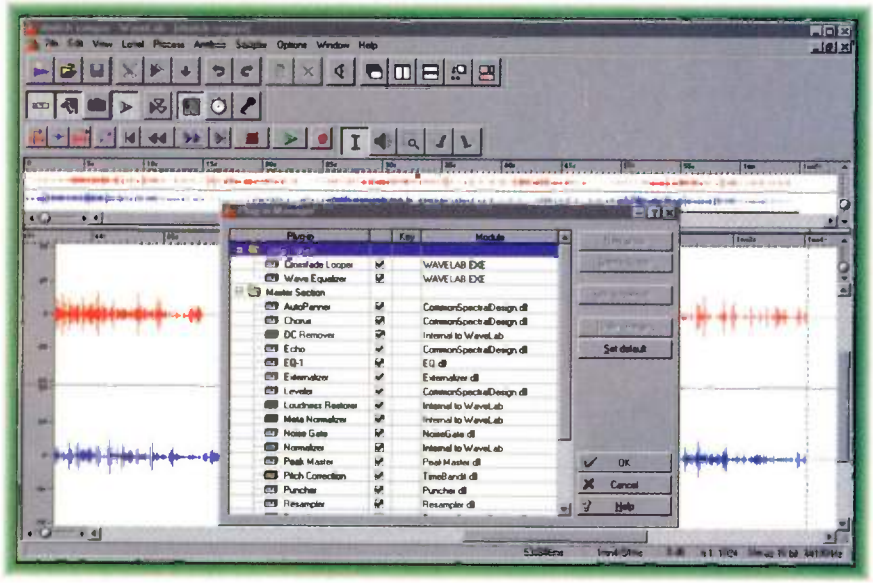

FIG. 2.1: *WaveLab* has many configuration options, including the ability to determine which plug-ins load at startup. The Plug-in Manager provides access to all the plug-ins a user has installed.

The four programs group their main features into toolbars that you can enable or disable and can arrange anywhere on the screen. Most will snap the toolbars to fit into a designated area, but *Sample Wrench* requires that you manually resize and position them. Each program also offers dozens of user-definable settings, including numerous options to improve performance. This allows you to tailor the programs to fit your particular computing environment. *Sample Wrench* even lets you save multiple configurations: for example, one optimized for recording, another for assembling projects, and yet another for sound-processing sessions.

Sound Forge provides a Workspace option that allows you to save the current position, size, and view of every file that's open when you quit the program. When you reload a Workspace, everything is back in place. *WaveLab*'s Screen Layouts function similarly, and you can assign layouts to hot keys. Among its many other customizable options, *WaveLab* has a Plug-in Manager that lets you determine which installed plug-ins appear when you run the program (see **Fig. 2.1**). It also has several style options for changing the basic look of the user interface.

Red Roaster allows you to switch between two user-definable workspace configurations as you're working on a project. Simply hit the Tab key to toggle the two Display modes. *Sample Wrench* doesn't provide a way to switch among different configurations once the program is running, but its Set View feature makes it easy to define up to ten time positions and zoom levels for any given open file.

All four programs allow multiple sound files to be open at once, and you can easily create new files from existing ones with *WaveLab* and *Sound Forge*. Simply drag a region from the soundfile window to any area of the program desktop, and you'll have a new file ready to edit.

Who's zooming who? Getting a precise view of your data is an easy task in all of these programs. *Red Roaster* offers numerous predefined zoom ranges, including fixed time increments such as

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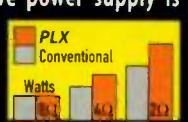

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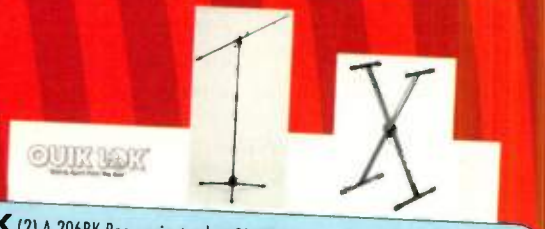

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one second and ten minutes (see **Fig. 2.2**). *Sample Wrench* has a Zoombox mode that you use to define a region that will automatically be resized to fit the entire screen. It also has several zoom buttons and keyboard shortcuts for zooming in and out. In addition to other zoom options, *WaveLab* and *Sound Forge* offer continuously variable zoom sliders that make it easy to find the exact view you need.

The programs provide a sound-file overview window above the main work area. You can use this overview to define a range or move quickly to any point in a file. The overview in *Sound Forge* is the only one of the group that displays no waveform data.

On the mark. Markers are available in each program, and all programs allow you to insert a marker while a file is playing. Each program lets you edit and name markers directly from the main sound-file window. *WaveLab* also provides a feature to generate markers automatically based on criteria you select. *Sample Wrench*'s Autolocator option provides a similar function.

PLAYING AROUND

Numerous playback options are available in these programs. Scrubbing is provided in *Sample Wrench, Red Roaster,* and *WaveLab.* (*Sound Forge*'s Auto Event Locator option is an alternative to scrubbing. It repeatedly plays back small sections of audio that you designate by clicking and dragging in the sound file overview window.) Looping playback is also easy with any of the programs, and you'll have no trouble updating your loop start and end points as a file plays back. All but *Red Roaster* offer specialized functions for defining good loop points.

In *Red Roaster,* you can use the Varipitch feature to change playback speed while a file is playing. If you set the Pitch parameter to something less than 1, the file will immediately begin to play backward. *Sample Wrench* allows you to trigger playback of an audio file using its own MIDI keyboard feature. In *Sound Forge,* you can map external MIDI commands to numerous functions, including playing an entire file or just a predefined region (see **Fig. 2.3**).

Other specialized playback features are sprinkled among the programs. For example, *Red Roaster*'s O-tone mode lets you trigger successive, predefined segments of audio by pressing the Space bar. This function, which is similar to the options available through *Sound Forge*'s Cut and Play lists, makes it easy to trigger prepared audio events in a live setting or broadcast environment.

Speaking of playlists, *Sample Wrench* has a Cut or Keep Regions feature that is similar to a playlist, and you can create a new file automatically from the regions you've selected (see **Fig. 2.4**). You can get similar results using *WaveLab*'s Mute Regions feature. *Sound Forge* and *Red Roaster* offer various synchronized-playback options, including various forms of SMPTE time code and MTC support.

ON THE RECORD

When you're ready to record audio, you'll appreciate that all the programs offer input-level meters. Only *WaveLab,* however, allows you to alter levels from within the program. (Of course, you can probably use your audio card's internal mixer to accomplish this feat when using any of the programs.) Among the more interesting recording options is *Red Roaster*'s real-time sample-rate conversion feature, which you could use, for example, to transfer a 48 kHz DAT recording to disk. You can also choose whether to insert the recording directly into an open window or automatically create a new editor window containing the recorded data.

Sound Forge has a Calibrate option that detects any DC offset in your signal and compensates accordingly. It also offers five recording modes, including the ability to punch in and an option to automatically "rewind" to perform a retake. *Sample Wrench* insists that you select a file name before starting to record, although the file is deleted if you choose not to save the take. I prefer the approach of the other programs, which start recording and let you deal with saving later.

Sound Forge can record up to 16-bit files at up to 96 kHz. The other three programs can sample at 96 kHz and support at least 24-bit resolution. *WaveLab* supports 32-bit recording, as well. Of course, your sound card will determine which rates you'll actually have available.

THE X FILES

Today's desktop musicians are often asked to juggle files that are created on any number of computing platforms in many formats. Thankfully, these programs all support the most common file types that you're likely to encounter. If your music is headed for the Internet, you'll be happy to learn that *Sound Forge* and *Sample*

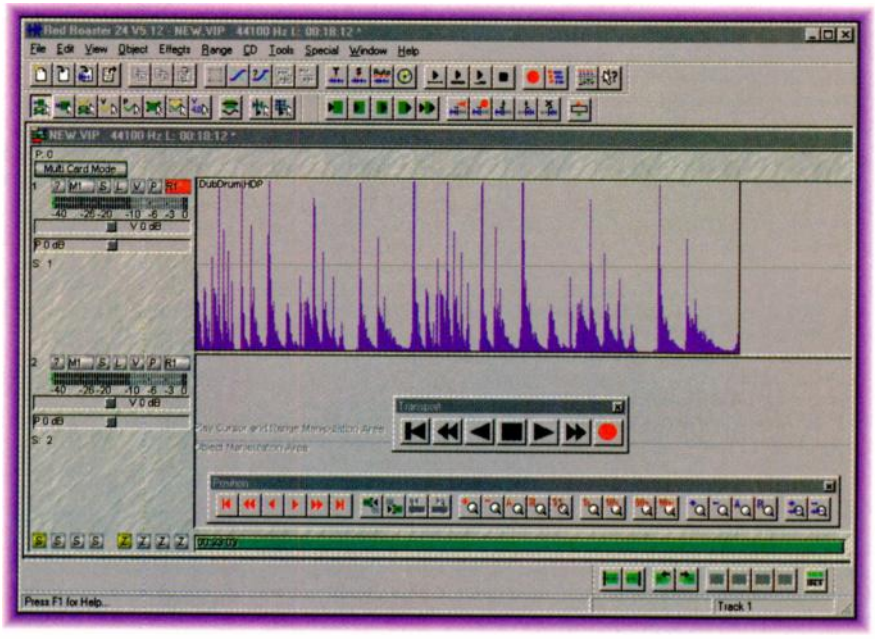

FIG. 2.2: *Red Roaster* offers several preset zoom options, which are shown in red along the toolbar at the bottom if this screen. Users can also use the zoom buttons to set the zoom level.

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Wrench support RealAudio format, although only *Sound Forge* lets you customize the RA file. *WaveLab* and *Red Roaster* support a smaller number of file types than the other two, but with their support for AIFF format, you can easily move files to and from a Mac.

Multimedia musicians will want to take advantage of the ability to view an AVI file along with their audio tracks in both *Red Roaster* and *Sound Forge*. Of these two programs, *Sound Forge* has slightly more options for managing AVI files, including the ability to direct video to an external monitor.

Red Roaster and *WaveLab* both come with thorough CD-burning options, including the capability of setting track gap lengths and defining index points. You can also extract audio from a CD in both these programs, assuming your CD drive supports it. *Sound Forge* users can use a plug-in such as Sonic Foundry's own *CD Architect* ($395), which is also available as a stand-alone application. *Sample Wrench* owners will have to buy a separate application to burn CDs from the WAV files they create. (You can easily find CD-burning applications for well under $100.)

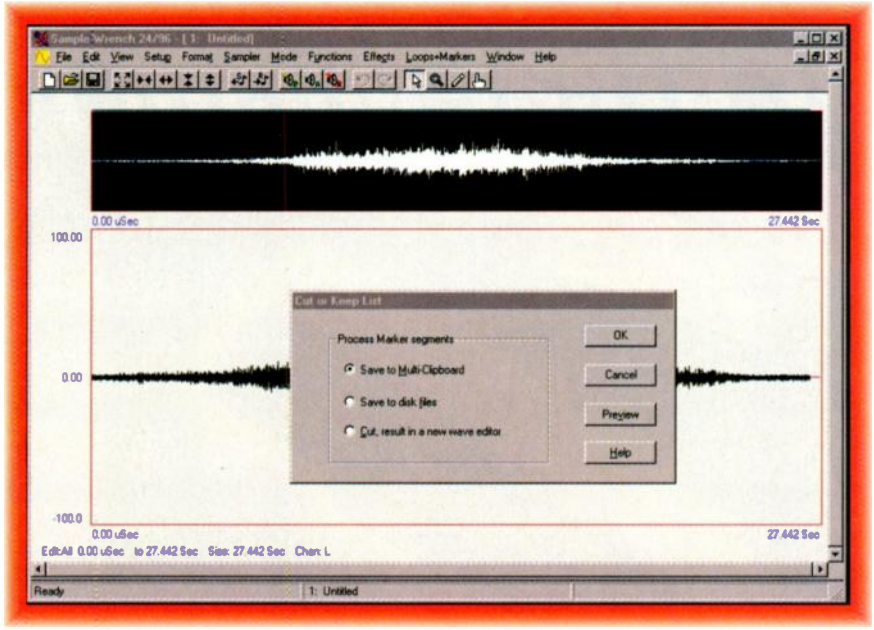

FIG. 2.4: *Sample Wrench* offers a Cut or Keep regions list that is similar to the playlist found in other programs. A new file can be defined from the regions you've selected.

EDITING SUITE

At the heart of any audio editor are its editing and processing functions. These four programs offer an array of features to help you manipulate your data. Some programs even give you multiple means of achieving your goals.

The programs all provide standard cut, copy, paste, and trim (crop) functions, but that's just scratching the surface. *WaveLab* allows you to paste multiple copies of buffered data anywhere within a file, and it can even create a new file automatically from a highlighted range. *Sample Wrench*'s Clone feature will make a duplicate of the currently open file and load it into a new edit window. You can drag/copy or drag/cut data within a file using *Red Roaster, Sample Wrench,* or *WaveLab,* and you can drag a range directly onto the workspace to create a new file in *Sound Forge. Red Roaster* and *WaveLab* allow you to rearrange chunks of audio as a file plays.

Sample Wrench's Multi-clip feature allows you to keep multiple cut or copied segments on its clipboard for instant recall. Simply highlight the range with your mouse or specify the region using text entry boxes, and the selection will be added to the list of available clips. *Red Roaster*'s Move Object feature deserves a special mention. This option provides numerous shortcuts for moving either a single Object or two crossfaded Objects. It's a real time-saver, especially when you're trying to define precisely the fade in or out points of a crossfade.

All the programs allow you to define the number of undo levels you want, which can be a handy way to save memory. There are also undo history lists in each program except *WaveLab.*

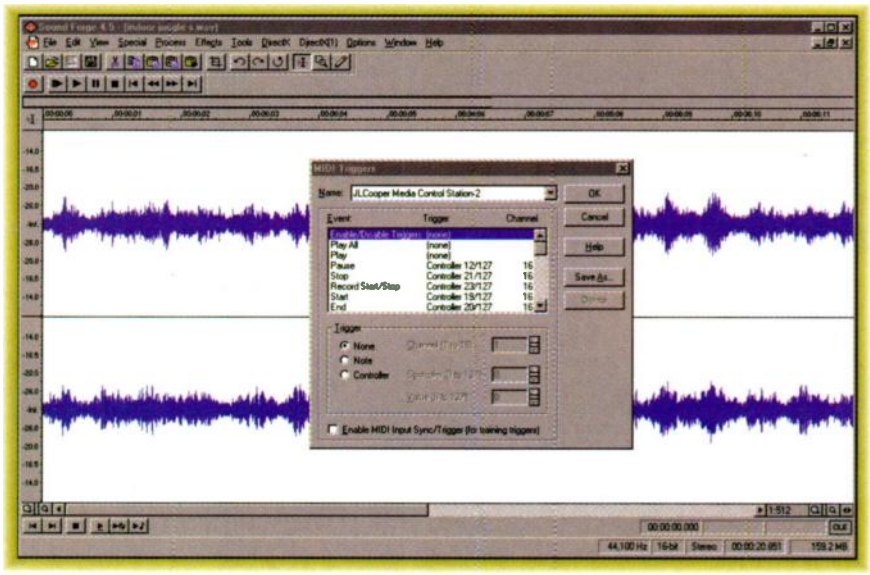

FIG. 2.3: MIDI triggers can be used to control many of *Sound Forge*'s commands, including basic transport and editing options.

IN PROCESS

In addition to the common editing tasks described so far, I looked long and hard at the ways each program allows you to process your music. Given

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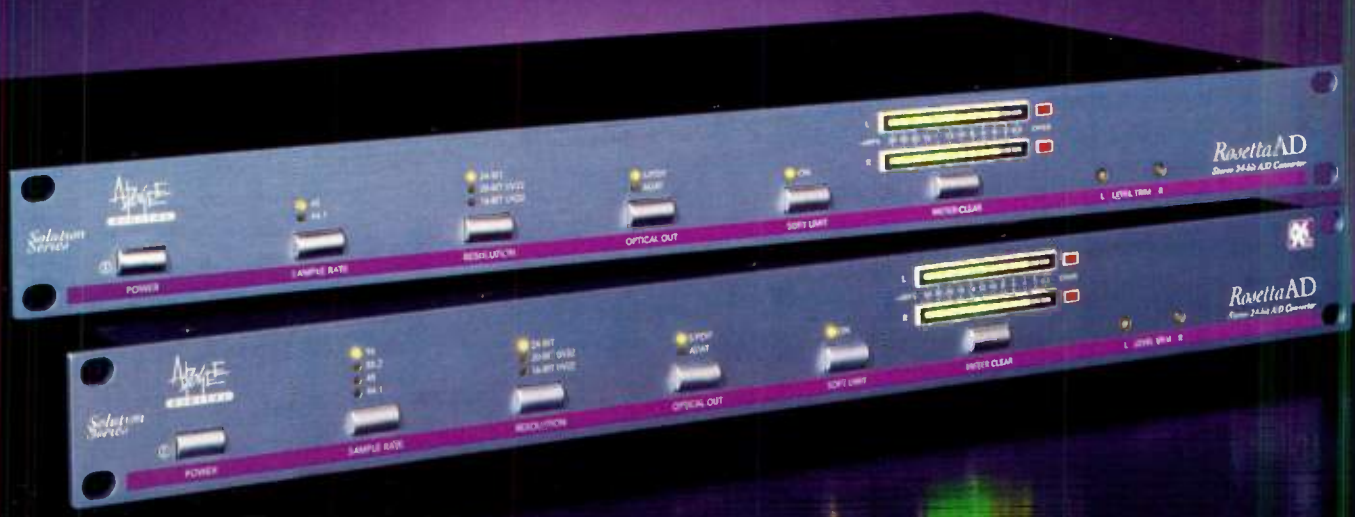

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even a moderately powerful computer, you'll have access to a wide variety of processing effects that range from the common to the truly bizarre.

Processing tools such as reverb, delay, echo, and reverse are standard fare. On the whole, you'll get excellent results from any of the programs, and I detected no serious shortcomings in this category.

Each program moves well beyond the basic features. Among the more interesting effects is *convolution*, which involves applying the sonic characteristics of one sound to another. Convolution is available in *Red Roaster* and *Sample Wrench*. *WaveLab* and *Sound Forge* users have to purchase a third-party plug-in, such as Sonic Foundry's excellent *Acoustic Mirror* ($249), to access this feature.

Red Roaster's multiband compressor is an especially powerful feature, and *Sound Forge* provides numerous ways to alter the dynamic range of a file, complete with numerous presets and an attractive graphic interface. *WaveLab* has its own terminology for its dynamics-processing features, which include Puncher and Leveler. These features sound very good and are especially well suited to real-time adjustments. *Sample Wrench*'s Level Control menu provides access to several useful tools for altering a file's dynamics. You'll find a number of handy presets in the Level Control menu, as in most of *Sample Wrench*'s other menus.

Each program has dozens of other interesting effects, but some of my favorites are the Gapper/Snipper and Wah-wah in *Sound Forge*, the amazingly useful filter-design features of *Red Roaster*, and the Stereo Expander and Externalizer of *WaveLab*. *Sample Wrench* offers efficient tools for noise reduction and click removal and has a Spectral Warp feature that I have yet to exhaust. It also wins the award for Most Unusual Presets.

It's handy to be able to preview an effect before applying it to a range of data, and all the programs support previewing for some of their features. *Sound Forge* has a versatile Reactive Preview mode that applies your changes as you make them. There's a slight delay before you hear the new settings take effect, but at least you don't have to keep pressing the Play button. *Sample Wrench* doesn't support preview for all of its features, but where the option is available, it's often possible to move a slider or a knob and instantly hear the new settings kick in. On the other hand, the sliders don't always have enough resolution for my taste. (You can use the cursor keys to fine-tune their movements.)

WaveLab allows you to start a looping playback in the main window, and then load and tweak a plug-in effect and hear the changes in real time. This works well for the effects you load through the Master Section, but there are no previews for a number of other internal effects, such as the Harmonizer and Time-Stretch.

Batch processing allows you to run numerous effects on a group of files. This option is available in *Sound Forge* and *WaveLab;* the latter even lets you run certain plug-ins "across" a series of files. Its MetaNormalize feature, for example, can analyze multiple files and process them so they all have the same apparent loudness.

One very exciting new development on the PC is the ability to process audio on the fly, directly through a program, which is possible in *WaveLab* and *Red Roaster*. In other words, you can apply many of the same processing options, including internal and plug-in effects, onto a real-time audio source that you route into the program. You could then capture the processed audio directly to DAT without ever writing it to disk.

Finally, I'd like to salute *WaveLab* and *Sample Wrench* for providing the best FFT displays of the bunch. *WaveLab*'s vivid colors and fine detail make its display the best looking, while *Sample Wrench* provides the most useful tools to resize and reorient the analysis window.

EXTEND YOURSELF

Despite their massive tool sets, there may be times when you need an option that is not available within one of these programs. Of the four, only *Sample Wrench* lets you create your own new features and add them to the program. The included Enable scripting language gives you dozens of functions for creating new sound-processing routines. The program supplies examples to get you started, and a good introduction to the scripting process is also included. Of course, you can add new features to the other programs by employing the DirectX support offered by all in our group except *Sample Wrench*. *WaveLab* also can use VST plug-ins, which you can find on the Internet or might already have on hand if you are a Steinberg *Cubase* user.

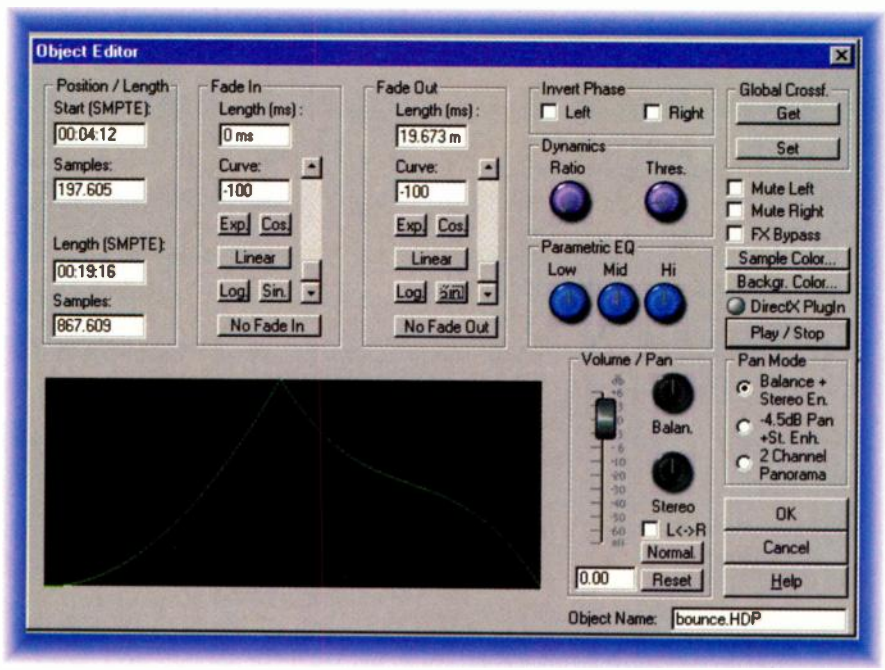

FIG. 2.5: *Red Roaster* allows you to edit individual Objects with great detail. Among other options, you can individually define the fade-in and fade-out points of a crossfade.

For manufacturer information, please see Contact Sheet, p. 179.

adjustments. This frees you from having to make an image file before creating your CD. You can also perform sample-rate conversion on files as they are burning, and you can even make multiple CDs in a single session; the program prompts you to insert the next blank CD for each successive copy.

The only important feature that *Red Roaster* still lacks is external sampler support. Although you may initially find the program's different project types somewhat confusing, you'll soon think of them merely as different working modes that are available for the various projects you'll do. *Red Roaster* is a solid choice for serious editing. Thanks to the upgrade path to the multitrack version, it is a good entry point into the *Samplitude* family.

***Sample Wrench 24/96* 5.0.** Before beginning this roundup, I was unfamiliar with *Sample Wrench* and was a little nervous that it might differ greatly from other editors I'd used. For example, the first task I attempted was to highlight a range by clicking and dragging across the waveform view with my mouse. When the program didn't respond, I jumped to the online help and learned that defining regions with the mouse was only one of several ways to perform that task: you can customize the program to use that as the default method, or choose from many other options to suit your working style. This type of flexibility is typical of *Sample Wrench*'s operation.

Among its many configurable features, *Sample Wrench* lets you load a macro at startup. Macros can perform a series of tasks, such as copying, pasting, and closing a file, all without intervention by the user. There's an Auto-create macro function that will watch you perform a series of tasks and save the steps for later recall, and it's easy to assign a macro to a Function key.

Of course, there's more to life than meets the macro. *Sample Wrench* is the most extensible of the programs covered here. Like Cakewalk *Pro Audio*'s CAL programming language, *Sample Wrench*'s Enable scripting language can be used to add custom features. Although not a trivial task, creating an Enable script is facilitated by an excellent tutorial, and you may find that trying your hand at this option gives you some insight into more general aspects of computer programming. (Hey, you never know when the band's going to be out of work!)

Sample Wrench includes numerous audio-processing routines that you won't find elsewhere. You can modulate one file with another using the Cross Multiply feature, which can produce a variety of effects ranging from tremolo to distortion. Using the Resynthesize option, you can change the time of a file from 25 to 400 percent of its original length (see **Fig. 2.6**). You can also use Resynthesize to shift the pitch of a sound up or down two octaves. Both processes, by the way, run very fast and produce nearly artifact-free results.

Sample Wrench hasn't the complete range of peripheral features (such as CD burning) offered by some of the other programs, nor does it provide a highly graphic interface for tweaking parameters and adjusting controls. Its strengths lie in the processing and editing areas, and those strengths are formidable. At $259, *Sample Wrench* is the least expensive program in the bunch, and for that price, you'd have to consider it a bargain. For only $199, you can get *Sample Wrench Classic*, which is identical to the high-end version except for the 24/96 support. If you're on a budget or are primarily interested in sound editing and manipulation, *Sample Wrench* is a great choice.

***Sound Forge* 4.5.** Anyone who's worked in the PC audio world for a while is familiar with the name *Sound Forge*. It's been the leading program in the 2-channel audio editor world for years, and its continued reign seems fairly well assured. But although it has been updated on a regular basis, including the recent release of version 4.5, some important features are missing, which might require you to purchase additional software.

Sound Forge is a deep and detailed program that offers a balance of utilitarian editing features, well-implemented processing functions, and many "supplemental" features. Its usefulness for day-in-and-day-out audio editing is beyond compare. But while it packs an enormous arsenal of tools, many musicians want an all-in-one solution, and for some of them, *Sound Forge* might not be the right choice. Most noticeably absent are support for 24-bit audio and built-in CD burning.

To its credit, Sonic Foundry now includes several features that were available previously only as add-ons. The spectrum-analyzer and batch-processor plug-ins are included in version 4.5, and a recent price reduction on some of Sonic Foundry's XFX line of DirectX effects also eases the burden somewhat. Tight integration with Sonic Foundry's *Acid* and the best all-around support for Internet formats add to the current release's appeal.

One thing I've always enjoyed about *Sound Forge* is its remarkable flexibility. If you are in an edit window and realize

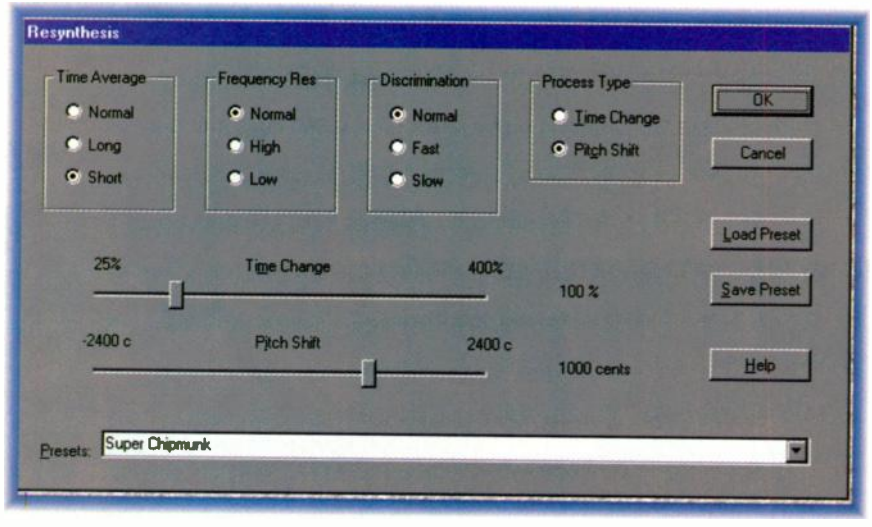

FIG. 2.6: Although not as graphic as some of the other programs, *Sample Wrench*'s editing tools are quite powerful. Here, the Resynthesis command provides settings to time-stretch or pitch-shift a sample over a wide range.

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WAVESHAPING SOFTWARE for Windows

that the range you've highlighted is a little short of the mark, there's no reason to jump back out and redefine the region. You can use the Selection display from inside most edit windows to recalculate the area to be altered (see **Fig. 2.7**). There are several preset regions (such as from the current cursor position to the start or end of a file) that make the task even easier.

Sound Forge's powerful playlist function is useful when you need to trigger sequential segments of a file. Simply open the Playlist window and drag a range of data directly from the waveform display to the Playlist screen, and you're on your way. You can set a particular number of times that the event should play back, define a MIDI or SMPTE time trigger for the event, and even specify a preroll time that precedes the playback. Then you can save the entire playlist to disk or create a new file from it. You can also transform the playlist into a cut list if you decide that you'd rather mute those sections during playback.

Despite its limitations, *Sound Forge* is the top-performing editor around. The program is remarkably stable—I don't recall a single crash in all the years I've had it on my desktop—and its widespread acceptance among audio professionals throughout the music industry is a sure sign of its quality. You can be certain that Sonic Foundry will continue to update the program for a good time to come, and you won't go wrong if you choose it.

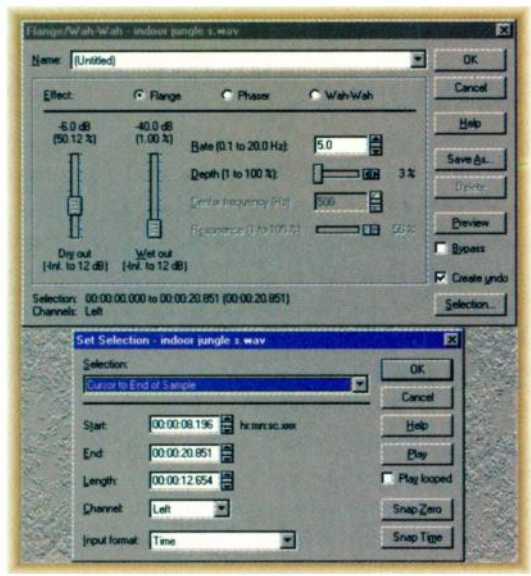

FIG. 2.7: Ease of use is a primary attribute of *Sound Forge*. For example, once you are in an edit window, you can alter the range that will be affected without returning to the main screen.

***WaveLab* 2.0.** Steinberg's *WaveLab* 2.0 has developed into a powerful and mature program in just a few years, offering a clean and elegant interface, which will be instantly familiar to all recording musicians. Among the major interface features is a Master Section that resembles an analog mixing environment (see **Fig. 2.8**). Using the Master Section, you have slots to add up to six plug-in effects (in DirectX and *WaveLab* proprietary plug-in formats). You can mute, solo, or bypass an effect, change master volume (but not pan), and monitor input and output, all in real time. The Master Section can also be disabled if you find that it puts a strain on your CPU.

FIG. 2.8: The Master Section in *WaveLab* provides access to all the plug-ins you have loaded. Up to six plug-ins can be running at once, and you can change their settings in real time.

WaveLab is especially good at editing and preparing audio for CD burning. It provides numerous shortcuts to help you define CD tracks; for example, you can drag a highlighted range directly from the waveform view to an open CD project window, or you can use the right mouse menu option to create a new track in just a few clicks. Once you have created your track list, you can preview the entire CD, make adjustments to track gaps and index points, and even join all the tracks into a new file. You should need no other software to make Red Book CDs if you have *WaveLab*.

WaveLab is also useful for organizing the audio files on your system. Its Database feature will automatically scan your drives, looking for sound files that have certain properties you specify. Once it locates the files, it allows you to group them into categories, which can include your sound effects or the files associated with a specific project. Scanning is very quick: the Database scanned more than 3,000 files on my drive in just under 30 seconds, then correctly identified all the files of the type I had specified.

WaveLab's effects come in two flavors: real-time options that you load through the Master Section, and a second set of processes that can't be run in real time. Among the second set are a Harmonizer, Hi-fi Chorus, Parametric EQ, and Time-stretcher. The Time-stretcher is useful for processing music of many styles because it allows you to define the stretch value using a percentage of the original length or by setting a new tempo, whichever is more appropriate. All the processes work quickly, although you don't have the option to change their precision. (Some programs let you preview a process in draft mode to see whether it is what you want.)

With support for the highest bit and sampling rates of the bunch, *WaveLab* is ready to carry you into the next millennium. It also has most of the features you'll need to take your music from the moment of inspiration to a final mastered CD. Although the program doesn't have support for all the newest file formats—in particular those commonly used for Internet audio—it's more than suitable for most of your editing needs.

Associate Editor **Dennis Miller** *lives in the suburbs of Boston.*

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THE HOUSE IS Rockin'

ENJOY A SMORGASBORD OF ACOUSTIC SPACES WITHOUT LEAVING HOME.

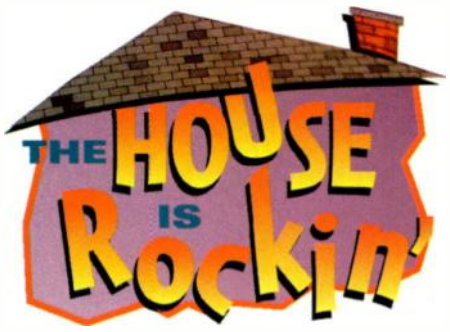
BY JEFF CASEY

At the dawn of the personal studio revolution more than a quarter century ago, doubting Thomases were quick to dismiss the burgeoning movement of do-it-yourself recordists. Their skepticism was not unfounded. Essentially, the argument came down to three points: one, that personal studios could never offer the same quality of gear typically found in commercial studios; two, that home recordists would not have the same skills as professional engineers who spend years learning their trade; and three, that the acoustics of a bedroom or garage would never rival those of high-dollar tracking rooms at major studios.

Since those early days, at least two of those points have lost their sting. The quality of gear available to personal studio owners has improved dramatically in recent years, and there are now myriad resources—including books, magazines, and the Internet—from which a novice can learn and perfect the craft of recording. In fact, I know of home recordists who, with the help of such resources (including this magazine), are more skilled than certain professional engineers I've come across.

The third argument has proven hardest to dismiss. Obtaining great acoustics can be a costly affair. Short of spending tens of thousands of dollars renovating a room, most of us will never have an optimal acoustic space at our disposal. Renting a professional tracking room is not cheap, either: in New York City, for example, use of a commercial studio costs upwards of $135 an hour. Obviously, neither of these approaches is economically feasible—at least for the weekend recordist—so it would seem that we're pretty much stuck working with the spaces we have.

ILLUSTRATION, BY RAUL MOCH.



But does that mean our projects must remain second-rate? Not at all. Take a look around your home. You'll find that it encompasses a diversity of acoustic spaces—everything from the ultra-ambient garage to the dry-as-a-bone walk-in closet. In fact, you may well have a greater variety of sonically distinctive spaces in your home than the typical commercial studio could boast.

Harnessing the ambience of these spaces, though, can be tricky. But with a little guidance and some practice, you can capture great-sounding tracks in the comfort of your home. I've done it countless times, and I'm not alone: acoustic tracks on many recent commercial projects have been recorded in personal studios. For example, Mark Hudson recorded Ringo Starr's and Ozzy Osbourne's latest albums in a makeshift studio set up in an office above a Thai restaurant. Who needs more inspiration than that?

THAT FAMILIAR AMBIENCE

For the purposes of this article, I will be referring to four types of acoustic spaces found in almost any house or apartment: small dry rooms (closets), small ambient rooms (bathrooms), large dry rooms (bedrooms), and large ambient rooms (garages and living rooms).

Of course, every home is unique, and you may have to adapt some of the following recording techniques to fit your own situation. If, say, your living room is carpeted and your spare bedroom has a wooden floor, the roles of these rooms might be reversed. On the other hand, if your bathroom is carpeted, you would be better off using a wood-floored closet or a tiled foyer as your small ambient space.

The first thing to do, then, is to assess the acoustic properties of the various rooms in your home and determine which category each fits into. In general, think of carpeted rooms as dry and those without carpeting as ambient. This is not an ironclad rule, of course: a carpeted living room with 15-foot ceilings and brick walls might be more suitable as an ambient space.

The bottom line is that different musical instruments sound best when played—and recorded—in particular acoustical environments; for example, I would be hard-pressed to recommend recording an electric bass-guitar amp anywhere other than in a dry room. But certain instruments can be recorded in either dry or ambient spaces, with very different but equally usable results. An acoustic guitar recorded in a bathroom, for instance, yields a more lush tone than one recorded in a walk-in closet. A drier sound, however, may be just what you are trying to achieve for a particular song. Obviously, it comes down to knowing how you want the final product to sound. Therefore, it is imperative that you think ahead, always keeping the final mix in mind.

In addition, you have to decide how much of each room's ambience you want to capture—that is, how close to the sound source are you going to place the microphone? In general, the closer the mic is to the source, the less room ambience it will pick up and the drier the recording will be. But no matter how close you position the mic, you'll inevitably hear *some* room ambience. So even with close-miked instruments, selecting the proper recording room (and the proper mic) remains a critical consideration.

It's also important to remember that, although ambience can be added with an effects processor, it cannot be *removed* from a track. Therefore, you must be very sure of what you're doing if ambient sound is part of your plan. Again, having a strong sense of the final mix is most helpful.

But before we get into specifics, let me reiterate the Number 1 rule of recording: there are no rules! What follows, rather, are some techniques that I've used and found to be valuable. Who knows—you may discover a technique that I've never thought of, or perhaps you'll have success with one

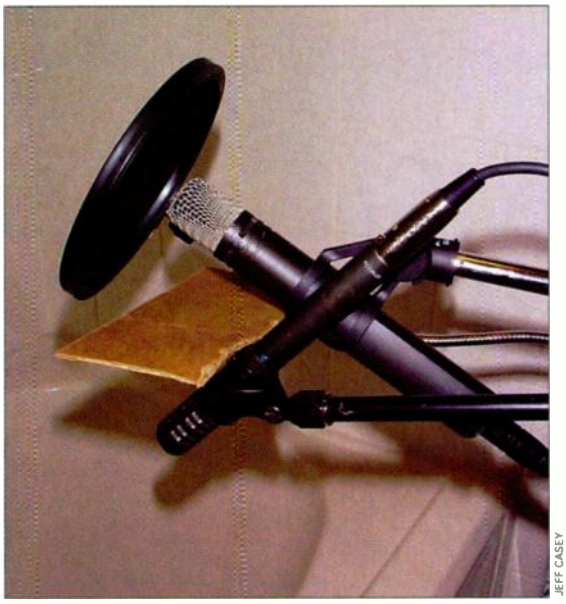

JEFF CASEY

FIG. 2: Here's one way to record acoustic guitar and vocals simultaneously. The small baffle between the two mics helps to minimize bleed, especially in ultra-ambient environments like this shower stall.


JEFF CASEY

FIG. 1: Recording vocals in a shower stall requires proper mic placement. Here the singer stands in the center of the tub; the blanket dampens excessive reflections.

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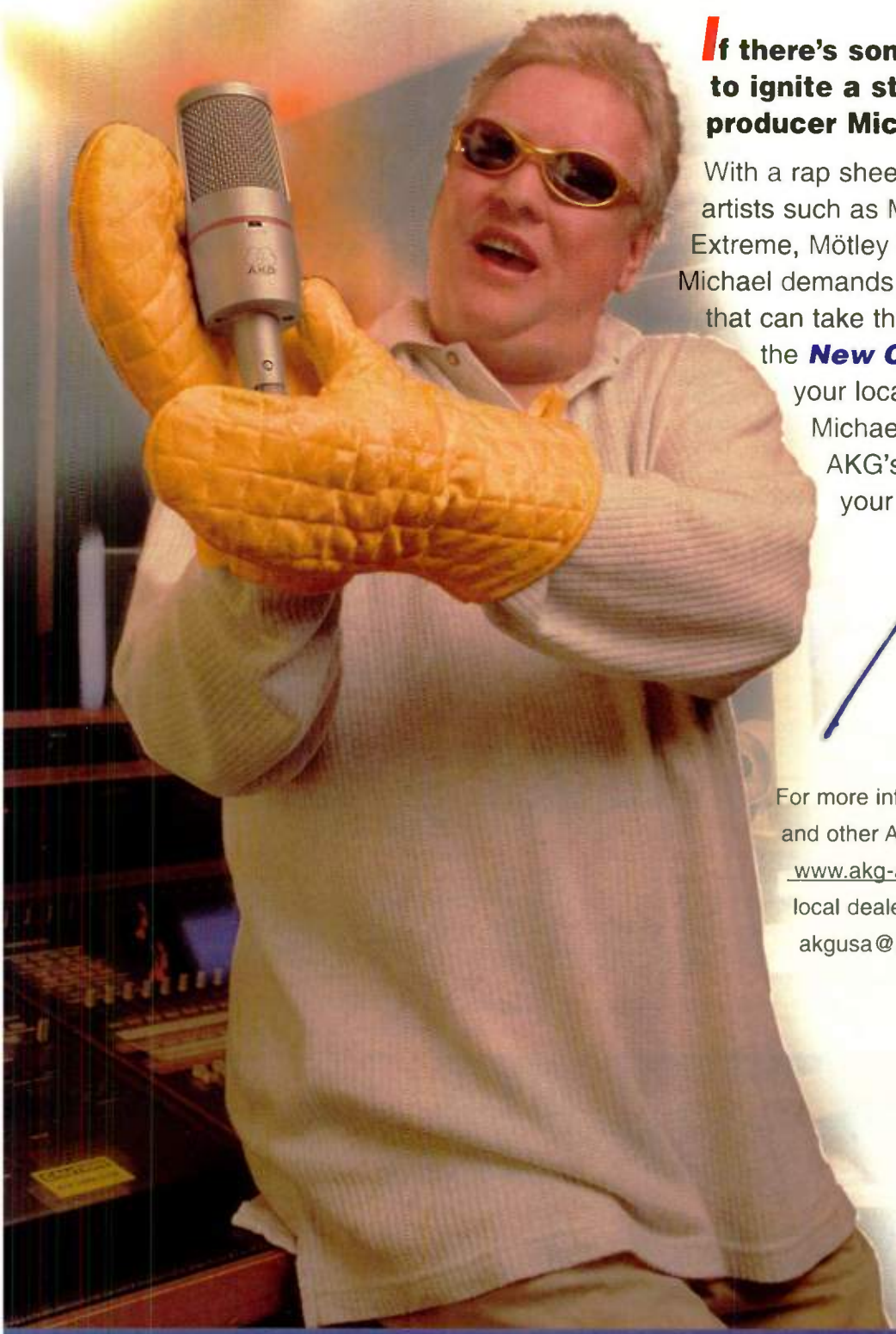

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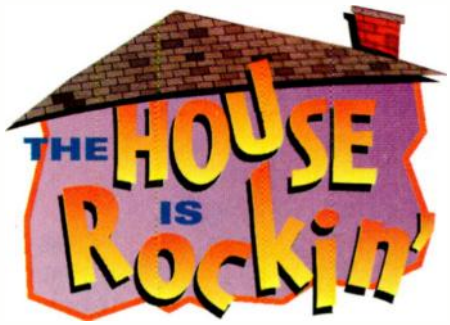


that didn't work for me. (In that case, I encourage you to e-mail me your success stories.)

MORNING WARBLER

Have you ever wondered why people are inclined to sing in the shower? In large part, it's because of the ambience. A tiled shower stall produces rich reverberations similar to those generated by the reverb chambers used in the early days of recording. In fact, the bathroom is typically the personal studio owner's best space for capturing natural reverb.

Obviously, vocals are a prime choice for recording in this ambient environment. Be sure, though, to position the vocalist and the microphone carefully—otherwise you might end up capturing more reflections than direct signal. The first step is to remove the shower curtain. (If your shower has a sliding door, you're out of luck; for this application you need a complete opening.) Next, position the singer close to the rear wall and centered in the shower stall or tub (see **Fig. 1**).

The microphone should be positioned about 8 to 12 inches in front of the vocalist and about 6 to 8 inches above her head, with the capsule directed downward toward her mouth at roughly a 30-degree angle. You may need to move the microphone around a bit before you find the sweet spot, so monitor through a pair of headphones while positioning the mic. If, after adjusting the mic's position, you're still picking up too many reflections, try hanging a blanket or another absorbent fabric on the rear wall of the shower (behind the singer), on the opposite wall (in front of her), or on both walls. This should eliminate any unwanted reflections.

Acoustic guitars also sound great in the bathroom. Try positioning the player on a stool in the center of the tub, sitting in the same placement as outlined for the vocalist above. Adjust the mic from below at a slightly upward angle about two or three inches from the guitar. (Angling the mic downward from above the guitar will usually pick up too many reflections from the shower floor.) Generally, I place the capsule just at the base of the fretboard; but again, it's important to monitor through headphones.

Sometimes you may need to record acoustic guitar and vocals simultaneously—say, if you're working with an artist who can't do the parts well separately. In this situation you'll probably get the best results using two mics, one for voice and one for the guitar (see **Fig. 2**). I've found that putting a small baffle between the two mics—for example, a piece of cardboard or plastic mounted on the mic stand—helps to isolate the sound sources.

One application that's practically guaranteed to rouse the neighbors is an electric guitar amp played loudly in the bathroom. Done right, it will produce an absolutely *huge* guitar sound. Place the amp on the bathroom floor against a wall and face it toward the center of the room. I often use two mics: a dynamic about an inch away from one speaker cone, and a condenser placed about three feet back from the amp. Record the signals to two separate tracks so that they can be blended in the mix.

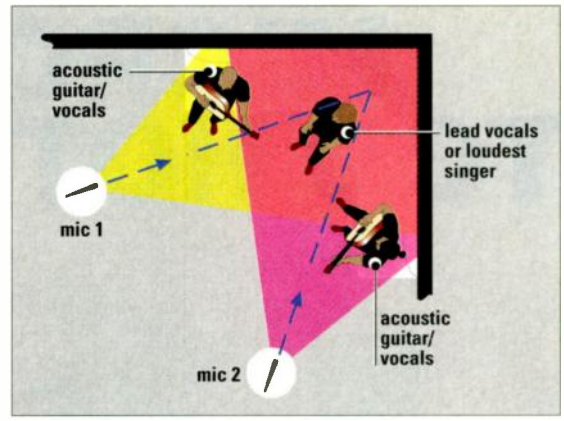


FIG. 3: In order to capture a group performance in a living room, the artists sit on an L-shaped sofa, which provides comfort while helping to contain the sound by absorbing early reflections.

For an even bigger sound, use two ambient mics in a coincident pair placed on the opposite side of the room and pointing downward at a 45-degree angle. This picks up a nice stereo image of the room that can later be blended with the dynamic mic to fatten up the sound. Be sure to listen for phase cancellation, though, by summing the tracks to mono (either with a mono switch or by panning each track to the same position in the stereo field).

LIVING LARGE

As great as the bathroom is for certain ambient applications, for others it doesn't provide a large enough work area. For example, a drum kit would be difficult to fit into most bathrooms. But if you're lucky, you have a fairly large living room with wood floors and a high ceiling. If not, perhaps you have a garage or other large space that isn't filled with too many absorbent materials. (The smaller the room, the more that absorbent materials will dampen the ambience.) Whatever your situation, use your largest ambient space and turn it into a temporary live room.

A great way to capture a group vocal performance—and one of my favorite home-recording techniques—involves using an L-shaped corner sofa in a living room. Sitting on the sofa not only makes the singers feel comfortable, but its shape helps tighten the sound and absorb stray reflections. In order to cap-

A very versatile microphone, the AKG C 1000 is an excellent (and inexpensive) choice for recording acoustic instruments in a home studio.

ture a nice stereo image, seat the loudest vocalists toward the center of the sofa and farthest from the mics, and set up a spaced pair of condenser mics five feet in front of the sofa, with each mic aimed at a point just behind the center singer (see **Fig. 3**). Fit as many people as you can on the sofa. (On one occasion I recorded six background singers simultaneously, using this method.)

This technique also works well for recording acoustic ensembles of various types and sizes. If you're working with two singer-guitarists, for example, place them on either side of the sofa (using the same mic setup outlined above). For a three-piece band with two guitarists and a singer, again place both guitarists on the sides of the sofa, and put the singer in the middle (see **Fig. 3**). There are dozens of ways to set this up, as long as you keep the stereo image nicely balanced.

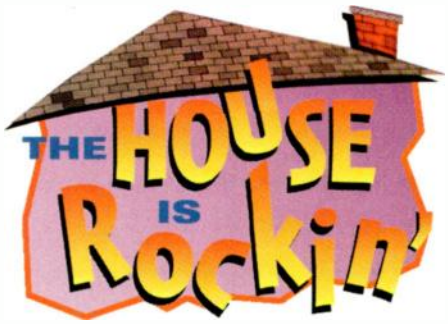
An engineer who worked on some of Santana's early recordings once told me that the band recorded its percussion sections in gymnasiums. Well, if Santana did that, then I believe that the rest of us should record our percussion in the largest rooms we can find, too. Single instruments—shakers, congas, and the like—will probably sound best close-miked with condensers. If you're recording a percussion section, though, it's good to employ some ambient mics as well.

A great way to record a large percussion setup is to capture the performance from above. I prefer to use a stereo pair of mics suspended as high above the players as possible. If the ceiling of your space has exposed support beams, this is fairly easy to do: simply drape the mic cables over one of the beams. If the beams are unexposed, secure the mic cable to the ceiling with duct tape, allowing the microphone to hang down at the desired level. Remember, the farther away the microphones are from the sound source, the farther apart they must be to maintain a good stereo image and be free of unwanted phase effects.

A drum set can be recorded well with this setup, too, especially if you're looking to capture a huge John Bonham–esque sound. First position the drums against a wall facing the center of the room, then tape a blanket on the wall behind them. How you mic the kit will depend on the size of the room you're working in. In a larger acoustic space, I like to close-mic each drum with its own microphone and employ *two* pairs of condensers: a spaced pair over the kit and a coincident pair on the opposite side of the room. Set up the coincident pair about a foot above the tallest cymbal and pointed down at the kit, with the mics positioned so that they form an equilateral triangle with the drums.

When working in a smaller space, four mics will often suffice—one on the kick drum, another on the snare, and a pair of overheads. You might also try putting up a pair of room mics. Done properly, this type of recording should make you feel as though you're right there in the room with the drums when you play it back with eyes closed.

You can also use a large ambient space to create natural reverb for an electric guitar. This technique is similar to that for miking an amp in the bathroom. Place the amp in a corner of the room and hook it up to a dynamic mic, then



put up a coincident pair of condensers in front of the amp to capture some room ambience. If possible, clear the room of furniture or anything else that might dampen desired reflections.

A CLOSET CASE

A walk-in closet is not only great for storage, but it also makes an excellent recording space. You can record almost anything in a closet, provided the sound you're after is a dry one. And the best part? You don't have to move any furniture, and all the clothes in the closet will help to create an environment that generates practically no reflections.

A large closet is the ultimate home environment for recording a bass guitar amplifier. For best results, position the amp against the back wall of the closet. Avoid putting it in the corner, because the low frequencies will tend to linger too long there.

To record electric bass guitar I often use three signals: a DI box and two microphones. The first mic is a dynamic (often a kick-drum mic) that is set up directly in front of the speaker cabinet. I position the second mic—either a condenser or a dynamic—about three feet back from the speaker. (If you use a dynamic microphone, the bass sound will be a bit punchier; with a condenser, it will be more bottom heavy.)

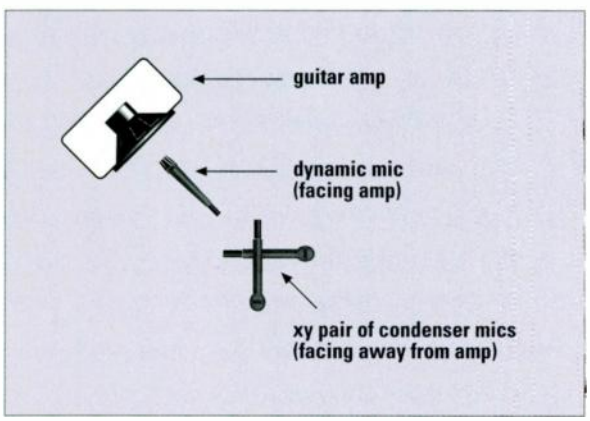


FIG. 5: One interesting technique for capturing natural delay when recording electric guitar is to face the two condenser mics away from the amp, allowing them to capture the reverberant and delayed sound in stereo.

FIG. 4: A rhythm section can be recorded in tight quarters. Here the bass was recorded direct, the guitar amp was placed in another room, and the singer performed scratch vocals in the bathroom. Note the mismatched overhead drum mics—a deliberate strategy. Because the Audio-Technica ATM33A (right) captures more bass response than the AKG C 1000 (left), it was positioned over the low toms. The author is shown at the drum kit, with Pat Oates on guitar and Dave Hayes on bass.

The far mic is important because the low frequencies of a bass guitar need physical space in which to "stretch out." So why not just use one microphone positioned back from the cabinet? Because the close mic is needed to capture the punch from the strings; without it, all you'll hear is rumble. (Electric bass can also be recorded in a carpeted bedroom—a good choice if the player is using a really large bass rig at a loud volume.)

You might consider putting your singer in the closet and recording a dry vocal track if you are uncomfortable working with the reverberant nature of a bathroom or if your song simply does not call for a lot of ambience. Have the singer stand near the back of the closet and position the microphone in front of him at the same height and angle as outlined previously for recording vocals in the bathroom.

You can track electric guitars in a closet, too. For this application you should probably also drape both the amp and the microphone with a blanket, to further eliminate any reflections.

BEHIND CLOSED DOORS

I must confess that some of the best drum tracks I've ever recorded were captured in bedrooms—without close-miking the entire kit. There's something about a small, dry room that makes for killer drum sounds. In fact, I generally prefer to record drums in a dry room: they are among the more difficult instruments to blend well in a mix, and the drier tracks give me more flexibility at mixdown.

Here's my typical approach. Put the drums against a wall in a carpeted room (preferably one with relatively low ceilings). Place a mic on the kick and another on the snare, and position two overheads above the drum kit as a spaced pair (see **Fig. 4**). Make sure the overheads aren't too high or you won't pick up the full sustain of the toms. Conversely, if the overheads are too low, you may get a phasing effect when the cymbals are hit. That's about it. Not only will the drums sound fat and powerful with this setup, but you'll also have a lot of room to tweak the tracks in the mix.

I sometimes employ an approach that's *really* unorthodox: using only three mics to record a drum kit—one in the kick drum, and a stereo pair facing

the kit from the middle of the room. I came across this technique by accident. I had miked a kit using the setup outlined previously (snare, kick, and two overheads), but I decided to throw a pair of room mics up, too. Well, I forgot to connect the cables for the snare and overhead mics, so all I got on tape was the kick and the room mics. But when I listened back to those three tracks, I was amazed at the detail from the kit. Granted, the two room mics needed to be delayed a bit so that they matched the kick. But after I had time-aligned the tracks, the kit sounded really fat. The moral? Don't be afraid to experiment—except on your client's time, of course!

A SLIGHT DELAY

As much as I love the sound of a double-tracked guitar, sometimes using a delay is more appropriate. Although you could employ a digital delay to achieve this effect, I prefer the real deal, which, if done properly, will sound more convincing than any DSP box. To do this you'll need a carpeted room with furniture removed. Place the amp in a corner facing outward and close-mic it with a dynamic microphone.

You can position the delay mic in one of two ways. The first method is easy: simply place a condenser mic facing the amp from across the room. Move the condenser closer to the amp to decrease delay time, or farther back to increase delay. Be sure to check for phase cancellation.

The second method is a little trickier and may not work for you. It involves placing two condenser mics in front of the amp, but facing them *away* from the amp toward the far walls of the room (see **Fig. 5**). This setup allows the signal to travel across the room and back, bounced from the opposite walls, before being picked up by the mics. The result is a spacious, natural stereo delay.

COME TOGETHER

Things get a little more complicated when it comes to recording two or more instruments—say, a whole band—simultaneously. Ideally each mic should capture only the sound of the instrument it is positioned to record. To make this happen, you'll need to physically isolate each instrument from all the others, especially when using sensitive condenser mics. Usually the most

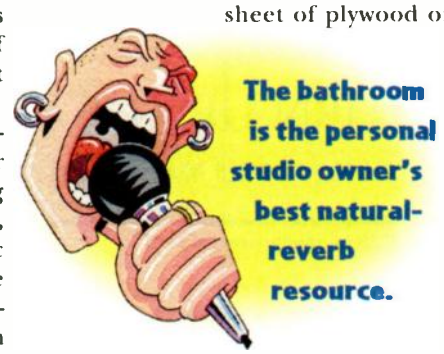
difficult instrument to isolate is the drum kit, due to its volume.

Thanks to their multiple rooms, most homes make isolation relatively easy to achieve. The obvious approach is to put each instrument in a different room of the house—for example, place the drums in a spare bedroom, the rhythm guitar amp in the bathroom, and the bass amp in a closet of another bedroom. Then have all the players perform in the room that contains the drums while wearing headphones. This setup requires plenty of cable, of course, but it will keep instrument bleed to a minimum.

If it's impossible to isolate each instrument, ask the band members or producer if it's okay to piece the song together through overdubs—starting, say, with the drums, bass, and electric guitar or keyboard. The bass and the guitar or keyboard can be recorded directly through the board or through DI boxes and then rerecorded using amps and speaker cabinets (and a new direct source for the bass, if desired).

If the group insists on recording the rhythm section together, complete with amps blaring, *and* you have only one room to work in, you'll have to do some baffling. In that case my advice is to place baffling around the drum kit, put the amps as far away as possible (and baffle them, too), and record the bass directly. If you have a vocal going down at the same time, put the singer in another room with a pair of headphones. It's a compromise, but at least you'll maintain the band's energy, and in many cases that's more important than getting a pristine recording.

You can fashion baffles from a variety of household items. Mattresses make effective baffles, as do futons (if you can figure out how to prop them up). Freestanding, folding screens also work decently, especially when draped with blankets. Sleeping bags and quilts are handy, too, and can help to isolate guitar amps, bass drums, and other instruments. Of course, you can easily build your own baffles: simply cover a sheet of plywood or particle board (the standard 4 × 8-foot size works well) with foam or other acoustically absorbent material and attach "L" brackets along the short end to help it stand.



A DAY IN THE LIFE

To better illustrate how some of these techniques play out in the real world, I'll chronicle a session that I recorded last summer in my own personal studio. The project was a typical rock record consisting of drums, bass guitar, and electric guitar for the rhythm section, along with overdubbed electric and acoustic guitars, piano, percussion, and vocals. (Some sequenced MIDI parts were added later.)

My band's first consideration was the fact that I live in an attached townhouse, so we needed to keep the overall volume down. Although we didn't have much control over the drum volume, we could regulate the level of the guitar amps. We therefore determined that the "amp cranked in the bathroom" technique was out of the question, and instead we put the guitar amp in the living room and the guitarist in the drum room. (Because this was just for the rhythm guitar track, we weren't concerned about getting an ambient sound or with having the player generate amp feedback.) The guitar amp was then miked with a Shure SM57 and covered with a thick blanket.

We recorded the drum kit with four mics: kick, snare, and two overheads. The bass went directly through a combination DI box/preamp. The bass player performed in the drum room, too, putting all the rhythm players in the same space (see **Fig. 4**). Scratch vocals were recorded in the bathroom using an AKG C 1000. Obviously, everyone wore headphones.

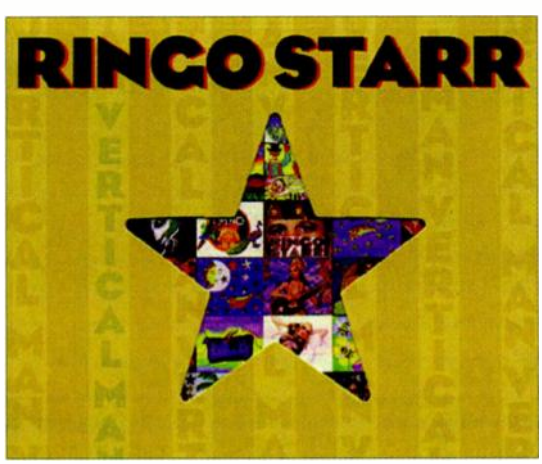
After the rhythm section was recorded, we moved on to electric guitar overdubs. We placed the amp against a wall in an ambient living room and used the Shure to close-mic it, while an Audio-Technica AT4050 captured some room sound from a few feet back.

Next we recorded acoustic guitar tracks in the bathroom. Although I would have preferred to record the guitar in the shower stall, our cabling limitations prevented us from doing so. Instead, we simply placed the guitarist against the tiled wall and miked the guitar with an Audio-Technica AT33R. Vocals were recorded in the same position, but this time the singer was standing and the AT4050 mic was used.

Finally, we recorded handheld percussion in the living room. The two percussionists played simultaneously, standing in the center of the room and facing each other. Each was miked with an AKG C 1000.

HOUSE PARTY

Recording acoustic instruments at home is definitely a challenge, but it can yield some great results. The trick is to become intimately familiar with the properties of every element in the recording chain, which is made up not only of the instruments and the microphones, but of the various acoustic spaces as well. Equipped with this knowledge you, too, can set the house a-rockin'.



***Vertical Man*, the latest album from rock legend Ringo Starr, is just one of many recent professional projects that were recorded completely in a personal studio.**

EM *Associate Editor* **Jeff Casey** *likes to record acoustic instruments through cheap cordless telephones.*

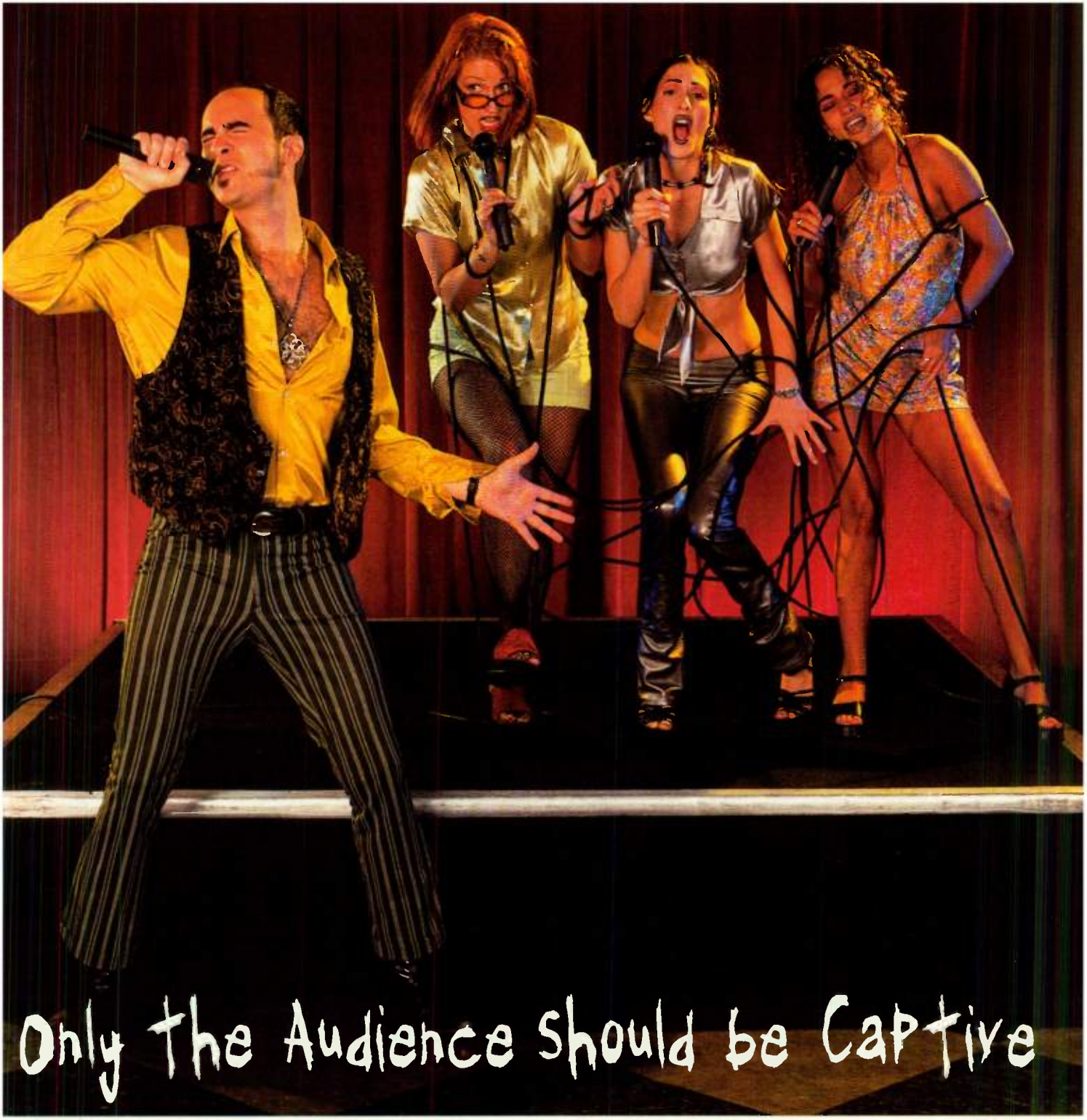


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ILLUSTRATION BY NATHAN OTA

Hard Disk Housekeeping

Save time and avoid frustration by managing your sound files the way the pros do.

A few years ago, paying a dollar per megabyte of storage seemed like a dream; today, it's less than ten cents a megabyte. Nine- and 18-gigabyte drives have become a common part of most workstations. At last, we can spend less time wondering about where we are going to fit all of our data and more time on how to find it. More data means more emphasis on organization if we want that data to be useful.

File management is crucial when you are working on big projects such as post-production for a feature-length film or sound design for a multimedia title. But the need to organize large numbers of files goes beyond these areas of production. Good housekeeping and organization make any kind of job easier.

Building Blocks

When it comes to file management, the best place to start is with the directory structure. A comprehensive, well-built directory tree is the backbone of any file system and will carry you through an entire project. As you start your project, the directories will most likely be composed of empty folders, which you will then fill as the work progresses. Therefore, you will want to create a set of folders that makes sense for the task at hand.

By Jeff Kliment

Hard Disk Housekeeping

The top-level folders should represent the broad categories relevant to your project, and those folders should be divided into more specific subcategories. For instance, let's say you're doing a multimedia project. The top level of your directory tree might consist of three folders: Music, SFX (sound effects), and Voice (see **Fig. 1**). The Music directory could contain folders for different scenes, and the scenes could be subdivided further with separate folders for each individual cue. The SFX and Voice directories would also contain appropriate subfolders.

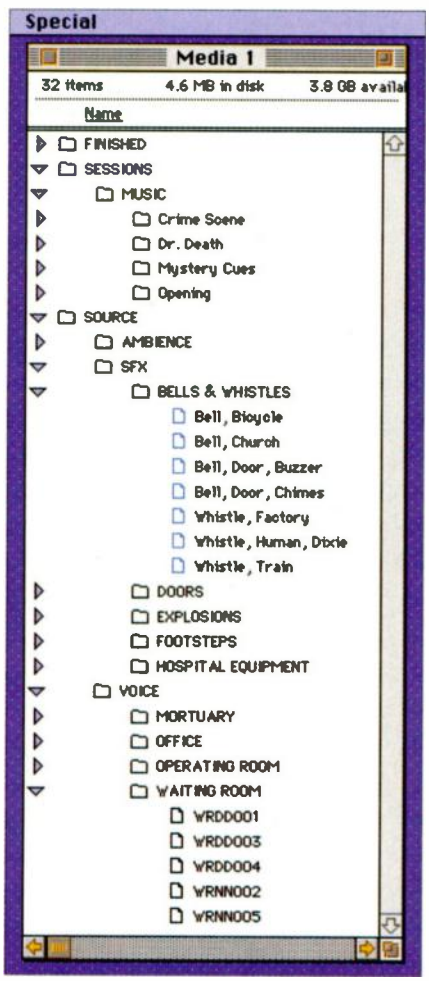

FIG. 1: In this typical set of directories, we see some source files. Note that the sound-effects and voice files implement different naming conventions.

Just as most projects can be broken down into various phases from conception to completion, the files associated with a project can be broadly grouped according to how and where they will be used in the production cycle.

Source Files

Source files are the raw materials that will be used to create a product: various takes of a performance, field recordings, items gathered from a music or sound-effects library, and so forth. These files are often long and unedited. In the case of a multimedia project, they will also be high resolution—that is, not yet downsampled.

Again, source files can be divided into several subcategories, depending on your needs. Sound effects are typically divided into categories such as Cars, Explosions, Footsteps, and so on. You might want to separate stock library sound effects from your original recordings and then subdivide each of those into various categories. If you have a lot of ambient sounds, those might need their own folder or folders. Voice files might be divided by actor or by character.

Keep in mind that the goal is to be able to find files quickly and easily, so it's best to avoid using too many folders. If you end up with lots of folders containing only a few files each, you can probably consolidate some of the similar files. Conversely, if a folder becomes too full and unwieldy, break it up into smaller groups. Be flexible: you may need to alter your directory structure as the needs of the project change.

Work-in-Progress Files

Work-in-progress files include multitrack sessions as well as individual sound files. Within a session, you generally record new material, or use files from your source-file directories, or both. In a music project, "session" might refer to a recording session, but it could also mean any multitrack mixing or editing session in which you combine sounds. As with the Source directory, sessions can be subdivided by Voice, Music, and SFX. If you are doing a lot of Foley work, you might want to put those sessions into a separate folder, as well.

At this stage of the production, you will be creating a great deal of new material. Deciding what to save and what to toss is an art in itself. For example, in a music session you might start with synthesized guide tracks and later replace them with live performances. How long do you hang on to the guide tracks, and how do you distinguish between the two sets of tracks?

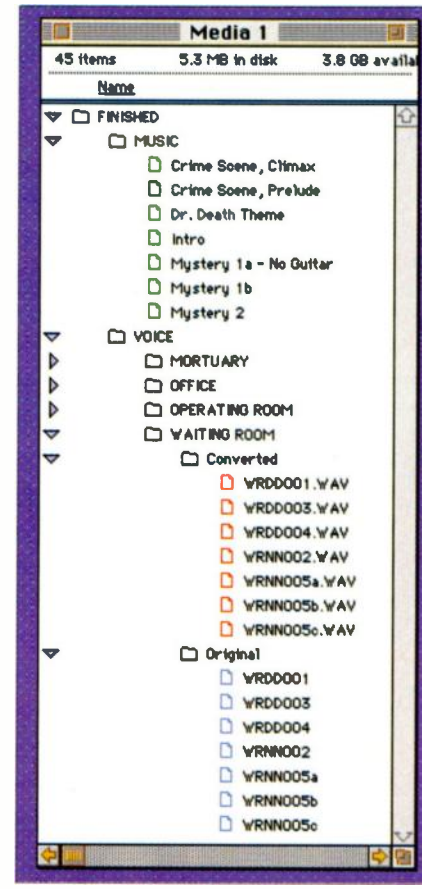

FIG. 2: Here we see the finished files. Note the two separate Waiting Room subfolders in the Finished/Voice directory and the use of Macintosh colored labels. Also, WRNN005 has been edited into three sections. Using only seven characters in naming the source files allowed the extra letter to denote a, b, and c in the finished versions.

When doing sound design, you might combine several individual sounds to create an entirely new sound, which is in turn combined with something else later. Is the interim sound worth keeping? The answer depends on the project and the potential usefulness of the sound in the future. Setting up a comprehensive set of directories is a good way to deal with these issues.

Finished Files

Create a directory titled Finished to store your final edited or mixed files,

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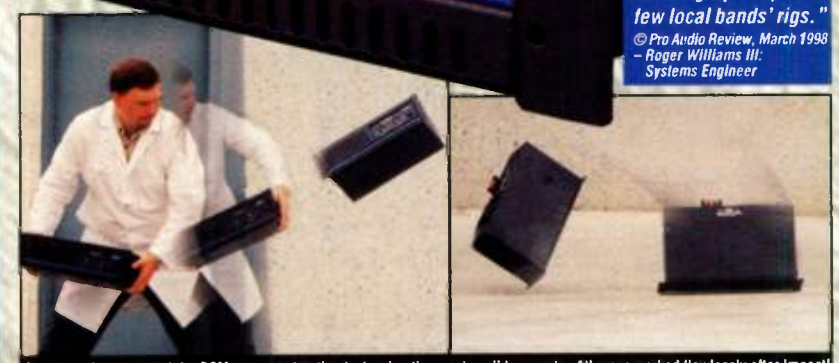

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whether they are generated from a session as a mix or bounced to disk, or are the result of editing or otherwise altering a source file.

The Finished directory should reflect the needs of the project and be divided according to the types of files you are delivering (see **Fig. 2**). Sometimes one big directory will be sufficient, but more often you will want to subdivide the finished files. Will some files need EQ or corrective processing? Are all the files going to be delivered to the same place? Answering these kinds of questions helps you decide how to structure your work.

Master Files

In many cases, the master files will be the same as the finished files, and a Master file directory would be unnecessary. However, the finished files may need to be polished or treated in a certain way before delivery, as suggested above. For example, you might need to normalize the finished files or convert them to a different sample rate. Sometimes there will be several processing steps between the finished set and the master set.

There are various methods of dealing with multiple versions of files. Setting up a logical directory structure is a good place to start. You may want to have a folder and subdirectories for the initial set of "untouched," high-resolution files, with separate folders for normalized, equalized, and sample-rate/bit-depth converted files. In some situations, you need to keep track of which files have been delivered to someone else on the project. If so, you probably need a separate, equivalent set of directories for "shipped" files. What happens when you redo something? If you're going to keep the old versions around, you'll need to distinguish them from the newer files by giving them unique filenames and perhaps keeping them in a separate folder.

What's in a Name?

One of the simplest ways to keep track of your files is to name them in a manner that makes sense both for your current project and for easy access in the future. Long filenames make this easier, but even if you are restricted to the DOS-style "8-dot-3" convention, there are ways to name files logically.

You have two basic goals here. The first is to give each file a unique name, and this includes different versions of the same sound. The second goal is to name the files in a way that makes them easy to identify and browse in a list.

Adding various extensions to the filenames, such as .SD2 (for Sound Designer II files), .WAV, and .AIF, is one useful technique. You can also add custom extensions such as .EQd, .NRM (for normalized), .44K, .22K, and so on—whatever works for you. Many batch processors automatically add extensions when you process the files, and automation utilities such as CE Software's *QuicKeys* for Mac and Windows 98/NT can be used to add, delete, and change extensions in a set of files. On the Macintosh, the Label feature is also handy for distinguishing groups of files.

When naming files, start with a general definition followed by more specific descriptions, such as "Door, Wood, Open" or "Bass, Direct." This way, correlated files will appear in groups when you view them as an alphabetized list. Later, when you are looking for a door sound or a certain bass part, it will be easy to browse through the directories and find it.

In most multitrack editing programs, newly recorded sound files are named according to the track name. Therefore, you can think of the track name as the first part of the filename. This makes it easier for you to scan through the list of files within your session. It is also easier to name exported sounds from the session because the region or edit names have been derived from the track names.

A CD-ROM game may have many rooms or levels. You could assign a two- or three-character code for each room and use that code as the first part of the filename. All sounds that take place in the Waiting Room, for example, could be named "WR." Dialog can be further broken down with a two-letter code for each character who says something in the Waiting Room. Lines spoken by Doctor Death in the Waiting Room might be named "WRDD" and then numbered according to the order in which they are spoken, for example, "WRDD012." This makes viewing a list

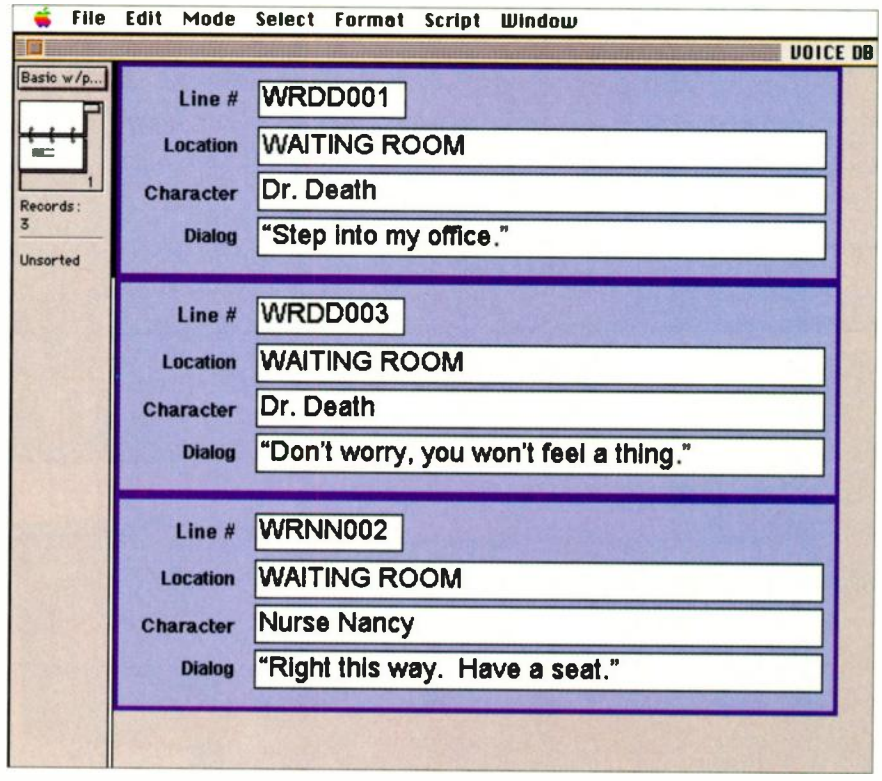
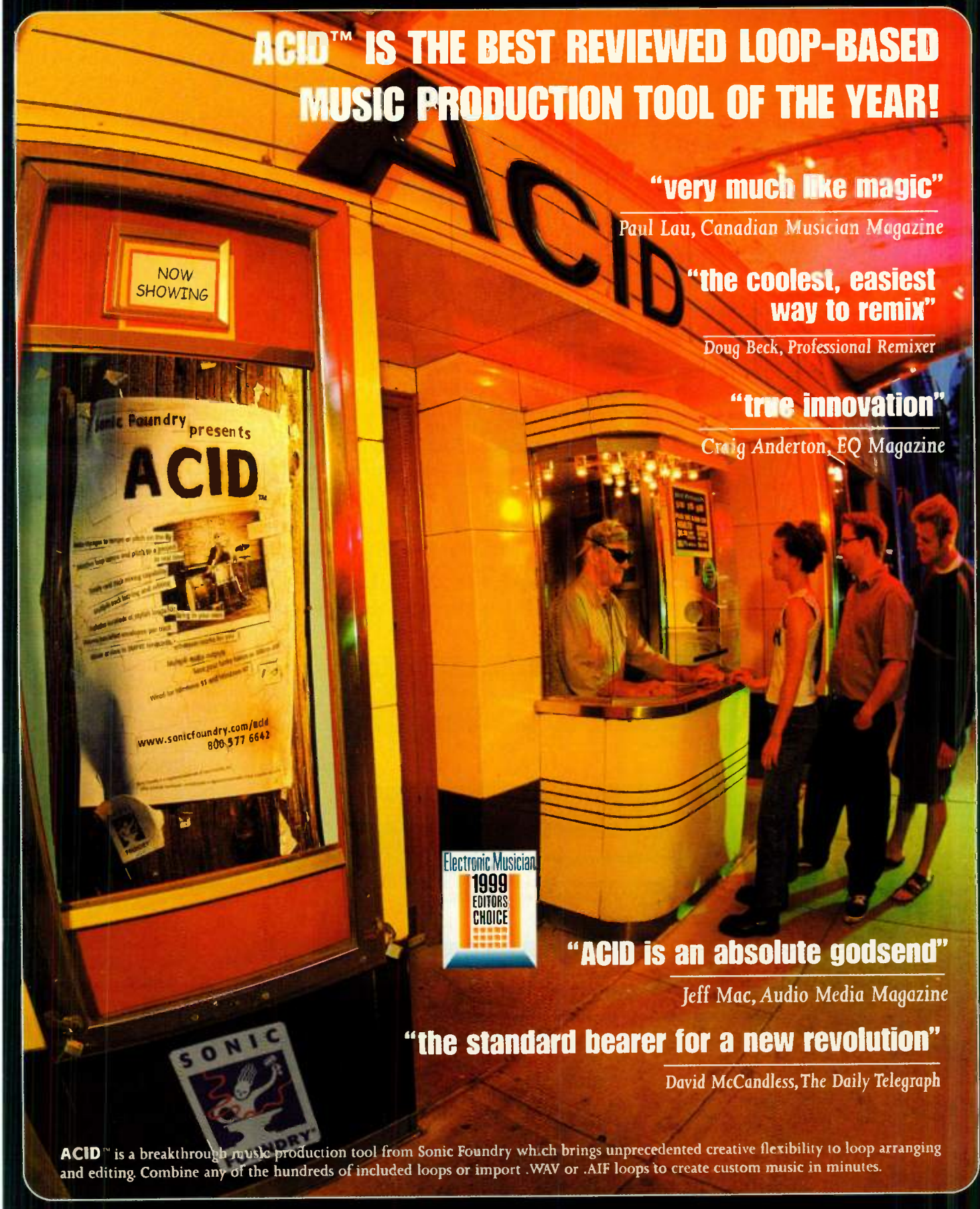


FIG. 3: This database includes fields specific to managing dialog files, including pull-down menus for the location and character, and text fields for the filename and opening words of the dialog.



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much easier because the files appear in order according to your codes. You can use extensions for the same purpose, to further refine your file descriptions.

Sometimes file-naming conventions are dictated by the needs of the project, and you might even receive a list of filenames in advance from the project coordinator. Version control becomes more difficult in cases like this, but specific applications can help. For example, Microsoft *Visual SourceSafe* 6.0 (Windows) can track the history of many types of files over the course of a project and even allow you to revert to previous versions if necessary.

Too Much Information

Even the most logical directory structures and file-naming conventions can eventually be overwhelmed by too much data. In most production environments, the sheer quantity of files can become a burden that requires another level of management beyond the physical storage media. This becomes even more important when you are working in a group. It's one thing to know where everything is on your own hard disk, but it becomes much more complicated when a lot of people need to share and exchange files.

The most common solution to this dilemma is a database. Think of a database as the card catalog to your library of sound files. As with directory structures and filenames, a database can be as simple or complex as necessary. Most common database applications, such as FileMaker *FileMaker Pro* and Microsoft *Access*, offer a set of templates for getting started and can be extensively customized.

Each individual record within a database can refer to one file or to a group of files, and it can contain as many or as few fields as you need. Typically, a record contains filenames, categories and subcategories (which can mirror a directory structure), and a description field (see **Fig. 3**). In addition to these basics, you might want to include information about the sources and destinations of the sounds, who will be using them, and technical information about the file format, sample rate, and so on (see **Fig. 4**). A more advanced database might give you the location of the files and could even include a Play button to audition the sounds directly from the database.

Needless to say, a comprehensive database can be an indispensable resource for individual projects as well as long-term archives. In a group environment, it can serve as a common point of reference by making essential information available to everyone on the project.

An Ounce of Prevention

Because they can store such huge numbers of files, large-format hard disks are susceptible to fragmentation. Many audio applications perform poorly or even crash when a hard disk becomes too fragmented, so it is worth taking the time to check your drives occasionally. Programs such as Symantec's *Norton Utilities* have easy-to-use defragmenting and optimizing tools; running them regularly will keep your drives humming and save you from major frustration down the road.

It is also worth mentioning that the more files you accumulate, the more you can lose, so do not neglect to back up often. If you're busy and create lots of new files, back up *more* often. Any work you've done since the last backup is vulnerable. If you don't have a dedicated backup device, copy everything to a second hard drive or, if available, to a network location. Just make sure you can get those files back when you need them. (For more on backup media, see "Desktop Musician: Before Disaster Strikes," p. 98.)

Effectively managing large numbers of audio files involves the same basic principles as managing any complex task. The bottom line is organization. Building a solid framework up front will make it easier to stay focused on the fun stuff during the course of any project.

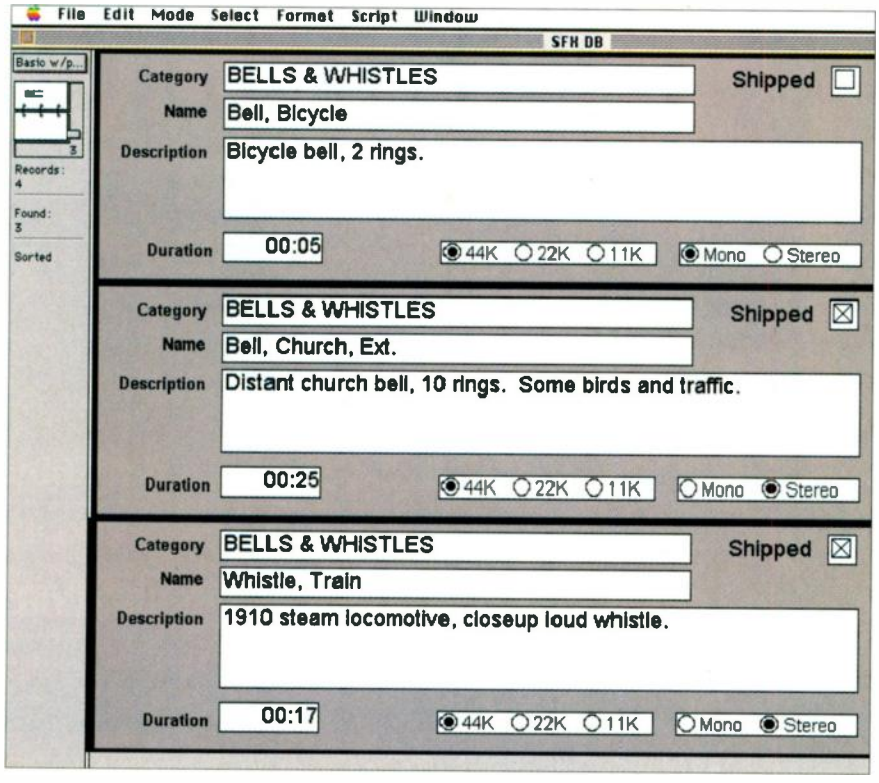

FIG. 4: LucasArts' database for managing sound effects is more elaborate than the dialog-file database shown in Figure 3. Here, we use a pull-down menu for the category. Text boxes contain the filename and description of the effect and the file duration (in minutes and seconds). Buttons mark the sample rate and whether the file is stereo or mono. Finally, a checkbox in the upper-right corner of each record shows whether the file has been shipped.

Jeff Kliment *works for LucasArts Entertainment, where he recently served as lead sound designer for the company's new adventure game,* Grim Fandango.

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Before Disaster Strikes

Which backup storage media are best for musicians?

By Michael Dorian

There's no doubt about the importance of backing up digital audio data (or any other data) on your computer. But what type of backup system is best suited for the musician's needs? Which storage devices give you the most for your money? Which backup applications are the most flexible and easiest to use?

Your storage needs depend primarily on your recording format, track count, and whether you use data compression. For example, suppose you have recorded a song at 44.1 kHz with 16-bit resolution (uncompressed) that includes eight continuously recorded tracks and lasts four minutes and 30 seconds. This song will require 180 MB of disk space. If three such songs are stored on your hard drive, they will occupy 540 MB—a significant amount of storage space, but small potatoes when compared with the requirements of digital video. That being the case, this article focuses on audio storage solutions that accomodate a range of 650 MB (CD-R) to 6 GB (SCSI DAT), although some backup devices accomodate up to 50 GB.

COURTESY HITACHI

FIG. 1: Hitachi's GF-1050 DVD-RAM drive is among the newest breed of rewritable optical storage, with up to 5.2 GB of capacity.

Backup devices can be divided into two categories: random access and tape based. Random-access devices use magnetic disks or optical discs, and data can be accessed directly from these. On the other hand, tape-based devices use magnetic tape, and their data must be restored to a random-access device before it can be used. (There is one exception to this, the Glyph DigDAT tape drive, which I'll describe shortly.) Random-access backup is more convenient, but tape-based devices can store more data.

An important consideration is data transfer rate, which determines how quickly the backed-up data can be restored to the primary storage device. The data transfer rate also determines the number of tracks that can be played simultaneously if you use the digital audio data on a random-access device without restoring it to your primary storage.

For manufacturer information, please see Contact Sheet, p. 179.


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FIG. 2: The Glyph DigDAT is the only tape drive currently available that can play audio files directly from the tape.

Of course, cost is critical for musicians, and when purchasing backup devices, you must consider the cost of the device itself and the cost of the medium it uses. (For a comparison of the capacity, data transfer rate, and prices of various backup devices, see the table "Storage Device Specifications.")

MAGNETIC MEDIA

Most backup devices utilize removable media of some sort, and this can result in essentially infinite storage: when the medium gets full, simply eject it and pop in a new one. One common type is the removable hard-disk cartridge, which stores data on a magnetic medium, just like a fixed hard disk. Relatively low capacity (and low cost) examples include the Iomega Zip (100 MB), Imation Super Disk 120 (120 MB), and SyQuest EZ-Flyer 230 (230 MB).

Moving up the capacity "food chain," the Iomega Jaz 1 drive accommodates 1 GB cartridges, and the new Jaz 2 drive uses 2 GB cartridges. I have tested the Jaz 2 drive on a number of platforms, and I found significant improvements over Jaz 1 in terms of access time and data transfer rate. In addition, Jaz 1 cartridges can be used with Jaz 2 drives.

SyQuest's SparQ and SyJet drives offer similar capacities at 1 GB and 1.5 GB, respectively. (Unfortunately, the company recently filed for bankruptcy; see the sidebar "The Rise and Fall of SyQuest"). The Iomega and SyQuest products exhibit impressive data transfer rates and performance—they are roughly comparable to one other—but their reliability is a controversial issue.

Castlewood's 2.2 GB Orb drive has drawn a lot of media attention lately, although it isn't shipping as of this writing. With a cost of $199.95 for the drive and $30 per cartridge, the Orb offers a cost-effective backup media solution when compared with the Iomega Jaz and the SyQuest SyJet.

OPTICAL MEDIA

Optical storage technology can also be used for backup applications. The prices of CD-R (CD-Recordable) and CD-RW (CD-Rewritable) drives have come way down in recent years, making them viable alternatives to magnetic media. CD-R drives range in price from about $299 to $600, and CD-RW drives range from about $299 to $800. I've seen CD-R media available for as low as $1 per disc, but I strongly advise you to seek out high-quality CD-Rs. (Look for name brands, such as Kodak, Maxell, Sony, and TDK.) Rewritable CDs are priced at around $20 per disc.

CD-R drives let you record data onto a disc once, after which the data can only be read. On the other hand, CD-RW drives are designed to let you write data to the disc as often as you choose. Both types of drives let you archive data or burn audio CDs, which is very handy for recording musicians.

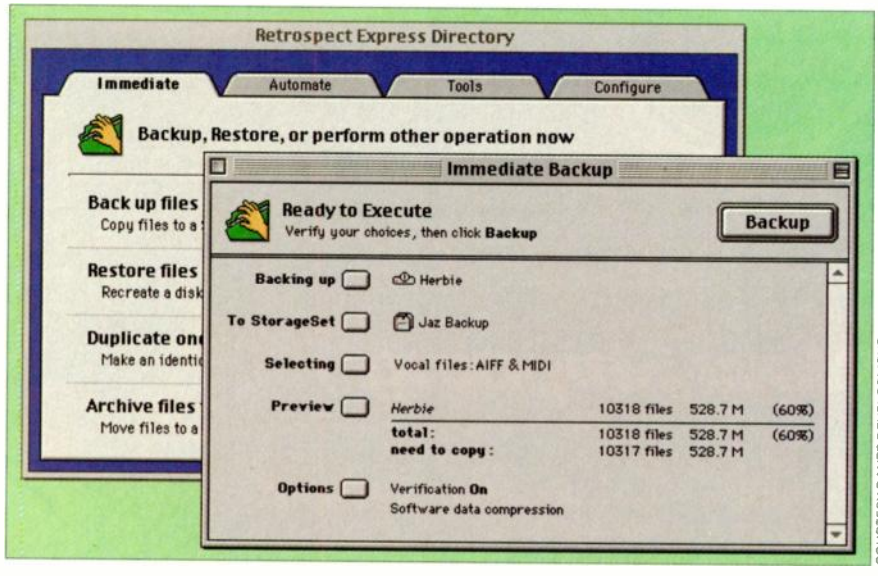
Because both CD-R and CD-RW drives boast peak data transfer rates of 5 MB per second, optical storage media have solid reputations for being reliable storage systems. Roland's VS-CDR CD recorder supports data archiving and the creation of audio CDs with Roland's VS-880 and VS-1680 modular hard-disk recorders (M-HDRs).

Another optical medium, DVD, could prove to be the next popular storage medium. Two recordable-DVD formats are now vying for this market: DVD-RAM and DVD-RW. Currently, LaCie is offering the Panasonic DVD-RAM drive for $799. Single-sided discs hold 2.6 GB and sell for $29, and double-sided discs hold 5.2 GB and cost $39. (It's expected that sometime in 1999, DVD-RAM will support 4.7 GB per side.)

I recently tested Hitachi's GF-1050 DVD-RAM drive (see **Fig. 1**). Using Software Architects' *DVD-Ram Tune-Up* for the Mac, I copied 429 MB worth of audio files in just 19 minutes. This drive can also read CD-ROM, CD-R, CD-RW, and DVD-ROM. (However, current DVD-ROM drives cannot read first-generation DVD-RAM discs.) Software Architects also offers *Format UDF* and *Write DVD* which are currently available for Windows 95 and Windows 98. The Hitachi GF-1050 delivers unsurpassed reliability. It's no speed demon, but it shows great promise as an ideal storage device.

MAGNETO-OPTICAL MEDIA

As its name implies, magneto-optical (MO) storage combines magnetic and optical techniques to store data on removable disk cartridges. Fujitsu's



COURTESY DANTZ DEVELOPMENT

FIG. 3: Dantz Development's *Retrospect* is one of the most widely used backup utilities created for the Macintosh.

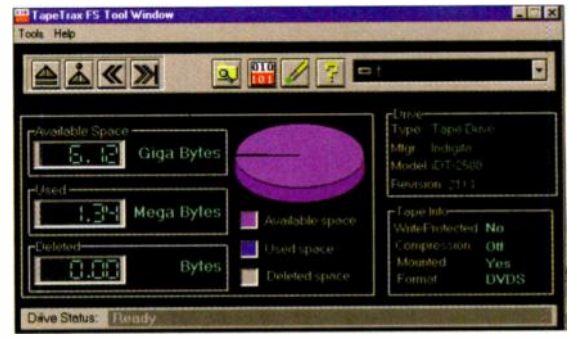
DynaMO 640SE drive supports 128, 230, 540, and 640 MB cartridges; a 640 MB cartridge costs about $20. You can also purchase a five-pack of 640 MB disks for $100. Access time is 28 milliseconds, and the transfer rate is up to 3.9 MB/second.

Pinnacle Micro's Ultra 5.2 MO drive provides up to 5.2 GB of storage, and sports a data transfer rate of 3.5 MB/second. With a price tag of $1,495 and media costing $89, the Ultra 5.2 might exceed the budgets of some home recordists, but MO drives and cartridges have proven to be rugged and reliable.

TAPE STORAGE

A tape drive can certainly provide a large amount of storage space, and its media is very cost effective. Some tape drives can store as much as 50 GB. However, the initial investment can be quite costly. Just to give you an idea, the Quantum DLT 4000 costs $2,665, with media priced up to $96. Exabyte's Eliant 820 stores from 7 GB (uncompressed) to 14 GB (compressed) on a tape. The Eliant 820's tape media sells for $15, and the drive itself is $1,495.

The Sony AIT-1 (Advanced Intelligent Tape) boasts a data transfer rate of 180 MB/minute (and it requires an Ultra Wide SCSI card), but it's priced at $2,495. It can store 35 GB of data (uncompressed) or 70 GB (compressed) on one tape. However, bear in mind that media costs start at $99.



COURTESY INDIGITA

FIG. 4: Indigita's *Tape Trax* software mounts tapes in a Glyph DigDAT drive on the Windows 95 or 98 desktop, just like a hard drive, and lets you drag files and folders to and from the tape.

Sony's SDT-9000 tape drive offers an excellent cost/benefit ratio. It stores 12 GB (uncompressed) or 24 GB (compressed) and costs between $1,100 and $1,200; additional tapes cost around $40. It delivers a data transfer rate of 72 MB/minute.

You may have heard of data DAT drives, which include any data-storage tape drive that uses 4 mm tape cassettes (which is the same size of tape used by audio DAT machines). For example, Glyph Technologies' DigDAT (see **Fig. 2**) retails for $1,075 and gives you up to 6 GB of uncompressed data storage with a data transfer rate of 52 MB/minute. In fact, the DigDAT is the only tape drive currently available that can play audio files directly from the tape (although it's limited to stereo files). The DigDAT can use 4 mm tape in 60-, 90-, and 120-meter cartridges. Prices for 90-meter tapes can be as low as $7, and 120-meter tapes go for around $15.

Storage Device Specifications

Storage Product	Manufacturers	Capacity	Transfer Rate	Drive Cost	Media Cost
Optical Media					
CD-R	Matsushita/Panasonic, Philips, Ricoh, Sony, and Yamaha	650 MB 74 min.	4.2 MB/sec. (burst)	$299 to $600	$1.25 to $2
CD-RW	Phillips, Ricoh, and Yamaha	650 MB 74 min.	5 MB/sec.	$299 to $800	$8 to $20
DVD-RAM	Hitachi and Matsushita/Panasonic	2.6 GB or 5.2 GB	Up to 10 MB/sec. (burst; synchronous) 4 MB/sec. (asynchronous)	$799 (LaCie)	(2.6 GB) $32 (5.2 GB) $44
Magnetic Media					
Orb	Castlewood	2.16 GB	12.3 MB/sec. (minimum)	$199.95	$30
Jaz 1	Iomega	1 GB	6.62 MB/sec. (max)	$199 (refurbished)	$89
Jaz 2	Iomega	2 GB	8.7 MB/sec. (max)	$349	$99
SparQ	SyQuest	1.0 GB	3.7 MB/sec.	$199	$39
SyJet	SyQuest	1.5 GB	7.0 MB/sec.	$299	$69
Magneto-Optical Media					
DynaMO 640SE	Fujitsu	640 MB	3.9 MB/sec.	$349	$20
Ultra 5.2	Pinnacle Micro	5.2 GB	3.5 MB/sec.	$1,495	$89
Tape Storage					
Eliant 820	Exabyte	7 or 14 GB	60 MB/min.	$1,495	$15
DigDAT	Glyph Technologies	6 GB	60 MB/min. (synchronous) 420 MB/min. (asynchronous)	$1,075	(90-meter) $7 (120-meter) $15
DLT 4000	Quantum	20 or 40 GB	90 MB/min.	$2,665	up to $96
AIT-1	Sony	35 or 70 GB	180 MB/min.	$2,495	$99
SDT-9000	Sony	12 or 24 GB	72 MB/min.	$1,100	$40

AUDIO DAT BACKUP

Many electronic musicians have an audio DAT deck in their studios, and these sometimes can be used to back up digital audio data as well as record stereo master tapes. Data is transferred from your digital audio workstation (DAW) through a digital connection (AES/EBU or S/PDIF optical or coaxial) and recorded onto an audio DAT tape. Obviously, this is a very cost-effective alternative to other forms of backup storage, but it is limited by the number of DAWs and M-HDRs with which it will work, and the storage capacity is relatively small.

If you use Digidesign hardware on a Macintosh, Digidesign's *DATa* utility lets you back up files to audio DAT. Unfortunately, this useful utility was discontinued after version 4.1.1 of the *Pro Tools* software. On the PC side of things, the Zefiro ZA2 audio card includes a DOS utility that lets you back up digital audio files (or anything else on your hard disk) to an audio DAT machine.

The Akai DR-8 and DR-16 M-HDRs let you back up the playlist information and audio files for each project to audio DAT, as well as to Alesis ADAT, Tascam DA88, and various SCSI devices. Akai's DPS-12 M-HDR also supports backups to audio DAT and SCSI devices.

Roland's VS-880, VS-880EX, and VS-1680 M-HDRs can also back up to an audio DAT recorder. Once you select the songs to back up, the operating system determines the length and number of the tapes required to back up your data. The backed up data includes all virtual tracks, locate points, mark points, and scene settings.

A 60-minute DAT tape can back up approximately 330 MB, and it takes about 60 minutes to perform the backup. The backed-up data can be verified, as well. The Roland VS-880EX and VS-1680 also let you restore data without erasing any information currently stored on your hard drive.

UTILITIES AND APPLICATIONS

Besides storage devices, it's equally important to discuss backup software. As for CD-Rs and CD-RWs, Adaptec's *Toast* (Mac) and *Easy CD Creator* (PC) are often bundled with drives. Both applications let you burn audio CDs and archive data. Adaptec's *Direct CD* for Mac and Windows can be used with approved CD-R drives to archive data. This software lets you delete data, but you cannot regain space on the CD-R. (For more information on CD-R software, see "The CD-R Software Cook-Off" in the March 1998 issue of **EM**.)

▼ Audio DAT decks sometimes can be used to back up digital audio data.

MO storage drives are usually bundled with utilities that initialize or format the media. Magnetic removable-cartridge drives also come with utilities for the Mac and PC.

Dantz Development's *Retrospect* for the Macintosh is a backup utility that supports removable cartridges, such as Zip, Jaz, and SyQuest cartridges, in addition to CD-R, CD-RW, DVD-RAM, MO, and tape (see **Fig. 3**). The software lets you do immediate or scheduled backups in addition to many other useful tasks. It also can apply data compression so you can save storage space.

For Windows, Seagate's *Backup Exec Desktop 98* supports a number of tape storage devices, as does Computer Associates' *ARCserveIT* software. Both applications work with Windows 95, 98, and NT. The Glyph DigDAT comes bundled with Indigita's *Tape Trax* software for Windows 95 and 98 (see **Fig. 4**). Once installed on your PC, your tape becomes a mounted volume like a hard drive, and you can easily drag files or folders directly onto the tape. Optima Systems' *DeskTape Pro* supports the DigDAT for the Mac in the same manner.

Grey Matter Response's *Mezzo* for the Macintosh allows background archiving to a large number of supported tape storage drives while running Digidesign's *Pro Tools* software. All of these applications can benefit you in organizing, archiving, and restoring your data.

BEST BANG FOR THE BUCK

Of the products I've looked at, CD-R, CD-RW, DVD-RAM, and tape storage are the most reliable and cost-effective backup solutions available. If the ability to interchange data is important to you, Zip or Jaz could be ideal because these products are widely used. However, media costs are relatively high.

DVD-RAM is far more cost effective than MO, and the media is well priced. Tape storage can also be a good solution, as long as you aren't bothered by slow data retrieval and access times. Purchasing additional tape media provides an extremely cost-effective archiving solution.

In any event, backing up your data should be as fundamental as eating and sleeping. If your hard drive starts to act up or completely crashes, you can avoid the hassle of sending it to a data-recovery service by simply restoring your data to a new drive. (My experience with data-recovery services has not been completely satisfactory.)

We all have a personal attachment to our creative endeavors, so protect your creativity. Avoid the headache and grief of losing your data, for it is far better to be safe than sorry.

Michael Dorian *is a freelance product specialist and consultant for the MI and data-storage industries, focusing on A/V applications. You can reach him at md_prod@earthlink.net.*

THE RISE AND FALL OF SYQUEST

On November 2, 1998, SyQuest Technology, Inc. announced that it was closing its doors. On November 17, the company filed a petition under Chapter 11 of the Bankruptcy Code in Oakland, California. This announcement came after months of struggle for the 16-year-old company that was once the leader in the removable-cartridge storage industry. Of course, SyQuest users have legitimate concerns about whether they can get support and where to purchase additional cartridges, but as of this writing, there is no news regarding these issues.

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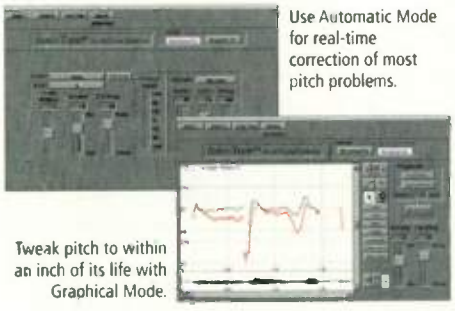

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Modulation Synthesis Methods

Explanations for those who find carriers creepy and sidebands scary.

By John Duesenberry

Modulation synthesis is a technique for generating or modifying audio spectra. The goal is to end up with more components in your sound than you started with. This type of synthesis normally involves the use of two audio-frequency signals. One audio signal, called (not surprisingly) the *modulator,* controls the amplitude, frequency, or some other parameter of another audio signal, called the *carrier.* The resulting signal contains audible frequency components that were not present in either of the original signals. These components are called *sidebands.* Due to the presence of sidebands, the resulting output may sound radically different from either of the original signals.

The key to mastering modulation synthesis—whether frequency modulation (FM), amplitude modulation (AM), or some more esoteric form—lies in the ability to predict and control the sideband spectrum. This involves a bit of computation that, for the most part, is simple addition and subtraction.

In this article I'll discuss AM and ring modulation, the most easily understood types of modulation synthesis. I'll also touch on some related but less widespread modulation techniques. (I'll cover FM in a future issue.) Take a good look at the "Classic AM" section below; many of the concepts discussed there apply to other forms of modulation, as well. If you're unfamiliar with concepts like DC offsets, negative frequencies, or balanced vs. unbalanced signals, see the sidebar "The Negative Side(band)."

STEVE RAMIREZ

CLASSIC AM

Classic amplitude modulation is a form of waveshaping in which two signals are multiplied. In analog systems, this is done with voltage multipliers. In the digital domain, it's achieved by coding a few instructions that multiply sample values.

Figure 1 shows the relationship of modulator, carrier, and output signals. The waveshaping effect of signal multiplication is clear: the amplitude of the output rises and falls in proportion

URLS, Mines, and Ars

A fascinating festival focuses on technology, art, and warfare.

By Bean

Nestled along the banks of the Blue Danube, the Brucknerhaus in Linz, Austria, plays host each year to the Ars Electronica Festival. This event includes the Ars Electronica Symposium and the Prix Ars Electronica. Since 1979, Ars Electronica has explored the sociocultural consequences of digital technologies from the social, political, artistic, and scientific points of view.

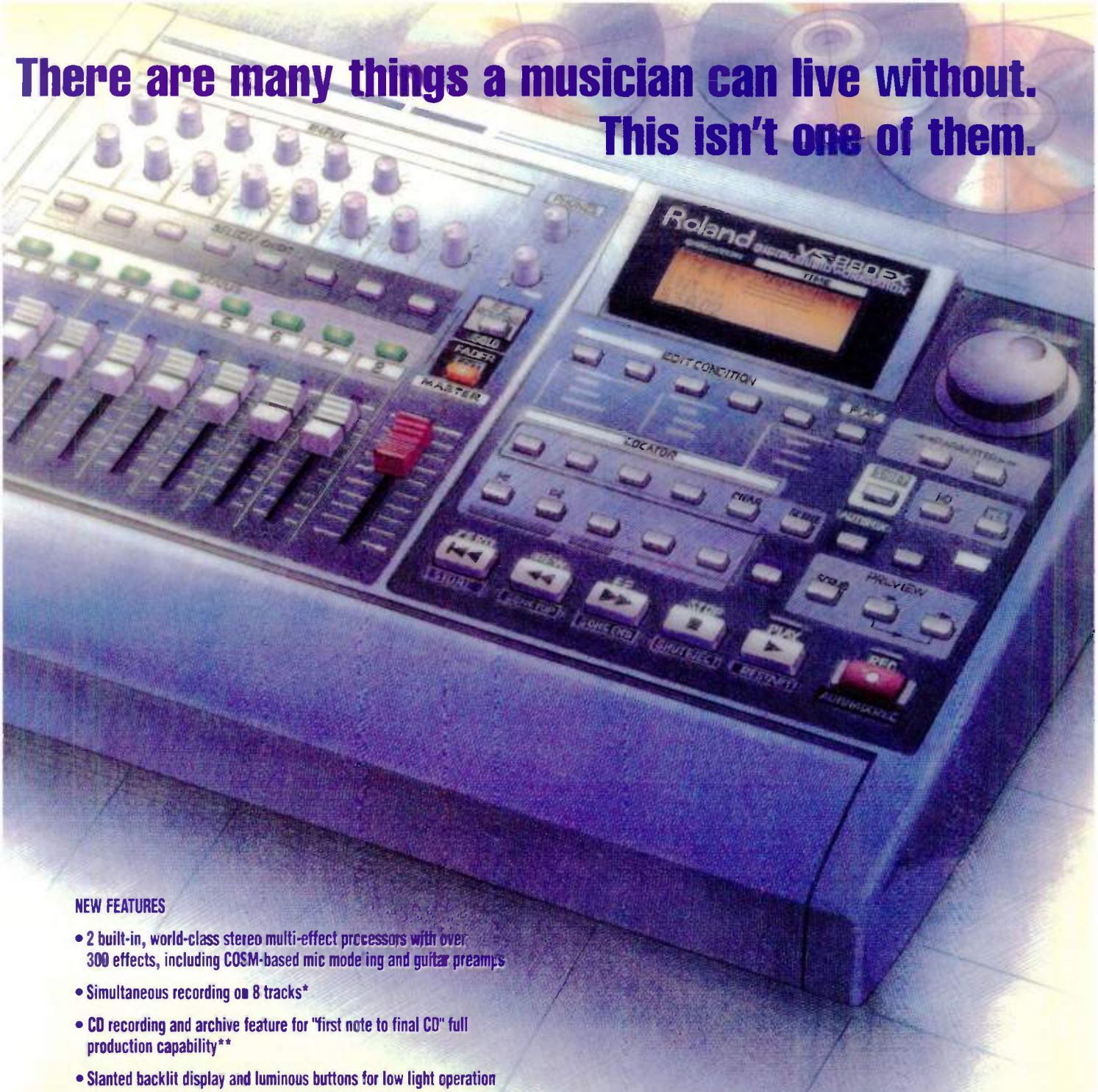
Sid Fels demonstrates his lamascope, an interactive, computer-generated, digital kaleidoscope that uses a video camera to record the performers' gestures. The lamascope processes these video images in real time and uses the resulting data to control musical tones and audio elements. A wireless mic provides audio input.

The topic of the 1998 symposium—InfoWar—concerned the use of information as a strategic weapon, not only in terms of computer-supported military conflicts such as the Gulf War, but also with respect to Internet cyberguerillas, electronic surveillance, the power of the media, the effect of information technologies on world financial markets, and so on. One of the focal points of this symposium is of direct interest to **EM** readers: the role and responsibility of artists in helping people confront and understand these issues.

Presented on September 8 and 9, the symposium attracted an eclectic blend of artists, musicians, historians, philosophers, journalists, military strategists, and of course, hackers. Information and disinformation were the main subjects of discourse, a reminder that all roads and technologies eventually lead to (or from) the military. Amidst the shadows of the secret service, virtual wars, and so-called intelligent land mines, I paused to appreciate the developers who craft hardware and software that is *not* designed to bring about death and destruction.

In some circles, Linz is best known as one of the great technology centers of Europe, although it was once infamous as Hitler's hometown. Despite housing the Museum of the Future, Linz is also a living museum that pays homage to its past. For example, late one evening, Ars attendees were

There are many things a musician can live without. This isn't one of them.



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crammed into open-air panoramic trains to take a tour of a former World War II steel factory. Still in operation, VOEST's Stahlwerk 3 lies on the site of St. Peter, a village that was destroyed by Hitler's army to make room for the Hermann Goering Steel Works.

Although the factory no longer manufactures weapons, we were able to relive a bit of history and watch molten steel being poured into giant vats along the river, set to a deafening soundtrack inside the train. The dramatic industrial ambience was chilling, to say the least.

THE SCENE

Further along the river was a musical playground where DJs, VJs, samplers, mixers, computers, immense satellite dishes, and speaker towers occupied an otherwise empty field. The sonic signals under the stars were scheduled to last from sunset to sunrise, and there were more people on stage than in the audience.

Several tables were filled with videos and music gear, including PCs running Sonic Foundry's *Sound Forge,* Clavia Nord synthesizers, Behringer 2408 Euroracks, Roland VS-series digital recorders, and a Roland JP-8000 keyboard. Not that it mattered, but even at close range it was impossible to tell whether the pulses, tones, and images being broadcast were truly downloaded live via the radio and satellite feeds or were simply prerecorded samples mixed in with video loops and white noise.

Even more astounding was the immense financial support provided by the Austrian government to underwrite the cost of these large-scale, noncommercial productions. The level of support was enviable, especially considering the precarious state of the National Endowment for the Arts in the United States.

COLLISION COURSE

Super Collider was conceived by Rupert Huber as an ongoing collision of music "particles" and visual imagery, presented in the Stadtwerkstatt. Choreographed by live musicians, composers, and audiovisual artists, this event occurred each evening for the duration of Ars Electronica.

The startup of the Super Collider accelerator was an improvisational, polymetric percussion trade-off between Kurt Dahlke on acoustic drum set and Lukas Ligeti on Alternate Mode's drumKAT MIDI percussion pads. In keeping with the evening's theme, rhythm, meter, and tempo changes were frequent.

Participating artists changed nightly, and each group improvisation blended ambient grooves and Germanic sociopolitical commentary in an experimental combination of sound and picture. The result was transmitted throughout the venue's interior spaces, which included the dance floor, observation station, and collision space, as well as cool-off and warm-up rooms. A full-blown sonic culture clash was definitely achieved.

THE HILLS ARE ALIVE

Staalplaat, Amsterdam's industrial-music label, sponsored the Sound of Music event on the outer fringes of Linz at the Posthof performance space. The headliner for three evenings was Negativland, famed for a copyright-infringement case with U2 and also known as slice-and-dice pioneers of the "reuse/reinterpretation" genre. Two of Negativland's original members, Mark Hosler and Don Joyce, were joined by Dutch tonal and visual artist Geerten Verheus, aka Muzictoerist, whose music is meant to be heard but not listened to. Also joining in the fun were two groups from the United Kingdom: People Like Us, featuring DJ and sound-collagist Vicki Bennett; and Barbed, the electronic cut-and-paste wizards.

Hosler pointed out that having seven people making noise and mixing as a group could have been a recipe for disaster. But an ongoing dialog between the participants before each night's performance contributed to an egoless atmosphere for collective listening and performance strategies.

Although the stage was covered with turntables, drum machines, MiniDisc players, mixers, analog synths, cannibalized 16 mm projectors, and more, there was not a single computer in sight. In keeping with tradition, an LP of Rodgers & Hammerstein's *The Sound of Music,* featuring Julie Andrews, was proudly displayed and sporadically plagiarized throughout the evening. But the 1950s sci-fi film loops provided by Peter Conheim and Craig Baldwin stole the show.

GLOBAL HOCKETS

Hailing from New Zealand, the energetic tour de force known as From Scratch passed rhythmic and melodic lines back and forth in a type of musical interaction known in medieval times as "hocketing." Group founder Philip Dadson and percussionists Shane Currey, Adrian Croucher, and Darryn Harkness carved a niche somewhere between Harry Partch, Steve Reich, and a gamelan orchestra (see **Fig. 1**).

The sound of From Scratch is infused with the distilled essence of a pseudo-Balinese monkey chant, although Dadson claims that much of the music was written before he visited Indonesia in 1991. Performing on gongs, tubes, bells,

FIG. 1: New Zealand's From Scratch (left to right): Adrian Croucher at the eye-drum station, Shane Currey at the bass-pipes station, composer Philip Dadson on water bells, and Darryn Harkness on num-drum.

and custom instruments made out of graduated PVC pipes, the playfully precise quartet had mounted piezo-electric crystals on just about everything onstage. Except for the jilzira (a giant rubber-band resonator with a sound board shaped like a boomerang) and the zitherum, (a drummable slide zither made out of Styrofoam and stretched piano wire), most instruments were wired to emit an electric signal that was routed through an Alesis D4 drum module to an Akai S3000 sampler.

This electro-acoustic crossover enabled a real-time collaboration with Supreme Particles, a collective of minimalist computer-graphics artists founded by Michael Saup of Frankfurt, Germany. Supreme Particles' DJ, Tricky

▼

A full-blown sonic culture clash was definitely achieved.

Chris, periodically layered in ambient backing tracks using a Clavia Nord Lead, a Casio CZ-101, and samples from another Akai S3000.

According to Dadson, the music was purposely in or out of time with the 3-D computer graphics rendered on SGI O2s. Much of the visual collaboration between From Scratch and Supreme Particles showed influences of early abstract German Expressionist films, molecular x-rays, and corporeal imagery. However, the most visually effective moments were during the low-tech shadow play that was created as the artists waved jilziras over their heads behind a giant screen.

I AM A WHAT?

A huge banner of a man diving face first off a building was displayed prominently on the outside of the Ars Electronica Center, with the message "Face the Future" for added emphasis. Inside, Sidney Fels's Iamascope—an interactive, computer-driven, digital kaleidoscope that uses a video camera lens as its eye—surrounded the performers with imagery of themselves on a large projection surface.

Iamascope participants play the role of a kaleidoscope's pieces of floating, colored glass; as people move in front of the Iamascope's highly reflective surfaces, kaleidoscopic images of their appendages and garments are integrated and processed in real time. A vision subsystem, linked to the electronic eye, controls musical tones using a sustain algorithm, and a wireless mic produces echoes that correspond to the kaleidoscopic images. Thus, the performers control musical tones and audio elements of the Iamascope by using gestures to explore zones of sound within the image. Arpeggiated patterns change from low to high as performers move their hands toward the periphery of the Iamascope.

TESLA REVISITED

With titles like "Happy Doomsday" and "Artists Rifles," many of the Prix Ars Electronica installations honored the theme of InfoWar and, not surprisingly, focused on elements of gloom and doom. One refreshing contrast was an installation called *Krachtgever* that featured 54 wooden crates connected to each other by giant spring coils.

Peter Bosch and Simone Simons programmed a computer sequence that controlled electric motors which set the crates into motion at varying speeds. Each crate housed a variety of materials that generated different sounds as the vibration rate of the crate changed, creating an overall sonic experience akin to sitting next to a passing train.

MILEAGE PLUS

Another innovative audio experiment called "Sound Mapping" required four portable suitcases to be wheeled around the streets of Linz by unwitting volunteers. Each sound-generating Samsonite was outfitted with an Apple PowerBook 190, a Kurzweil K2000 sampler, motion sensors, and speakers.

A Differential Global Positioning System was used to radio information to a "lead" suitcase that was mounted with an aerial antenna and accompanied by a festival attendant. Iain Mott, Jim Sosnin, and Mark Razewski designed each suitcase to have a distinct musical voice and corresponding algorithm that changed in predetermined sound zones around the city. Opcode's *Max* was used to filter the motion data and create regionally specific responses according to the participant's movement and location. A high level of interaction between the performers and curious onlookers was a natural evolution of this unusual parade through the urban landscape. (I'll discuss this in more detail in a future article.)

THE LAST BYTE

One of the more humorous installations, called "Byte," was also one of the most popular, according to my unofficial survey. Christoph Ebener and Uli Winters concocted the Pavlov-inspired project to create a breed of mice specifically trained to gnaw their way through RS-232 computer cables. Positively reinforced with food pellets and a steady stream of visitors cheering them on, each mouse's performance was tracked on a monitor outside its glass menagerie.

Mouse 3 was far and away the most industrious of the bunch and was undoubtedly whisked away after the conference for controlled breeding.

Bean *'s techno-rhythmic journeys have taken her from Senegal to Silicon Valley in pursuit of percussion. Her latest music-making methods include sneaking into schools around the Bay Area with her group, RhythMix.*


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SPIRIT

DIGITAL 328

A respected British console manufacturer joins the digital revolution.

By Randy Tobin

With the release of the Digital 328, Spirit by Soundcraft has become the first British manufacturer to enter the burgeoning small-format digital mixer market, which has been the exclusive domain of the Americans (Mackie Designs) and Japanese (Yamaha, Panasonic, and Tascam). Indeed, not only have the British joined the fray, but they've done so with a quality product that deserves an enthusiastic welcome.

Spirit's mixer comes standard with key items that are options on most competing boards. For example, it comes with two sets of ADAT Optical I/O ports, two sets of TDIF I/O ports, S/PDIF and AES/EBU I/O, a SMPTE time code input, an RS422 control port, and 16 mic inputs rather than 8 or 12. This means you probably won't have to add much to the unit—except, of course, a second unit if your facility grows. Even then, the expansion connector is included.

To put this unit through its paces, I unplugged one of our two trusted analog warriors, the Ramsa WR820B (a 40 × 8 × 2 desk); built a base to accommodate the much smaller Spirit Digital 328; plugged in all the existing plugs (and a few new ones); and

Spirit's Digital 328 gives you flexible analog and digital I/O, including ADAT Optical and Tascam TDIF ports; snapshot and dynamic MIDI automation; 3-band parametric EQ on every channel; Lexicon multi-effects; and up to 24-bit, 48 kHz sampling.

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went to work. I had the opportunity to use this board in several situations, including tracking acoustic instruments and vocals, MIDI sequencing and mixing, tape/hard-disk recorder mixing, digital format conversion, and in-studio live-performance mixing.

INS AND OUTS

The Digital 328 is a 42-input by 8-group by 2-out mixer. Each mono channel has 16 line inputs and 16 mic inputs; the latter are equipped with a Soundcraft UltraMic+ preamp and a 100 Hz highpass filter. A single trim knob controls the mic and line input. Each channel has a send/return insert point (with tip being send). All 16 of the 100 mm channel faders are motorized, as is the stereo master fader. You get 16 digital inputs via any two of the ADAT Optical and TDIF ports. Each of the 32 input channels feeds a 3-band, fully parametric EQ. You get four auxiliary sends and two sends dedicated to the built-in Lexicon effects processor.

There are five additional sets of stereo inputs, which can be used as channels or as effects returns (bringing the channel-input total to 42). Four of the stereo inputs feed an 8 × 2 submixer; the fifth is a straight stereo input channel. The submixed channel and straight stereo channel each have rotary level knob, a 3-band parametric EQ, aux sends, and internal effects sends. They can be soloed, muted, and routed to the subgroups or main mix, just like the mono channels. In addition, you get two sets of 2-track analog returns (for monitoring stereo mixes, CDs, and so on).

The 328 has four stereo outputs, two of which—the L/R control-room outs and the stereo headphone jack—carry the control-room monitor signal. A Solo Control switch lets you select prefade listen (PFL), after-fade listen (AFL), or solo-in-place (SIP) soloing for these outputs. The third and fourth output pairs are the master mix outputs—one pair on balanced XLRs and the other on RCA jacks—and are unaffected by PFL/AFL solos, although solo-in-place does affect them, as you'd expect.

The eight subgroups can be assigned individually or as logical pairs (1-2, 5-6, and so on). Any input, including the stereo returns, can be assigned to the stereo mix out and to any of the subgroups, thereby providing convenient one- or two-fader control of several channels. The only way to feed external signals directly to a group without going through a channel slice is a third ADAT Optical port on the rear of the unit (see **Fig. 1**). This port is quite handy, by the way; it can serve either as a set of digital group outs, replacing the eight analog group outs, or as a digital aux output, replacing the four analog aux sends.

You also get stereo digital I/O in both AES/EBU and S/PDIF formats (on XLR and RCA connectors, respectively). These are independent, floating interfaces that can carry the same signal as stereo inputs 1 or 2, the tape returns, any of the four aux outs, or the main outs.

Control ports include MIDI In, Out, and Thru for MIDI Machine Control (MMC); word clock I/O; an RS422 serial port for Sony 9-pin machine control; and a SMPTE time code input. A 15-pin D-sub connector lets you cascade two Digital 328s. The power supply is internal, and the board has a power switch.

All this fits neatly into a reasonably small enclosure. I liked that it took only one person to lift the unit into place (unlike the analog unit it replaced). Clearly, the Digital 328 provides a multitude of configuration options suitable for project studios, post-production facilities, radio stations, and even live applications.

THE E-STRIP

Designing user interfaces for digital mixers is a challenge, and each manufacturer has approached the problem differently. Of the digital mixers I've seen, the 328 may have the most clever approach.

As on other units in this class, the fader bank performs triple duty, controlling input channels 1 to 16; tape returns 17 to 32; or groups 1 to 8, aux sends 1 to 4, and the two internal effects sends. What makes the 328 distinctive is the E-strip, a horizontal row of 16 knobs positioned above the 16 channel faders. These knobs control most of the channel parameters. A ring of green LEDs surrounds each knob; when you select a channel, the LEDs reflect the channel's settings.

Between the E-strip and the fader bank are two rows of oval Select buttons, and each button has a status LED. The top row selects mic/line inputs 1 to 16; the lower row selects channels/tape returns 17 to 32. Select buttons can be activated for any channel, regardless of which fader bank is active. The buttons require a firm touch, so you're unlikely to accidentally activate them.

The E-strip has two distinct modes. In Individual Channel/Return mode, when you press any Select button, the E-strip controls the selected channel's parameters: EQ cut/boost, center frequency, and "Q curve" for each band (with shelf options for the high and low bands); levels for the four aux sends and two internal effects sends; and pan. The E-strip also displays the settings for the two stereo inputs and two Lexicon effects returns.

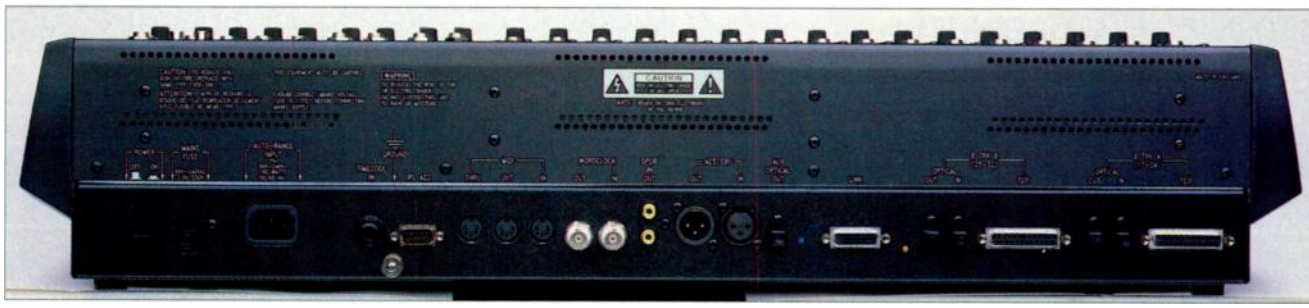

FIG. 1: In addition to flexible analog I/O, the Digital 328 has several digital I/O options, including floating S/PDIF and AES/EBU, two sets of TDIF ports, two sets of ADAT Optical ports, and a separate ADAT Optical aux output. You also get a variety of control ports and a Link port for cascading two consoles.

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In Fader Bank One-Knob-per-Channel mode, the E-strip lets you control the same parameter on 16 channels at once. Above the E-strip knob for channel 9 begins a series of LED-equipped buttons that determine which parameter the E-strip displays. When you press one of these buttons, the E-strip changes to reflect the parameter level for each of the 16 channels in the active fader bank. For example, pressing the FX1 button brings up the 16 effects-send levels for either channels 1 to 16 or 17 to 32, whichever bank is active. The Pan button shows the pans for 16 channels, and so on. The Level button sets the E-strip to control levels for the 16 channels *not* currently under control of the fader bank, giving you 32 channels of level control at a time.

This design takes some getting used to, but it did not take me long to get up to speed. You must keep track of which Select button is active, however, as it's easy to change settings for the wrong channel. Fortunately, a press of the 328's Undo button returns your settings to the state they were in before your erroneous twist of the knob. Using Undo and Redo, you can go back and forth to compare your edit.

Settings such as EQ and level can be copied easily from one channel to another. However, I would like to see the E-strip automatically switch channels when a Solo button is pressed or a fader is manually moved. That would cut down on button pressing.

Although the Individual Channel/Return mode restricts adjustment to one channel at a time, that's how I work with analog consoles—even though all their parameters are available at once. Obviously, if you must have one knob per feature, as with analog boards, the 328 is not your console. But competing digital boards also have multifunction controls, and I suggest you think carefully about how often you really need to tweak several channels at once. It might be less often than you suspect.

Digital 328 Features

Analog Inputs, Mono (mic/line)	(16) XLR/(16) balanced ¼"
Stereo Channel Inputs	(2) channels configured as: (4) balanced ¼" input pr. routed into 8 x 2 submixer and (1) balanced ¼" pr.
Channel Insert Points	(16) ¼" TRS (tip = send, ring = return)
Analog Aux Sends	(4) balanced ¼", post-EQ
Internal Effects Sends/Returns	(2) post-EQ/(2)
Analog Subgroup Outputs	(8) balanced ¼"
Analog Main Outputs	(2) balanced XLR; (2) RCA
Analog Control Room Outputs	(2 pr.) balanced ¼"; (1) ¼" stereo headphone
Digital Channel I/O	(2 pr.) TDIF; (2 pr.) ADAT Optical
Digital Aux Output	(1) ADAT Optical (carries group outs or aux sends)
Digital Main Outputs	(1 pr.) AES/EBU on XLRs; (1 pr.) S/PDIF on RCAs
Additional Ports	MIDI In, Out, Thru; word clock I/O (on BNC); (1) RS422 serial port (for Sony 9-pin machine control); (1) ¼" SMPTE time code In; (1) DB15 Link (cascades multiple 328s)
EQ	(36) 3-band parametric (32 mono channels, 2 stereo channels)
EQ Parameters	cut/boost (±15 dB); center frequency (low, 40–800 Hz; mid, 200 Hz–8 kHz; high, 1–20 kHz); Q curve (low sweep/shelf; mid sweep; high sweep/shelf)
Dynamics Processing	(2) assignable mono/stereo. Can be used as gate, limiter/gate, limiter, compressor, or compressor/gate
Onboard Effects	(2) Lexicon stereo multi-effects processors
Effects Programs (factory/user)	128/128
Faders	(16) 100 mm motorized channel; (1) 100 mm motorized stereo main; 128-step resolution
Display	2-line x 16-character LCD; LED time code display
Automation	100 snapshots; dynamic automation via external MIDI sequencer
Phantom Power	48V (global)
Add-On Modules	analog-tape interface (TDIF to 8 RCA ins/outs); AES/EBU interface (TDIF to 4 XLR ins/outs); mic-preamp interface (TDIF to 8 XLR ins/8 ¼" outs)
Power Supply	internal, with switch

ON DISPLAY

Now that you've grasped the E-strip concept, let's move on to the LCD and cursor keys located above the transport controls and SMPTE display window. The 328's designers wanted to make a board that worked much like an analog console, and they decided that a two-line display was sufficient. When you turn an E-strip knob, the associated parameter values automatically come up on the display, which lets you do precise work by the numbers.

Much of the time, this is fine. However, entering character information such as names for channel instruments, automation snapshots, and user setups is tedious: you have to use a single knob in order to scroll through the entire alphabet/number set, one character at a time. If you want to keep track of where you are and what you're doing, you need to label as many things as you can, but there isn't much room for a scribble strip below the fader bank, although space was left there for that purpose.

According to Spirit, software mixer maps for popular sequencers are on the horizon. These will provide on-screen control of the 328. As of this writing, mixer maps have been released for Emagic *Logic Audio*, Steinberg *Cubase VST*, and Cakewalk *Pro Audio*. (These mixer maps require OS version 1.1.) However, channel, user setup, and snapshot names are internal to the board and will not be available in the mixer maps.

The LCD is the command center for many of the global features. A Menu button to the right of the window pulls

For manufacturer information, please see Contact Sheet, p. 179.

up whatever main item has been selected, including user setups (great for storing often-used tracking or mixing setups), automation settings, digital options for TDIF/ADAT machines, clock rates, SMPTE rates, digital-port assignments, and so on. You can save and load all parameters via MIDI.

LEXIFFECTS

A strong selling point for this unit is the pair of built-in stereo Lexicon effects chips, which appear to be similar to the Lexicon Reflex Plus but with more parameters (up to ten per effect). Most of the Spirit's effects sound quite good with a bit of tweaking, but some of the long delay effects did not respond to the feedback adjustments the way I expected.

It took a while to get used to the method of entering and exiting the effects-selection and editing modes. The process goes like this: You select an effect from the FX Presets menu, where you can also edit and save it as a user preset. Once you exit this mode, however, the next time the effect needs tweaking, you must select the FX Settings menu option, which does not indicate the name of the effect you want to edit. Although the manual lists all the effects in the 328, no descriptions of their characteristics or editing parameters are included.

Nevertheless, having quality effects in the digital domain makes for clean sounds. Besides, if you want to use your favorite analog effects, you have four analog aux sends and stereo inputs (which can be used as returns) at your disposal. The new version 1.1 firmware upgrade implements dynamic MIDI control over the effects parameters, although I didn't get to test this.

DYNAMICS PROCESSING

The board also comes with two assignable mono/stereo dynamics processors. Each can be used as a gate, limiter/gate, limiter, compressor, or compressor/gate. These devices include a sidechain, making this the first digital board I've seen with the potential for digital de-essing. Spirit has chosen not to have dynamics for every channel of the board, a decision I agree with mostly because I haven't heard a digital mixer's compressor that can stand up to a quality analog dynamics processor. However, there's nothing wrong with using these internal processors to limit a stereo mix or a particularly hot vocal, especially when doing live-sound work.

Unfortunately, the dynamics processors performed erratically and did not respond to the adjustments predictably. My de-essing test—sending an identical signal to a sidechain channel and dropping out all the lows while boosting the sibilant frequencies—resulted in no reduction of the sibilance of the processed track, regardless of the threshold setting. In another example, I set the gate for a kick drum and then bypassed it, but it remained attached to that channel. (In fairness, I was testing an early version of the Digital 328, and Spirit was unable to duplicate this problem on current models.)

Accessing and assigning the dynamics processors is also unintuitive. I would like to see an improved interface to both the effects and dynamics processors in a future OS upgrade.

AUTOMATION

The Digital 328 offers snapshot automation, as well as dynamic automation via an external MIDI sequencer. Once you learn to use them, the automation schemes are major time-savers.

Snapshot automation remembers most of the board's audio control settings in a single "picture," which can be recalled at any time. Time code must be running for you to automatically recall snapshots while a mix is progressing. My experience with snapshot automation was good, and once you get the hang of it, it will save you a great deal of time and stress.

As of OS version 1.004, snapshots set less than five seconds apart failed to trigger reliably in my tests. But the beauty of a digital console is that such problems can be addressed in an operating system upgrade, which you can download from the Internet and upload to the board via a special cable connected to the RS422 serial port. *HyperTerminal* for Windows or *XTerm* for the Mac is required for this retro X-modem experience.

In the 328's Timecode Master mode, you can use the transport controls and snapshots to control your MIDI sequencer. For tape mixes, time code must reflect the position of the tape, and the 328 must be set to time code slave or MMC. For tape users, the ultimate scenario is controlling your tape deck from the 328 (including transport and record/record-arm functions) and having the SMPTE counter on the board reflect the current tape position. For the Tascam DA-series MDMs, an MMC interface (or SY-88 sync card for the DA-88) is required. For ADATs, you need a synchronizer that supports ADAT sync (such as a BRC or a JLCooper Datamaster).

TRACKING SESSIONS

Our first tracking session involved recording a live band for an interactive Disney project. I found that mics and line sources cannot be plugged into this board simultaneously—the line input preempts the mic input. Although this is a common scheme on small-format consoles, and it is not a problem for most personal studios, engineers at post-production and hardwired facilities with patch bays might not like the prospect of plugging and unplugging cables on the board in front of clients. I'd prefer a simple mic/line switch.

The insert sends and returns are both pre-EQ. This means that, if you use an insert for analog compression, the compressor will be acting on an unequalized signal, perhaps overcompensating due to excessive low end in a vocal track. Of course, the reason for this scheme is that the EQ is in the digital domain, and digital console manufacturers generally don't want to place extra converters in the signal path. This is one reason some competing digital mixers have internal dynamics processors on each channel. Spirit's approach is to let you use the two onboard digital compressors as insert effects. The other alternative is to route one of the analog aux sends to an external compressor.

▼ I liked the fact that it took only one person to lift the unit into place.

The track-assignment scheme is similar to that of most 8-bus analog consoles. With the Tape Send Direct button engaged, mic/line input channel 1 goes to tape track 17, input channel 2 to track 18, and so on. If you disable the Tape Send Direct button and feed your tracks from the subgroups, group 1's output can go only to tape track 17 and tape track 25 (if you have two MDM decks attached), group 2 goes to tracks 18 and 26, and so on. The only way around this is to use the analog inserts as channel outputs. I'd like to see the ability to assign any input to any of the tape tracks, especially when overdubbing things such as vocals.

Our second tracking session was with acoustic percussion and involved three mics: our beloved AKG "The Tube" and two Manley-Langevin CR3A condenser mics. The AKG has its own power supply and sounded warm, as always. But the Langevins failed to come up at all. An AKG 414 worked fine with the 328's phantom power. After some head scratching, I tested the Langevins out on our Ramsa console, and they worked fine. I turned off the 328's phantom-power switch and used an AKG external phantom supply (which I haven't used in years), and that solved the problem.

Once that was handled, we were treated to the wonderful clarity of the mic preamps. We then sent the signal out the inserts to our compressors and on to the tape tracks. I was surprised at the clarity of the most subtle nuances of the percussion, including the last hint of sound from the bell trees and chimes.

MIDI MIXING

Using the Digital 328 for a MIDI mixing session was fairly straight ahead. Because the line inputs preempt the mics, I didn't need to unplug anything; I just set the trim levels and ran. The internal reverbs worked great on the orchestral pieces I'm composing for an original ballet, and I was able to name each channel and save the entire setup in one of the 26 user setups. It's nice to be able to go instantly from an acoustic session to a MIDI session with the push of a couple of buttons.

According to Spirit, the next OS upgrade (which should be available by the time you read this) will allow you to use the faders as MIDI controllers for your sequencer. Less mousing is a good thing!

THE CONVERSION

Need to take a tricky vocal or instrument part from tape and edit it on a digital audio workstation? Use the 328's flexible digital routing to send the track. Auxes 1 to 4 can be routed to the S/PDIF or AES/EBU outputs, allowing you to transfer pairs of digital audio almost anywhere while you're synched to time code. We used this feature more than once to correct parts without leaving the digital domain.

About the only thing the Digital 328 had trouble with in this regard was our Panasonic CD player. For some reason, the 328 didn't work properly with the CD player's S/PDIF output. According to Spirit, this problem has now been fixed.

AUTOMATED MIXDOWN

I've become pretty good with the snapshot features on this board. You just get things where you like them, roll tape, hit Store, and then edit the snapshot in the window and fine-tune the SMPTE time. Of course, you have to be sure you're on the right snapshot, or you'll overwrite the current one with new data. To avoid such an error, you

can enable the Write Protect feature, in which case you'll be prompted to confirm that you want to overwrite the old snapshot. Stay alert, watch the LCD, and know before you go.

Most mixes can be accomplished with snapshots arranged in a sequence (allowing at least five seconds between snapshots). If you decide to dynamically automate, you still need a snapshot of the starting points before rolling your sequencer. Although this system works, I would like to have enough memory in the board to store a few mixes and then dump the data out via the MIDI port. There's a lot to keep track of: you have to arm the sequencer track, enable Record, recall the first snapshot, roll, save the sequence, change sequence tracks, and so on. If you want to start in the middle of the song, you need a snapshot to get your levels where they should be.

The 328 has four dynamic automation modes: Write, Read, Update, and Remote. Ideally, Update should be the only one you'd need; it is supposed to read incoming automation data and write any moves from the console, thereby effectively eliminating the separate Read and Write modes. However, I had to manually switch the unit into Read mode before Update would operate correctly. Remote has been eliminated in OS version 1.1.

It's nice to have an extra set of hands

SPIRIT BY SOUNDCRAFT
Digital 328 digital mixer
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FEATURES ■■■■■
EASE OF USE ■■■■
AUDIO QUALITY ■■■■■
VALUE ■■■■■
1 2 3 4 5

PROS: Great audio quality. Comes fully loaded. Extremely flexible I/O. User-upgradable operating system. Clever user interface. Compact size.

CONS: Incomplete documentation. User interface for effects and dynamics sections needs improvement. Phantom power too low for some mics. LCD data entry tedious.

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working the board—make that 100 hands! Automation opens up a new world of possibilities, things you would never consider with manual mixing. The best part is the way automation reduces the stress that comes from having to remember a zillion things while mixing. Spirit's automation did a good job. The faders tended to move in small, jerky increments when receiving MIDI dynamic-automation data, but the result was not audible on the finished mix. It's great to be able to repeat the mix on another day. Between the user setups, snapshots, and dynamic automation, the 328 remembers everything except the line-input trims and 100 Hz rolloff switches. It's easy to get used to this way of working.

Spirit's dynamic automation uses MIDI NRPNs and SysEx, which is difficult, if not impossible, to edit in most sequencers. In one mix, I wanted to fine-tune a quick switch between two vocal tracks in the sequencer and was unable to do so. I had to retake the section until I manually got it right. The advantage of using NRPNs and SysEx is that you get 256-step resolution instead of the 128-step resolution you'd get with regular Control Change messages. As mentioned previously, if you have a sequencer for which mixer maps have been written, you won't face this problem.

OPTIONS

Almost everything you need is built into the 328. However, for live environments, you'd be wise to get one or two extra TDIF-to-mic-preamp interfaces (est. $649.95). Each of these full-featured units includes eight UltraMic+ mic preamps, eight meters, tape trims, 48V phantom power, insert points, a 100 Hz highpass filter, and eight group outs, all in a 2U rack-mount package. Each 8-channel interface connects to one of the TDIF ports; with two of them, you can mix 32 live channels. With snapshots and user setups, this makes the 328 a flexible live board.

Other options include an 8-channel AES/EBU interface (est. $399.95) and an 8-channel, analog, line-level I/O board with RCA connectors (est. $399.95). Each option uses one of the 328's TDIF connectors.

ODDITIES

Occasionally the 328 did weird things. For instance, the SMPTE display would not light, and dynamics processor assignments popped up in the strangest places. As with a computer program gone awry, the best solution was to recall the factory defaults (#27 in the user setups). If that failed to do the trick, I rebooted the system (turned the power off and on) and then recalled the factory defaults. That solved most of the problems.

I got around the lack of a talkback mic by using an old dynamic mic plugged into a free channel and manually slating the mixes. This also works for talking with the talent in a multiroom studio.

The Spirit comes with a hard, metal, curved rail along the front. This may seem petty, but for someone who has spent thousands of hours resting on forearms and elbows while working the board, a comfortable arm/wrist pad/lean bar is not a luxury—it's a necessity. Even the lowly TEAC Model 2 had one. Someone should come out with a line of color-coordinated lean bars for this console; I'll be your first customer.

THE VERDICT

Overall, I really liked about 80 percent of what the Spirit 328 offers. Once you get past its limitations, you'll be happy with what you hear, which is crystal clarity and a low noise floor. The 328's analog I/O is fed through 24-bit converters, and the internal processing is 56-bit. Performance isn't perfect, of course; for example, the mutes are not instantaneous but ramp up and down in about a quarter of a second. But the mic preamps have plenty of headroom, and in my experience, the board never distorted. The EQ is smooth and understated. I liked the user interface a lot, and given that the most-requested features and digital interfaces are all included, the price is excellent.

Much of the 20 percent that I didn't like consisted of software-based issues that could eventually be resolved. (In fact, as noted earlier, OS v. 1.1 has just been released and adds lots of new features. See Spirit's Web site for details.) From a hardware standpoint, I would like to see Spirit pack this same functionality into a board that has all connections on the back (except local headphones); a separate studio headphone cue with its own volume adjustment that is impervious to solo modes; mic/line switches; internal memory/storage for dynamic automation; a steeper viewing angle from the E-strip to the rear for easier viewing of the LEDs around the rotary knobs; and a padded lean bar.

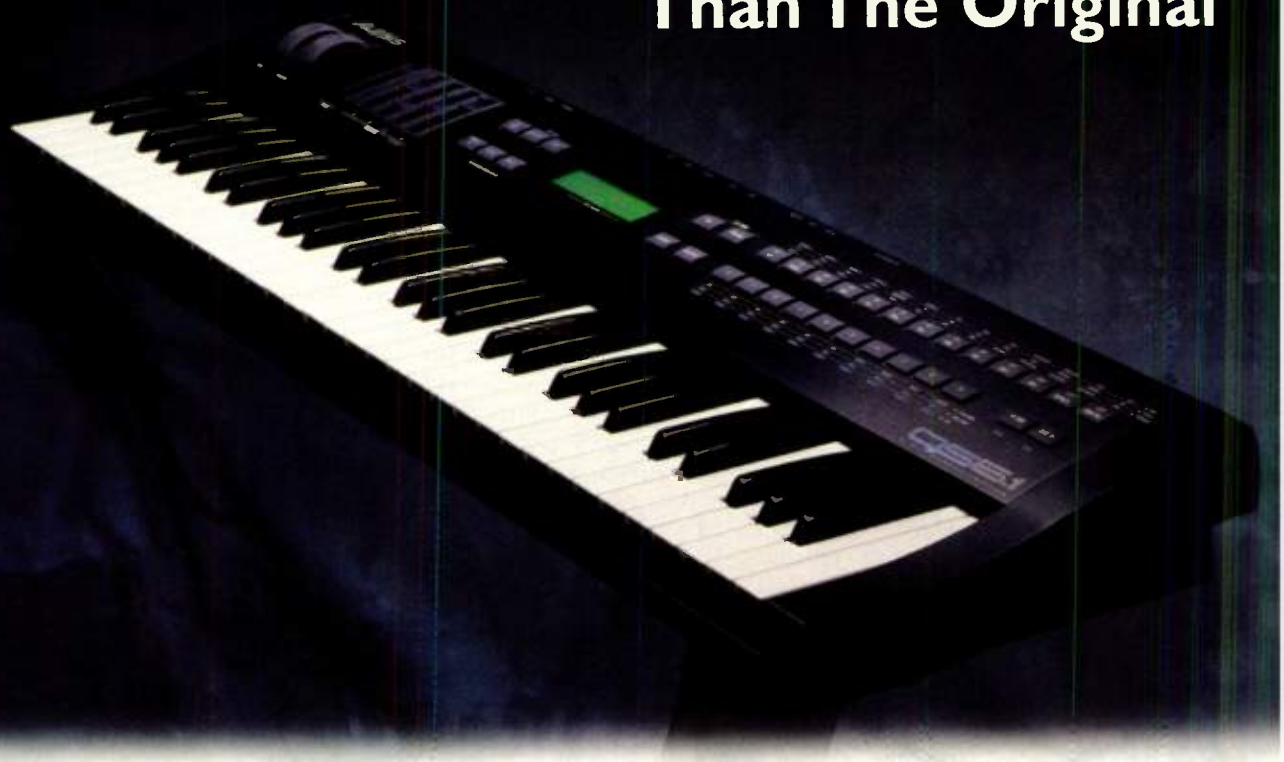
All in all, the British have indeed landed with a winner. The more you use this board, the more you will discover its depth and power. With one of these consoles, you could start a musical revolution of your own.

Digital 328 Specifications

Frequency Response	20 Hz–20 kHz (+0/-0.5 dB @ 4 dB into 600Ω)
Dynamic Range	mic/stereo input to mix output: 119 dB; digital input to mix output: 115 dB
THD	0.005% (mic in to mix out, 1 kHz @ 30 dB gain, +14 dBu output)
Crosstalk Isolation	adjacent channel: >95 dB; pan: >88 dB
Sampling Frequency	internal: 44.1, 48 kHz; external: 40–50 kHz
A-D Converters	24-bit, 128x oversampling (all analog inputs)
D-A Converters	24-bit, 128x oversampling (all analog outputs)
Internal Processing	56 bit
Signal Latency	<2.5 ms (channel input to mix output)
Digital Output Dither	word length 16-, 20-, 24-bit (on/off)
Mic Equivalent Input Noise	-127 dBu (150Ω source)
Residual Output Noise	-90 dBu (mix output with faders down)
Dimensions	5.5" (H) x 28" (W) x 21" (D)
Weight	31 lbs.

Randy Tobin *is a composer, musician, producer, engineer, author, graphic designer, and owner of Theta Sound Studio in Burbank, California.*

Finally, A Sequel That's Actually Better Than The Original



The QS6.1's four real-time control sliders are assignable to any mod destination, including envelopes, LFOs and even multieffects.

With two expansion ports, the QS6.1 can access another 16MB of sounds for a total of 32 meg available at once. Use our QCard™ expansions in your musical style of choice, or burn your own samples to a Flash RAM card using the included Sound Bridge™ software.

It doesn't usually happen this way. Sequels are supposed to be boring and derivative. But the new QS6.1™ takes the powerful 64 voice synth engine of the original QS6 and supercharges it with double the sound memory, double the expansion capacity, new performance features and much more. So how is it that the QS6.1 got a whole lot better than the keyboard it replaced while actually costing less? The answer is that this sequel is from Alesis – the company that always delivers more than you expect.

QS6.1™

64 VOICE EXPANDABLE SYNTHESIZER

QS6.1 New Features

- Double the sound ROM of the QS6 (16MB internal)
- Now includes Alesis' stereo grand piano sounds from the QS8
- Enhanced GM sound set
- Double the expansion capacity (up to 32MB total)
- Four control sliders
- Big new LCD display
- New dedicated buttons for Transpose and Sequence Select
- CD-ROM software pack with sequencing, editing, extra sounds, demo programs and more
- Internal power supply
- High speed serial port

circle #566 on reader service card

Alesis Corporation
1633 26th Street Santa Monica CA 90404 800-5-ALESIS alecorp@alesis1.usa.com www.alesis.com

For more information on the new QS6.1, contact your Authorized Alesis Retailer or visit our web site.

ALESIS

Alesis synthesizers

NEMESYS

GIGASAMPLER (WIN)

Turn your PC into a sampling Goliath.

By Allan Metts

Several years ago, I witnessed a demo of Digidesign's SampleCell system. "What a cool concept," I thought. Turn the computer into a sampler, and you no longer have to deal with tiny editing displays and cryptic commands.

Well, these days computer-based samplers are no big deal. Even the consumer-grade sound cards are doing it. But until now, anyone who played with sampling technology had to confront one immutable law: if you want to load a bunch of high-quality samples, you have to buy a lot of memory for your system. Even so, most sound cards can't access more than 32 MB of RAM, and the latest hardware samplers typically max out at around 256 MB.

Wouldn't it be nice if you could play samples directly from your hard drive? Wouldn't you love to incorporate sample after sample in your instrument program, without having to go through the pain and agony of creating memory-saving sample loops? Well, thanks to *GigaSampler* from NemeSys Music Technology, now you can.

THE FIRST GIG

I tested the *GigaSampler* system on a 266 MHz Pentium II with 128 MB of RAM. Installation is easy, although you have to contact NemeSys for a registration number. You can use the software for several days without registering, however, so it shouldn't be too much of an inconvenience.

GigaSampler supports any Microsoft DirectSound-compatible sound card, as well as "Giga-compatible" ones. As of this writing, only two cards are certified as Giga-compatible. (More are on the way.) One such card is the Aark 20/20 from Aardvark. This PCI card and breakout box provides ten channels of audio outputs, which allows *GigaSampler* to send many different audio signals to your favorite mixer.

Fire up *GigaSampler,* and you'll find that the opening screen resembles a rack of hardware gear (see **Fig. 1**). The hardware look is attractive, but I always get nervous when I see software that deviates from the Windows user-interface standards. Fortunately, the program is easy and intuitive to use.

The hardwarelike display has three components. At the top, the Console controls the Instruments that appear on each MIDI channel. (In Giga-speak, an Instrument is equivalent to a program or patch in other samplers; for example, an Instrument contains samples and the settings that control them.) The Console is also the closest thing the program has to a main menu. Beneath the Console, the Loader makes Instruments available for loading into the Console. At the bottom, the Mixer presents a fader and MIDI Velocity meter for each MIDI channel.

The Console is simple to use. Dedicated buttons show or hide the Loader and Mixer components, and three additional buttons launch your favorite Sequencer, Wave Editor, and Patch Editor. Other buttons provide access to online help, as well as Instrument and system configuration areas (described shortly).

GIGA CONFIG

Before you start sampling, you must hit the Config button on the Console. This brings up a multipage dialog, which allows you to choose your MIDI input and audio output routings. *GigaSampler* can play 16 different Instruments at once (one for each MIDI channel), each of which is routable to a pair of audio outputs.

You'll also use the configuration dialog to access *GigaSampler*'s automatic system profiling, in case your system performance isn't what it ought to be. *GigaSampler*'s polyphony depends on your system (I had 64 voices available on mine). If you need to free up computing resources, you can reduce maximum polyphony in the configuration dialog. You can also control how many voices get "stolen" when you exceed the maximum.

Beneath the Console's button panel, a status display lets you see whether *GigaSampler* is receiving MIDI information and lets you determine which audio outputs are enabled. You can view or choose the current Performance (described later) and see how much memory you have left.

But wait a second. Memory wasn't supposed to be an issue, right? So what about those gigabyte-sized piano sounds? Well, memory isn't an issue in the traditional sampler sense. Samples are stored on disk, and they can be as big as your hard drive can handle. There is, however, a memory constraint that is based on the number of samples you have loaded. In practice, the memory

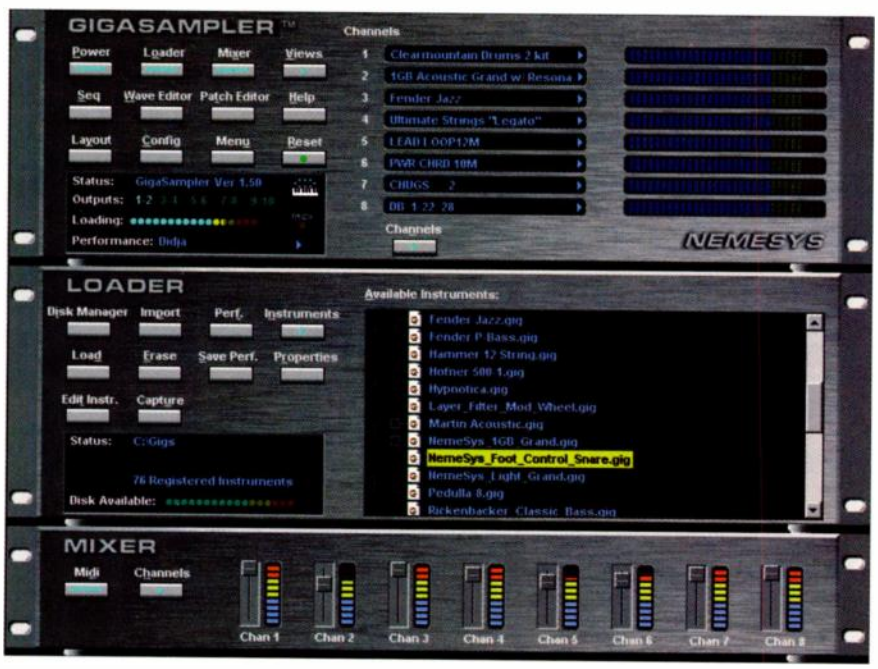


FIG. 1: *GigaSampler* uses a hardwarelike display with three components. The Console is used the most. The Loader and Mixer can be hidden if necessary.

limit wasn't an issue on a machine with 128 MB of RAM. Often, I could put different Instruments into all 16 MIDI channels without exceeding the limit. It was only when the distributor sent me a Bösendorfer piano CD that I started running into trouble. The Instrument contained almost 1,000 samples, which used about two-thirds of my available memory.

Back to the Console. To the right of the button panel, fields show which Instrument is playing on which MIDI channel. You can choose between two views of this information: one shows eight channels at a time with MIDI Velocity meters for each channel; the other shows all 16 channels simultaneously, without the meters.

LOAD 'N' GO

To put Instruments into the MIDI channel slots, you use the Loader, which shows you all of your available *GigaSampler* Instruments and provides you with the tools to manage them. When you're ready to use a particular Instrument, just select it in the Loader and hit the Load button. (You can also right-click it and select Load from the context-sensitive menu.) When you do this, *GigaSampler* puts the Instrument into the next unused MIDI channel on the Console.

The Mixer is simple, yet functional. Each MIDI channel gets a corresponding fader, which allows you to set a level for each channel. Unfortunately, there are no pan controls or automation, although the faders do respond to MIDI Volume messages from an outside source. (You can control Pan that way, too.) Eight faders are visible at a time, and each has a meter next to it that indicates only the fader position. I'd prefer eliminating the meters to free up screen space so that you could see all 16 faders at once.

An Instrument doesn't have to appear on a MIDI channel to be loaded into *GigaSampler*. If you have enough memory available, you can load more than 16 instruments at once. Each loaded Instrument appears in a context-sensitive menu when you click a MIDI channel field on the Console, which makes it quite easy to change the Instrument that's assigned to a particular channel.

What's more, you can change Instruments via MIDI by sending Program Change or bank select messages to *GigaSampler*. The program and bank number are built into the Instrument itself (changing it requires opening it in the Instrument Editor and saving it to disk), but *GigaSampler* is quite good at handling collisions between identical program numbers. If a given bank/Program Change combination is unavailable when you load the Instrument, *GigaSampler* will assign it a new one. A click of the Console's Layout button shows you all the loaded Instruments and tells you which bank and program numbers to use when you want to call one up.

One particularly nice item, which you don't get in a hardware sampler, is *GigaSampler*'s More Info feature. Anywhere you see an Instrument, you can right-click it and select More Info from the context-sensitive menu. When you do this, a Windows Help file opens with plenty of information about that particular Instrument (if the Instrument's creator provided such a file).

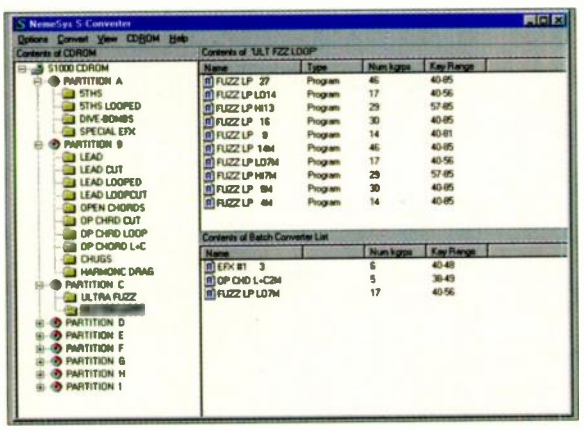


FIG. 2: *S-Converter* can read Akai S1000 and S3000 CD-ROMs directly. You can use this application to convert Akai programs to *GigaSampler* Instruments.

Most of the *GigaSampler* Instruments that I worked with had really nice More Info files. They typically contained a graphic or logo, the manufacturer's contact information, credits, copyright and license information, some background on the sampled instrument, and information on how it was sampled. But the most valuable components of More Info files are the performance notes. *GigaSampler*'s claim to fame is an ability to access bunches and bunches of samples. A good *GigaSampler* Instrument will make heavy use of MIDI continuous controllers and other expressive elements. So those who don't check out the performance notes may hear only a small portion of what an Instrument can do.

Once you have everything the way you want it, you can save it as a Performance. A *GigaSampler* Performance consists of all loaded Instruments and their MIDI channel mappings. If you like, you can also store the Mixer and *GigaSampler* configuration settings in a Performance.

FROM THE OUTSIDE IN

Before a *GigaSampler* Instrument is shown as available in the Loader, you must import it. The import process allows the Loader to keep track of which Instruments are available and where they can be found. The *GigaSampler* import process also supports the entry of registration codes, so suppliers of third-party Instruments can be sure their work is properly licensed.

Importing is easy: just press the Import button and follow the steps of the Import Instrument Wizard. The Loader provides all the tools you need to manage the available Instruments on your system. You can search for them, delete them, open their Help files, open them in the Instrument Editor, and view them in multiple ways. Performances also appear in the Loader, with many of the same options. I particularly liked being able to see the Instruments in a Performance without having to load it.

It's no surprise that *GigaSampler* imports files in *GigaSampler* format, but those of you with large collections of Akai samples are in for a treat. This package includes a separate application, called *S-Converter,* which can convert programs from Akai S1000 or S3000 CD-ROMs. The nicest thing about *S-Converter* is its ability to read Akai-formatted CDs directly, using any ATAPI CD-ROM drive. (These are quite common in today's systems.)

Even though *S-Converter* is a standalone program, you can launch it from the *GigaSampler* Loader as part of the import process. When you do this, the converted programs automatically appear in the Loader as available Instruments.

When you launch *S-Converter*, you see a display that's quite similar to Windows Explorer (see **Fig. 2**). The program displays Akai's hierarchy of Partitions, Volumes, and Programs, and makes it easy to select the Programs you want to convert. You can convert Akai programs to *GigaSampler* format, or you can extract the samples as WAV files.

If you select multiple Akai programs, you can use the Combine to Gig feature to analyze the selected programs. If the programs contain no overlapping MIDI Velocities, then *S-Converter* will create one *GigaSampler* Instrument, with each Akai program mapped as a Velocity split. If the Velocities do overlap, you'll get an Instrument that lets you use Mod Wheel messages to switch between the sounds.

S-Converter also has a batch conversion feature, which lets you add several Akai programs to the batch list and convert them to *GigaSampler* format or WAV files all at once. *S-Converter* gives you all the tools you'll need to manage your batch list.

YOUR OWN GIG

Before you can build a *GigaSampler* Instrument, you need samples—WAV files, to be specific. *GigaSampler* comes with dissidents' *Sample Wrench XE* audio editor. (For a description of *Sample Wrench*, see **EM**'s review in the October 1997 issue.) *XE* is a stripped-down version of the full-blown *Sample Wrench*. It provides fewer functions and effects and allows only one edit window to be open at a time.

If you already have a favorite audio editor, *GigaSampler* will support that, as well. You can specify the file path to the editor of your choice in the Instrument Editor and the Console. Once you've done that, any requests to edit audio in *GigaSampler* will cause the chosen editor to come up with the file. Recording, matching, and looping the many samples required for a complex instrument takes plenty of time. Although *GigaSampler* can't speed this process up, the disk-based technology should eliminate much of the looping you'd need to do.

Most of the *GigaSampler* files I saw contained only one Instrument, although the format is capable of storing many Instruments in one file. (You switch between them using bank select and Program Change messages.) Generally speaking, you should put Instruments that share a common set of samples into one file. Or you can group your favorite Instruments in one place.

You build Instruments in the *GigaSampler* Instrument Editor (see **Fig. 3**). Almost everything takes place in one multipaned window, which has sections for Instruments, Samples, Regions, Velocity Splits, and Dimensions (described shortly). The Instruments pane shows all the Instruments in the current file, organized by bank. Context-sensitive (or right-click) menus are available to create, destroy, cut, copy, and paste Instruments to your heart's content. You can also call up a property sheet to specify some of the global parameters (such as name and program number).

Before you can go any further, however, you must bring in some samples. Click the Samples pane, and you can bring in individual WAV files or an entire directory. The Samples pane is organized into groups, which can be created, deleted, and named. And as you'll see shortly, sample groups are more than just an organizing tool. They keep you from having to repeat tedious mapping operations for each sample.

From the Samples pane, you can call up your audio editor or export a sample back out to a WAV file. Each sample has an associated properties sheet, where you can specify its name, unity note, loop points, and fine-tuning. One particularly nice feature is the program's ability to deal with WAV files that have no unity note specified. If you like, *GigaSampler* can take a guess at the unity note by looking at the file name. This feature worked well and saved me lots of time. If a unity note does exist in the WAV file, *GigaSampler* can offset the note number by any amount. Anyone who has ever dealt with samplers that have differing interpretations of middle C will appreciate this feature.

THE FIFTH DIMENSION

Here's where the fun starts. For a given instrument, samples are dropped onto a portion of a Velocity Map. The Velocity Map that you see depends on the Regions and Dimensions that are selected. A Region represents a key range; however, because a sample can be assigned to multiple Regions, you'll probably want to create a Region for each note that plays a sample.

The Velocity Map allows you to set up Velocity splits within a Region. So if you have four samples of a note (for example, pianissimo, piano, forte, and fortissimo), you can assign each sample to a range of nonoverlapping Velocities for that note.

Dimensions can add another aspect to this scheme. Let's say you have four concert grand piano samples of a note, and four honky-tonk piano samples of the same note (each piano sampled at four different Velocities). By adding a Dimension that is based on the position of the Mod Wheel, you can instruct

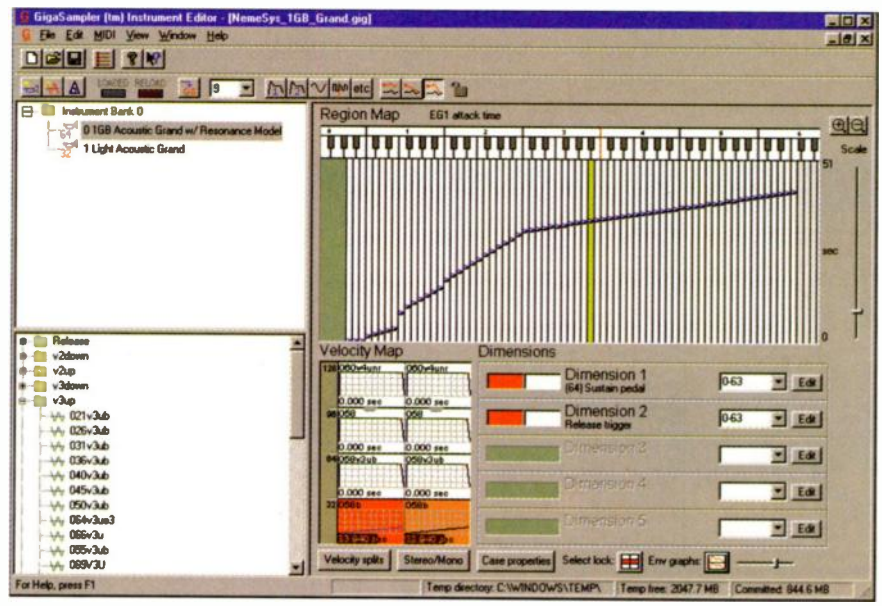


FIG. 3: The *GigaSampler* Instrument Editor provides all the necessary tools for creating your own *GigaSampler* Instruments.

GigaSampler
Minimum System Requirements
Pentium 166 MMX PC (Pentium II recommended); 32 MB RAM (128 MB recommended); Windows 95 or 98; CD-ROM drive; GigaSampler-compatible or Microsoft DirectSound sound card

GigaSampler to play from the concert grand set of samples when the Mod Wheel value is between 0 and 63, and then play from the honky-tonk set when the Mod Wheel is past the halfway point. Now you can change pianos in the middle of a solo.

You don't have to stop there, either. Create another set of samples for both pianos at four Velocities with the sustain pedal held down. Create another Dimension based on the position of the sustain pedal. Now you have realistic Velocity and sustain response for two pianos (16 samples total), and all are under one key. Do this for all 88 keys, and you're playing a lot of samples.

You can assign up to 16 stereo or 32 mono samples to one Region, and the assignments can be made in any manner you choose. For example, you can choose multiple Velocity splits with no Dimensions, or you can have many Dimensions with only a few Velocity splits. Dimensions needn't be based on MIDI Continuous Controllers. One Dimension setting is for layering samples and one is for triggering samples when the key is released. You can even set up a range of keys to use as a Dimension "switch," which lets you hold down, say, a low A with your left hand and play a trumpet with your right. When your left hand changes to a low C, your right hand immediately starts playing a wailing sax.

SAMPLE OVERLOAD

GigaSampler's sample-mapping capabilities are quite powerful, but a complex Instrument can easily contain several hundred samples. Mapping all these samples properly would be quite a chore if you had to do each of them individually.

Fortunately, you don't. *GigaSampler* includes an Instrument Wizard, which walks you through the mapping process and automates several tasks. The Wizard automatically creates Regions

over a range of notes (you provide the range), and then asks you for the Dimensions and Velocity Splits you wish to use. You can name each Dimension position for clarity (for example, Low Mod Wheel or High Mod Wheel).

Once that's done, the Instrument Wizard asks you to provide a Sample Group for each combination of possibilities. Returning to our earlier example, you would put all the pianissimo, concert grand, and sustain pedal up samples into one sample group (and create similar groups for the other 15 possibilities). Using the unity note for each sample, the Wizard automatically handles the sample mappings for all the Regions it created.

Sound designers know that you don't necessarily have a usable Instrument once you've mapped the samples. Like most samplers, *GigaSampler* provides envelope generators, filters, and other tools to help you achieve just the right sound.

GigaSampler has five-stage envelopes for amplitude and the resonant filter, and an attack time/depth envelope to modify pitch. You can also modify pitch (but not amplitude or filter cutoff) with an LFO. The filter can operate in lowpass, highpass, or bandpass mode, and can be modulated by a MIDI controller and by keyboard region. Keyboard Velocity can map to both the filter and to amplitude, with varying response curves for each.

Modifying all these settings for the hundreds of Region-Velocity-Dimension possibilities would be quite a chore if you had to call them up individually. Fortunately, *GigaSampler* lets you multiselect any combination of these possibilities and edit them all at once. The program will even overlay envelope-generator diagrams on top of the Velocity map, so you can see how your changes affect the envelopes for each Velocity split.

Each Region has a little blue ball inside of it, which represents the current value of one of these settings. When you select a parameter from the toolbar, it's easy to see how this parameter changes across the keyboard. Changing the value is as simple as moving the blue ball—or you can choose from several tools that move all the balls simultaneously. This is a very intuitive way to edit settings, such as filter cutoff, that typically change from note to note.

WAIT, THERE'S MORE

GigaSampler comes with a couple of extras to help out in your recording environment. For starters, there's an audio capture utility that can make a stereo recording of whatever the *GigaSampler* is playing. The capture utility can write 16- or 24-bit WAV files and can delay recording until it receives a MIDI start message. In addition, it's easy to use *GigaSampler* on the same machine as your sequencer, thanks to the inclusion of a virtual MIDI port driver. (Just choose the *GigaSampler* MIDI port in your sequencer.)

NemeSys provides several Instruments to get you started, including a piano with hundreds of samples. You also get excerpts from several popular third-party libraries (all of which are becoming available in the *GigaSampler* format). Oddly enough, my least favorite Instruments were the pianos. (I also tried a piano disc from a third-party distributor, in addition to the one that comes with the product.) Technical superiority aside, I preferred the 8 MB piano on an Alesis QCard to the *GigaSampler* pianos that occupied hundreds of megabytes. When I played the *GigaSampler* pianos, I was very aware that the sound was coming from a set of speakers. Furthermore, they were a bit too dark for my tastes. Your mileage may vary.

NEMESYS
GigaSampler software sampler
$795
GigaSampler LE software sampler
$199

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

PROS: Capacity for large numbers of mapped samples. Disk-based samples minimize need for sample loops. Instrument editor is well designed to eliminate tedium.
CONS: No effects. Missing some minor sampler capabilities. A little pricey if you don't already have a PC.
CIRCLE #438 ON READER SERVICE CARD

I'd like to offer some insights on *GigaSampler*'s sound quality, but such an evaluation would undoubtedly be subject to the sound quality of the samples and sound cards that were used. Suffice it to say that everything sounded fine to me. I heard no clicks or pops, I had no trouble with latency, and I found the program to be quite usable in practice.

The product's documentation is excellent and includes printed manuals and online help. (There are even some video tutorials.) Some of the help isn't context sensitive, but I had no trouble finding information when I needed it.

With all this capability, is there anything that *GigaSampler* can't do? When compared with a hardware sampler, not much is missing. However, you don't get effects, and I did notice the absence of a couple of minor sampler capabilities. For example, you can't assign samples to mutually exclusive groups, an ability that is handy to have for working with hi-hat sounds.

Samples can be as big as your hard drive will handle.

Is *GigaSampler* worth the $795 price tag? If you have a capable computer, this is an incredible sampler for the money. (NemeSys also offers an upgradable, reduced-feature version of the program, *GigaSampler LE*, for $199. This version offers only 2-channel output and 48-note polyphony and lacks *S-Converter; GigaPiano*, which is a piano disc consisting of three samples with the sustain pedal down, three with it up, and additional "resonance" samples that trigger on key release; and *Sample Wrench*.) If you have to buy a computer to use *GigaSampler*, then you're getting into the price range of a good hardware sampler. Even so, this product does things a hardware sampler can't do. You'll definitely appreciate it if you already have a large library of audio material. Whatever the case, NemeSys has a real winner on its hands with *GigaSampler*.

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

YAMAHA

EX5

This could be Yamaha's most powerful synth yet.

By Geary Yelton

We've been hearing a lot of buzz on the street about the long-anticipated Yamaha EX5. This is understandable: its smaller sibling, the EX7, is an impressive workstation, and on paper the EX5 looks like it's one of the coolest synths ever designed. We decided to find out how it *really* stacks up.

Competing head-to-head with instruments such as the Kurzweil K2500 and Korg Trinity, the Yamaha EX5 is a full-fledged synthesizer workstation, featuring four types of sound generation, 128-note polyphony, 512 Voices, three sequencers (a 16-track song sequencer, 8-track pattern sequencer, and 4-track arpeggiator), very respectable effects processing, and a sampler. Sampling memory can be expanded to 65 MB, and by adding flash RAM, you can recall your samples instantly at the touch of a button. A Performance-resampling feature even allows the EX5 to sample its own output.

The EX5 provides a wealth of control features, including 76 unweighted keys, two modulation wheels, a pitch-bend wheel, a ribbon controller, and six assignable controller knobs, which can be configured in a variety of ways. Transposition switches extend the keyboard's range, and a large backlit LCD displays information graphically and alphanumerically. All told, there are 78 dedicated buttons on the front panel that allow quick access to most parameters.

Rounding out the package are several expansion options, including a SCSI interface ($249.95); a 4-channel, analog, assignable output board ($149.95); and an AES/EBU digital I/O card ($199.95). The EX5 also comes in a rack version, the EX5R ($2,195).

So is this workstation all that it was promised to be? Let's find out.

MAKING NOISE

The first thing you may notice about the Yamaha EX5 is that it sounds great. The variety of high-quality sounds is amazing, ranging from punchy basses and searing leads to velvety, transparent pads. Massive oscillator stacking provides analog-type timbres that are thicker than you've ever heard from an analog synthesizer. A wealth of flexible real-time controllers adds to the realism of acoustic tones created by various digital synthesis techniques.

The EX5 incorporates what Yamaha calls EXtended Synthesis, which produces sounds using four methods of synthesis. In addition to Yamaha's second-generation Advanced Wave Memory (AWM2) sample playback, the EX5 offers three types of totally DSP-based synthesis. The first is VAS synthesis (Virtual Acoustic Synthesis), which Yamaha first introduced in the VL1. Used primarily for modeling wind and stringed instruments, VAS employs physical modeling to simulate the drivers, resonances, reflections, and other physical elements that make up an acoustic tone. The second type of DSP-based synthesis is AN synthesis, which physically models analog synthesizers. The third type, FDSP (Formulated Digital Sound Processing), is a new and hybrid technology that begins with a sampled waveform and processes each note individually, using specialized effects algorithms (more in a moment).

The EX5 has two banks of programs in ROM (Preset 1 and Preset 2), and two user-programmable banks (Internal 1 and Internal 2). Each bank contains 128 programs, which Yamaha calls Voices, and each Voice can contain up to four Elements. (An Element is a Voice path with four stages: oscillator, pitch, filter, and amplitude.) There are also 128 Performances, each of which contains up to 16 individual Voices configured in splits and layers. The EX5 ships with just 64 Performances, which are repeated in Presets 65 through 128. This allows you to save your own variations without disturbing the factory presets.

An Element may use any of the four synthesis types. Because processing power is limited, though, DSP-based synthesis can generate only one Element in a Voice; if you want more Elements, they must be AWM based. Furthermore, VAS and AN synthesis have severely restricted polyphony: a VL Voice is strictly monophonic, and AN Voices are confined to two notes at a time. Two AN Voices can be layered into a single Voice, and AN sounds may be layered with AWM or FDSP sounds. VL sounds may also be layered with AWM sounds.

The AWM oscillators let you choose from 419 waves in ROM, most of them

An impressive keyboard workstation, Yamaha's EX5 offers four types of sound generation, 128-note polyphony, great-sounding DSP, and an intuitive interface.

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2. All songs submitted must be original.
3. **Contestants may enter as many songs in as many categories as desired but each entry requires a separate cassette, entry form, lyric sheet and entry fee.** One check for multiple entries/categories is permitted. Entry fee is non-refundable.
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multisampled across a wide range of pitches. These waves are constructed from 1,484 individual samples and are the basis of both AWM and FDSP synthesis. For VL synthesis, there is a list of 272 waves, but only 256 of these have been preprogrammed, which leaves 16 locations for storing waves that you create on a computer-based VL editor. For AN synthesis, each Voice has two oscillators that offer sawtooth and pulse waveforms. You can create other analog-type waveforms by synchronizing and frequency-modulating these two basic waves.

Voices, Performances, and AWM waves are divided into 22 named categories (for example, Brass, Ethnic, Sequence, and Material). A useful Category button allows you to scroll through similar Voices; for example, to find the bass part you want, start with any bass preset and scroll through other basses by pressing the Category button.

Any Voice can be designated as a drum Voice. Drum Voices are essentially a drum kit, a collection of samples of fixed pitch with a different sample assigned to each key. These samples can be ROM-based AWM waves or they can be your own, and up to 128 Elements can be assigned to the same key. The EX5 ships with nine designated drum Voices, but you can create as many as you like.

Yamaha offers several expansion options for the EX5. Shown here are the SCSI interface card and 4-channel analog-output board.

The EX5 can store 32 alternate tunings that can be saved as part of a Voice. For example, when you create an Indian instrument Voice, you can specify that it always play an Indian scale on the white keys. In addition to equal temperament, other tunings include pure major and minor, Werkmeister, quarter tone, and eighth tone.

Although all the presets sound great, the balance of types of instrument Voices is a little lopsided. For example, there are a plethora of acoustic pianos, electric pianos, and electric organs. You'll also be amazed by the large number of new and interesting electronic sounds and sound effects. And there are lots of electric and acoustic guitars as well as electric and synth basses. However, aside from the saxophones and a couple of flutes, there's a shortage of woodwinds. Likewise, although the strings are all good, they're in short supply, and there are no solo stringed instruments at all.

EX5 Features

SYNTH/CONTROLLER	
Keyboard	76-key, unweighted, Velocity- and Pressure-sensitive
Left-Hand Controllers	(1) pitch-bend, (2) mod wheels
Other Controllers	(6) assignable knobs, ribbon controller, breath controller
Synthesis Types	AWM, VAS (VL), AN, FDSP
Sampling rate/Resolution	44.1 kHz/16-bit linear
Polyphony	128 notes
Multitimbral Parts	16
Preset Sounds	256 (4 Elements per sound)
User RAM Locations	256 (4 Elements per sound)
User Waveform RAM	1 MB DRAM, expandable to 72 MB with 64 MB SIMM card
Drum Kits	9
SEQUENCER	
Sequencer Types	16-track song, 8-track pattern, 4-track arpeggiator
Sequencer Storage Capacity	30,000 notes
Sequencer Resolution	480 ppqn
EFFECTS	
Effects Processors	(1) global reverb, (1) global chorus, (2) insertion effects
Number of Reverb/Chorus Effects	12/17
Number of Insert Effects per Processor	79/24

GENESIS OF A SYNTHESIS

Because FDSP synthesis is new, let's take a closer look at it. FDSP is a way of processing sampled sounds polyphonically in real time. Processing is applied to each note independently, depending on its note number and Velocity. Have you ever heard a guitar with a separate pickup on each string fed through several individual fuzz boxes? Beyond that analogy, you'll just have to hear it for yourself.

There are ten FDSP algorithms, some of which simulate physical modeling, such as EP (electric piano) Pickup and EG (electric guitar) Pickup. Others, such as Flange, Phaser, and Ring Modulator, are best described as polyphonic effects processing. Pulse-width modulation is simulated by modulating the delayed phase of the mathematical difference between the original tone and a phase-shifted sawtooth wave. The result is a lot like comb filtering, with separate envelopes and LFOs for each note. Tornado and Seismic take a stab, I suppose, at the aural equivalent of geophysical events; they aren't always pretty, but they're good ways to get someone's attention. Self FM is an algorithm that enriches harmonic content by distorting the phase of the original with a feedback loop.

My favorite FDSP type is the soothing and ethereal Water, which applies a resonant sample-and-hold filtering effect to the input signal. I can imagine Water

For manufacturer information, please see Contact Sheet, p. 179.

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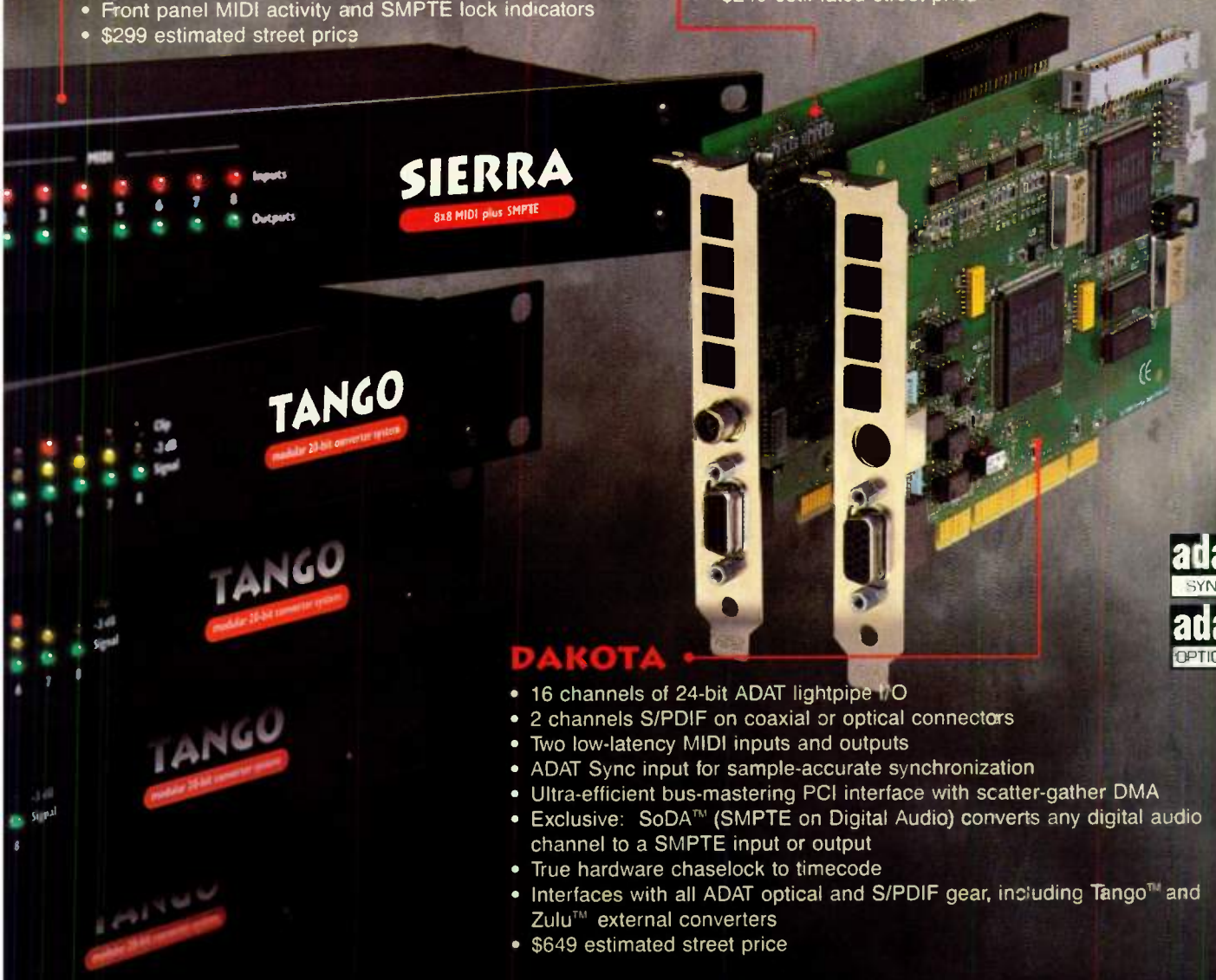

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catching on and someday becoming a sound associated with the turn of the millennium, much like the DX Rhodes sound is associated with the mid-1980s. I had some great fun sampling my voice and processing it with Water.

SAMPLING

The EX5 has two ¼-inch TRS audio-input jacks on the rear panel for sampling, and an input-trim knob on the front panel. Sampling memory is displayed in words rather than bits, and because its format is 16-bit linear, the number appearing in the display is half the number of bits available. User samples are saved as AWM waves and can be used in AWM, FDSP, and drum Voices. The fixed sampling rate is 44.1 kHz; however, the EX5 will load samples (from floppy disk or SCSI) recorded at other rates.

Sampled sounds can be displayed graphically for editing purposes, and a separate loop-tuning window appears beside the full waveform display. However, there's no autolooping function; when you move the loop points, you have to retrigger the sample to hear any changes you make. Other editing features include gain normalize and the standard cut, copy, and paste. Samples can be extracted from longer samples, which is useful if you're trying to pull single beats out of a drum pattern.

Loading from floppy disk is slow, as expected. But accessing hard disks via the optional SCSI interface is also slow—painfully so. It takes more than 20 seconds to save a megabyte and more than 30 seconds to load a megabyte from a hard disk. Larger file transfers don't speed things up, but transferring from a sample-editing program on your computer via SMDI is a little faster. Unfortunately, this problem is a hardware shortcoming and can't be fixed with an operating system update.

One partial solution is to add Yamaha's rather expensive, optional 8 MB flash-memory board ($399.95), which lets you save your samples to nonvolatile flash RAM for quick recall. A company called Vital Technology makes two flash RAM kits that are more reasonably priced: the 8 MB EXF-1 ($179) and the 16 MB EXF-2 ($319). Flash memory, however, is no substitute for a hard drive or dynamic RAM; it is more useful as a complement to them. For one thing, 16 MB of flash RAM hardly replaces, say, a 4 GB hard drive. Furthermore, you can't just delete one sample from flash RAM without affecting the others; you have to clear the entire memory bank and reload from scratch.

Like Yamaha's A3000 sampler, the EX5 can import Akai S1000 samples and can load WAV and AIFF files saved on a DOS-formatted disk. Its sample format, however, is completely incompatible with the format for the A3000. The programming structure for A3000 sounds is quite different, so some incompatibility is understandable, but I wish the EX5 could at least read raw A3000 samples. According to Yamaha, the best way to transfer sounds from the A3000 is to export them as AIFF files.

One of the best features of the EX5 is

EX5 Specifications

Display	64 x 240 backlit LCD
Analog I/O	(2) ¼" TRS inputs, (2) ¼" TRS outputs, (4) assignable outs (optional)
Digital I/O	AES/EBU (optional)
Headphone Outputs	(1) ¼" TRS
Additional Ports	(2) MIDI In, (2) Out, (1) Thru; (1) ¼" assignable footswitch; (1) ¼" assignable sustain; (1) ¼" assignable foot controller
Storage	1.4 MB, 3.5" floppy drive
Options	4-channel analog output board, AES/EBU digital I/O card, SCSI interface, flash memory boards, SIMM cards
Dimensions	49" (W) x 5" (H) x 16" (D)
Weight	44 lbs.

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Jeff Obee in EM
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Electronic Musician 1999 EDITORS CHOICE

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resampling, which lets you sample the EX5's output without ever leaving the digital domain. Just choose "Internal" as the recording source, and you can sample single notes, chords, patterns, live performances, and, in fact, any sound the EX5 produces.

Resampling also helps to increase DSP resources. How? Consider that VL and AN Voices are limited to one or two notes at a time. By sampling them and turning them into AWM Voices, they become fully polyphonic. It's true that you relinquish considerable control in exchange for greater polyphony, but sometimes the trade-off is well worth it. You can also record sounds with effects, bypassing the DSP limitations on the number of insertion effects in a Performance; all 16 Voices in a Performance can have effects if they're sampled with the effects turned on.

SEQUENCERS

The 30,000-note sequencer holds one 16-track song at a time, which is no problem, because the Direct Play function lets you play a series of type 0 Standard MIDI Files directly from floppy disk, with no delays between songs. In addition to SMFs, the sequencer recognizes songs in ESEQ format, which is native to Yamaha's SY99 keyboard workstation.

The pattern sequencer lets you record as many as 50 8-track patterns, each of which can be up to 16 measures long. Keymap mode allows you to assign patterns to single keys for one-finger playback. Patterns can also be inserted into the song sequencer's pattern track, allowing you to construct a song from pattern sequences.

You can record to either sequencer in real time or step time and insert tempo and meter changes in the middle of a track. Happily, the sequencer's resolution is 480 ppqn. You can overdub new data on a previously recorded track and perform automatic punch-ins. You can also record data from an external sequencer on all 8 or 16 tracks simultaneously.

Like the pattern sequencer, the 4-track arpeggiator records patterns up to 16 measures long. The EX5 has 50 preset arpeggios, including the usual up and down variations, as well as strummed guitar arpeggios, octaves and echoes, and some pretty funky syncopations. You get 50 locations to store arpeggios of your own design. Unlike some arpeggiators, this one generates MIDI data that can be recorded into an external sequencer and used to control other instruments.

Sophisticated sequence and arpeggio editing lets you copy and mix tracks, scale time, thin controller data, extract notes and other data, split chords, and so on. You can also scale Velocity, shift events in time, and transpose notes either individually or as a range of pitch. Quantization parameters include Strength, Sensitivity, Rate, Velocity, and Gate. Individual events can be edited or inserted in an event list, and the most recent edit can be undone. To hear your edits, unfortunately, you have to exit to the Pattern Play screen.

A Play Effects function can be applied to individual sequencer and arpeggiator tracks to temporarily adjust attributes such as Velocity and quantization without altering the recorded data. Play Effects include 100 preset groove templates, and you can also create your own.

IN CONTROL

Although many synths can store a handful of unique controller assignments for each program, the EX5 really shines in this department. The EX5 can store up to 16 real-time controller assignments for each Voice or Performance. Each set maps any of 13 controllers, including multiple controllers, to a single parameter. The 13 source controllers include pitch bend, ribbon, Aftertouch, breath controller, footpedal, two modulation wheels, and six soft controller knobs.

The controllers can be assigned to any of 146 parameters, although not all destinations apply to all Voice types. For example, assigning a knob to control an analog modeling parameter has

The stock EX5's rear panel provides two analog inputs and outputs, a headphone jack, and three footswitch jacks, in addition to MIDI In, Out, and Thru ports.

no effect on an AWM sound. Of course, many more parameters can be controlled in real time via MIDI.

The EX5's six controller knobs change identity depending on how they're set up for a particular Voice. One very cool aspect of the EX5's controllers is its ability to recall Scenes, or instantaneous "snapshots" of the value of the six controller knobs. Two buttons just above the second mod wheel select Scenes 1 and 2. The values of these knobs may differ from one Scene to another, including completely dissimilar envelopes and filter types.

If you press both Scene buttons together, you can use the second mod wheel to morph between the two Scenes, with a 50/50 mix in the center position. You can also use a footpedal to morph between Scenes.

If you're going to dabble in VAS synthesis, a breath controller is essential. Applied to VL wind instruments, such a device gives you immediate control over details like breath noise, throat formant, tonguing, and growl.

EFFECTS AND DSP

Effects are integral to any sound, and unique combinations may be stored

YAMAHA EX5
keyboard workstation
$2,695
EX5R (rack-mountable version)
$2,195

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

PROS: Great sound. Four synthesis techniques. Lots of polyphony. Optional flash RAM for instant access to user samples. Resampling. Unusual effects processing.
CONS: Underpowered. Perceptible timing latency. Limited polyphony using DSP-based synthesis. Incompatible sample format. Slow SCSI transfers. Limited sample-editing features. Cannot read Yamaha A3000 samples.

CIRCLE #439 ON READER SERVICE CARD

with every Voice and Performance. Like many synths, the EX5 offers global reverb and chorus, which are always available to all Voices. (Chorusing includes variations like flange and phase.) There are also two insertion effects, which share DSP power with the Voice generation section.

One insertion effects processor has 79 effects, and the other has 24. In addition to standards such as compressed distortion, aural exciter, and touch wah, you get oddities such as Tech Mod, which resembles ring modulation, and DPCM, which intentionally degrades audio quality. You can find most of the same effects on the A3000 sampler.

In Voice mode, you always have two insertion effects. In Performance mode, four Voices can each have two insertion effects unless you're using DSP-based synthesis, in which case you might get less. The computing horsepower of the EX5 is limited, which means you can go only so far before you encounter the dreaded "DSP Resource Full" message. Using VL or AN Voices in a Performance puts enormous demands on the processing engine, as do insertion effects in a Performance. If you try them both simultaneously, you risk disappointment. Because insertion effects are so basic to many really cool-sounding DSP-based Voices, you're likely to have problems during multitrack sequencing.

The problem is that the effects share the digital signal processor with the VL, AN, and FDSP tone generators, and sometimes there isn't enough processing capacity to go around. This limited DSP power also reveals itself in timing delays, specifically latency problems. When you're sequencing several channels, notes that should fall on the same beat may flam. You'll hear this as sloppy timing, and it occurs whether you're using the EX5's sequencer or an external one. Flam is also more noticeable on the higher-numbered MIDI channels.

EX-IT, STAGE RIGHT

The EX5 is an ambitious synthesizer workstation that succeeds to varying degrees. Putting SCSI problems aside, I think the EX5 is a good sampler for most practical purposes. Sure, the A3000 has a lot more editing and sample-processing capabilities, but the importance of that depends on how often you use those features. Besides, that's what computer-based sample editors are for, right?

Most of the EX5's other problems are a result of a processor with inadequate horsepower. A more powerful processor would probably have raised the price and thus reduced the unit's consumer base. Fortunately, there are work-arounds, such as Performance resampling, that minimize bumping your head against its limitations.

Despite its shortcomings, I want to own an EX5. I love its sound, I love its playability, and I love its depth. On the other hand, I also see the EX5 as a stepping stone to some future Yamaha synth with a processor that's fast enough to pull it all off. The way processor speed in general has increased with time, Yamaha is bound to create such a machine. Someday. But the EX5 sounds great right now, and I don't know if can wait for its successor.

Geary Yelton *likes long vacations, colorful cuisine, and pretty pictures. He lives in Atlanta and listens to a lot of synthesizer music.*

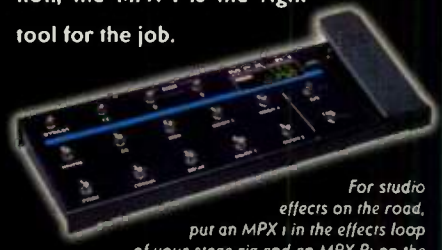
INDISPENSABLE MULTI-EFFECTS PROCESSING

MPX 1

No-compromise stereo reverb in combination with as many as 4 additional stereo effects, 200 superbly crafted presets, database sorting, and complete flexibility of routing and effect order in every program make the MPX 1 an indispensable recording and performance tool.

Powered by two separate DSP processors, the MPX 1 is loaded with 56 Pitch, Chorus, EQ, Modulation, Delay and world-class Reverb effects – each with the audio quality and control flexibility you'd expect in a dedicated processor. The 200 presets, designed for a wide variety of performance, sound design and production applications, exploit the unique characteristics of each effect – and a built-in database function makes it easy to find the right program fast.

An interactive front panel gives you instant access to each effect and its essential parameters, as well as push-button control over tempo, morphing, and mix and level settings of any or all effects. Whether you're looking for a rotary cabinet, a 4-Band Parameteric EQ, Ducking Delay, Pitch Shifting, or virtual rooms of any size and description, the MPX 1 is the right tool for the job.



For studio effects on the road, put an MPX 1 in the effects loop of your stage rig and an MPX Ri on the floor. A single cable provides stomp-box control of MPX 1 effects.

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LEXICON

MPX 100

Big stereo effects for a small chunk of cash.

By Jeff Obee

Over the years, Lexicon has cemented its reputation as the venerable grandfather of high-end multi-effects processors. Nonetheless, the company has also made successful forays into the budget-conscious side of the market. Previous entries such as the LXP-1, LXP-5, and the Alex, for example, were relatively inexpensive units that offered excellent value in their time. The new MPX 100, however, beats them all with its 24-bit DSP, excellent sound quality, and surprisingly low cost of $299.

Clearly, the MPX 100 is aimed at personal studio owners and musicians who perform live. It offers considerable flexibility with MIDI controllers and a smorgasbord of sounds. And although its price is modest, the unit definitely doesn't sound cheap.

FIRST IMPRESSIONS

The MPX 100 is a true stereo processor replete with 240 preset effects and 16 user-definable edit locations. It's a standard 1U rackspace unit but only four inches deep and very light, weighing in at just over two pounds.

The front of the MPX 100 has five sturdy, tapered knobs (Input, Mix, Output, Effects Level/Balance, and Adjust) and two larger knobs for selecting individual programs. Bypass, Store, and Tap Tempo buttons are also present. The front panel provides neither a power switch nor a dedicated LED to indicate that the power is on; however, when you first turn the device on, several LEDs flash momentarily.

The back panel has unbalanced stereo ins and outs on ¼-inch jacks (the left output doubles as a headphone jack), S/PDIF digital output (on an RCA jack), MIDI In and software-selectable Out/Thru, and a ¼-inch TRS footswitch jack (for tap tempo and bypass functions). A 9 VAC input accommodates the wall-wart-style power cord.

Although the front panel is well designed and relatively simple, the user interface isn't immediately intuitive. As mentioned, there is no LCD screen, so except for a few blinking buttons, you get little in the way of visual feedback. Furthermore, you have to use combinations of buttons and knobs to access certain functions (such as the System and MIDI parameters), which requires some digging through the manual.

Aside from that, though, working with the MPX 100 is easy. To change presets, simply select a program and then turn the Variation knob to one of 16 positions. (The manual provides detailed descriptions of presets and Variations.) Then, by using the Adjust and the Effects Level/Balance knobs, you can apply a limited amount of editing to the presets.

Storing your edits is also a cinch: press Store, turn the Program knob to User, turn the Variation knob to one of the available 16 slots, and press Store again. This automatically overwrites any program previously stored in that spot. However, the unit does not provide an overwrite warning, so I recommend creating a basic program sheet to keep track of things.

BASIC OPERATION

The MPX 100 offers the usual reverb, delay, pitch, and chorus/flange effects, supplied by the company's Lexichip, a proprietary 24-bit DSP processor. This is the latest version of the chip used in Lexicon's high-end MPX 1, PCM 81, and PCM 91 units, and is responsible for making the MPX 100 a clean and quiet processor. Even with my effects returns cranked up and the MPX 100's output control at 90 percent, the unit produced no discernible hiss.

There are three basic types of programs: Single, Dual, and User, which are selected using the Program and Variation knobs. Lexicon's terminology is a bit confusing, but here's the gist. Single programs, as you would expect, offer one effect. You have, for example, pitch-shifting programs, detuning programs, choruses, flangers, rotary-speaker effects, delays, tremolos, gates, and an assortment of reverbs. The MPX 100 provides an eight-program bank of variations for each Single effect: eight types of delay programs, eight detuning effects, eight hall reverbs, and so on.

These eight-program Single banks are organized in pairs. For example, when you choose "Chorus, Flange" on the Program knob, Variations 1 to 8 (selected on the Variation knob) are choruses, and Variations 9 to 16 are flanging effects. You can choose any chorus Variation or any flanger Variation, but you cannot use a chorus and a flanger at the same time. The Program knob also has a setting marked "Special FX"; this loads 16 Single programs, one at each Variation-knob position. Single programs are stereo, except for the mono delays, in which the left and right inputs are summed.

Dual programs combine two effects in a preset order; for example, "Flange-Reverb" programs route the signal to the flanger and then to the reverb. You get seven types of Dual programs: Flange-Delay, Pitch-Delay, Chorus-Delay, Delay-Reverb, Flange-Reverb, Pitch-Reverb, and Chorus-Reverb. Each bank contains 16 Variations. Dual programs are routed in one of four fixed stereo configurations (detailed later).

The User setting lets you access 16 memory locations for your custom programs. When the unit ships, these Variation locations contain duplicates of selected factory programs.

When working with Single programs, the Effects Level/Balance knob controls the overall level; with Dual programs, this knob controls the level of each effect.

Lexicon has simplified parameter

For manufacturer information, please see Contact Sheet, p. 179.

Lexicon's latest high-quality, cost-effective processor is the MPX 100, a unit that offers 240 great-sounding presets, surprisingly comprehensive MIDI implementation, and a digital output.

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On the rear panel of the MPX 100, you'll find two ¼" unbalanced inputs and outputs, a digital S/PDIF output, a footswitch jack, and MIDI In and Out/Thru jacks. Because MIDI Out and Thru are on the same jack, you must designate how you're using it in the System mode.

editing on the MPX 100—an effort on the company's part to keep the unit's production costs down and to provide users with an easy-to-use interface. Basically, the MPX 100 employs a single control, the Adjust knob, to affect multiple parameters simultaneously. (The Tap button is also used on a number of delay-based programs for manually inputting tempo.)

The parameters that the Adjust knob controls vary from program to program. For example, the knob controls decay time only on the "Large Plate" preset; however, on "Vocal Plate" it controls both low cut and decay time, increasing both parameters in a linear fashion as the knob is turned clockwise. With certain programs, the Adjust knob behaves in a bipolar fashion, increasing one value when the knob is turned to the right of center and another when it is turned to the left of center. For instance, on the "Ping Pong Quarter Note" programs, Adjust controls the amount of feedback and also selects digital delay or tape echo. Feedback is increased as the knob is moved in either direction; turning the knob left of center, however, gives you digital delay, and turning it right of center produces the tape echo.

Granted, this design isn't intuitive, and it does lead to some restrictions. Overall, though, Lexicon has coupled its parameters in a smart and logical fashion. In addition, having multiple parameters assigned to a single linear knob makes it possible to create some really wild effects.

SINGLES' BAR

The MPX 100 contains some really versatile Delay/Echo programs. Up to 5.5 seconds of delay time is available in mono and 2.7 seconds in stereo. Variations 1 through 8 employ the Tap button for setting the delay time parameter, whereas 9 through 16 rely on the Adjust knob to dial in delay time. There is no infinite hold or loop setting, but an Infinite Repeat effect is provided as one of the Special FX programs.

The Tap Tempo feature made me a happy camper. I love being able to audition delay times on the fly, and with the MPX 100, two taps is all it takes. Besides tapping the button manually, you can also enter delay times via MIDI, with a footswitch, or through the audio inputs by playing a couple of notes on an instrument. (The latter feature is very useful for musicians who are playing live.)

The Reverbs consist of plates, halls, chambers, rooms, gated reverbs, and Lexicon's proprietary "Ambiences." A producer friend and I agreed that the Reverbs are all very natural sounding. Programs such as "Bedroom" and "Basement," for example, sound dead on. Several of the Plates also worked beautifully on my friend's voice, as did the Vocal Chambers. I also applied assorted hall, chamber, and room reverbs to a female Celtic singer's voice with satisfactory results. I felt limited, however, by the lack of an extended decay parameter; even at full tilt, the Large Hall's decay wasn't long enough for the desired effect on the voice.

The rooms and chambers get high marks for processing various drum samples and percussion instruments. I especially liked the Small Church on a drum kit. The Synth Hall also sounded quite luscious on some analog pads. I really liked the authentic stereo imaging this processor delivers.

The splendid six-voice Choruses exhibit impressive depth. For example, the Rich Chorus breathed extraordinary life into some guitar and bass tracks. I even played a gig using the MPX 100. With my two bass cabinets positioned approximately ten feet apart, and even with no panning control, the stereo spread of the chorus was huge. Even more importantly, the effect didn't wash out any of the low end.

The MPX 100's flange effects, though more subtle than the choruses, are all extremely musical. Also, the unit's eight Tremolos should definitely appeal to guitarists. Lexicon uses a variety of waveforms for these effects: triangle, rectified sine, square, and sawtooth. Rotary effects are also grouped with Tremolos. Although I don't normally gravitate toward tremolo-type effects, these offer good stereo panning and depth, with a natural speed shift that was easily controlled by a pedal.

The Pitch algorithms allow you to process at a variety of intervals. The MPX 100 isn't the best pitch-shifter, but I liked the effect that some of these programs had on percussion and esoteric synth patches.

MPX 100 Specifications

Preset Programs	240
User Locations	16
Analog Inputs	(2) ¼" TS
Analog Outputs	(2) ¼" TS
Digital Output	20-bit S/PDIF (RCA)
Other Connections	MIDI In, Out/Thru; ¼" TRS footswitch jack
A/D/A Conversion	20-bit
Internal Processing	24-bit
Sampling Rate	44.1 kHz
Frequency Response	20 Hz–20 kHz (±1 dB)
Dynamic Range	>95 dB (20 Hz–20 kHz, unweighted)
Dimensions	1U x 4" (D)
Weight	2 lbs., 2 oz.

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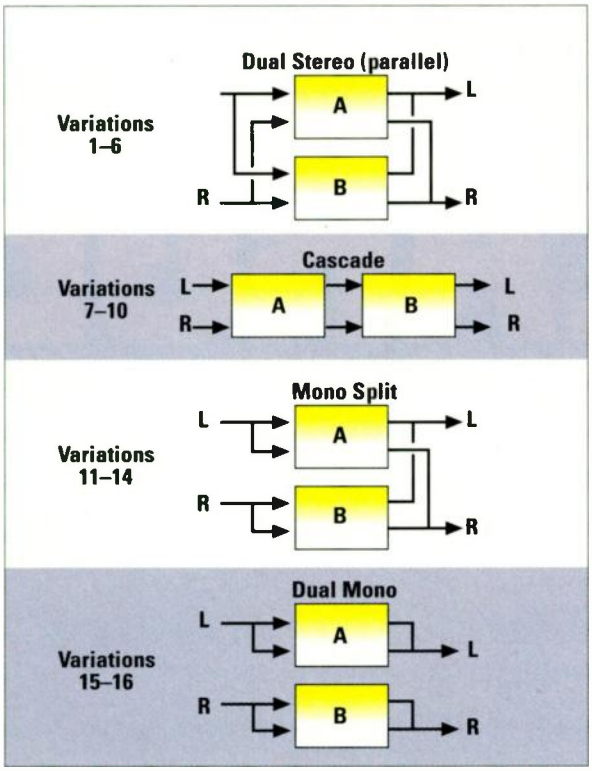

FIG. 1: The MPX 100's effects are divided into Single and Dual programs. While Single programs employ a basic stereo-signal flow, Dual programs use one of four fixed routing configurations. All but one work in parallel.

Detune effects are included with the Pitch effects, and I enjoyed these as well. Lexicon designed the detune effects so that the original root note is maintained and equal amounts of positive and negative detuning are added as you move the Adjust knob. The result is a rich, natural effect that doesn't obfuscate the root pitch.

The Special FX bank offers some useful programs. Infinite Reverb and ChorusVerb both work well for textural processing. There are also three Ducking effects—Reverb, Chorus-Delay, and Triplet Delay—which sound cool on a variety of instruments. The Subdividing Delay, which has variable values from a 32nd note to a whole note, works very well when synched to MIDI Clock. The Panning Delays also shine when synched. Synching a digital delay to MIDI Clock when working with sequenced tracks is a great way of ensuring that your delay times will always be 100 percent accurate.

DUELING PROGRAMS

Most of the Dual programs employ Single program algorithms, although there are some exceptions. In general, the Dual programs combine a Delay or Reverb with a Flange, Pitch, or Chorus. The Dual effects are routed through one of four stereo configurations that are fixed as part of the Variation (see **Fig. 1**).

The Effects Level/Balance knob affects the sound according to which routing is being used. With the Cascade routing, for example, the Effect Level/Balance knob varies the dry/wet balance of the first effect that is being fed into the second effect. However, in the Dual Stereo, Mono Split, and Dual Mono routings, Effect Level/Balance controls the balance between the two effects. That is, when the knob is turned full left or full right, you hear only one effect or the other; whereas when the knob is centered, you get an equal stereo blend of the two effects. Moreover, you can use the effects independently of each other by routing them through separate mono sends and returns.

I played some synth pads through the Dual Reverb programs and found some juicy stuff, especially in the Chorus-Reverb presets. Also, many sounds in the Pitch-Reverb section lent the pads a wonderfully ethereal sheen. Vocalists will delight in the Delay-Reverb effects, which offer quality reverb and audio-controllable Tap Tempo delay.

Overall, the Dual programs are simple to use, yet you can get a great deal of creative mileage from them. One of my favorites was the "Intervals Up" preset in the Pitch-Delay programs, which creates variable ascending intervals as you turn the Adjust knob. I used this on a marimba patch, for example, and it really added some character to the sound. And I made my fretless bass sing simply by soaking it in Rich Chorus 1–Ping Pong 1/4 Note Chorus-Delay. In fact, I wrote a new tune using just that patch.

MIDI MAGIC

The MPX 100 offers a surprising amount of MIDI control. It syncs perfectly to MIDI Clock, responds to MIDI Program Changes and Bank Select messages, can learn continuous controller assignments, and has thorough MIDI Dump capability. (You can dump either the full bank of user programs, just a single program, or your system settings and patches.)

To enter the MPX 100's Learn mode, press the Store and Tap buttons simultaneously. From there, continuous controllers (CCs) can be assigned to five parameters (Mix, Effects Level/Balance, Adjust, Bypass, and Tap) by moving the control you want to assign to (a system that Lexicon initiated with the LXP-1). By moving your controller through the desired range, you direct that CC information to the MPX 100. You can easily Unlearn those assignments, too, and even temporarily suspend them. However, the MPX 100 does not transmit CC data from its front panel, so you will need an external MIDI controller for such applications.

The MPX 100 recognizes Pitch Bend, Aftertouch, and CCs 1 through 31 and 33 through 119. These capabilities allow for some hip interactive effects-mixing applications. For example, you could assign a controller to Mix and do rhythmic reverb swells, or assign one to Bypass and alternate between dry and delay on a snare-drum side stick.

The inclusion of MIDI capabilities also provides a great work-around for the MPX 100's limited user RAM: simply save your System information and Learned Controller settings along with

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

PROS: Excellent sound. Lots of presets. Comprehensive MIDI control. Digital output. Low price.

CONS: Limited parameter control. No LCD or LED status screen. Only 16 user slots in RAM.

CIRCLE #440 ON READER SERVICE CARD

your sequence. I tried this on several occasions, and it worked like a charm every time.

SYSTEM STUFF

By pressing the Bypass button for two seconds, you can access the System mode, where you'll find the MPX 100's global parameters: Bypass, Patching, Program Load, Digital Output, MIDI Out/Thru, MIDI Program Change, MIDI Clock Receive, Tempo, and Sys-Ex Dumps. You can then use the Variation knob to change parameters, and the Store button to toggle the state of the selected parameter. The Edit light denotes whether a parameter is on or off, wet or dry, and so on: when the Edit light is on, the parameter is off, and vice versa.

The Tempo parameter sets the tap settings of programs individually or globally—a nice option when you want to try a specific delay time with a variety of programs. In addition, the digital output can be set to pass dry signal while the analog output delivers the processed sound—a handy option for stage monitoring purposes.

As for documentation, the MPX 100's manual is easy to understand and uses illustrations judiciously to demonstrate its points. However, it is small, and the top-bound spiral spine and glossy stock make it somewhat tedious to reference. Further, I had to constantly leaf through the program descriptions. For a processor that is primarily made up of presets, a single page of descriptions would have made life easier.

LOVING IT

The Lexicon MPX 100 is a great-sounding, inexpensive, and easy-to-use multieffects processor. It offers extensive MIDI implementation, and, to my knowledge, is the only effects box in its price range that provides a digital output.

Most of my criticisms about the unit—lack of an LCD, limited programmability, and minimal RAM—simply indicate the areas where Lexicon had to cut costs to produce such an outstanding processor at such a reasonable price. But if you're looking for great-sounding effects at a low price, you can't beat the MPX 100.

Jeff Obee *is a fretless bassist/synthesist/composer who is getting to the point where he wants to review everything he sees. He can be reached at obeej@dsp.com.*

CAKEWALK

OVERTURE 2 (MAC/WIN)

An old standby receives a major face-lift.

By Thomas Wells

In the arena of music-notation software, it's hard to find a single program that can be all things to all people. One program might be well suited for lead sheets and horn parts, while another might work best for complex, modern notation. Cakewalk's *Overture 2* stands out from its competitors in its power and versatility, its thoughtfully designed and easy-to-use interface, and its high-quality printed output. It also offers features that are useful for many different musical applications.

Originally developed for the Macintosh and marketed by Opcode Systems (see the review of *Overture* 1.0 in the April 1995 issue of **EM**), *Overture* was later licensed to Cakewalk, which has taken great pains to bring the program to the Windows world. With a few exceptions, the Mac and PC versions are remarkably similar—so much so that a single 795-page manual (with differences clearly indicated) works quite well for both platforms.

AT A GLANCE

Among the first things I noticed about *Overture* was the microscopic control it provides over the look and placement of symbols. After a short time, I also noticed an increase in my productivity and speed when copying music and doing MIDI orchestrations. Overall, *Overture* can competently handle every detail, from copying and pasting pages of orchestral systems to notating complex nested tuplets. The Mac version is also adept at saving notation as EPS or PICT files for importing into graphics programs or combining with text files, and it can also import external graphics files for creating custom symbols. Both versions include a Graphics palette for creating your own symbols.

The program lets users assign different fonts to various score elements, such as lyrics, bar numbers, track names, tempo indications, and rehearsal numbers. It would be helpful, however, to have more flexibility in the low-level manipulation of symbols and fonts, such as changing the size and shape of accents. According to Cakewalk, the company will be enhancing this aspect of the program in the future. (The PC version already has an edge over the Mac in this area.) The quality of *Overture*'s printed output is high, and its Aloisen music font is attractive and looks professional.

Screen redraw in the program is so quick that I didn't even notice it on the machines that I used for this review: a 233 MHz PC and a 132 MHz Power Mac. The Mac version has a special feature called Speedy Scrolling, which loads the entire contents of the page into RAM so the program doesn't have to redraw the screen from scratch each time you scroll the window.

Although I don't recommend using *Overture* without reading the manual, it is possible for the average user to get around in the program pretty well without first getting lost in the documentation. Try that with some other high-end programs and you won't get very far.

IN YOUR FACE

From the moment you launch it, *Overture* is the epitome of the "what you see is what you get" interface. **Figure 1** shows an *Overture* screen (Mac version) with the toolbar across the top and several frequently used menus. The Text, Dynamics, and Articulations menus are "torn off" from the horizontal toolbar and "parked" down the left side of the screen. The Transport window (reminiscent of a popular Mac sequencer) appears in the upper right.

As with many notation programs, the interface divides its functions between menu commands and tool actions. Although many of the menu and submenu commands have keyboard shortcuts, many do not, which makes a good macro editor (such as CE Software's *QuicKeys*) a wise investment for serious Mac users. (The Windows version offers greatly improved keyboard shortcut access.)

The toolbar is divided into five groups of buttons that control specific types of actions: the Arrow, Erase, and Scale cursors; Notes, Groups, Ornaments, Articulations, Noteheads, Tablature, Guitar, and Jazz buttons; Dynamics, Text, Expressions, and Graphics buttons; Clefs, Staves, and Barlines buttons; and the Transcription Quantize Amount button. You can orient the toolbar and any of its tear-off menus vertically or horizontally, and the Windows version lets you arbitrarily resize the toolbar palette.

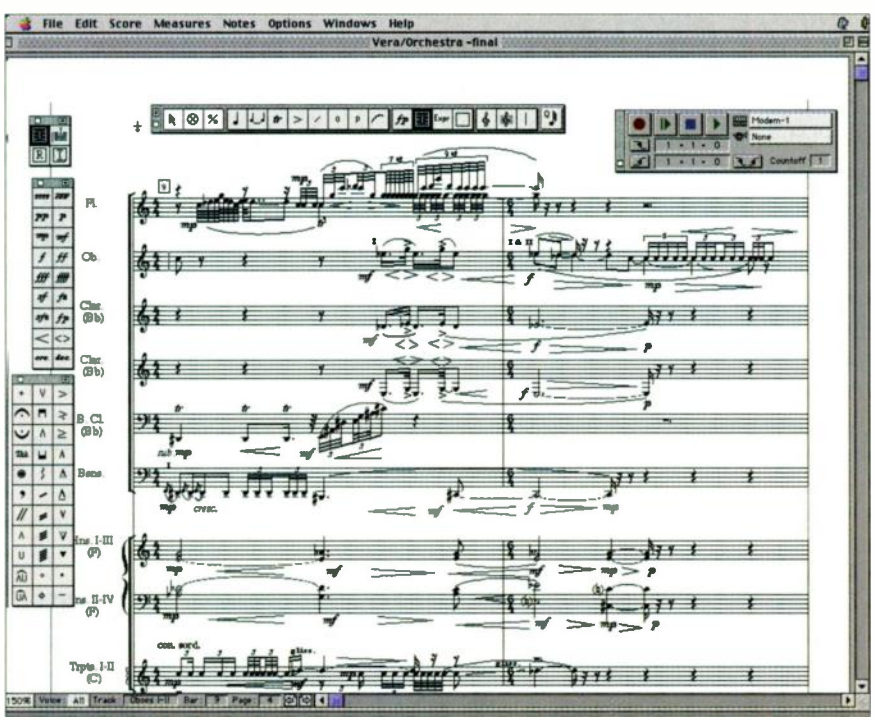

FIG. 1: The *Overture* main window (Mac version) is shown here with the toolbar along the top and several menu items on the left. The transport controls appear in the upper-right corner.

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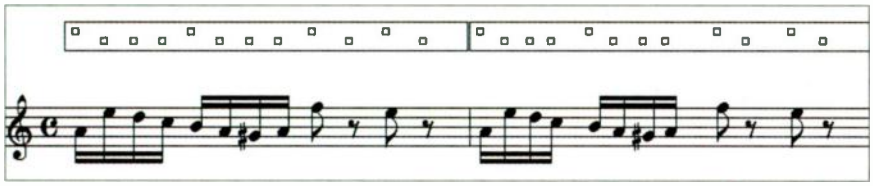

FIG. 2: These two measures have the same notes but with different note spacings. *Overture*'s Beat Chart enables you to precisely adjust the spaces between notes within a measure.

READY, SET, ENTER

As with any good notation program, *Overture* lets you import Standard MIDI Files or enter notes by step-entry, mouse-entry, or real-time performance (with 480 ppqn resolution). You can't, however, freely enter music to your own beat (and have the barlines end up in the right places), which may disappoint some users. However, *Overture* makes up for this deficiency in many ways. For example, it doesn't complain when you put too many beats in a measure (although the program's Show Incorrect Rhythms command can check for bars with too few or too many beats). It's also interesting to note that the Macintosh version of *Overture* can still import Opcode *Vision* files.

The step-entry function is easy to use and nicely enhanced with keyboard shortcuts, so you can keep one hand on the MIDI keyboard and one on the computer keyboard, with few side trips to the mouse. The keyboard shortcuts for note durations are logical, although there's no shortcut for 64th notes.

Overture provides automatic, as well as manual, transcription capabilities. Recorded or imported note data first appears onscreen as what *Overture* calls "raw" data. It's a kind of "time notation" in which noteheads are extended in proportion to their duration. (Notes can also be printed in this form for contemporary music scores.) Manually quantizing the raw data is a simple matter of selecting a region with the mouse, clicking the Quantization button, and entering the desired resolution when prompted. You can also specify the quantization resolution when importing files (or before using real-time recording), which provides automatic transcription.

Furthermore, *Overture* lets you import score setups, or templates, which simplifies the task of importing MIDI files. Cakewalk supplies a large assortment of ready-to-use templates on the *Overture 2* CD-ROM.

Overture offers several attractive features in the areas of note entry and symbol manipulation. The Make Invisible command (which hides all currently selected notes and symbols) is a terrific feature, and you can apply it to any symbol on the page. It will be especially appreciated by those who write multiple parts in different voices on a single staff. *Overture* also lets you specifically assign up to eight independent voices per staff with individual control over such things as stem direction and playback parameters.

The Scale button lets you resize almost any symbol on the page (such as staves, clefs, dynamics, and notes with associated articulations and ornaments) from 25 to 250 percent by selecting a region and specifying the percentage change. The Display on Previous Staff and Display on Next Staff commands are extremely handy, particularly for piano notation. They allow you to move a note or group of notes from one staff to another. (These commands don't move the data to another MIDI track, however; separate Move to Next Track and Move to Previous Track commands do that.) Another important time-saver that *Overture* provides is the ability to apply an articulation marking to a range of notes simply by selecting the notes and choosing the appropriate marking. That feature can really improve efficiency and boost productivity.

Chord specification is another area in which *Overture* excels. Its repertoire of chord types is extensive and well thought out. You can enter something as outrageous as C7(♭9/♯9/♭13), and *Overture* will handle it without a problem. User-defined chords can be stored in libraries and imported into an *Overture* session. The program also provides great tools for jazz notation: the Jazz Articulations palette comes complete with flips, doits, plops, lifts, slides, falloffs, shakes, and smears.

FREE ASSOCIATION

When you're working with notation software, associating symbols with certain staves can be frustrating, especially at part-extraction time when you're up against a deadline. The ability to

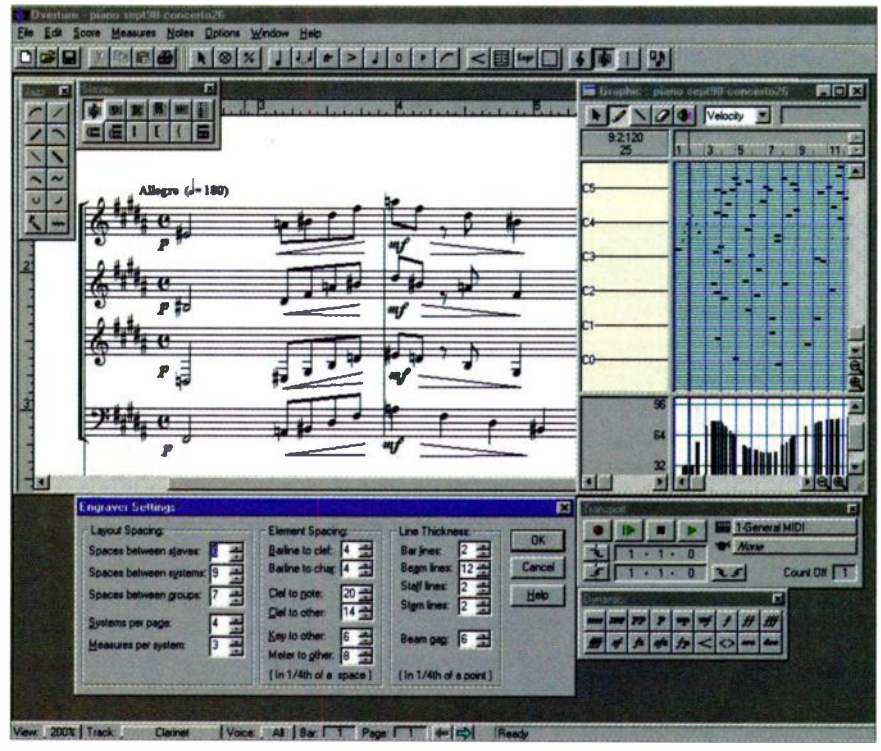

FIG. 3: The *Overture* main window (PC version) is shown here with the Engraver Settings window and the piano-roll MIDI-editing display.

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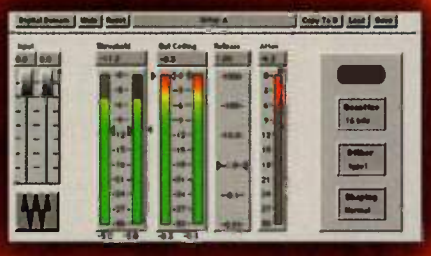
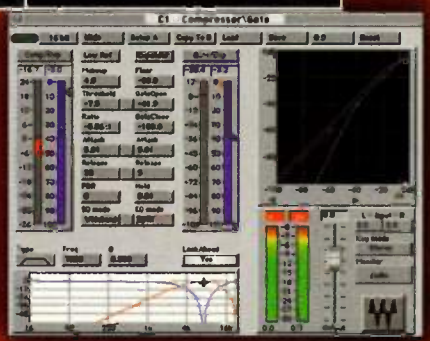


C1 UNPARALLELED PARAMETRIC COMPANDER



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attach symbols to the proper staves is crucial to the usefulness of any notation program. If you have to spend hours chasing down articulations that have mistakenly glommed onto the wrong staff, you might as well copy the parts by hand in the first place.

With *Overture*, when you place a symbol with the cursor, its position is shown by a cross within the five-line staff region. As you move the cursor down, the top of the cross grows a small arrow that points toward the staff. Move out of the staff-capture region, and the arrow appears at the bottom of the cross, pointing toward the system below (see **Fig. 1**, to the left of the toolbar). The process is similar for above-the-staff operation. In either case, you can always verify that symbols and markings are being associated with the proper staves as you work with them.

Positioning symbols is equally simple: click on the symbol and move it with the cursor, or nudge it with the arrow keys. When you've made your fine adjustments to accidentals (in a big chord, for example), *Overture* lets you lock that measure to prevent a global justification from undoing your work. Fine editing is facilitated by *Overture*'s ability to zoom in by up to 800 percent.

HAVE IT YOUR WAY

You can control the overall appearance of your finished notation in *Overture* in several ways. You can globally change the space occupied by different note values in an Allotment Table. Different Allotment Tables can be stored and called up for different notational tasks. For adjusting the spacing of notes within individual measures, *Overture* includes a Beat Chart, which provides a series of small handles that appear above the measures, enabling you to position notes at the metrical and submetrical levels. **Figure 2** shows two identical measures with a different Beat Chart for each. You can see the effect that this has on the note placement.

Overture's Recalc Layout command

You can assign up to eight independent voices per staff.

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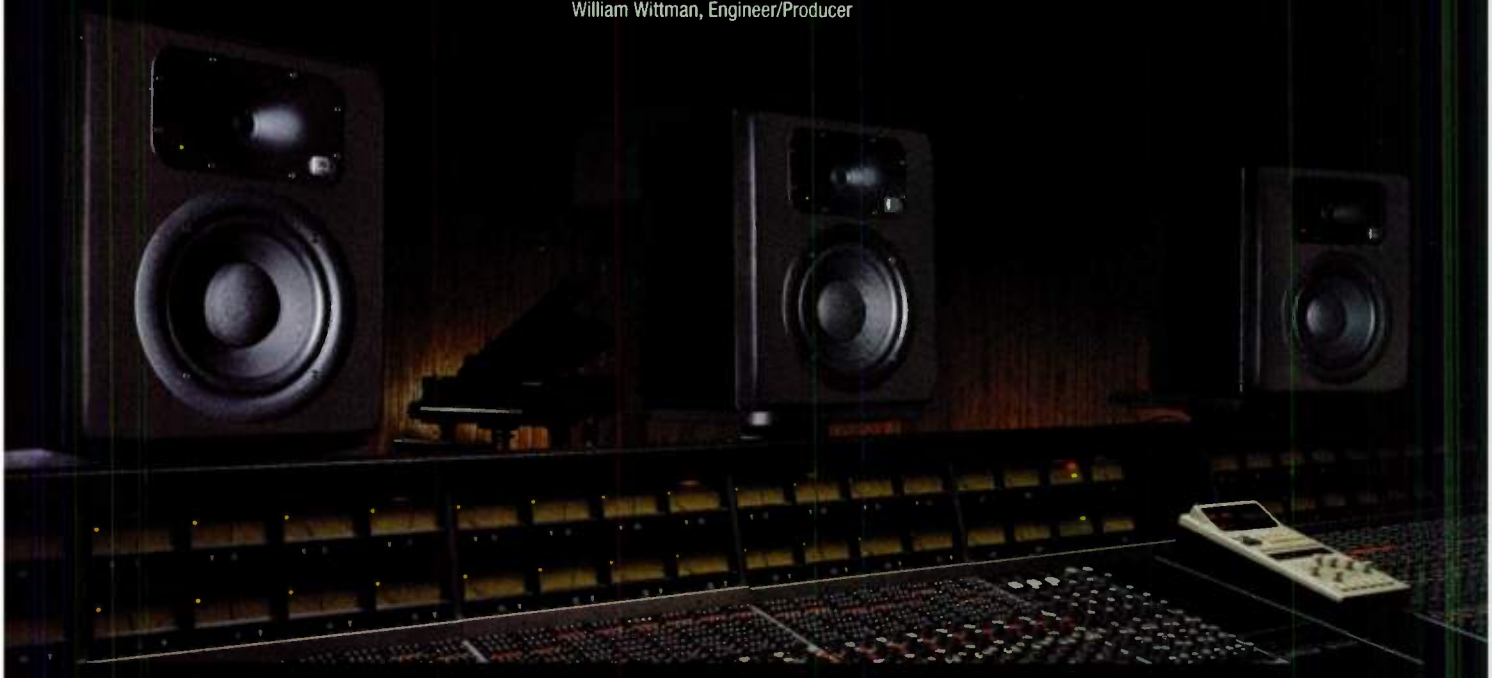
William Wittman, Engineer/Producer



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Overture 2
Minimum System Requirements
Mac: 68020 or Power Macintosh; 2 MB RAM; Mac OS 7.0; CD-ROM drive
PC: Pentium 100; 16 MB RAM; Windows 95/98; CD-ROM drive

adjusts material based on measures-per-system settings. In practice, I use this command sparingly, because Recalc Layout can lead to some surprising changes in otherwise carefully tweaked measures that you've forgotten to lock down. (Unlike the current Mac version, the PC version provides multiple undo capability, which can help you recover an earlier layout if necessary.) Measures-per-system settings are most easily adjusted at the local level, using the Wrap Left and Wrap Right commands. These commands are particularly helpful for preparing parts where the placement of rests is critical for page turns.

The tools for setting the space between staves, naming and hiding staves, and setting the space between groups of staves and systems are always intuitive and easily accessible in *Overture*. The implementation of these functions differs in the Mac and PC versions, but the capabilities are equivalent, for the most part. The PC, however, has a slight edge over the Mac when it comes to making microadjustments on such things as the thickness of barlines, beams, staff lines, stems, and related items. These are all specified in the Engraver Settings window (see **Fig. 3**).

You'll find it easy to drag individual staves around with the mouse until you get them where you want them. For precisely positioning staves and other score elements, mouse movement is constrained to the first detected direction. That's handy when you're working with complex page layouts.

Flipping symbols above or below the notehead—a nail-biting experience in some programs—is a simple matter in *Overture*. The same is true for placing cautionary accidentals. *Overture* allows you to override the usual settings and add these extra sharps, flats, and naturals directly from the Accidentals palette in the toolbar.

Part preparation with *Overture* is straightforward. You specify instrument transpositions along with instrument names and abbreviations. They are then applied automatically during the part-extraction process. You can specify minimum and maximum lengths of multibar rests, as well. Parts can also be extracted together into multiple-staff systems to create, for example, an orchestral percussion score or an instrumental part with cues.

MAD ABOUT MIDI

Overture's ability to edit and massage MIDI data is a feature that really sets it apart from the competition. The Mac version has an advantage here because it has access to OMS, with its patch-name management tool. The PC version, however, provides a Name Manager, which is used to assign MIDI instrument definitions to available ports and channels. Each of the eight voices per staff can be assigned to a different MIDI device.

The Graphic Window, where you can edit MIDI data in a piano-roll display, is the area of the program where the Mac and PC capabilities most differ. The Mac version has much of the sequencer-like look and editing capabilities of Opcode's *Vision*, while the PC version looks identical to Cakewalk *Pro Audio*'s Piano Roll view. Cakewalk is working toward Graphic-Window parity for the Mac and PC versions, and the company also plans to address one of my main criticisms of *Overture*—its inability to play back articulations.

FINAL CUE

Overture is a terrific and stable piece of software that provides complete professional music typography and page layout with a user-friendly and intuitive interface. It's a breath of fresh air amidst other high-end programs that are burdened with overwindowed and overkeystroked interfaces. The documentation is clear and well presented and offers plenty of examples. A separate 104-page *Overture 2 Encyclopedia* is also provided as a quick reference.

Overture 2 shows that a professional-level notation program can be powerful without being cumbersome to use. The program clearly points the way to the next generation of music-notation applications.

Thomas Wells *is a composer, author, and professor at Ohio State University and has been involved with electronic music and audio production for more than 25 years.*

For manufacturer information, please see Contact Sheet, p. 179.

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ROLAND

MC-505 GROOVEBOX

A nightclub in a box.

By Steve Wilkes

If you liked the Roland MC-303 Groovebox, you going to love the new MC-505. Combining a state-of-the-art drum machine, synthesizer, and sequencer, this feature-enhanced follow-up to the MC-303 is designed for use by instrumentalists and DJs alike, regardless of their skill level.

Features new to the MC-505 include the 8-channel mixer, the D-Beam infrared controller, three independent effects units, MegaMix mode, and the ability to send and receive MIDI information with many of the front-panel controls.

The MC-505's user interface is set up for easy and intuitive playing; I was able to take the unit out of the box and start making music with it immediately. However, it took a while to develop a comfortable visual relationship with many of the controls.

INSTANT ACCESS

With orange, red, and green lights flashing, the Groovebox looks like the light show for a late-night rave at your favorite techno hot spot. Its face is a mosaic of knobs, sliders, buttons, and keypads that give you a wealth of hands-on control over the sound.

In the center of the unit is the Part Mixer, the 8-channel mixer that serves as the main control surface. Any of the MC-505's internal sounds can be assigned to channels 1 through 7 of the mixer. The eighth channel, channel R (for "rhythm part"), is reserved for drum and percussion sounds.

Each of the eight channels has its own multifunction fader and mute button. The faders can be used to regulate volume level (the default setting) or to modify six other assignable parameters: Pan, Key Shift, Reverb, Delay, EFX/out, and MegaMix. In Reverb, Delay, and EFX/out mode, the sliders work in conjunction with the corresponding knobs in the effects section. As expected, Pan allows you to adjust the stereo position of each part, and Key Shift changes the pitch of each part. MegaMix allows you to use the faders to select various parts or phrases from other sequenced patterns and combine them in real time to create new patterns. DJs will find this immediately rewarding.

The MC-505 uses standard sequencer controls (Play, Record, Stop, Forward, and Backward). A single button triggers the metronome (your choice of a cowbell or click) and controls the Tap Tempo feature.

Another important control feature is the array of 16 multifunction keypads, which are laid out like a standard piano keyboard. You can use the keypads to play the internal sounds, a pattern set (which contains from 2 to 16 patterns), a single phrase from a pattern (called a Real-Time Phrase Sequence, or RPS), or you can control an external device via MIDI.

Editing information is displayed on a 2×16-character LCD. Parameter selections are made using either the Value knob, the Page button, or the Increment/Decrement buttons. The Increment/Decrement buttons will not, however, modify tempos, and there are no numerical assignments on the keypads to allow you to punch in tempo numbers (for example, 142 for 142 bpm). Instead, you have to scroll to the desired tempo by using the Tap Tempo button or the Value knob. (You can scroll through values faster by using the Shift button with the Value knob.)

The face of the Groovebox also houses the D-Beam, an invisible infrared beam that senses the two-dimensional motion within the beam area. The D-Beam, which is based on technology developed by and licensed from Interactive Light, can control any one of 28 parameters. (For more information, see the review of Interactive Light's Dimension Beam in the July 1996 issue of **EM**.)

On the rear panel (see **Fig. 1**), the MC-505 has main left/right outputs and two pairs of direct outputs (direct 1 L/R and direct 2 L/R). The direct outputs can carry up to four separate unprocessed signals. You also get a headphone jack, a pedal input, MIDI In and Out, and a slot for a 2 or 4 MB SmartMedia memory card.

GOOD SOUND FOUNDATION

The MC-505's synthesizer is impressive. It uses a 64-voice polyphonic Roland JV-1080 synth engine and features classic Roland sounds from the Juno- and Jupiter-series synthesizers and the TR-808/909 drum machines.

Sound parameters are accessed from the front panel or through MIDI. Anyone who has used a Roland synthesizer of recent vintage will feel at home with the voice architecture's organization of Tones (the smallest unit of sound), Patches (up to four Tones combined to create the sounds), and Parts (a track in the sequencer). The MC-505 has 512 onboard Patches and room for 256 Patches in User Memory and 512

COURTESY ROLAND CORPORATION U.S.

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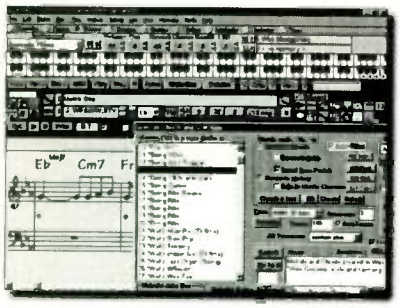

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NOTE: Soloist Disk 1 is included with Band-in-a-Box 8.0 and upgrade, so it is not offered as an upgrade. Styles Disk 12 is included with the upgrade to Band-in-a-Box Version 8.0 from an earlier version.

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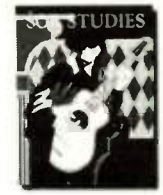

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FEATURES ■■■■
EASE OF USE ■■■▮
AUDIO QUALITY ■■■■▮
VALUE ■■■▮
1 2 3 4 5

PROS: Easy to use. Good combination of features. High-quality sounds. Nice front-panel layout. Knobs and sliders send and receive MIDI information. D-Beam infrared controller.

CONS: Keypads are not Velocity sensitive and are unequipped for numeric data input. Minimal effects editing.

CIRCLE #442 ON READER SERVICE CARD

Patches on a 4 MB SmartMedia card.

The MC-505 offers analog-style, hands-on control of many basic sound components. A button selects between a sawtooth and square-wave source signal; sliders adjust envelope attack, decay, sustain, and release times (ADSR), as well as envelope depth; and dedicated knobs control filter cutoff and resonance. You get controls for the arpeggiator rate, portamento time, and fine/coarse tuning, and the Low Boost control is great for accentuating the subsonic pulse of urban-sounding Patches.

The two LFOs are easily synched to tempo and can modify the amplitude, filter cutoff, and envelope of a Tone. A button steps through the eight LFO waveforms, which include triangle, sine, sawtooth, trapezoid, and square waves, as well as sample-and-hold and the less predictable random and chaos settings. A dual-function knob changes both the rate and depth of the oscillators.

The synth's 26 editable rhythm sets contain an outstanding collection of contemporary drum and percussion sounds, which add considerable value to the unit. In addition to the aforementioned TR-808/909 sounds, the MC-505 has a variety of rhythm sets tailored to different contemporary styles with descriptive names such as Ambient, House, Drum 'n' Bass, Hip Hop, Reggae, Industrial, and Jungle. The MC-505 is a fine drum module, especially when you consider the amount of control you have over the percussion sounds through real-time editing, sequencing, and mixing.

EFFECTIVE IMMEDIATELY

The MC-505 gives you three independent effects processors for each track, which are labeled Reverb, Delay, and EFX (insert effects). These processors are fed by sends in the Part Mixer. The output of the insert effects can be routed and mixed through both the reverb and delay sections. Each effects processor has one dedicated multifunction knob for accessing all parameters.

The MC-505 has six types of reverb, of which only three parameters can be edited: level, high-frequency damping, and reverb time. Similarly, aside from being able to choose a short or long delay, you can edit only three delay parameters: level, feedback (number of repeats), and delay time.

A significant difference between the MC-505 and MC-303 can be seen in the EFX section. This processor can be used as an enhancer, compressor, limiter, overdrive, parametric EQ, flanger, phase shifter, and more. Some trendy effects are also included, such as Lo-Fi (for that vintage sound), Phonograph (for adding vinyl artifacts), and Radio (which simulates tuning between stations on an old radio). I tried a number of the effects with a techno/trance-style groove and got great results. If you're like me and want your drum sounds wildly distorted and generally messed up, you'll like the MC-505's effects.

SEQUENTIAL ESSENTIALS

The 96 ppqn sequencer has eight tracks (corresponding to the eight tracks of the Part Mixer) and a 95,000-note memory capacity. You get the usual hardware-sequencer editing features and then some, including Copy, Erase, Delete/Insert Measure, Transpose, Change Velocity, Change Gate Time, Shift Clock (moves a pattern backward or forward in time), Data Thin, Play Quantize (nondestructive), Edit Quantize (destructive), and Reclock (doubles or halves the timing of the data in a pattern).

There are 714 editable patterns in ROM and space for 200 user patterns. Patches and patterns can be saved internally or to the optional card. Patterns are combined to create Songs, and there's enough storage space for 50 Songs. Preset patterns include such dance-floor favorites as Psy Trance, Minimal, Detroit Techno, and Ambient Techno.

PLAYABILITY

The face of the Groovebox has 16 small pads from which you can trigger sounds and patterns (using the RPS feature). However, the pads are not Velocity sensitive. In fact, for the first groove I programmed as a sequenced pattern, I used my drumKAT as a controller to trigger sounds during the initial writing process. (I later recorded additional parts using the MC-505's keypads.) Although the MC-505 responded beautifully to MIDI triggering, the sounds I triggered from the drumKAT played back at a considerably lower Velocity than those same sounds when triggered from the onboard pads. This factor made the later additions to my first pattern a little unbalanced dynamically. Perhaps it's a drummer thing, but I prefer Velocity-sensitive pads on drum machines.

Real-time recording on the MC-505 is a breeze. Hit Record and the machine goes into Standby, at which point you have the option of hearing the metronome click or muting it. Next, hit Play, and the Groovebox begins a two-measure countdown to the downbeat of the selected pattern. Then you can play your musical motif from the keypads or external controller.

FIG. 1: The MC-505 has stereo mix outputs as well as two pairs of direct outputs for access to unprocessed signals.

For manufacturer information, please see Contact Sheet, p. 179.

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The pattern length, tempo, and quantization settings are all up to you, and you can continue to overdub to your heart's delight. Saving the pattern is even easier: hit the Write button to assign the pattern to a user memory slot, name it, and save it. The Groovebox takes a few seconds to process the information, which is especially noticeable if you're accustomed to using a computer-based sequencer.

The RPS (Real-Time Phrase Sequence) is an internal collection of 30 phrase (that is, pattern) sets, in various musical genres, that can be assigned to the keyboard pads. That means you get 16 phrases (one for each pad) in each RPS set.

Press one of the pads on beat 1, and you get a loop, layer, or breakbeat accompaniment to your sequenced pattern as it plays. (Roland recommends setting the RPS Trigger Quantize function to your choice of quarter notes, eighth notes, or 16th notes for absolutely precise playback with the pattern already playing.) You can press and hold up to eight keypads simultaneously, although that uses up polyphony. Hit the Hold button while pressing down a keypad, and the RPS pattern will continue playing when you remove your finger. All RPS phrases are programmable, and there is user storage for 60 RPS sets.

You can disable the onboard pads and allow a MIDI controller to trigger the RPS phrases. I tried triggering RPS phrases using my Roland D-50, and the phrases played back flawlessly.

ON D-BEAM

The D-Beam infrared controller is the MC-505 feature everyone is talking about. You can program the D-Beam to control one of 28 effects, including modulation level, pitch bend, filter cutoff, filter resonance, and reverb and delay levels. D-Beam controller functions can be chosen in real time while a pattern or song is playing. You simply hold down the D-Beam On button and use the value wheel to scroll through the controller effects until you find the one you want.

▼ The Turntable effect is remarkably authentic.

The first thing I tried to do with the D-Beam was to start and stop a pattern. Cover the beam, and the pattern stops; remove your hand, and the pattern begins. While simple, it can be very effective visually. Next, I tried the Turntable effect, which simulates the way a record changes speed by simultaneously changing the pitch and tempo of the parts. This effect is remarkably authentic; it sounded as though I had hands-on control of a turntable.

AdLib mode allows the user to play melodically using the D-Beam. Once you have assigned a particular key and scale to a patch, the pitch of the selected instrument will change as your hand moves within the beam. Normally, the closer your hand is to the Groovebox, the higher the pitch will go, but you can invert the polarity of the control parameters. In AdLib mode, you have 21 scales from which to choose.

Three D-Beam control modes (Turntable, Cut + Resonance, and AdLib) can be directly selected from the front panel. However, you can substitute any three of your favorite functions for easy, front-panel access. Unfortunately, the unit will not remember these assignments after you power down, so you'll need to reassign them each time you use the machine.

The D-Beam can also be used to control an external MIDI device. I tried playing my D-50 with the D-Beam controller in AdLib mode, using similar-sounding electric piano presets on both instruments. First, I turned off the volume of the MC-505 to hear how the D-50 responded to the D-Beam, listening for glitches and tracking errors. Then I brought up the volume on the MC-505 to match that of the D-50. In both cases, the D-50 followed the D-Beam flawlessly, and the D-Beam sounded as good playing the D-50 patches as it did with the MC-505's internal sounds.

MC-505 Specifications

Synthesis Engine	sample-playback, subtractive
Maximum Polyphony	64
Multitimbral Parts	24 (8 main, 16 RPS)
Patches (ROM/RAM/card)	512/256/512
Percussion Sets (ROM/RAM/card)	26/20/20
Patterns (ROM/RAM/card)	714/200/200
Sequencer Songs/Tracks	20/8 + Mute control track
Sequencer Note Capacity (ROM/2 MB card/4 MB card)	95,000/260,000/480,000
Sequencer Resolution	96 ppqn
Effects Types	(6) reverb; (2) delay; (24) insert
Audio Outputs	(2) unbalanced ¼" main; (4) unbalanced ¼" direct; (1) stereo ¼" headphone
Other Ports	MIDI In and Out; ¼" footswitch
Expansion Slots	(1) 2 or 4 MB SmartMedia memory card
Display	16 x 2 character LCD
Dimensions	18.2" (W) x 4.4" (H) x 12.6" (D)
Weight	11 lbs. 1 oz.

IT'S A WRAP

The MC-505 is an inspired combination of technologies and an irresistible instrument if you're working with any of the current club dance styles. Admittedly, this Groovebox is as expensive as some hard-disk recorders and computers. But you get a lot for the money, including a 64-voice polyphonic synth with analog-style controls, a drum machine equipped with contemporary sounds, a sequencer, an 8-channel mixer, and the D-Beam controller.

Besides, I like the "cool factor" of this machine. The MC-505 may just carry you through the next several music trends, as well as through the next several years.

Steve Wilkes *plays percussion with the Empire Brass Quintet and is the drummer for the Boston production of the Blue Man Group's acclaimed show* Tubes.

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D B X

DDP

Comprehensive 24-bit digital dynamics processing in an affordable package.

By Alex Artaud

The dbx DDP is a dual-channel, multi-effect, digital dynamics processor that features programmable gating, compression, limiting, equalization, and de-essing. Although the DDP is tailored for the project studio, pros should also find the unit useful. Priced at $599.95, the DDP is well within reach of the frugal audio gourmet.

MAKING CONNECTIONS

The single rackspace DDP can be connected to your console's insert points, placed in-line, or wired into a patch bay. The unit provides balanced XLR and ¼-inch analog inputs and outputs (see **Fig. 1**) as well as 24-bit A/D and D/A converters. The A/D converters use dbx's proprietary Type IV converter scheme.

Although the DDP is a digital processor, AES/EBU and S/PDIF input and output are available only with an optional DDP digital I/O card ($199.95) that the user can easily install. (In my opinion, dbx should include the digital I/O card with the DDP.)

Once you have the I/O card, you can software-configure the analog and digital I/O for any application. One feature of the design is that the analog outputs are not defeated when the digital output is selected; that is, you get simultaneous analog and digital output. The analog inputs, on the other hand, are defeated when the digital input is selected. When digitizing an analog source, you can choose either a 44.1 or 48 kHz sampling rate, but you cannot convert the sample rate of an incoming digital signal.

Various program parameters can be continuously controlled via MIDI, and both MIDI In and Out/Thru ports are provided. The DDP also offers full MIDI SysEx implementation, allowing SysEx dumps and reloads of presets, among other tasks.

HEAVENLY DISPLAY

The first thing you'll notice when you fire up the DDP is the generous size of its LCD. Measuring one inch by five inches, it's a luxury for the squinting masses who have labored too long with tiny screens. The display contains four sections: digital input/output meters (peak and average); program and setting information; gain reduction meters; and the Curve window, which doubles as a display for threshold meters (see **Fig. 2**).

The front-panel layout is uncomplicated. To the left of the display, sturdy detented pots adjust the analog input and output levels of channel 1 and channel 2. Above the pots, a pair of eight-step LED meters displays analog input or output levels. (Metering buttons below the knobs select between the two options.) As noted above, level controls for the analog outputs operate independently of the digital-output level controls.

To the right of the display is a data knob for program selection and parameter tweaking. Twelve buttons address the five main dynamics elements and allow you to select, edit, and store parameter settings. Unfortunately, there is no numeric keypad, so you must use the knob for all data entry.

CHAIN CHAIN CHAIN

To delve deeper into the unit, it helps to understand the DDP hierarchy of presets, known as *programs*. All programs are composed of one or two *setups*. A setup is a chain of processing elements that may include compression, limiting, gating, parametric EQ, sidechain parametric EQ, and de-essing. Setups can be stereo linked (using dbx's True RMS Power Summing), or they can operate separately in dual-mono mode.

The DDP has 72 stock setups as well as 100 mono and 100 stereo user slots for creating new setups from scratch. Each program is then created using one of the stereo setups or two mono setups from the 100 mono and 100 stereo user slots. At the next level, there are 100 program locations divided between 50 ROM presets and 50 user locations.

The startup screen (see **Fig. 3**) gives a nice overview of the DDP hierarchy. The unit powers up in Program mode and shows the name and number of the program (and its associated setups). The "link" indicator appears between the channel identifiers to show stereo operation. Chain types and threshold meters are shown in the Curve window.

The DDP provides three preset stereo-linked chains and six preset mono chains, all of which can be customized. Chain types are displayed using intuitive abbreviations and arrows for routing. For example, EQ→G→Cmp→L means that the signal routes through the equalizer to the gate, from the gate to the compressor, and from the compressor to the limiter.

Associated with each chain are threshold meters for compression, gating, limiting, and de-essing. The respective plus signs light up when a signal is above threshold, and the respective minus signs light up when a signal is below threshold. An additional

COURTESY DBX

FIG. 1: The dbx DDP gives you hands-on control of analog input and output levels, as well as a palette of 12 function buttons for access to effect parameters. The balanced XLR and ¼-inch inputs and outputs make the DDP useful in both personal and professional studio settings.

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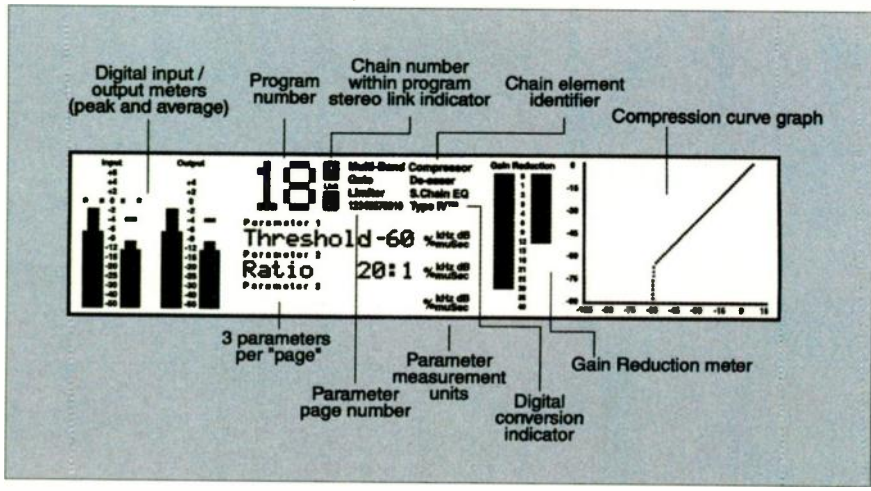


FIG. 2: The DDP's generous LCD provides a wealth of useful information including level meters, program information, and gain reduction meters.

meter, "o," corresponds to activity from dbx's OverEasy/soft-knee compression algorithm. In all of the chains, the gate is placed before the compressor and limiter. Therefore, in the routing example in the previous paragraph, compression and limiting won't occur if the signal doesn't reach the gate's threshold setting.

GETTING SET

In Program mode, you press either CH 1 or CH 2 on the keypad to move into Setup mode for that channel. The program number, the setup name, and the chain type will be displayed. The Curve window shows whether the setup is a factory preset or your own, and you can scroll through the chain types using the data wheel. Dbx provides various ways to customize the unit: you can alter and save an existing factory setup, start from a default or blank template, or build a program from scratch using the Config Setup mode.

You can alter any of the dynamic elements in a chain by pressing the corresponding Function button. For example, pressing the Gate button brings up the first page of the gate's parameters for editing. In dual-mono mode, pressing the Gate button twice sends you from channel 1 to channel 2. If you're stereo linked, changing parameters in one setup will affect the other setup.

If you make an adjustment to an existing setup, the Store button lights to alert you that changes have been made. You can either save the changes to a setup library or ignore them by changing programs.

THE FIVE ELEMENTS

There are several editable parameters for each of the DDP's five processor elements. Keep in mind that the elements exist in a chain, and any alterations made to one element can affect the next element.

Equalization. The equalization section provides two applications: in-line and sidechain. Both include 3-band parametric EQ with an adjustable frequency center (25 Hz to 20 kHz) and adjustable Q (0.25 to 16 octaves). If the program that you've selected uses the sidechain, a monitor parameter will appear that allows you to choose between monitoring the sidechain signal or monitoring the audio ins or outs.

Because of the limitations of the chain algorithms in the DDP, EQ appears only at the beginning of chains: you cannot place EQ after the compressor or limiter. In general, the EQ sounds fine, although I sometimes wished the DDP had four bands rather than just three.

Gating. You can set the gate to respond to thresholds from -75 to 0 dB, with gate reduction ratios of 1:1 to 1:∞. The attack can be varied from 0.1 to 200 ms, the hold duration can be set from 0 to 500 ms, and the release speed ranges from 360 dB/sec to 5 dB/sec. (These ranges are the same for the compressor and limiter, too.)

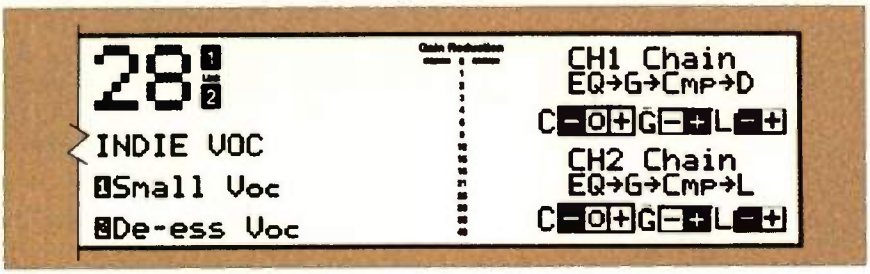
One solid feature of the gate section is the Variable Transient Capture mode (TCM), which was originally introduced in dbx's 172 Super Gate. This algorithm effectively delays the incoming signal and triggers a controller to activate the VCA, enabling the fast capture of slippery transient signals. Capture times vary from 0 µs to 3 ms. Because compression and limiting always come after gating in a chain, the TCM acts as a "look-ahead" feature for limiting. I found the TCM quite useful and didn't notice it introducing any phasing problems.

Compression. Many **EM** readers are familiar with dbx's OverEasy feature. The DDP provides OverEasy, as well as a new feature called VariKnee that offers ten variable-knee algorithms ranging from hard to soft (see **Fig. 4**). VariKnee provides greater control over the introduction of compression on a signal.

DDP Specifications

Analog Inputs	(2) XLR; (2) ¼" TRS
Analog Outputs	(2) XLR; (2) ¼" TRS
Digital I/O (optional)	(1 pr.) AES/EBU; (1 pr.) S/PDIF
Additional Ports	MIDI In and Out/Thru
Digital Converters	24-bit dbx Type IV Conversion System
Sampling Rates	44.1 and 48 kHz (switchable)
Maximum Input Level	>+24 dBu
Maximum Output Level	>+20 dBm into 600Ω; >+21 dBu into 2 kΩ or greater
A/D Dynamic Range	109 dB typical, A weighted, 22 kHz bandwidth
A/D Dynamic Range with Type IV	114 dB typical, A weighted, 22 kHz bandwidth
D/A Dynamic Range	105 dB typical, A weighted, 22 kHz bandwidth
Frequency Response	20 Hz–20 kHz, +0/-0.5 dB
THD + Noise	0.002% at +4 dBu, 1 kHz, gain at 0 dB
Crosstalk	<-85 dB at 1 kHz, gain at 0 dB
Dimensions	1U X 9" (D)
Weight	6.5 lbs.

For manufacturer information, please see Contact Sheet, p. 179.



COURTESY DBX

FIG. 3: In Program mode, you can view the chain type for each channel and watch the threshold meter for each dynamic element in the chain.

The threshold can be set from -60 to +4 dB, and the gain range is -20 to +20 dB, allowing you to add makeup gain to the compressed signal. Ratio, attack, hold, and release ranges are the same as those for the gate.

As with many dynamics processors, the DDP has an Auto mode feature that automatically adjusts attack and release settings on the compressor. (The DDP's factory programs use the Auto mode almost exclusively.)

De-essing. The DDP's de-esser has a frequency range of 800 Hz to 8 kHz. Although the de-esser worked well within the setups and programs (and sounded fine to me), some of my colleagues weren't thrilled about the sound of this particular processing element.

Limiting. Attack and release times for the DDP's limiter are the same as those for the gate and compressor. Because the limiter is last in the chain, its threshold controls the output of the DDP. The manual does a good job of warning users to watch the relationship between the compressor and the limiter. This point is important, because setting the limiter's threshold lower than the compressor's threshold, for example, would result in gain reduction at the limiter.

WARMING TRENDS

One of dbx's concerns when it went digital was loss of dynamic range. When in-house engineers compared analog tape recordings with digital versions, they noticed that tape had a linear dynamic range until the point of saturation. As tape saturation occurred, the response became increasingly logarithmic.

To simulate this effect, dbx created a Tape Saturation Emulation (TSE) algorithm. As the company explained it to me, TSE was incorporated into the design of the Type IV A/D converters to make the DDP less susceptible to hard-clipping distortion, effectively giving the unit a wider dynamic range.

The TSE section derives its sound from five filters built into the conversion process. The settings are Dark, Warm, None, Light, and Bright. In general, I preferred the Warm and Light settings; the Dark filter often felt too muddy, and the Bright setting too harsh.

That TSE is integral to the A/D conversion is important to note; any signal that goes through the Type IV process is potentially colored by TSE—even when TSE is set to None—because there is

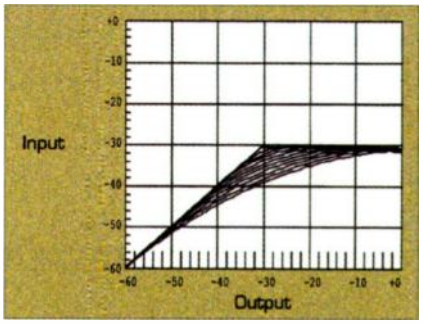
no bypass around the converters. Ultimately, I found TSE more valuable as a distortion algorithm than as an approximation of analog tape saturation.

STRAIGHT OUTTA DA BOX

One challenge in designing a multifeatured digital dynamics processor is to make the interface intuitive and easy to use. To its credit, dbx avoided "menu hell" by keeping the DDP's menu choices to a minimum. However, if you're accustomed to quickly dialing in settings on a standard analog dynamics processor, you'll have to get used to moving more slowly on the DDP—that's just the nature of digital menu hopping.

Overall, I was pleased with the sound of the DDP's presets. The unit boasts a useful selection of dual-mono and stereo-linked programs suitable for many applications. On vocals, for example, the "Nashville" and "LA Vocals" programs were impressive for their clarity. "Say What?" served up a beefy bass, and "Drum Room" was ideal for bringing out kick drum and snare in a mix. Also noteworthy was "Finisher," which delivered a judiciously compressed sound with very little coloration.

Typically, digital processors are known to add a touch of brittleness to a signal. However, this was not the case with the DDP, as was borne out when I compared the DDP with other, more expensive dynamics processors—both digital and analog. In fact, the DDP can sound remarkably transparent. Once you understand the signal path within a chain, you can customize its processing to get the sound you want.



COURTESY DBX

FIG. 4: VariKnee offers ten variable-knee algorithms, allowing greater control of compression on a signal.

CHOICE BITS

Much of the credit for the fine sound quality of the DDP goes to the unit's outstanding digital converters. They provide a better A/D front-end than any consumer DAT machine I know of—and they sound better than some professional DAT units, too.

The other strong suit of the DDP is its Curve window, which uses a screen representation that is reminiscent of software-based processors for computers. It's a pleasure to set up and view a compression curve in real time, and it's also a terrific learning tool for anyone wanting to develop an understanding of dynamics processing.

The unit I reviewed used OS version 1.2, which offered no output-dithering options. However, the DDP currently ships with OS version 1.3, which includes new chain types that let you dither to 16, 20, or 24 bits at the digital output. In addition, OS 1.3 allows you to use the AES/EBU input to synchronize multiple DDPs using an outside clock source.

THE FINAL SQUEEZE

Overall, dbx has packed many useful features into the affordable DDP. The large display, clean algorithms, and excellent converters show that dbx compromised little in its design. Aside from having a few qualms about its software architecture and the extra cost for the digital I/O, I found the DDP to be the perfect workhorse for taming dynamics and a fine choice for the personal studio owner.

Alex Artaud *is editor in chief of the Spanish edition of* Mix *magazine.*

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U&I SOFTWARE

XX (MAC)

An ultra-simple MIDI sequencer with sophisticated pattern features.

By Len Sasso

The MIDI sequencing program *Xx* was originally developed by U&I's Eric Wenger to add MIDI functions to the company's flagship product, *MetaSynth* (reviewed in the August 1998 issue of **EM**). Along the way, various tools were added for creating and manipulating patterns. The end result is an amazing little 16-track sequencer with a host of surprising capabilities, given the program's simplicity and ease of use.

Xx is essential if you're a *MetaSynth* user. But even on its own, it's a great tool for sketching and developing MIDI parts and patterns. Like *MetaSynth*, *Xx* is highly visual in nature; once you start to use it, you may find that it gives you some very different ideas about how to create music.

XX WITH METASYNTH

Let's start with a quick look at what *Xx* adds to *MetaSynth*. In a nutshell, *MetaSynth* converts pictures into sounds by interpreting vertical position as pitch and horizontal position as time. (Color intensity represents stereo position.) You can import pictures or create them using the built-in draw and paint tools typical of most graphics software. However, great pictures do not always make great music. If you *MetaSynth*-esize a picture of your mother and send it to her for her birthday, she probably won't be pleased. (Mom's picture might make a great sample for your sound effects library, though.)

What *MetaSynth* does not offer is an easy way to enter sequences of notes in its picture window; the only option is to use a pencil tool to draw in the notes one pixel at a time. (A note-entry tool is included in the 2.5 upgrade to *MetaSynth*, which should be out by the time you read this.) *Xx* provides the note-entry and editing techniques found in all MIDI sequencers, as well as the ability to convert the resulting sequences into pictures synchronized to *MetaSynth*'s pitch and time scales. It will go the other way, too—converting pictures you've created in *MetaSynth* into MIDI sequences.

Because any MIDI sequencer can play back MIDI sequences, why would you want to use your *Xx* output in *MetaSynth*? For one thing, *MetaSynth* has a built-in wavetable editor and FM synth, in addition to an instrument builder for mapping samples to pitch zones. This gives you a whole new sound palette for MIDI playback. You can also use *MetaSynth*'s many graphics tools and processes to modify the picture of the MIDI sequence you import. And once the MIDI sequence has been converted to a sound file, you can process it with *MetaSynth*'s built-in DSP tools.

In the other direction, if you have a picture that's been *MetaSynth*-esized into a great audio clip, you can edit the picture—perhaps leaving only the rhythmic essentials—then convert it to a MIDI sequence in *Xx*. Because the program can import and export Standard MIDI Files, it becomes the link between *MetaSynth* and MIDI.

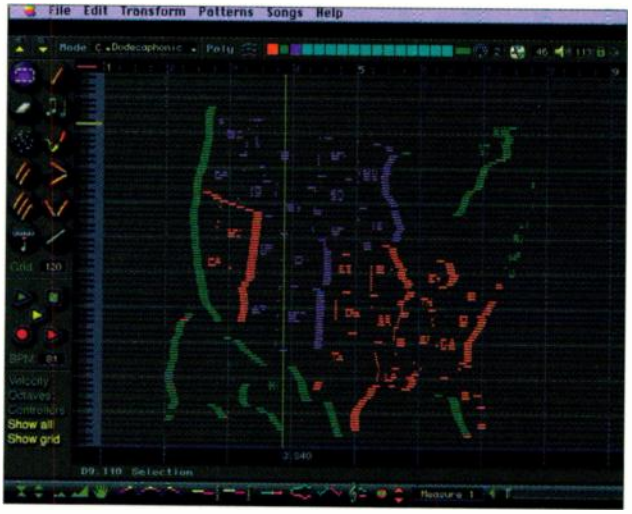

FIG. 2: *Xx* provides a 16-track, piano-roll-style MIDI edit window surrounded by buttons for many of its actions and tools.

Figure 1 illustrates this connection in both directions. The leftmost picture is a simple MIDI part in *Xx* (blue bars). The middle picture shows the part converted to a *MetaSynth* picture (yellow bars), and then graphically manipulated to add 32nd-note harmonic pulses (red, yellow, and green dots). The rightmost picture shows these pulses transferred back to *Xx* (red and green dots) over the original MIDI part (blue bars).

In *MetaSynth*, red and green correspond to stereo placement; in *Xx*, colors represent different tracks. When converting pictures to MIDI, *Xx* can assign notes on up to three tracks depending on their red, green, and blue value. (The program's conversion algorithm can handle either 64 or 128 vertical pixels; bigger pictures will be downsized.) The luminance values determine the note's Velocity.

Moving your *Xx* file to *MetaSynth* couldn't be easier: just select the Export to MetaSynth file option. That will place a picture of your MIDI data on the Clipboard, or save it to a PICT file if you prefer. To go the other way, open *Xx*'s Pict to MIDI command and load the file you've saved in *MetaSynth* (or elsewhere). The notes will be placed in *Xx* starting at the cursor position.

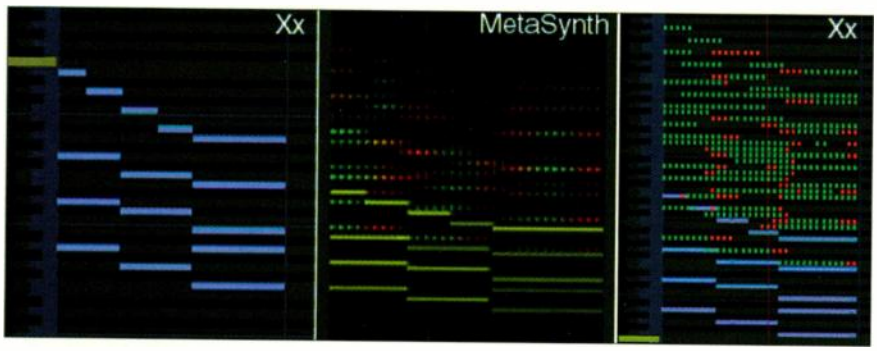

FIG. 1: With *Xx* you can convert MIDI sequences (left) into *MetaSynth* pictures (middle) for graphic modification and resynthesis. You can also convert pictures to MIDI sequences (right).

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FIG. 3: The Patterns palette holds up to 36 patterns that can be entered with a single mouse-click. You can store any selection of notes as a pattern, and palettes can be saved and loaded from disk.

XX ALONE

Xx's user interface is deceptively simple—there is a single MIDI-data window displayed on U&I's typical solid-black background (see **Fig. 2**). Various buttons, pop-up menus, numeric fields, and information displays are arranged around the top, left, and bottom borders of this window. Most ordinary tasks, like note entry, playback, track selection, and zooming, are accessible using these controls. Some of the more complex functions are accessed from the menu bar at the top of the screen.

Xx's only form of note display is a piano-roll editor, in which pitch is represented vertically and time is represented horizontally. The grid lines and keyboard at the left of the screen serve as a reference for pitch, and the measure ruler along the top is your time reference. In this sense, *Xx* is a what-you-see-is-what-you-get sequencer, and that is its charm; the program is ideal for quickly creating, editing, or auditioning MIDI parts. For other features, such as notation, event lists, subgroupings of sequences, and complex MIDI and audio arrangements, you'll still need one of the many full-function MIDI or digital audio sequencers on the market.

MIDI playback requires either MIDI Manager, OMS, or FreeMIDI (in OMS emulation mode). For sketching purposes, *Xx* will also play back through Headspace's *Beatnik* software synthesizer, which comes with the program. But for full functionality, you'll want one of the above extensions active. OMS, in particular, is passive when not in use, so there's no harm in keeping it in your startup set, even if you don't use it for other music applications.

MIDI setup is quite simple. First, there is a MIDI Prefs dialog box (accessible from the Edit menu) for selecting the MIDI driver, specifying the clock resolution (ticks per quarter note), choosing the MIDI input device, and setting several other preferences. The Track Mixer is opened by double-clicking any of the colored squares in the Track Bar along the top border. This tool is where you select the MIDI port and channel for each of *Xx*'s 16 tracks. Note that you can assign more than one track to the same port and channel. The Track Mixer, as its name implies, also allows you to transmit MIDI Volume and Program Change data.

You may find that Xx gives you some very different ideas about how to create music.

Xx offers several convenient options for note entry, display, and playback. Notes are represented by colored bars; color normally indicates track. In **Figure 2** there are three tracks (green, red, and blue), all of which are visible. Optionally, color can be used to indicate Velocity by clicking the Velocity button on the lower-left border. This area of the screen also contains display-option buttons for hiding other tracks, for showing MIDI controller data (which you can enter and edit on a per-track basis), and for hiding the pitch and time grid.

The Octaves option is particularly useful when you're entering notes are being entered with the mouse—it displays "ghost" notes at all octaves above and below existing notes. These notes merely serve as a visual reference and will not be heard. The five buttons at the left of the bottom border are for zooming and scrolling the display window.

WORKING WITH SEQUENCES

Xx has two playback modes, Mono and Poly, which are controlled by a button that appears in the top border (visible in **Fig. 2**). In Poly mode, all tracks play back; in Mono mode, only the selected track plays. The choice of mode also affects note entry and selection: in Mono mode all actions will be restricted to the selected track, but in Poly mode several tracks may be affected. You can select tracks by clicking on the associated colored square in the Track Bar.

The menu to the left of the Poly/Mono button is for selecting scales by root and type. All note entry and editing will be automatically corrected to the selected scale. You can avoid scale correction by selecting Dodecaphonic. This feature becomes especially useful when using any of *Xx*'s many pattern-generating techniques (more on these below). The scale can be changed at any time, and you can enter your own User Scale in the MIDI Prefs dialog box. You can also force

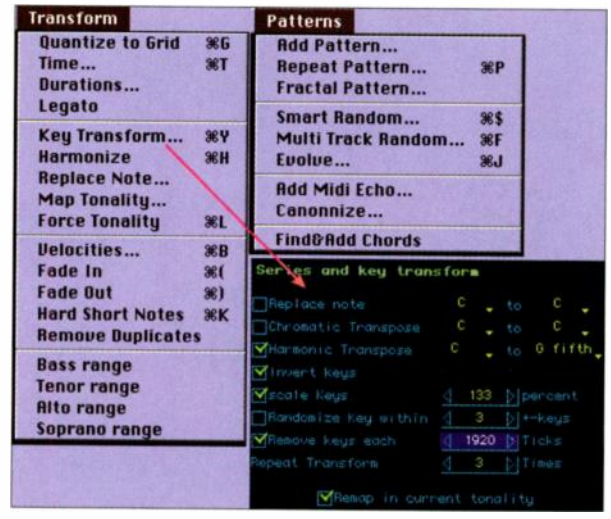

FIG. 4: Many of *Xx*'s more sophisticated pattern-creation and pattern-manipulation features are selected from the Transform and Patterns menus. The Key Transform function (lower right) is particularly useful.

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after-the-fact scale correction from the Transform menu. The one shortcoming of scale correction is its restriction to seven-step scales, which rules out such useful choices as diminished and bebop scales. (Scales with fewer than seven steps can be accommodated with User Scales.)

Along with scale correction, *Xx* has harmonic-correction features, called Remove Dissonance and Avoid Dissonance. These commands adjust all major and minor 2nd and 7th intervals by moving the notes to the closest consonant interval allowed by the current scale. The treble clef icon on the bottom border performs this function on all selected notes (or all notes if none is selected). You'll also find Avoid Dissonance options in several of the Patterns and Transform menus' dialog boxes.

At the right end of the top border are two more buttons for modelike options. The Padlock button locks the track to prevent any changes. The Loop button next to it causes the track to loop during playback. (In *Xx*, tracks loop independently, with the loop length determined automatically by the last measure containing notes.) Both of these buttons are duplicated in the Track Mixer.

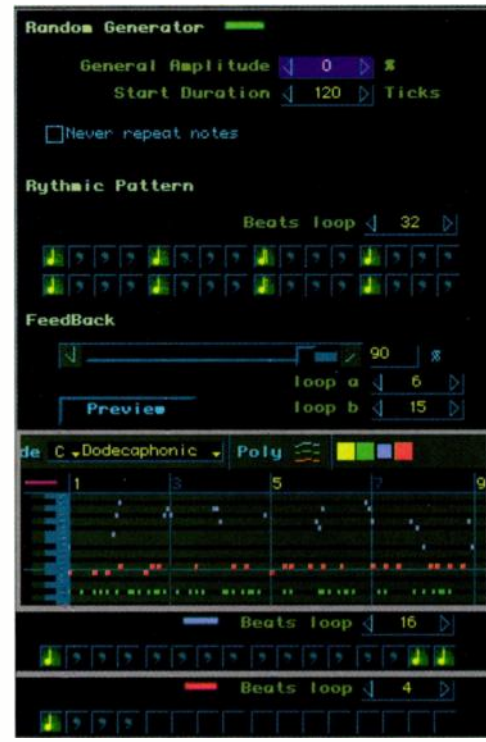

FIG. 5: The red, green, and blue notes were generated by *Xx*'s Smart Random pattern generator. The settings shown at the top were used to generate the green notes.

NOTES AND PATTERNS

In addition to MIDI real-time and step entry, *Xx* provides a number of unusual note-entry tools that you select by using the buttons located along the left border (see **Fig. 2**). At the top, there is a standard Marquee tool for selecting notes or groups of notes, a Pencil tool for click-entering notes one at a time, and an Eraser tool for deleting notes. The rest of the tools, except for MIDI Step-Entry (shown by the keyboard icon), are for entering various patterns of notes with a single mouse-click. I constantly found myself wishing that the same pattern-entry techniques were available when step-entering notes from a MIDI keyboard.

The button with the note heads on it (next to the Eraser tool) is for entering predefined patterns. The available patterns are contained in a palette that you open by double-clicking the button. **Figure 3** shows the Choose Pattern window together with the Patterns palette and the Speed pop-up menu. Selections made here determine the effect of the Pattern Entry tool. The speed setting allows the pattern to be used at multiples or fractions of its original tempo. *Xx* comes with a number of different pattern palettes, but you can also create your own by selecting groups of notes and then choosing Add Pattern from the Patterns menu. If you select notes from more than one track, separate patterns will be made with the notes from each track. The Patterns palette is a great way to assemble collections of riffs, loops, and chord voicings for quick entry.

Besides using the Pattern tool, you can enter patterns using either Repeat Pattern or Fractal Pattern from the Patterns menu. Repeat Pattern will repeat the pattern as many times as it takes to fill out the selected region. A very nice feature of Repeat Pattern is that you can choose to apply the pattern only to Velocities. This will affect the Velocities of existing notes, but no new notes will be created. Thus, patterns can be used as accent-groove templates.

Fractal Pattern also repeats a pattern to fill the selected space, but it modifies

the pattern and repeats it at four different speeds: 0.5×, 1×, 2×, and 4×. In Poly mode, it puts the different speed patterns on consecutive tracks. This gets intense quickly but can produce interesting results with harmonizing, scale correction, and some editing.

Three graphics-related tools are provided: a spray can, a paint brush, and a line tool. These work like the similar tools of most graphics programs and would not be particularly useful without harmonization and scale correction. Finally, *Xx* has four other multiple-note entry tools. Two are for entering canons—each click produces two or three notes separated by a fixed time and pitch interval that is user definable. The other two are for pitch inversion and time inversion (retrograde). (The product's name, *Xx*, was chosen to symbolize these features via the symmetry of the letter *X*.) Both inversion tools enter two notes for each click. With pitch inversion, you select a center pitch by double-clicking the tool; the additional notes are placed opposite each other at equal distances from this center pitch. For retrograde, the additional notes are placed from right to left starting at the end of the selected region. Pitch inversion allows for a time offset, and retrograde allows for a pitch offset.

NEVER SINCE DARWIN

The evolutionary comparison may be a little over the top, but *Xx*'s Patterns

U&I SOFTWARE
Xx graphic MIDI sequencer
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FEATURES ■■■■
EASE OF USE ■■■■■
DOCUMENTATION ■■
VALUE ■■■■
1 2 3 4 5

PROS: Unique, fast, and powerful basic MIDI sequencing. Sophisticated tools for creating and manipulating patterns.
CONS: Unusual Macintosh interface. No audio support. Minimal documentation.
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Xx
Minimum System Requirements
Power Macintosh; 16 MB RAM; Mac OS 7.3; OMS, MIDI Manager or FreeMIDI

and Transform features are surprising for a program this simple and intuitive. **Figure 4** shows the Patterns and Transform menus, with an arrow pointing to one of the Transform windows. Most of the menu choices in *Xx* are self-explanatory, but several very useful ones are unique to the program.

Smart Random allows you to specify a rhythmic pattern with several variation limits; then it generates a random pattern within those limits. **Figure 5** illustrates sample Smart Random settings and the music that they produced. There are even settings to control whether and when the pattern settles down to a repeating loop. Multi Track Random is a similar feature. It generates up to eight tracks of notes in a given rhythmic pattern and lets you specify a preferred interval, the amount of variation, and some of the relations between the tracks.

Evolve is used to create repeats with variations. It applies only to the selected notes and has separate variation amount controls for each track. I found Evolve to be very effective with anything from a few selected notes to all notes on all tracks.

Key Transform, from the Transform menu, modifies and creates notes. It offers various pitch transformations that can be activated individually and that take place in the order shown in the window. If the Repeat Transform value is 0, then only the selected notes are transformed. If this value is greater than 0, the transformation is repeated with each new version placed after the preceding one. Each transformation applies to the results of the previous one so that the pattern evolves through each repetition.

XYZ

While it does have many advanced features, *Xx* is an excellent introductory sequencing program made even better by its ability to translate between MIDI and *MetaSynth*'s picture format. Because of its unusual design, *Xx* takes a little getting used to, but most of its operations are available right under your fingertips. Once you become accustomed to using it, *Xx* is quick and powerful. Its one-screen format and simple setup make it easy to learn, and its MIDI implementation is fully adequate for recording multipart compositions.

Although the word "algorithmic" can be intimidating, the term definitely applies to *Xx*. Its many tools and options for entering patterns of notes provide a lot of instant gratification. For the experimentally inclined, it has enough gadgets to keep you entertained for quite a while.

To promptly meet the demands of *MetaSynth* users for MIDI input, U&I released *Xx* without full documentation. At the time of this writing, the documentation is still minimal. But a Web tutorial and a more complete manual are in the works and may be available by the time you read this. Pick up a copy of the program, and you might find yourself working in different and exciting new ways.

Len Sasso *is a freelance writer and composer living in Carmel, California.*

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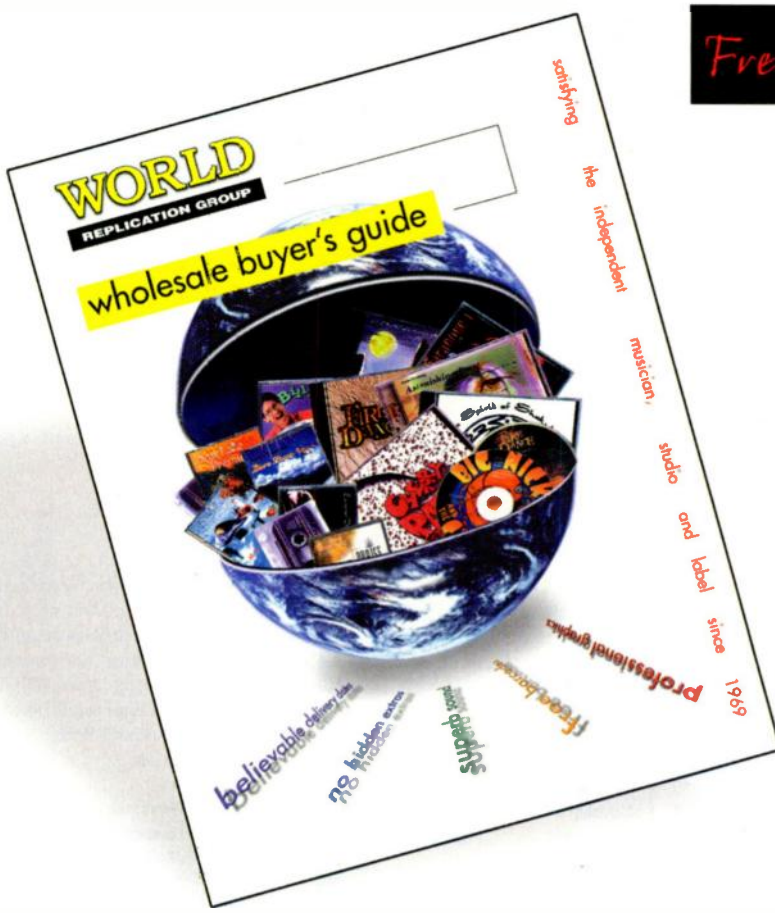

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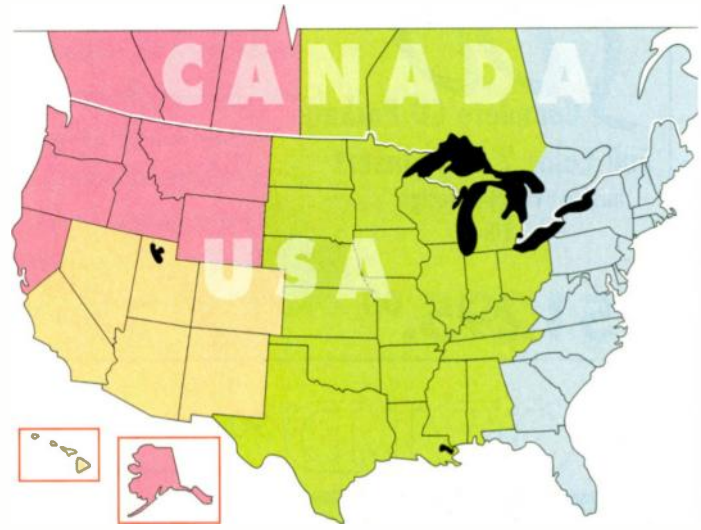

CONTACT SHEET

A GUIDE TO THE COMPANIES AND ORGANIZATIONS MENTIONED IN THIS ISSUE OF ELECTRONIC MUSICIAN

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SHERMAN

FILTERBANK

Warning! This effects processor is not for the fainthearted.

By Peter Freeman

In my humble opinion, most of today's instruments and signal processors are boring. They are boring not just in an understated way, but rather in a grand, epic, sweeping, *Ben Hur* sort of way that screams, *"Lack of imagination!"* Many devices are devoid of sonic character and personality, with manufacturers choosing instead to focus on churning out endless cookie-cutter copies of previously successful ideas.

Therefore, equipment design that imbues the gear with creativity, innovation, and the personality of the designer is especially valuable. Because of the unpredictable economics of this approach, however, most of the unusual, quirky, and interesting instruments and processors tend to come from smaller companies.

Sherman Productions is one such company. A tiny Belgian concern employing fewer than a half dozen people, Sherman has come up with a unique and powerful filter box that has nothing to do with trendiness, offering instead a vast (and, frankly, dangerous) array of sounds.

ON THE SURFACE

The Filterbank is a 2U rack-mount, dual, multimode filter equipped with features such as an ADSR envelope generator, an LFO, MIDI control, and the ability to crossfade between lowpass, bandpass, and highpass filter modes. One immediately apparent and unusual aspect of the Filterbank is its enclosure: a wedge with a sloping front panel.

Rack ears are included in the form of mounting brackets with three sets of holes that allow the device to be mounted at three different angles. This makes the Filterbank easy to use in a conventional rack or dropped into a horizontal mount, with the controls facing directly upward.

The Filterbank uses a typical wall-wart AC adapter, so you'll have to make room on your power strips for yet another one. This is unfortunate but understandable, given the cost of making versions with internal power supplies for different countries.

FRONT VIEW

The Filterbank has a fairly densely populated front panel (see **Fig. 1**). It's divided into three main sections—the bottom row contains the controls for each filter, and the top row has the global controls. The knobs are color coded: blue indicates a frequency knob, yellow knobs control the ADSR envelope generator, green indicates a volume control, orange denotes a resonance/power control, white is for balance knobs, and red indicates anti-phase-correction controls (which I'll explain shortly).

The Filterbank's controls for filters 1 and 2 are almost identical. Each filter has a frequency control (cutoff frequency for highpass and lowpass, center frequency for bandpass) and resonance control. Each filter also has a lowpass/bandpass/highpass balance knob, with which you can continuously vary the filter type.

Now things get really interesting. Sherman recognized that the Filterbank's LP/BP/HP balance control alone would not permit a broad variety of filter types, so the company added an anti-phase-correction control for each filter. In its extreme counterclockwise position, this control adds the inverted output of the bandpass filter (-BP). In the extreme clockwise position, it adds the combined outputs of the lowpass and highpass filters (LP+HP). In-between positions give you a fraction of each output.

This control has more uses than can be briefly described (see **Fig. 2**). You can use it to create a notch filter, an allpass filter, and an assortment of more complex filters. A basic explanation of the math behind this control is included in the manual, but you need to work with it yourself to really understand.

Filter 2 has only one control that filter 1 lacks: Harmonics. When synched to filter 1, filter 2's frequency is determined by that of filter 1. In this mode, the Harmonics rotary switch allows you to select from preset intervals between the two filters' frequencies. (For example, filter 2's cutoff frequency can be an octave below that of filter 1, a fifth below, and so on.) If you set the Harmonics knob to the Free setting, filter 2 will no longer be synched to filter 1 and will operate independently. (When the two filters are synched, filter 2's frequency control is inactive.)

FIG. 1: Sherman's Filterbank is made for those who want aggressive, hard-edged filtering effects. This powerful dual, multimode analog filter has several unusual features, such as variable parallel/serial routing, a selectable harmonic relationship between synched oscillators, and the hard-to-describe anti-phase-correction circuit.

Contact Sheet (continued from p. 179)

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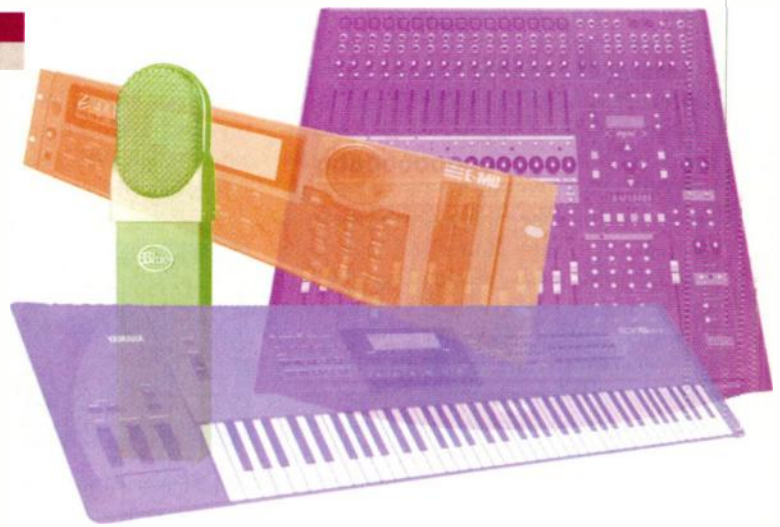

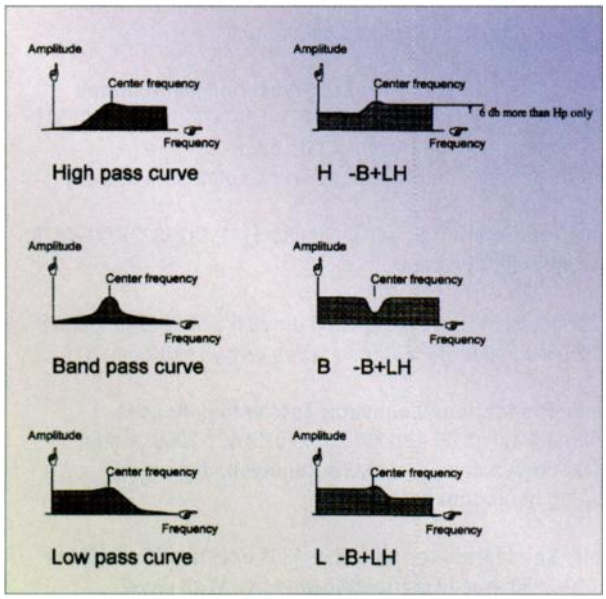

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FIG. 2: The anti-phase-correction control adds to the main signal the inverted output of the bandpass filter and/or the positive output of the lowpass and highpass filters. In combination with the LP/BP/HP balance control (and other controls), you can use it to create a seemingly endless assortment of filters.

Controls that affect both filters include input level, frequency modulation (FM) amount, ADSR envelope generator/envelope follower settings, LFO speed (frequency) and depth, amplitude modulation (AM) amount, and attack and release for the AR envelope generator.

A toggle switch selects either ADSR or envelope-follower modulation. This circuit can be controlled by an external signal via the ADSR input jack, and it has a control-voltage output. When the circuit operates as an ADSR, the sustain level can be continuously varied from positive to negative.

Looking at the front panel, you'll notice that three of the ADSR knobs (controlling attack, sustain, and release) are aligned horizontally, while the third (decay) is higher up. When operating as an envelope follower, the control-voltage output varies according to the amplitude envelope of the input signal. In this case, the S knob controls sensitivity rather than sustain, and the decay control has no function, which is why the D knob is not aligned with the others.

Two more controls operate on both filters. The Bypass/Effects (Byp<>Eff) knob sets the wet-to-dry mix, which is straightforward enough. On the other hand, the Parallel/Serial (Par<>Ser) control, which smoothly crossfades between parallel and serial routing of the two filters, has the potential for some very interesting applications.

When the Parallel/Serial knob is all the way to the left (set to fully parallel), the input signal is fed independently to both filters, and the output of the filters is mixed and routed through the main output VCA. (You can also take separate outputs from the two filters, rather than mix them.) When the Parallel/Serial knob is turned completely clockwise, to the serial position, you can route the signal first through filter 1 and then through filter 2. (The slope of each filter is 12 dB/octave, so two in series give you a 24 dB/octave slope where the filters overlap.)

In-between Parallel/Serial settings route some of the signal in parallel and some serially, providing an amazing number of possibilities, especially in combination with the Resonance controls. This control is noteworthy due to the flexibility that it provides and because it's not commonly found on this type of device.

GETTING IN AND OUT

In addition to the aforementioned ADSR trigger input and CV output, the rear panel includes a trigger input for the AR envelope generator; a ¼-inch, mono audio input; and ¼-inch main and filter 1 outputs (see **Fig. 3**). The main and filter 1 outputs' functions depend on which one of them is connected and how the Parallel/Serial routing control is set (see **Fig. 4**). The Filterbank provides MIDI In and Out connectors and *three* MIDI Thru jacks.

Also on the rear panel is the FM input jack; signals coming through it modulate the frequencies of both filters. Plugging an external signal (which can be either audio or a DC voltage from an analog synth) into the FM input disables the Filterbank's onboard frequency modulation. Similarly, the rear-panel AM input accepts either DC voltage or audio in and modulates the Filterbank's VCAs, defeating the onboard AM modulation.

The Link In/Out jacks are an interesting and smart feature of the Filterbank; they allow endless numbers of Filterbanks to be linked to create a single monster filter or an array of synchronized filters. These jacks carry a control voltage that, when multiple units are connected in series, allows the first Filterbank in the chain to control all filter 1s in the successive units. Because only one Filterbank was provided for this review, we were not able to test the Link In/Out feature.

SOUND PRACTICES

Sonically, the Filterbank is an aggressive, unwieldy monster. Depending on what you put through it and, most important, how you mix its signal in your music, the Filterbank can produce a staggering range of tones. They can sound dirty and harsh, lovely, or unlistenable. You can create anything—from overblown extreme highs and lows with tons of distortion to smoother, more musical sounds with just the right amount of bite. The ADSR and LFO allow all manner of expressive (and often terrifying) effects, from huge sweeps to more percussive sounds.

Once I realized that I was dealing with the sonic equivalent of weapons-grade plutonium, I began to get a handle on how best to use the Filterbank. In general, I found it most immediately appealing on drums and other rhythmic and percussive material. But its usefulness

FIG. 3: Getting in and out of the Filterbank is no problem; in fact, you can get interesting effects by experimenting with rear-panel patching, modular synth–style.

For manufacturer information, please see Contact Sheet, p. 179.

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tool that reads and writes AIFF, AIFC, SDII, WAV, SND, and many other formats. *SoundHack* also lets you edit sound-file header data, such as loop and marker information. To edit samples, you can pass a file to a designated editor program.

SoundHack's more commonplace processing functions include sample-rate conversion, varispeed, multiband dynamics processing (gating/ducking, expansion, and compression), gain scaling, normalization, and DC offset adjustment. Its Phase Vocoder performs time stretching and pitch shifting as well as, or better than, some much more expensive programs.

All of the above are excellent, but the fun really begins with *SoundHack*'s more exotic DSP techniques. The Spectral Extractor separates the steady-state and transient portions of a signal, based on the rate of frequency change. You can use this to isolate the pitch-stable part of a sound for looping purposes, or to "splice" out an attack. The Binaural Filter locates a mono signal in a 360-degree headphone space. The Spectral Mutation Function generates timbral crossfades between two signals. This technique, developed by composer Larry Polansky, can produce some interesting "morphs," but the results can be unpredictable—patience and openness to surprises are required.

SoundHack's Function window (see **Fig. 1**) lets you define a waveform to control time-variant processing—"panning" the Binaural Filter, for example. Time stretching, pitch shifting, varispeed, and mutation can also be controlled in this way.

The Convolution Processor is my favorite feature. Convolution is a cross-synthesis technique that multiplies the spectra of two signals. Among other things, it can be used to create very specialized reverbs. Suppose that the impulse response of a cathedral is recorded and convolved with a recording of a guitar. If the convolved signal is mixed with the original guitar signal, the result is the sound of the guitar playing in the cathedral. More interestingly, the guitar signal could be convolved with any signal—a cymbal crash, for instance, whose result might be described as "the guitar playing inside the cymbal." This is just one of the fascinating timbral and rhythmic effects made possible by convolution. I'd need to write another article to describe them all.

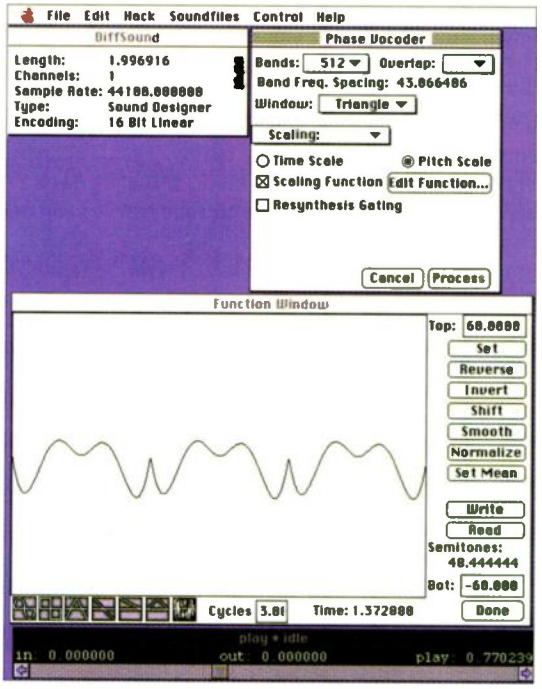

FIG. 1: *SoundHack*'s user interface is simple and straightforward. This figure shows its input sound-file window, Phase Vocoder parameter window, Function window, and progress indicator.

Signal Display and Analysis Tools

SoundHack will display a spectrum, waveform, or sonogram of the input or output signals during processing. It can also perform a sonogram analysis of a file, writing the results to a QuickTime movie. *SoundHack* can even convert any QuickTime movie into a sound file. The results often sound bizarre, with a repetitive quality that may appeal to those working in loop-based styles.

Technically minded users can harness *SoundHack*'s analysis/resynthesis engine. The Spectral Analysis feature reads or writes spectral data files that can be used with *Csound* or user-written programs. File-format documentation and sample C code are provided.

Final Pitch

You could spend a small fortune on commercial DSP programs and still not get all the functionality packed into *SoundHack*. If you do any sort of creative work with audio files, you need this program. Get it and use it—and please pay your shareware fee. Author Tom Erbe deserves your support for his years of selfless work on *SoundHack*.

Overall EM Rating (1 through 5): 4.5

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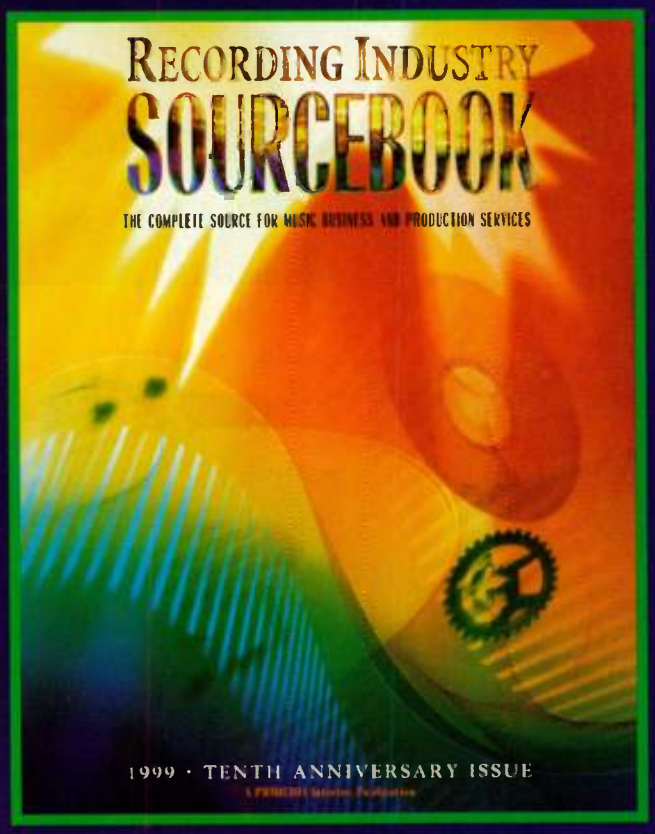

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EM

HARD DISK RECORDERS

Roland VS1680 Digital Production Studio

New

The new VS-1680 Digital Studio Workstation is a complete 16 track, 24-bit recording, editing, mixing and effects processing system in a compact tabletop workstation. With its advanced features, amazing sound quality and intuitive new user interface, the VS-1680 can satisfy your *wanderlust*.

FEATURES–

- 16 tracks of hard disk recording, 256 virtual tracks.
- 24-bit MT Pro Recording Mode for massive headroom and dynamic range.
- Large 320 x 240 dot graphic LCD provides simultaneous level meters, playlist, EQ curves, EFX settings, waveforms and more.
- 20-bit A/D D/A converters
- 2 optional 24-bit stereo effects processors (VS8F-2) provide up to 8 channels of independent effects processing.
- 12 audio outs: 8x RCA, 2x stereo digital & phones.
- New EZ routing function allows users to create and save various recording, mixing, track bouncing, and other comprehensive mixer templates for instant recall.
- 10 audio inputs: 2 balanced XLR-type inputs w/ phantom power, 6 balanced 1/4" inputs, and 1 stereo digital input (optical/coaxial)
- Direct audio CD recording and data backup using optional VS-CDR-16 CD recorder.

KORG D8 Digital Recording Studio

New

The new D8 Digital Recording Studio features an 8-track recorder, a 12-channel mixer, onboard effects, and basically everything else you'll need to record and mix your music, you supply the talent.

FEATURES–

- 8-track recorder, 12-channel mixer
- 1.4GB hard disk for up to 4.5 hours of recording on a single track.
- High and low EQ on each channel
- 130 high-quality stereo digital effects for complete recording in the digital domain.
- MIDI clock sync, SCSI port and S/PDIF digital interfaces all standard.

DIGITAL MULTI-TRACK RECORDERS

TASCAM DA-98 Digital Audio Recorder

The DA-98 takes all the advantages offered by the DTRS format and significantly ups the ante for the professional and post-production professional alike. With enhanced A/D and D/A convertors, a comprehensive LCD display and full compatibility with the DA-88 and DA-38, the DA-98 delivers the absolute best in digital multitrack functionality.

FEATURES–

- Confidence monitoring for playback and metering
- Individual input monitor select switch facilitates easier checking of Source/Tape levels
- Switchable reference levels for integration into a variety of recording environments with internal tone generator
- Digital track copy/electronic patch bay functionality
- Comprehensive LCD display for easy system navigation
- Dedicated function/numeric keys make operation easier
- Built-in sync with support for MMC and Sony P2
- D-sub connector (37-pin) for parallel interface with external controller
- Optional RM-98 rack-mount ear for use with Accuride 200 system

DA-88 A standard digital multitrack for post-production and winner of the Emmy award for technical excellence, the DA-88 delivers the best of Tascam's Hi-8 digital format. Its Shuttle/Jog wheel and track delay function allow for precise cueing and synchronization and the modular design allows for easy servicing and performance enhancements with third-party options.

DA-38 The DA-38 was designed for musicians. Using the same Hi-8 format as the highly acclaimed DA-88, the DA-38 is an 8 track modular design that sounds great. It features an extremely fast transport, compatibility with Hi-8 tapes recorded on other machines, rugged construction, ergonomic design and sync compatibility with DA-88s.

ALESIS ADAT XT20 Digital Audio Recorder

New

The New ADAT-XT20 provides a new standard in audio quality for affordable professional recorders while remaining completely compatible with over 100,000 ADATs in use worldwide. The XT20 uses the latest ultra-high fidelity 20-bit oversampling digital converters for sonic excellence. It could change the world.

FEATURES–

- 10-point autolocate system
- Dynamic Braking software lets the transport quickly wind to locate points while gently treating the tape.
- Remote control
- Servo-balanced 56-pin ELCO connector
- Built-in electronic patchbay
- Copy/paste digital edits between machines or even within a single unit. Track Copy feature makes a digital clone of any track (or group of tracks) and copies it to any other track (or group) on the same recorder

CD RECORDERS

HHB CDR-800 Compact Disc Recorder

The new CDR-800 Compact Disc Recorder from HHB is built rock-steady for the best recording on this widely accepted format. You can record direct from either analog or digital sources and it comes loaded with features, making it ideal for professional studios looking to output quality CDs.

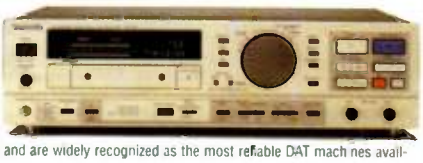
FEATURES-

- Built-in Sample rate converter
- Analog and digital inputs and outputs
- 1-bit A/D converters for lowest possible distortion
- Synchronized recording and editing
- Digital fader for natural fade-in and fade-out.

STUDIO DAT-RECORDERS

Panasonic SV-3800 & SV-4100

The SV-3800 & SV-4100 feature highly accurate and reliable transport mechanisms with search speeds of up to 400X normal. Both use 20-bit D/A converters to satisfy even the highest professional expectations. The **SV-4100** adds features such as instant start, program & cue assignment, enhanced system diagnostics, multiple digital interfaces and more. Panasonic DATs are found in studios throughout the world and are widely recognized as the most reliable DAT machines available on the market today.



FEATURES–

- 64x Oversampling A/D converter for outstanding phase characteristics
- Search by start ID or program number
- Single program play, handy for post.
- Adjustable analog input attenuation, +4/-10dBu
- L/R independent record levels
- Front panel hour meter display
- 8-pin parallel remote terminal
- 250x normal speed search

TASCAM DA-30MKII

A great sounding DAT, the DA-30MKII is a standard mastering deck used in post-production houses around the world. Among many other pro features, its DATA/SHUTTLE wheel allows for high-speed cueing, quick program entry and fast locating.

FEATURES–

- Multiple sampling rates (48, 44.1, and 32kHz)
- Extended (4-hour) play at 32kHz.
- Digital I/O featuring both AES/EBU and S/PDIF
- XLR balanced and RCA unbalanced connections.
- Full function wireless remote.
- Variable speed shuttle wheel
- SCMS-free recording with selectable ID.
- Parallel port for control I/O from external equipment.

Fostex D-15

The new Fostex D-15 features built in 8Mbit of RAM for instant start and scrubbing as well as a host of new features aimed at audio post production and recording studio environments. Optional expansion boards can be added to include SMPTE and RS-422 compatibility, allowing the D-15 to grow as you do.

FEATURES–

- Hold the peak reading on the digital bargraphs with a choice of 5 different settings
- Set cue levels and cue times
- Supports all frame rates including 30df
- Newly designed, 4-motor transport is faster and more efficient (120 minute tape shuttles in about 60 sec.)
- Parallel interface • Front panel trim pots in addition to the level inputs

D-15TC & D-15TCR

The D-15TC comes with the addition of optional chase and sync capability installed. It also includes timecode reading and output. The D-15TCR comes with the further addition of an optional RS-422 port installed, adding timecode and serial control (Sony protocol except vari-speed)

SONY PCM-R500

Incorporating Sony's legendary high-reliability 4D D. Mechanism, the PCM-R500 sets a new standard for professional DAT recorders. The Jog/Shuttle wheel offers outstanding operational ease while extensive interface options and multiple menu modes meet a wide range of application needs.

FEATURES–

- Set-up menu for preference selection. Use this menu for setting ID6, level sync threshold, date & more. Also selects error indicator.
- Includes 8-pin parallel & wireless remote controls
- SBM recording for improved S/N *(Sounds like 20bit)*
- Independent L/R recording levels
- Equipped with auto head cleaning for improved sound quality.

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MIDI Time Piece™ AV
8x8 Mac/PC MIDI Interface

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

FEATURES–
- Same unit works on both Mac & PC platforms
- 8x8 MIDI merge matrix. 128 MIDI channels.
- Fully programmable from the front panel.
- 128 scene, battery-backed memory.
- Fast 1x mode for high-speed MIDI data transfer.

Digital Time Piece™
Digital Interface

Think of it as the digital synchronization hub for your recording studio. The Digital Timepiece provides stable, centralized sync for most analog, digital audio, and video equipment. Lock together ADATs, DA-88's, ProTools, word clock, S/PDIF, video, SMPTE, and MMC computers and devices flawlessly. It ships with "Clockworks" software which gives you access to its many advanced features and remote control of some equipment settings such as record arm.

OPCODE

Studio 64XTC
Mac/PC MIDI Interface

The Studio 64XTC takes the assorted, individual pieces of your studio-your computer, MIDI devices, digital and analog multitracks and even pro video decks, and puts them all in sync.

FEATURES–
- 4 In / 4 Out, 64 channel MIDI/SMPTE interface/patchbay with powerful multitrack & video sync features
- ADAT sync with MIDI machine control
- Simultaneous wordclock and Superclock output, 44.1kHz or 48kHz for perfect sync with ADAT, DA-88 and ProTools
- Video and Blackburst in (NSC and PAL)
- Cross-platform Mac and Windows compatibility

SAMPLING

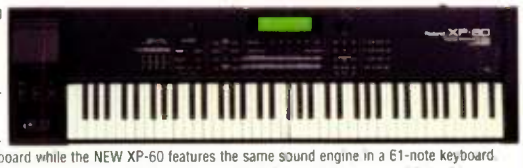
AKAI
S-Series
Rack Mount Samplers

Starting with 64x oversampling, Akai's S-Series Samplers use 28-bit internal processing to preserve every nuance of your sound and the outputs are 18- and 20-bit to ensure reproduction of your sounds entire dynamic range. These three new samplers add powerful capabilities, ease-of-use, expandability and affordability to set the standard for professional samplers.

KEYBOARDS & SOUND MODULES

Roland

XP60 & XP80 Music Workstations



The XP-80 delivers everything you've ever wanted in a music workstation. An unprecedented collection of carefully integrated features provide instant response, maximum realtime control and incredible user expandability. The XP-80 features a pro-quality 76-note weighted action keyboard while the NEW XP-60 features the same sound engine in a 61-note keyboard.

XP80 FEATURES–
- 64-voice polyphony and 16-part multitimbral capability
- 16 Mbytes of internal waveform memory; 80Mbytes when fully expanded (16-bit linear format)
- 16-track MRC-pro sequencer with direct from disk playback. Sequencer holds approx. 60,000 notes
- New sequencer functions like "non-stop" loop recording and refined Groove Quantize template
- Enhanced realtime performance capability with advanced Arpeggiator including MIDI sync and guitar strum mode and Realtime Phrase Sequence (RPS) for on-the-fly triggering of patterns
- 40 insert effects in addition to reverb and chorus
- 2 pairs of independent stereo outputs; click output jack with volume knob
- Large backlit LCD display

SR-JV80 Series Expansion Boards

New

Roland's SR-JV80-Series wave expansion boards provide JV and XP instrument owners a great-sounding, cost-effective way to customize their instruments. Each board holds approx. 8Mb of entirely new waveforms, ready to be played or programmed as you desire.

Boards Include–
Pop, Orchestral, Piano, Vintage Synths, World, Super Sound Set, Keys of the 60's & 70's, Session, Bass & Drums, Techno & Hip-Hop Collection.

KURZWEIL
K2500 Series Music Workstations

The K2500 series from Kurzweil utilizes the acclaimed V.A.S.T. technology for top-quality professional sound. Available in Rack mount, 76-key, and 88 weighted key keyboard configurations, these keyboards combine ROM based samples, on-board effects, V.A.S.T. synthesis technology and full sampling capabilities on some units.

FEATURES–
- True 48-voice polyphony
- Fluorescent 64 x 240 backlit display
- Up to 128MB sample memory
- Full MIDI controller capabilities
- 32-track sequencer
- Sampling option available
- Dual SCSI ports
- DMTi Digital Multitrack interface option for data format and sample rate conversion (Interfaces with ADATs or DA-88s)

KORG
Trinity Series Music Workstations DRS

Korg's Trinity Series represents a breakthrough in sound synthesis and an incredible user interface. It's touch-screen display is like nothing else in the industry, allowing you to select and program patches with the touch of a finger. The 24MB of internal ROM are sampled using ACCESS which fully digitizes sound production from source to filter to effects. Korg's DSP based Multi Oscillator Synthesis System (MOSS) is capable of reproducing 5 different synthesis methods like Analog synthesis, Physical Modeling, and variable Phase Modulation (VPM).

FEATURES–
- 16 track, 80,00 note MIDI sequencer
- Flexible, assignable controllers
- **DRS (Digital Recording System)** features a hard disk recorder and various digital interfaces for networking a digital recording system configured with ADAT, DAT recorder and hard disk
- 256 programs, 256 combinations
- Reads KORG sample DATA library and AKAI sample library using optional 8MB Flash ROM board

TRINITY *88 Weighted-key/Solo Synth*
TRINITY *76-key/Solo Synth*
TRINITY *61-key/Solo Synth*
TRINITY *61-key*

(Digital IF, SCSI, Hard Disk Recorder, and sample Playback/Flash ROM functions are supplied by optional upgrade boards)

MONITORS

Hafler
TRM-8

Winner of Pro Audio Review's PAR Excellence Award in 1997. Hafler's TRM8s provide sonic clarity previously found only in much more expensive speakers. They feature built-in power, an active crossover, and Hafler's patented Trans•nova power amp circuitry.
- 45Hz - 21kHz, ±2dB
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MACKIE.

HR824

These new close-field monitors from Mackie have made a big stir. They sound great, they're affordable, they're internally bi-amped. "What's the catch?" Let us know if you find one.

FEATURES-
- 150W Bass amp, 100W Treble amp
- Full space, half space and quarter space placement compensation
- Frequency Response 39Hz to 22kHz, ±1.5dB

TANNOY

New

Reveal

The latest playback monitor from Tannoy, the Reveal has an extremely detailed, dynamic sound with a wide, flat frequency response.

FEATURES-
- 1" soft dome high frequency unit
- Long throw 6.5" bass driver
- Magnetic shielding for close use to video monitors
- Hard-wired, low-loss crossover
- Wide, flat frequency response
- Gold plated 5-way binding post connectors

SOUND CARDS

digidesign
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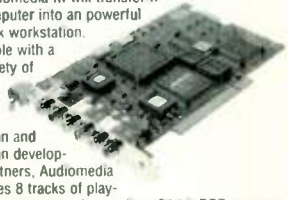
Audiomedia III
Digital Audio Card



Working on both Mac and Windows OS systems, Audiomedia III will transform your computer into an powerful multitrack workstation. Compatible with a wide variety of software options from Digidesign and Digidesign development partners, Audiomedia III features 8 tracks of playback, up to 4 tracks of recording, 24-bit DSP processing, multiple sample rate support and easy integration with leading MIDI sequencer/DAW software programs.

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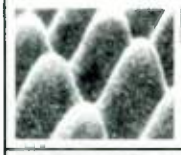
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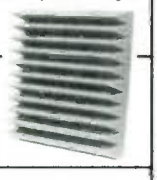

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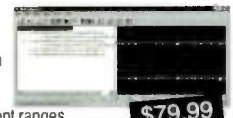

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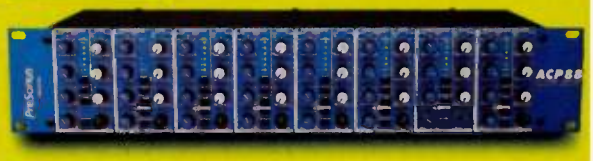

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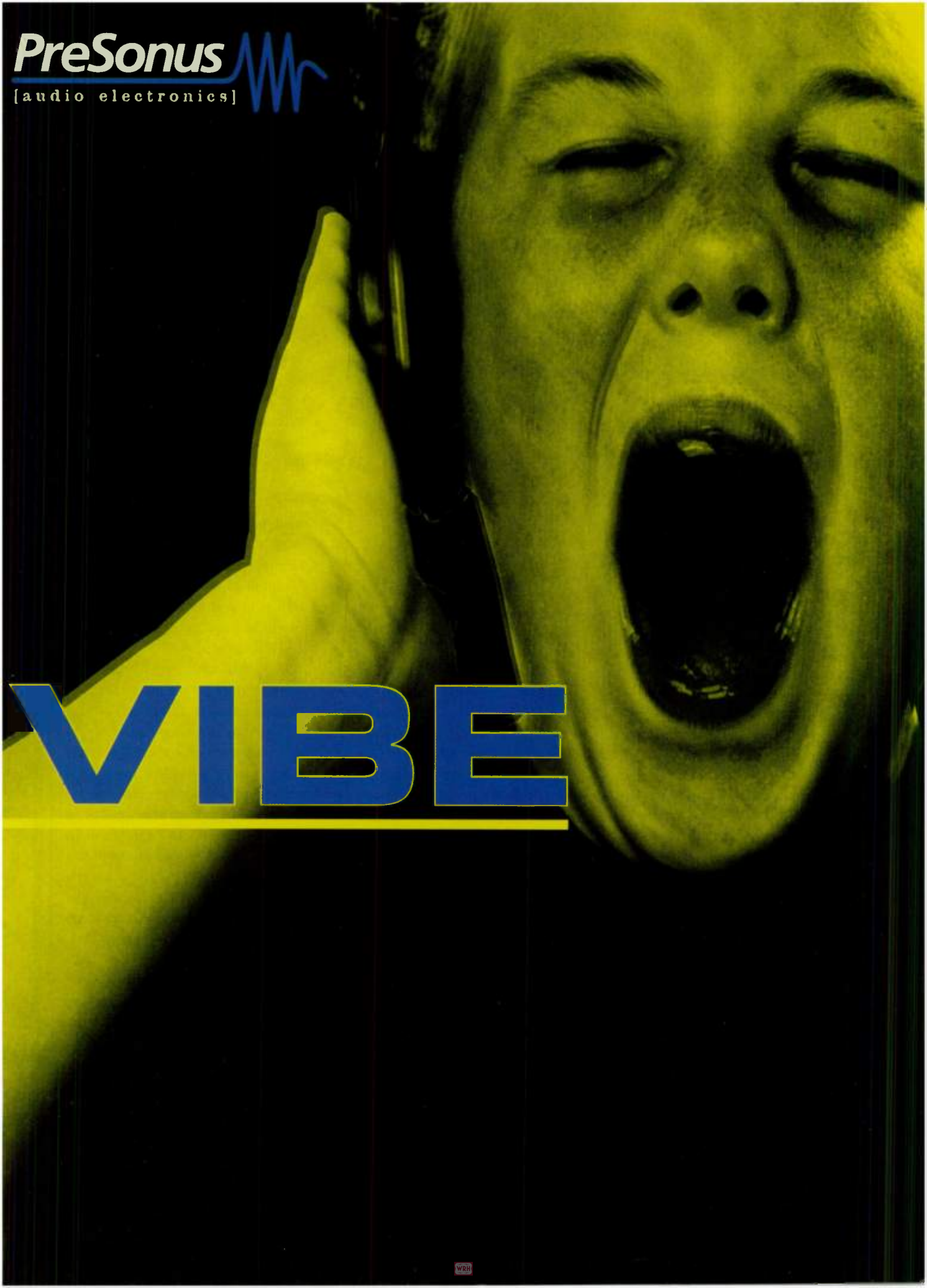
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By Larry the O

Under One Roof

I am often reminded, when in the middle of working on some audio project, of one of *Saturday Night Live*'s greatest skits: the ad for Shimmer, the multipurpose product that was both a floor wax and a dessert topping.

Maybe you need to polish up a cut for your new album, *Lt. Chili's Burning Hearts Club Band,* or perhaps you need to throw together some sound effects for the new animated fashion film *Pantz*. It could be that you need to build and burn a CD master for an independent-label rerelease of collected radio laundry-detergent ads of the '50s. In any of these cases, you're likely to turn to your deluxe digital audio sequencer, *Logical Performing CakeVisionBase ProMagnon,* or maybe your 2-track editor, *ForgePeaker* 9.8.

You can do *any* kind of work in those programs. All you have to do is open the Editor-Window Editor and sift through the pop-up subsubmenus of the contextual, hierarchical, drop-down menus. Hmm, the function you need doesn't seem to be in any of the menus, so you'll have to look in the manual. With 25 PDF files worth of documentation, it must be in there somewhere.

Is the problem that today's programs are capable of too many things? I don't think that's quite it. When I experience a scenario such as the one described, I get the feeling that I have to plow through zillions of features that don't apply *to the kind of work I'm doing*.

People who are trying to do many different kinds of work inundate software developers with demands for the features they need. Naturally, given the relatively small size of any one of these markets, the developers try to be as accommodating as possible. But no product can be all things to all people; folks doing some tasks will be thrilled with a particular program, while other people will find the program usable but a little lacking for their work. It seems there is a need for more specialized tools, which would appear to be in conflict with the need to service multiple tasks.

When you examine the problem more closely, however, you find that the real issue is more the way the features are viewed and accessed than which features are provided. One very simple example is that all digital audio sequencers allow you to view time as bars and beats, as is appropriate for working with music, or as time code, which is necessary for post-production work. Similarly, the use of markers differs for various types of work.

Programs could be significantly simpler to use if they didn't contain all the features that anyone doing anything might need. It would be a splendid thing to have the vast capabilities of today's audio and MIDI software filtered through a user interface appropriately optimized for the task at hand. (Ah, the old "less is more" saw again.) Whether this would take the form of a whole product line built on the same core code base, or, as **EM** Editor Steve Oppenheimer suggests in this month's "Front Page" (p. 8), a single application with a bunch of happy faces, would be a matter of market demand and economics.

One initial stumbling block is that user interfaces are not especially cheap or easy to design and create. But most people would be willing to pay good money for a tool that really does exactly what they need in a package of manageable complexity.

This idea has been attempted once or twice before, but I can't think of anyone that has fully developed this tack. I *have* seen multiple versions of a program that offer differing levels of power, but not multiple powerful versions in task-specific flavors.

Power versus ease of use is a balancing act, not a problem that can be solved. But application-specialized versions may be able to lessen some of the weight involved.

Larry the O *is musician, engineer, producer, and sound designer in the San Francisco Bay Area. He is generally user-friendly but exhibits some bizarre bugs in his humor programming.*

STEVE CURL

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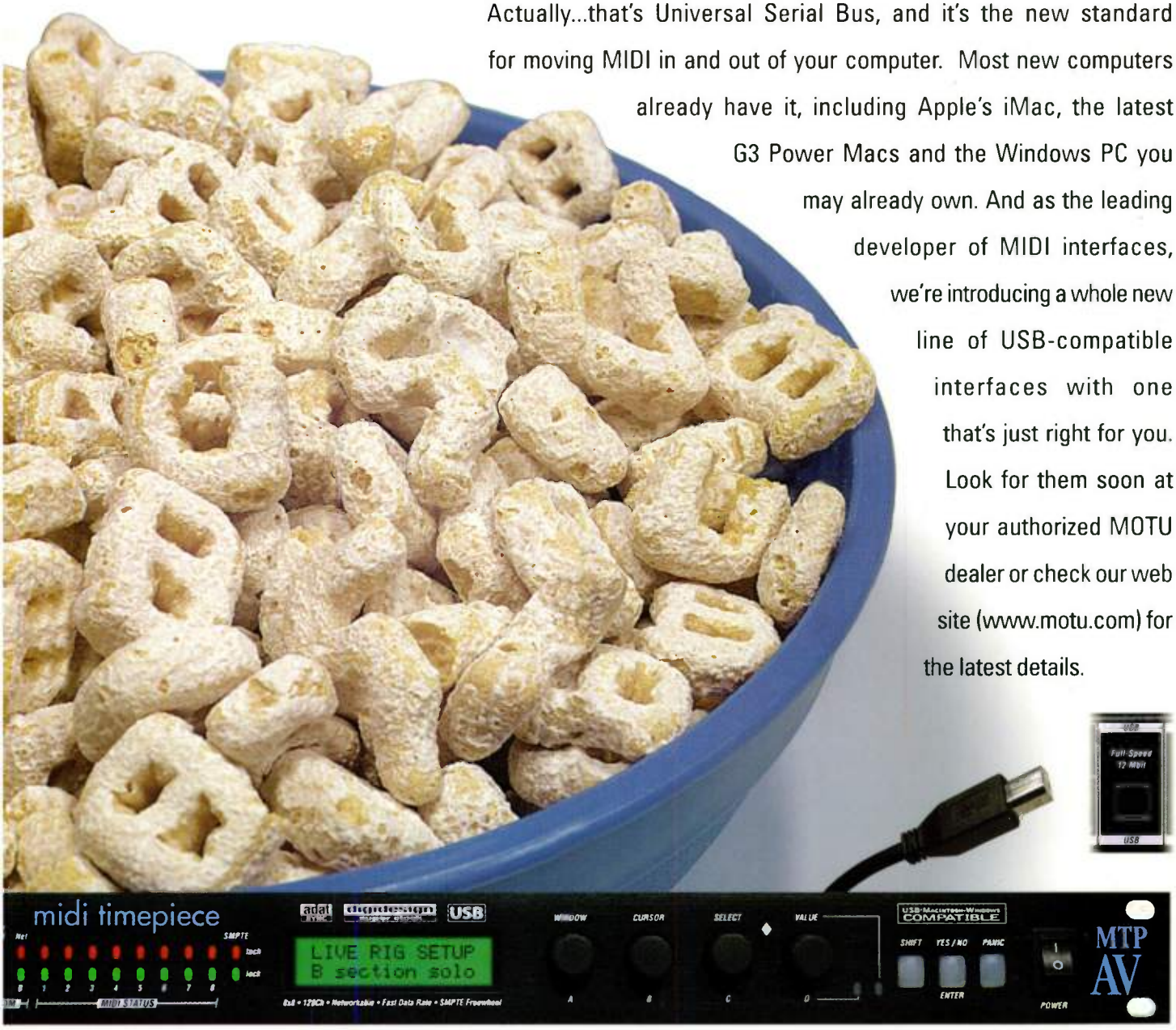

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